Dancing on the shoulders of giants

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DANCING ON THE SHOULDERS OF GIANTS

An action inquiry into the navigation of organisational transformation for sustainability in the university

Alex R.W. Baker - Friesen

DANCING ON THE SHOULDERS OF GIANTS

AN ACTION INQUIRY INTO THE NAVIGATION OF ORGANISATIONAL
TRANSFORMATION FOR SUSTAINABILITY IN THE UNIVERSITY

Alexander R. W. Baker-Friesen

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DANCING ON THE SHOULDERS OF GIANTS
AN ACTION INQUIRY INTO THE NAVIGATION OF ORGANISATIONAL
TRANSFORMATION FOR SUSTAINABILITY IN THE UNIVERSITY

DISSERTATION

To obtain the degree of Doctor at Maastricht University,
on the authority of the Rector Magnificus, Prof. Dr. Rianne M. Letschert
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by

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To the human illusion of permanence, dominion over nature, and its faith in limitless material wealth.

*“At certain revolutions all the damned
Are brought; and feel by turns the bitter change
Of fierce extremes, extremes by change more fierce,
From beds of raging fire to starve in ice
Their soft ethereal warmth, and there to pine
Immovable, infixed, and frozen round,
Periods of time, thence hurried back to fire.”*

Paradise Lost, book 2, II., John Milton, 1667

*I met a traveller from an antique land
Who said: “Two vast and trunkless legs of stone
Stand in the desert... Near them, on the sand,
Half sunk, a shattered visage lies, whose frown,
And wrinkled lip, and sneer of cold command,
Tell that its sculptor well those passions read
Which yet survive, stamped on these lifeless things,
The hand that mocked them, and the heart that fed:
And on the pedestal these words appear:
‘My name is Ozymandias, king of kings:
Look on my works, ye Mighty, and despair!’
Nothing beside remains. Round the decay
Of that colossal wreck, boundless and bare
The lone and level sands stretch far away.*

Ozymandias, Percy Bysshe Shelley, 1818

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PART I. UNDERSTANDING ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY WITHIN THE UNIVERSITY

GENERAL OVERVIEW & STRUCTURE OF THE THESIS

This PhD thesis opens with the monumental challenge posed to universities to transform themselves in order to make a positive ecological, social, and economic impact. It is divided into three parts. PART A presents a conceptual synthesis of what and how to transform as organisations for sustainability, using a pluralistic and integral approach from various metatheoretical perspectives. PART B situates this inquiry from the insider view: how do actors inside universities navigate organisational transformation for sustainability? Three embedded case studies are included, followed by a synthesis of their findings. This transition from meta-theory to practice gradually demonstrates potential pathways of organisational transformation using the case-study empirics. Combined with the most embedded action research case, Maastricht University, PART C leads into the conclusions, recommendations and discussion of this thesis. Pragmatic outcomes are shared to inform and empower insiders who seek to challenge sub-optimal practices, and whose purpose is to proactively manoeuvre, accelerate, deepen or enhance their organisation's sustainability performance.

In *Chapter 1*, the main issues that this thesis grapples with are introduced: the research landscape of sustainability science, organisational research and transformation in higher education. Core concepts are introduced and explored in an overview of the research undertaken in the related literature. The rationale and the purpose of this PhD project is also set, allowing for the later examination of the nature of organisational transformation for sustainability at universities; just how they can navigate such transformations, and the correspondence with action research as orientation to inquiry, moves us to the next chapter. Consequently, the ontology, epistemology, methodology and research design are presented and discussed in *Chapter 2*. It aims to circumscribe a coherent and authentic orientation to inquiry, and, eventually, to produce a well-informed selection of pioneering institutions that are undertaking organisational transformation for sustainability. In *Chapter 3* a systematic conceptual review of key theories for understanding organisational transformation for sustainability is presented, with a view to developing this metatheory in practice using embedded case study research. A set of research themes originating from initial conditional research questions was built in order to do this. The most connected corpora of literature were grouped according to their findings, theories and methods used. Niches were also discovered where conceptual underpinnings were less developed or where there was limited knowledge. The chapter rounds off with meta-theoretical perspectives for comprehending organisational transformation for sustainability; each perspective's inclusion is further justified theoretically using secondary macro-empirical data.

CHAPTER 1. OPENING: TRANSFORMING THE UNIVERSITY FOR SUSTAINABILITY

THERE IS A CLEAR & POWERFUL IMPERATIVE FOR UNIVERSITIES TO NAVIGATE POSITIVE TRANSFORMATIONS TOWARDS SUSTAINABILITY

“Our beautiful Earth is becoming inhospitable to us. How should educators, researchers, and knowledge creators respond to this existential threat? By accepting an unpalatable truth: our mainstream approach to learning, education, and research is actively co-producing the very opposite of what we need at this time of unsustainability.

Inadequately tethered to human centred intention and ethics, our collective actions increase divides between people and the planet, accelerating the speed of ecological destruction. Some of the world’s leading scientists share the belief -along with the empirical evidence - that humanity is destined to die out as temperatures increase, rainfall patterns change, sea levels rise and oceans become more acidic. The most recent IPCC Special Report on Global Warming gives us 12 years before catastrophic environmental breakdown becomes our shared reality.

Though the social and environmental impacts of environmental changes will have negative consequences for food and water security, health, and the well-being of both human and non-human species, there is still a window of opportunity to reduce these risks and move to a more equitable and sustainable world.

Avoiding such catastrophes now requires questioning the very nature of the way we produce and use knowledge. In the current era of Sustainable Development Goals and Agenda 2030, this is also an opportunity for transformative change. Rather than holding ourselves as objective observers of an inert world, we must recognize that human communities are part of a living planet.” (Bradbury et al., 2019)

PREAMBLE

The imperative is stark and simply put: radical human transformation of the ecosphere both necessitates and threatens an equally radical transformation of organised human life. This research project can be understood in terms of the manner it has been conducted: as ‘transformation research’ or as ‘action research’ into the university as a complex system, where the researcher participates in the sustainability transition under study to help address various challenges, and in terms of the kind of knowledge it aimed to generate: how to transform, what to transform, and whether and to what extent we should transform (transformational, descriptive-analytical and anticipatory-normative knowledge respectively) (Wittmayer, Hölscher, Wunder, & Veenoff, 2018; Wittmayer & Schöpke, 2014; Wittmayer, Schöpke, van Steenberg, & Omann, 2014). This chapter introduces a vision of universities in the 21st century which has crystallised in the literature and discourse in recent years, regarding the design, management and governance of transformations - whether of themselves and their surroundings - towards sustainability (Bos & Brown, 2012; Ceschin, 2014; Davies, Doyle, & Pape, 2012; Frantzeskaki & Tefrati, 2016).

This emergent vision of transformative universities shows that they have a clear role to focus on human and ecological wellbeing rather than material consumption, and that they need not fear becoming participants in the core issues of sustainability. Currently, in sustainability science, these include: nature-society interactions, long-term environment and development scenarios, ecological and livelihood resilience, timely tipping point warnings (Meadows, Meadows, Randers, & Behrens, 1972; Rockström et al., 2009), incentive systems prompting sustainability transformation, and the development of monitoring and evaluation tools for sustainability transformation (Koehn & Uitto, 2017, p. 68). The complexity, urgency, and ubiquity of such challenges justifies experimentation and implementation of pluralistic, integrative and holistic research into the interdependency of social, organisational, economic and ecological systems. Universities are certainly capable of generating this. They have been called upon to promote learning and innovation in their own organisations in order to advance transnational sustainable development through generating new knowledge and comprehension, “inculcating students in this new knowledge, and applying it to real world situations” (Koehn & Uitto, 2017, pp. p. 73).

1.1 RESEARCH LANDSCAPE & PURPOSE

In contemporary society, universities worldwide have a clear mandate to participate in the endeavour for sustainable development through institutional transformation. Moreover, there is recognition that universities are well positioned to identify and navigate pathways of transformation towards sustainability given their propensity for consideration of the extended time horizon for sustainability outcomes (J. Sachs, 2015). Yet, despite their being organisations of learning, they struggle to set up structures to promote *their own* organisational learning (Stephens, Hernandez, Román, Graham, & Scholz, 2008). This is a problematic paradox as researchers repeatedly place universities at the centre of the “fundamental transformation of conceptualisation and action” that sustainable development demands of social actors, organisations, institutions and societies (Barth & Rieckmann, 2016). Therefore, universities must also work on their own transformations if they are to operationalise their aspirations to implement

sustainable development in the surrounding societies within which they are nested. This is an especially urgent imperative given the wicked problems they are tasked with providing solutions for, such as relieving anthropogenic pressures on the global environment, and attaining population wellbeing in the face of growing inequality (Koehn & Uitto, 2017). This paradox can be formulated as a form of organisational-social fragmentation, where such fragmentation is a function of wicked problems and social complexity (Conklin, 2006; Rittel & Noble, 1989).

Building on this imperative for transformation in the pursuit of sustainability, it is clear and logical that universities will play profound and unprecedented roles throughout the rest of this century, in which humanity will be judged by its capacity for self-transformation in response to pandemic crises of climate and capitalism. The significance and urgency of these roles were predicted by the American sociologist, Daniel Bell, at the cusp of what was termed ‘the Great Acceleration’, a period of rapid acceleration of indicators across socio-economic and earth systems (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015; Steffen et al., 2004):

“If the business firm was the key institution of the past one hundred years, because of its role in organising production for the mass creation of products, the university will become the central institution of the next one hundred years because of its role as the new source of innovation and knowledge”, Bell (1976) in Fallis (2011, p. 4).

The emergence of the knowledge-economy and post-industrial society has therefore arguably moved the university’s mission to centre stage (Fallis, 2004), implying its core roles in education, research, operations, and their own governance and organisational design principles. The increased importance of the university can be defended in comparison to that of the multinational firm in terms of the need to prepare and educate future leaders of these firms, whose economic and political power often outshine those of many nation states on a global stage (for example, consider the Big 5 tech firms, Alphabet, Apple, Facebook, Amazon and Microsoft). Pursuing this line of argument then, it makes sense to consider the philosophy behind the design and governance of the university model in modern society as well as its traditionally regarded core mission of research, education and operations.

Additionally, due to continuing crises of climate and capitalism, universities, in particular public research institutions, have a moral obligation, through education and research, to guide and steward the transformations required away from modes of production and consumption that are still rooted in economies that do not respect planetary boundaries (Rockström et al., 2009). Public research institutions have the moral, constitutional and financial obligation to create public good - by dint of their receiving public funding, and they also have the capacity for innovation and societal engagement, acting as ‘honest brokers’ of knowledge at the boundaries of science, society and policymaking (Pielke Jr., 2007). Yet, their potential to embed sustainability principles and practices remains under-realised, which may be due, in part, to an overreliance on simplifying cognitive heuristics and an associated lack of organisational learning processes at various levels of behaviour (Shu & Bazerman, 2010; Tversky & Kahneman, 1975). This, in turn, may limit authentically innovative approaches to generating sustainability solutions from their own change-agents.

The much-proliferated concepts of sustainability and sustainable development vary widely according to the societal actors that aim to implement them in their aspirations to make their organisations more socially, environmentally and economically responsible. These concepts are critiqued as being amorphous and have come to harbour a plethora of complex and contested meanings in contemporary society (Hoover & Harder, 2014; van Zeijl-Rozema, 2011). They can also be unclear and intangible for non-academic actors, and the general public, besides expert sustainability scientists and practitioners. One widely cited definition has been ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987), though this has been said to be creatively ambiguous (Kates, Parris, & Leiserowitz, 2005). ‘Sustainability’ has often been interpreted in the management and corporate responsibility literature as simply meaning the continuation of the firm into the long-term (Aras & Crowther, 2008), ensuring survival and resilience in a world of dwindling resources, increasing population and resource scarcity. On the one hand this definition fits within the neoliberal individualist worldview, but on the other, it does not fit within one of interconnected ‘deep’ ecology. Indeed, Sachs’ definition¹ takes more of a deep ecology view that “sustainability (truly conceived) - comprising, it is important to stress, both ecology and social fairness - may be incompatible with the worldwide rule of economism... that the Western development model is fundamentally at odds with both the quest for justice among the world’s people and the aspiration to reconcile humanity and nature” (W. Sachs, 1999, p. x). Relatedly, Kates et al. (2005) emphasise the importance of establishing what exactly is to be sustained and what is to be developed in projects to do with sustainable development and sustainability. Another significant interpretation is given by Daly (2006): “Sustainability is a way of asserting the value of longevity and intergenerational justice, while recognising morality and finitude. Sustainable development is not a religion, although some seem to treat it as such” (p.44). This is considered appropriate for the context of higher education as it illustrates the temporal ethic of intergenerational justice, which should arguably be present in the purpose of higher education institutions (HEIs). More generically though, the youth of today do have a stake in the future state of the world that is left to them, and universities are ostensibly designed to prepare them effectively for such a world.

However, numerous instances of scientific misrepresentation and mis- and dis-information have been documented, belying the meaning and purpose behind the preceding definitions of sustainability. This may have had systemic repercussions, hypothetically delaying effective implementation of solutions to sustainability challenges. A sample of instances: consistent political interference with climate change science as in the case of James Hansen and the Bush administration (Hansen, 2004,

¹ According to Sachs, the notion of sustainable development is an oxymoronic extension of the ‘Western development model: “under the banner of sustainable development a major rescue operation for the development idea was set in motion”, and this has pervaded the objective of “re-fashioning the world in the image of West” (W. Sachs, 1999, p. xii); this same observation remains a relevant point of departure, necessary to defragment the discourse on sustainability, 20 years later: “the search for justice has to start with changing the rich, not with changing the poor, as the development discourse implied (W. Sachs, 1999, p. xii).”

2007; Lynch, Burns, & Stretesky, 2010); Exxon Mobil and Shell's decades-long misleading of the public, its customers and its shareholders regarding the state and implications of climate science (Supran & Oreskes, 2017a, 2017b); and the Trump administration's overt climate science denialism, misinformation and pull-out of the Paris climate agreement (Foster, 2017; Friedman & Thrush, 2017; Wuebbles et al., 2017).

Therefore, to ameliorate its obfuscation and amorphousness, sustainability could (and should) be made more tangible for societal actors and organisations. To generate solutions through active learning, experimentation and innovation, it is necessary to go well beyond idealised definitions, as there is an established scientific body signalling that our social, organisational and economic systems persistently encroach ecological carrying capacity and planetary boundaries (Meadows et al., 1972; Rockström et al., 2009). Nothing less than a transformation of such systems is thus required for humanity to attain a fundamentally more sustainable, resilient, interdependent and harmonious way of living and being, amongst its diverse communities, as well as its environment. It was from these considerations that the United Nation's 17 Sustainable Development Goals were announced in 2015, with their associated 169 actions, and that numerous organisations across sectors experiment with their implementation on the ground (UN General Assembly, 2015).

Against these logics, it becomes clear that such a complex meta-concept requires a proportionately advanced complex framing, bringing temporal and spatial dimensions into account as well as the stakeholders involved (Martens, 2006). Sustainable development must therefore indicate a societal process of change towards desired quality-of-life now and in the future. Hence, a pluralistic approach is advocated, dealing with multiple actors, utilising various systemic scales and theories, creating an integrated vision around shared concern towards a shared solution that resolves trade-offs along the way (Baker-Shelley, van Zeijl-Rozema, & Martens, 2017; van Zeijl-Rozema, 2011; van Zeijl-Rozema, Cörvers, Kemp, & Martens, 2008). The grand challenges of sustainable development, indeed, have been said to go well-beyond the expertise, abilities, and resources of "any single player or organisation" (Kania & Kramer, 2011). In scientific endeavour for sustainable development one sees a variety of novel approaches and lenses for understanding and analysing complex sustainability problems: post-normal science, mode-2 science, sustainability science, transdisciplinarity², action research, and integrated assessment, amongst others. Recurrent issues that sustainability science deals with can be organised into a typology of problems, knowledge, goals and challenges in *Table 1* below:

Against the backdrop of sustainability challenges, such as poverty, climate change,

² *Transdisciplinarity is a reflexive learning process that goes beyond interdisciplinary research and involves academics and non-academics (Mausser et al., 2013). It "is an umbrella term for all kinds of efforts towards reflexive co-evolution of science, technology and society", creating "interfaces between science and society to address challenges, by generating knowledge and solutions for unstructured problems" (Regeer & Bunders, 2009, p. 42). It is different from multi-disciplinarity: combining knowledge from different scientific disciplines, and interdisciplinarity: integrating knowledge from different disciplines with common conceptual frameworks, since trans-disciplinary work must consist of praxis between academic and non-academic actors, often across societal realms and sectors, about contentious, uncertain or high stakes issues.*

Type of problem	complex, societal, decision stakes high, disputed values, systemic uncertainty high, political, ideological, cognitive bias, heuristic bias
Knowledge created:	inter-, transdisciplinary explicit lay knowledge, <i>savoir quoi faire</i> , 'knowing what to do', and tacit knowledge, <i>savoir comment faire</i> , 'knowing how to do it'
Goal:	contribute to decision-making by improved problem understanding, structuring complexity and bringing about positive societal change, operationalising academic language for societal actors
Challenges:	dealing with long-term developments and short-term actions, dealing with spatial scale levels, dealing with uncertainty and risk, co-production of knowledge, combining qualitative and quantitative approaches, integrating knowledge, perspectives and interests, structuring complexity, quality assurance of results, not considered as 'science', lack of credibility of novel experimental research methods

Table 1: Description of the type of problems addressed, knowledge produced, goals and challenges of Sustainability Science. Adapted from Dijk et al. (2017) and van Zeijl-Rozema (2011).

infectious diseases, biodiversity loss, water scarcity, social immobility, ecological deterioration, poor governance and a lack of cultural plurality - the capacity and potential universities possess to prepare younger generations for a turbulent future cannot be understated. This mission embodies the principles of intergenerational justice and socio-ecological equilibrium and ensures that social and environmental externalities are accounted for so that no one human group has to bear the costs of production and consumption of another without compensation. Externalities are created when an agent incurs a social or environmental cost that they do not have to pay for because it is borne indirectly by a third-party (Porter & Kramer, 2011). Similarly, with respect to intergenerational injustice, future generations have to pay for costs incurred by previous and present ones. This includes costs incurred in the past being paid off at extreme levels in debt passed onto the younger generations through higher education tuition fees (e.g. in the USA and UK). These 'rolling' temporal externalities, this research argues, are at least in part due to the myopathy of past (and current) policies undergirding political, economic and governance systems that are not commensurate with the scale, scope and complexity of sustainability challenges.

Accordingly, since the 1980s, we have witnessed massive funding cuts across European, North American and Asian universities. This corresponds with the stagnation of wages against inflation-adjusted economic growth of industrial production and per capita consumption, and complex and opaque financial derivatives that caused the global financial crisis of 2007-2008 - see the literature examining the aftermath of the 'GFC', for example Krugman (2009). We also see this against a wave of privatisation that has swept the legs out from the underneath the giants of our higher education institutions, upon whose shoulders we are meant to stand. This represents a coherent set of enacted policies and management styles that have proved less than beneficial for the holistic functioning of universities in synergy with society and environment, as, for example, Bleiklie and Kogan have indicated (2007). This research has aimed to drive, and contribute to, future efforts in a generative dance upon the shoulders of

giants, with the specific objective of seeding and inspiring innovation and creativity, the creation of mutual pathways for better ways of living, and a research cluster for understanding, learning and advancing how to navigate organisational, institutional and societal transformation for sustainability.

The capacity of universities to ‘redesign’ themselves so as to transform as organisations towards sustainability is intra-linked and interdependent on their competencies of response to complex sustainability challenges. Such responses involve the implementation of inter and transdisciplinary research about how to tackle sustainability challenges, and ideally lead to the realisation of solutions in real-world settings, as ‘sustainability outcomes’ (Melnick, 2016). The need for implementation of sustainability outcomes grows as does the scale and scope of our ecological overshoot and social dislocation, which comes “precisely at a time when seeing the whole and acting appropriately in light of the insights is so important” (Reason & Bradbury, 2001b). This requirement for helping transformations towards sustainability around them includes the co-responsibility for the privilege of learning and knowledge mastery that universities provide to students and researchers. It behoves the university to act as steward for society, in an academically rigorous, pragmatic yet innovative advocacy for transformational change towards sustainability, nested within their regional environments (Crow & Dabars, 2015a).

Pertinent to this endeavour, we have witnessed pushes for reform, and a spattering of pioneering organisational transformation of public research universities in the last two decades, combined with a plethora of promising inter-organisational, trans-boundary networks, purveying sustainability solutions to where they are needed most³. Some universities even derive success and progression in their academic missions from the extent to which they generate positive societal impact via their education, research and practice. To transition to the work done, the outcomes of this research could help add several theoretical and epistemological lenses to our understanding of how universities can improve as communities of inquiry and experiential learning - from silo to matrix-based organisational ecologies. In addition, it triggers actionable knowledge regarding how they could increase the potential for propagating sustainable ways-of-life, whilst adding more positive quality in societal impact on their surroundings. It is upon this logic that the imperative for navigational tools in organisational transformation for sustainability is set as the purpose of this research. Now we will delve into the background of the research problem, and the main issues this thesis grapples with.

1.2 RESEARCH PROBLEM BACKGROUND

One may go so far as to claim that universities can act as change-agents, triggering and stewarding their surrounding region’s societal (sustainability) transformation. Associated with this observation, the problem tackled in this thesis is explained well by Cortese (2016), who firstly argues that transformative change of higher education is an imperative if we are to “transition to a thriving, just and sustainable society” and provide

³ Just a few examples witnessed in this work include the UNESCO Chair for ESD, Global Consortium for Sustainability Outcomes, National Union of Students, Hong Kong Sustainable Campus Consortium, Studenten voor Morgen, and RootAbility. See Chapter 3 for more examples of the state of the governance of sustainability at the trans-national level for HEIs.

an “educated citizenry” with “knowledge and critical abilities”. Secondly, he argues that business as usual will not suffice given the hyper-connected globe we occupy, and that therefore “transformative action” needs to serve “a complex interdependent, crisis-prone world” and produce a “new generation of bold visions, leaders and institutions” (Cortese, 2016).

Nevertheless, what this work does not do is claim objectivity as an extensive quantitative analysis might or aim to criticise and diagnose from the side-lines. It has instead aimed to reconcile dialectics of sustainability as observed, lived and practiced within the academe, and its relationship to itself and its surroundings; to interpret what the world currently needs from universities, and, therefore, what they are positively required to become in their organisational design and culture. Indeed, sustainability, as lived and practiced within universities is the phenomenon that spurred this inquiry (Sonnenberg, 2017b). As a result, the rest of this chapter also presents an overview of the research undertaken, its core research questions, objectives and the general structure of this thesis. Moreover, a transdisciplinary investigation into the structure and agency of universities has been central to this study’s inquiry, especially with respect to pragmatic design aspirations to improve their sustainability performance throughout their whole organisation, via transformative change. It is through this problem that the focus on *organisational transformation of universities for sustainability* is defended.

Despite the established justification behind this research problem and inquiry, substantial knowledge gaps emerged early on. These centred on the observation that there is little synthesis regarding what organisational transformation towards sustainability actually entails, and how the phenomenon may take place within universities specifically. Uncertainty was also found in the methodological strategies required to effectively research the subject matter. This dearth of knowledge was found to be the result of the complexity, fragmentation, and difficult qualification of the relationship between the practice and organisation of science, and the individuals and groups taking part in ensuring it contributes to transformative sustainability. *Chapter 2* shall attempt to resolve these issues to ensure clarity and comprehensiveness in the following chapters.

To explore the landscape relevant to this introductory overview - of the responsible management and governance of scientific and educational organisations for sustainability - one can assert certain cognitive bias under conditions of high uncertainty and high stakes, and that such bias can trump scientific knowledge and substantiated fact via obfuscation, disinformation and the like. It is reasonably claimed, therefore, that heuristics and underlying mechanisms in the organisational development and transformation of universities need to be understood at the individual and group levels of social psychology. Related to the realisation of the problem of heuristic bias in university organisations, I refer to a foundation of behavioural economics in ‘prospect theory: an analysis of decision under risk’ (Kahneman & Tversky, 1979), and ‘judgement under uncertainty: heuristics and biases’ by Tversky and Kahneman (1975). These bear significant implications for the important aspect of behavioural change in organisations working (or not) towards sustainability. This is due to the imperative of post-normal science in the context of sustainability science and policy, where complex systems such as organisations experience conditions of high uncertainty and the stakes

for decision-making are also high (Funtowicz & Ravetz, 1993; Ravetz, 2004, 2006). The implications of decisions made under these conditions inimitably affect our collective movement towards reducing negative environmental impacts and creating more circular flows of natural resources through the organisation.

To justify the focus on these questions of interest, as possible elements of organisational transformation for sustainability at universities, Chomsky's arguments are supportive. In his prolific works, he often connects the responsibility of the intellectual (as a core part of the academic community in universities), and the study of the behaviour of individuals (his background), with the need to comprehend the internal processes - mental models - undergirding such behaviour. This cross-scalar interaction is similarly used in this thesis's application of structuration theory to construct the conceptual framework of organisational transformation for sustainability (Geels, 2002; Giddens, 1984; Turnpenny et al., 2008). It can be said that the difference between this study's use of structuration theory and Chomsky's is one of fractal integration: Chomsky referred to the mind of an *individual* and that individual's ensuing behaviour and the effect vice-a-versa. In a different way, in search of grounded knowledge of organisational transformation for sustainability, this study tries to explore the collective behaviours of teams, groups or *dyads*⁴ of individuals – challenging sub-optimal practices as change-agents embedded in their organisation – and the ensuing behaviour and/or pathologies of the organisation itself with its surroundings. The efficacy of the actions of dyad behaviour, with respect to their host organisation's transformation towards sustainability, may determine and also be affected by how that organisation recognises and reacts to its external situation.

In the context of these scalar interactions therefore, before summarising the trajectory of the Maastricht Sustainability Institute (**ICIS**) and Green Office (**GO**) PhD - henceforth 'ICIS-GO', it is necessary to explore further what is meant by certain concepts applied to the management of universities. Besides the main subject of the study, sustainability, these are governance and innovation in and of higher education, as these were identified as characterising the contemporary situation of universities with respect to their pursuit of scientific and applicable knowledge.

1.3 GOVERNANCE, INNOVATION AND SUSTAINABILITY IN HIGHER EDUCATION

Pertinent to the research landscape and problem background, as we zoom into the subject matter, a more detailed overview is now justified. Analysing organisational transformation for sustainability for universities should include the processes, external macro-economic trends (operating at regional and global scales) and qualities that characterise their contemporary situation. One such 'megatrend', which has significance for the reconfiguration of universities from the inside-out in their pursuit of sustainability, is their governance of themselves. The governance perspective in the context of this research refers both to the 'internal' governance of university organisations, as well as their 'external' governance in wider society. The latter relies on the definition of governance for sustainable development in complex systems of

⁴ *Definition of Dyad from social psychology: In the research paradigm of social constructivism, the distinction between the inquirer and the inquired is rendered a porous dialectic, and both form a social group referred to as a dyad (Guba & Lincoln, 1994) – see Chapter 2.*

Kemp, Parto, and Gibson (2005), and reflexive governance and sustainability of (Voß & Kemp, 2006). Kemp et al. (2005) conceptualised governance in terms that are apt for understanding the external effects of governance as well as its internal organisation in universities:

“Governance is how one gets to act, through what types of interactions (deliberation, negotiation, self-regulation or authoritative choice) and the extent to which actors adhere to collective decisions. It involves the level and scope of political allocation, the dominant orientation of state, and other institutions and their interaction” (Kemp et al., 2005, p. 17). They continue to connect governance with complex systems in order to better understand *“the workings of the political economy through the inter-relationships among identifiable parts (e.g., social, economic and ecological), rather than just the parts themselves. A complex systems approach to governance also implies explicit appreciation of complexity and uncertainty, likelihood of surprise and need for flexibility and adaptive capacity”* (Kemp et al., 2005, p. 17).

This also links to the accountability of public administrators to their stakeholders as well as to their grants commissions, governors or boards of trustees. As with corporations, with universities too “robust systems of governance are recognised to be a requirement for sustaining public trust and stakeholder confidence” (Newby, 2015). This may lead to see more clearly how universities are managed and governed, and how they hold themselves accountable to the citizen. Indeed, “universities are not exempt from these obligations, not least because of the increasingly globalised and competitive environment in which they operate” as Newby (2015) explains. We now have a better notion of the tight rope that university leadership has to walk in the contemporary task environment: between maintaining the university’s autonomy and intellectual independence, and their accountability to the public through disclosure and dialogue. There is a dialectic⁵ here in which an appropriate balance must be struck, which ought to require adaptive, anticipatory and reflexive qualities and competencies in presidents, vice-presidents, chancellors, rectors and provosts of our public research universities.

In setting the scene for this thesis, the researcher conceives of three broad meta-narratives, or ‘megatrends’, which coalesce in the overarching institutional environment of universities that constitute their macro-level external surroundings. Governance, innovation and sustainability are all arguably important discourses and external drivers of policy for university leaders which affect all activities in the organisation. Hence the need for proactivity not reactivity, anticipation not mere reactionary policies, as MacGregor (2016) elaborates. Later in this thesis we will see that similar qualities - or rubrics - are distinctly identifiable in organisational behaviour and transformation towards sustainability in various contexts, such as purposeful-adaptive evolution and organisational-societal learning in the change management of the institution. With respect to anticipation and change management in universities, innovation can be defined as the exploration of new manners of thinking and doing, not only more efficient execution of product development (Cars, 2016). In the wider sense, this

⁵ Definition of ‘Dialectic’ from *Sociology and Philosophy*, as the logical analysis of various competing or contradictory positions e.g. Hegel, Adorno, however, in this research, I specifically refer to competing contradictory discourses on sustainable development and sustainability as outlined by W. Sachs (1999) in *Planet Dialectics*..

research takes the framing of ‘responsible innovation’, as van den Hove et. al. (2012) argue. They criticized bringing more products and services to markets in the pursuit of economic growth for its own sake as “Innovation should be viewed in a broader social context. That is, innovation is beneficial to people only if it meets the needs of society, providing economic, environmental and social sustainability” (Burget, Bardone, & Pedaste, 2017, p. 2).

Correspondingly, “governing boards (and councils) are often made up of business leaders and professionals and other very smart people who have led what they believe to be innovative companies” according to Richard Legon, of the Association of Governing Boards of Universities and Colleges in the United States (MacGregor, 2016). However, in his article concerning the anticipatory nature of innovation in Higher Education, MacGregor (2016) claims, “Questions about innovation mostly come when the business model of colleges and universities are at risk”, which puts an external locus on the governance of universities. Conversely, there may also be an internal locus as “institutions that want [or express intent] to be pushed to be accountable to students and society should increase the engagements of volunteers from outside their academy.” This way, using a metaphor from ecology and biology, antigens enter the organism that increase the resilience and adaptability of its immune system. Therefore, it can be seen that at the macro-level of our institutions of higher education, boards have the “responsibility to talk about Higher Education’s value proposition” (MacGregor, 2016). This requires an in-depth and dynamic operational knowledge of how their institutions work. The communication, language, reporting, intelligence, and data-informed approaches used by actors to understand the workings of the university organisation are thus elementary to improving sustainability performance.

The relationship between sustainability and innovation is underexplored and internal barriers to realising their linkage exist (Ávila et al., 2017). The authors note that “comparatively little literature... can be found that focusses on the nexus between innovation and sustainable development..” (Ávila et al., 2017). This research goes on to note the sparsity of research at the individual or group-level of university organisational and behavioural dynamics. Notably, the theme of intrapreneurship within universities was underrepresented, despite its apparent relevance to questions of organisational transformation to sustainability in Higher Education (see Antoncic & Hisrich, 2003; Berzin & Pitt-Catsouphes, 2015; Gündoğdu, 2012; Sonnenberg, 2017a). It is also observed that ‘large-n’ remote research predominates, whereas ‘small-n’ embedded research is scarcer, where the researcher temporarily becomes part of the social and organisational system that their participants are members of. This is where the researcher lives, practices and inquires with and for individuals seeking to understand their organisation-environment.

To finalise, it is important to focus on innovative and existing approaches to sustainability in Higher Education; for example, how universities can work on their existing assets towards rethinking actions and policies for sustainable development. Markedly, Sharma (2016) claims *“There is no formula for universities around the world”* as *“Innovation... must respond to local, regional and national changes”*; therefore, organisational transformation involving the development of innovative, alternative processes and practices seems to

be rooted in the organisations' own intrinsic logic. This corresponds to the overarching context of the case-studies the macro-empirical research undertaken in this work. It can likely be beneficial in the mid to long-term for universities to reflect on their mission, values and visions, to "*respond better to the future*" and to develop partnerships across the public, private and social sectors (Sharma, 2016). The imperative to reflect is therefore clear, but also to avoid simply copying and pasting policies, organisational structures, governance models and initiatives; to combine transformative change from the intrinsic logic of the organisation with an appreciative inquiry that would inspire exploratory ventures that spur innovation, creativity and discovery, that enable the university to contribute towards ways of living more in tune with the ecosystems we share with other life on Earth. It is furthermore defended that these ecologies do not only 'belong to us' as *services* to improve our species' quality of life (an anthropogenic perspective), but *we belong to them*, as do all other species on this planet. This is grounded in the perspective of deep ecology which this thesis adopts at the level of planetary discourse and dialectics (W. Sachs, 1999); this deep ecology perspective is intended to complement not contradict the human focus on the organisation, in order to attempt to remediate the fissure our species has created between ourselves and 'the environment. In this sense, it is argued that organisations should mimic and learn from living systems – that is to say, they act as organisms themselves in organisational ecosystems.

Modelling or mapping pathways of transformation of a complex system such as a public research university is therefore not to be underestimated. Especially against the backdrop of global socio-ecological challenges such as social inequality, ecological deterioration, and ocean acidification, modelling is seen as a powerful tool to develop a specific understanding of how we as a species can tackle these issues (Todorov & Marinova, 2011). One objective of this thesis is to contribute with effective tools for organisational transformations towards embedding sustainability using the empirical basis of the university as unit of analysis. According to Boulanger and Bréchet (2005), multi-agent modelling was identified as a promising approach in the context of sustainable development policy-making, and could assist in the analysis of institutional dynamics to avoid lock-in scenarios for innovation, collaboration and good governance. This is derived from a socio-ecological systems (SES) thinking perspective. However, despite the initial intent in 2014 for modelling in the research design, it was not employed in this study, due to the identified correspondence between action research, organisational transformation, and the sustainability of universities⁶.

The preceding introduction has aimed to characterise the contemporary situation of universities in light of the goal of the research, to evaluate and interpret the complexity, dynamic nature, and the causal and symptomatic relationships of sustainability problems, towards unearthing the "social, temporal and biological embeddedness of human existence", framed by Becker (2010) in his sustainability ethics. For the university, this means exploring the social, temporal and biological embeddedness of the organisational life of its members. This thesis will posit that creating a culture of sustainability, innovation and creativity requires going beyond the descriptive-analytical

⁶ Further elaborated on in Chapter 2, using various strands of the literature on action research, trans-disciplinary sustainability science, post-normal science, and modes of action inquiry and practice.

approach into an interpretative-therapeutic approach to how individuals understand and are cognizant of their organisational and institutional circumstances. Now that the core concepts, main issues and trends have been introduced, this section leads into an overview of the research undertaken and the research questions.

1.4 ICIS-GO PHD PROJECT RESEARCH TRAJECTORY

This PhD was designed to produce policy recommendations on the sustainability governance framework of Maastricht University (UM) itself, and pragmatic research outcomes from *and for* each external case-study. The research also aimed to contribute to knowledge of structural transformation and transformative agency of public institutions towards sustainability, and to shed light on the extent to which initiatives and activities add value to university governance and beyond, via spin-offs and spill over effects. These were seen as possibly taking place through practices of open innovation, going beyond the boundaries of the organisation (Chesbrough, Vanhaverbeke, & West, 2006) and social intrapreneurship embedded within the organisation (Antoncic & Hisrich, 2003; Berzin & Pitt-Catsoupes, 2015; Dentchev et al., 2016; Parker, 2011).

In this thesis, the definition of a sustainable university presented by Velazquez, Munguia, Platt, and Taddei (2006) is used as a point of departure for the purpose of answering the primary research question: how universities can effectively navigate organisational transformation for sustainability. According to Velazquez et al. (2006), a sustainable university: “*addresses, involves, and promotes, on a regional or global level, the minimisation of negative environmental, economic, societal, and health effects generated in the use of resources in order to fulfil functions of teaching, research, outreach, partnership, and stewardship to help society transition to sustainable life-styles*” (Velazquez et al., 2006). This definition is further based on the economic, social and environmental triple bottom line of sustainable development as defined in the Brundtland report (J. Elkington, 1999; World Commission on Environment and Development, 1987).

Based on the initial research proposal, the ICIS-GO PhD was divided into three phases whose transition can be seen as continuous, progressive and non-linear. These are presented in detail in *Table 2* below. UM and the UM Green Office (UMGO) were embedded in the research process as a living laboratory and test bed for experimentation to investigate the means of propagating organisational transformation for sustainability. ICIS⁷ – currently known as the Maastricht Sustainability Institute, hosted the research project. Effective pathways in organisational transformation for sustainability at other outstanding universities, and practices from the social sector, have also been investigated along with UM. With the best practices and patterns learnt from the external embedded cases, inquiries with UMGO and pilots were set up throughout and especially in the latter stages of the PhD. Once rubrics had begun to crystallise,

⁷ Although ICIS, the International Centre for Integrated Assessment and Sustainable Development, has recently changed names to the Maastricht Sustainability Institute, ‘MSI’, for the sake of continuity with the start of the project, it is referred to as ‘ICIS’ throughout this thesis. The acronym ‘ICIS-GO’ refers to the title of the research proposal to which the successful PhD candidate applied to in Autumn 2013 and is a combination of the institute ‘ICIS’ and the student-driven green office, ‘GO’. It therefore symbolises the balance and twin-role of the PhD in the research design. See Chapter 11: Back-casting.

significant internal and external practical implications arose, presented in *Chapter 9*, from the reflection and evaluation of the cases. These have been grounded in actor-based datasets, whose accounts required trustworthy, authentic and fair decision to be made, in conjunction with intelligible and substantiated outcomes from the qualitative analysis undertaken.

1.4.1. PROJECT STRUCTURE AND TRAJECTORY

Phase 1: The first year and a half of this PhD drew from a shared experience of UMGO members observations to gain a deep knowledge regarding the organisational

Phases / Duration	2014	2015	2016	2017	2018	2019
1: <u>Meta-theoretical review, conceptual synthesis & analytical framework development</u>: Embedded formative research of the GO. Strategic small-scale experiments.						
2: <u>External Case study research</u>: 3 pioneering universities and small social sector cases. 2015-2017. Operationalisation of conceptual framework into evaluative-diagnostic tool.						
3: <u>Living Lab/testbed</u>: 2014-2017 – study of the state of the affairs at UM – strategic small-scale experiments. 2017 – planned interventions with more subjective role of research team using lessons from [2].						

Table 2: *Project Trajectory of the ICIS-GO: PhD project, with three steps presented over the project duration from 2014 to 2019. Light blue represents the Living Lab applied at the group level within the Green Office prior and during the case study period, in order to allow for interventions (small and large-scale) to take place and to be studied over a longer time period (dark blue). Due to unforeseen circumstances, the period of engagement was extended into 2019, marked in teal. The reasons for this are given in Chapter 2 and Chapter 8.*

challenges faced and its team's specific micro-level issues – for example the limitation of practical mandate fulfilment, visibility, and strategic alignment with its host, UM. This was the inductive reasoning component, whilst an extensive conceptual review was undertaken of the state of the art in organisational transformation towards sustainability at universities, from all its connected corpora of literature: the deductive reasoning strand. These strands coalesced in 2015 with the testing of the analytical framework for understanding organisational transformation for sustainability, first at UM in a plausibility probe, then in 2016 on the selected cases.

Phase 2: From late 2015 onwards, the objective was to test out the framework in external case studies of pioneering universities, in order to arrive at a more coherent and comprehensive diagnostic-evaluative tool that could possibly assist researchers and practitioners alike. This phase presents the intent and nature of the empirical research planned. Essentially, this entails the production of new knowledge from applying the framework to the empirics in deep-dive investigations *as well as* the reflexive testing of the conceptual distinction and groundedness of the tool. The primary aim was to substantively evaluate the situated organisational transformations at three cases to arrive at rubrics that might be used for improving organisational sustainability performance in different contexts. Initially (2016) and finally (2018), plausibility probes were run at UM and the GO to test the feasibility of the tool in the field – in the technology entrepreneurship field this represents the beta-testing stage before prototyping. Semi-structured interviews, documentation, formal and informal meetings all form means of data collection, in order to arrive at coherent answers for the presence of the diagnostic criteria at each case. This therefore allowed the emergence of a valuable set of recommendations and best practices from signatures of transformative capacity for sustainability, as well as similar structural properties, behavioural patterns and characteristics in the synthesis of the case studies.

Phase 3: Having completed the field work and communicated preliminary findings to UMGO and the case host universities in 2017, the final phase was planned to begin: the living laboratory. This involved the planning of interventions within the organisation of UM, with the support of the GO and the research project team's co-researchers. Although these may not have been realised at the scale and scope planned earlier intended, this may not necessarily stop the cascade effect of putting insider academic research into practice with decision-makers and the members of UM, to whom the responsibility and any positive outcome of small-scale interventions based on lessons from the case studies belongs. The expectation then is that the stakeholders of this project set in motion a chain-reaction of appreciative inquiry that expands the community of sustainability praxis within UM, originating in the Green Office. The action research period was prolonged when the researcher decided to maintain the relationship with the Green Office. In early 2018, the former sustainability advisor, who had previously supervised the team, departed, leaving a void of guidance during a period of disruptive and uncertain conditions. This will be further explained in *Chapter 9*. For now, it is enough to say this effectively extended the period of engagement into late 2018/early 2019.

1.4.2. RESEARCH QUESTIONS

Maastricht University is the alpha and an omega of this inquiry. This is represented in the research questions below. The questions were not static, and evolved as the problem formulation became deeper, as knowledge about the subject matter grew, and were refined according to iterations of research solution formulation. This process can be described with the model of creative design as a “co-evolution of problem and solution spaces” as established by Dorst and Cross (2001). The three sections the research questions are divided into also form the overall structure of the thesis in its three Parts, A, B and C.

Primary:

α) How can Universities navigate their organisational transformation towards sustainability?

A variety of sub questions are related to this research question. Note sections A-C respectively correspond with phases 1-3 of the research design summarised above covering each part of this thesis.

In order to investigate how universities (and actors and groups within them) effectively navigate organisational transformation for sustainability, it was first necessary to pose the following preliminary guiding questions:

I. What exactly is the phenomenon of organisational transformation for sustainability?

II. What informative approaches to organisational development and organisational transformation exist towards sustainability at universities?

Hence, another overarching primary research question emerged:

Ω) What are the core elements needed to enable the organisational transformation of universities towards sustainability and how they can be operationalised?

This refiguration encouraged greater practical outcomes and recommendations in Part C, and allowed a more focussed evaluation according to structured sub-questions below. A structure that is followed in this thesis:

A) Meta-level:

1. What does organisational transformation towards sustainability entail for a university specifically?
2. Where are the theoretical blind spots with potential to advance knowledge on organisational transformation for sustainability, from niches and underexplored connections in the literature?
3. What is the philosophy, responsibilities, and values of a university that is undergoing organisational transformation for sustainability?

B) Case-studies and synthesis: based on the development and application of the diagnostic tool (see Chapters 3 & 4)

4. What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to each case, and what, therefore, is the case university's signature pathway of transformation?
5. What is the role of specific identified (actors, social entrepreneurs, intrapreneurs⁸,

⁸ Social entrepreneurs already embedded and under the auspices of the systems they seek to change for the better are referred to in the business model innovation literature as intrapreneurs. A small literature review was performed to clarify what the roles were inside organisations of 'change-makers, and to disambiguate terms before attempting to answer the question with the empirics. A sample: (Antoncic & Hisrich, 2003; Berzin & Pitt-Catsoupes, 2015; Dentchev et al., 2016; Parker, 2011).

change makers, boundary workers, and the sustainability department) in the pathway/s of organisational transformation for sustainability in each case?

6. a. Which rubrics and action strategies were instrumental in the signature organisational transformation pathways for sustainability?

b. How do the pathways compare once the case studies are synthesised?

c. What common patterns could be drawn⁹ that help other universities recognise their own potential for transformation?

C) Insider action research: The case study findings serve to develop experiments and recommendations that circumscribe a reconceptualisation and redesign of UM as a purposeful, responsive-anticipatory, complex-adaptive knowledge enterprise, according to its own intrinsic logic and context-specific conditions; a campus test bed for organisational transformation for sustainability.

7. How can Maastricht University be described using the diagnostic tool of organisational transformation for sustainability?

8. What pathways, rubrics, and/or action strategies can therefore be prescribed?

In light of the meta-level, insider action, and case-study research:

9. a. How, then, could universities – and actors within them – effectuate and navigate organisational transformation towards sustainability?

b. What are the implications for their regions were they to navigate transformation successfully?

In this research therefore, a set of research themes was formulated from the meta-theoretical review and conceptual synthesis in Part A. I draw from these research themes and the models used in the literature in the attempt to synthesise theories, secondary data and mental models identified in previous empirical research.

The overall aim of the ICIS-GO PhD was to better comprehend the nature (what is it?), purpose (why undertake it?), and the practice (how do we navigate it?) of organisational transformation for sustainability applied to the university. This was first undertaken by generating an integral pluralistic meta-theory of organisational transformation for sustainability in the study of systemic change of universities, with the aim to iteratively test and refine its framework in the field, and to substantiate and operationalise it for university academics, managers and student professionals. Part B demonstrates the realisation of this aim.

The goal was to achieve a targeted application of this framework in a particular kind of organisation of HEI: the public research university, with its more well-defined social contract for providing public goods as they receive a large portion of their funding from national governments, and by proxy, taxes. Public research universities are therefore

⁹ *i.e. from the various competencies, shared qualities and patterns identified which define the synthesised transformations.*

arguably under more pressure from students, society and their boards of governors and trustees with respect to the outcomes and impacts generated from research and education. Part C will reflect, at various scale-levels on the particular implications and recommendations that arise for the public research university and its associated actors. Now that the project trajectory has been mapped out, and the research questions have been introduced, we shall proceed into the general structure of this thesis to conclude this chapter.

1.4.3. STRUCTURE OF THE THESIS

The state of the art of theories and practices of organisational transformation for sustainability are vast and fragmented (Edwards, 2010). What seems to be lacking is the synthesis of a diverse array of theoretical perspectives, *as well as* the various methods implicated. The second chapter thus describes and explains the ontological and epistemological positions, the methodological strategies, and the use of action research in the project.

Chapter 3 then traces out the integration of metatheoretical lenses from various disciplines, which is then synthesised and applied to the university as an organisational system. From this review, the core elements of organisational transformation for sustainability are depicted in an analytical framework.

In *Chapter 4* describes the methods and case-study approach, and also shows how the analytical framework is operationalised, through criteria of diagnosis and categories of analysis into tangible systemic rubrics.

Chapters 5, 6 and 7 present three external embedded case studies, that were evaluated with the tool and with whose data the tool was in turn refined. These were, in order, Leuphana Universität Lüneburg, Germany, Arizona State University, USA, and Hong Kong University of Science and Technology. A synthesis of these three cases in

Chapter 8 presents similar structural properties, behavioural patterns and characteristics, forming action strategies taken along pathways of transformation. Distinctive signatures of transformation peculiar to each case are discussed, operating across various scales of the organisation-environment relationship as a socio-ecological system.

Chapter 9 presents the final application of the tool in order to answer the case-specific research questions, and last set of research questions specific to UM. Its first section proceeds as the other case chapters; its latter sections follow the action research approach explained in *Chapter 2*, then shows how case study findings helped develop experiments that circumscribe a reconceptualisation and redesign of UM as a purposeful, anticipatory, complex-adaptive knowledge enterprise: a campus-municipal test bed of organisational transformation for sustainability.

Chapter 10 presents the discussion, conclusions and scalar recommendations that centre on the implementation of the diagnostic tool, the outcomes of the action research at various scales for the co-researchers, participants and actors who are

implicated and partook in this work. These actor groups include, but are not limited to, insider action researchers, UM Green Office (and other Green Offices on similar pathways), UM itself, public research universities, and the public, private and civic sectors at the broadest level. The discussion connects with relevant literature from organisational science and sustainability science and zooms out to address the bigger picture implications of the thesis; for example, an aspired pragmatic design and philosophy of the transformative-sustainable university, and of relevant practices and patterns seen in the research at the macro-level of human-environment relations.

CHAPTER 2. PARADIGMS & CHALLENGES OF DOING INSIDER ACTION RESEARCH FOR TRANSFORMATION IN THE UNIVERSITY

ACTION RESEARCH, AS A VEHICLE AND PARADIGM OF INQUIRY, HELPS TO GAUGE AND EFFECTUATE ORGANISATIONAL TRANSFORMATION OF UNIVERSITIES FOR SUSTAINABILITY

Based on Baker-Shelley, A. (2016): Gauging Universities for Sustainability: Action Research as a Tool for Assessing and Influencing Organisational Transformation. In W. Leal Filho & M. Zint (Eds.), The Contribution of Social Sciences to Sustainable Development at Universities (pp. 127-141): Springer International Publishing.

“Most of us educated within the Western paradigm have inherited a broadly ‘Cartesian’ worldview which channels our thinking in significant ways. It tells us the world is made of separate things. These objects of nature are composed of inert matter, operating according to causal laws. They have no subjectivity or intelligence, no intrinsic purpose or meaning. And it tells us that mind and physical reality are separate. Humans alone have the capacity for rational thought and action and for understanding and giving meaning to the world.

The split between humanity and nature, and the abrogation of all mind to humans is what Weber meant by the disenchantment of the world... We will not be able to address the ecological devastations wrought by humans until we fully experience the universe and the Earth as a community of subjects rather than a collection of objects.”

(Reason & Bradbury, 2008c, pp. 8-9)

SUMMARY

The lack of the necessary systemic rubrics to understand how organisational transformation for sustainability is navigated goes further than theory or method. It extends into the nature and philosophy of the scientific inquiry undertaken by people in universities, which itself appears to arise from the design and philosophy of the university itself. This is further complicated by the researcher being inextricably part of the same organisation as the one under investigation. This conundrum can be reconciled with action research, in which researchers willingly become part of the context they are investigating and extends to researching themselves by reflexively monitoring their own learning in that process.

In this chapter, I establish the ontological, epistemological, and methodological positions showing how action research has been applied, and how it can be used to enhance sustainability science's transformative capacity. I position organisational transformation as the phenomenon under study in this thesis, whilst action research is the orientation to the inquiry, identifying with social constructivism as the research paradigm. Action research is here framed in dialectical and hermeneutic methodological strategies. Throughout the project, I tried to operate as a reflexive practitioner with co-inquirers, under an epistemology of practice (Schön, 1987, 1992, 1995).

The fundamentals of the transformative sustainable university as an organisation are explored. Outcomes of the reflexive practice on how to usefully apply action research for organisational transformation for sustainability are also considered. A case is made for doing insider research combined with various challenges of doing insider action research on transformations from within the university.

Finally, I attempt to clarify and contribute to the fields of organisational development research and sustainability science, and to clear up issues of contention and confusion from different sources regarding what action research is and should be. These problems of action research within organisational systems are examined to explain the reasoning for the fusion of strands employed in our work as pragmatic-insider action research (PIAR).

2.1 INTRODUCING ACTION RESEARCH WITHIN THE UNIVERSITY

This chapter explores the philosophy of science and action-oriented inquiry that undergirds this thesis; a philosophy of (post-normal) scientific inquiry that helps to inform the most appropriate mindset and practices to steward and navigate wider systemic transformations to sustainability; one that is clearly necessary to avoid the worst case, hot-house Earth, heating scenarios in the crucial coming decades. Along these lines, it eventually proposes a 'pragmatic-insider' form of action research designed for researching and navigating transformations towards sustainability from within universities. The fundamental assumption is that we are living through times of profound paradigmatic change - as defined in the work of Thomas Kuhn, *the Structure of Scientific Revolutions*. Hence, the ways we organise and conduct science in the university, and the organisation and governance of the university itself, are being called into question. It follows that they should therefore be guided through a profound

rethinking and redesign, defined in the rest of this thesis, along various pathways of organisational transformation for sustainability.

Action research was found to be a meaningful and fruitful manner of inquiry into organisational transformations for sustainability from *within* universities. By within, I mean that interpretative primacy begins from the intrinsic, inside-out, perspective, rather than outside-in, taking validation from extrinsic sources. This shall become clearer as Part A progresses. Action research is presented as a form of 'praxis', taken in the Arendtian sense (Arendt, 1958; d'Entrevres, 2014). Praxis is described as where democratic dialogue and creative action as activities are the means and the goal of the research. I, as researcher, and intertwined with the participants in this praxis to the extent that I also participate in the activity under research, and that they become *coresearchers* who contribute to the inquiry in turn. Inquiry is defined in ecological terms according to Reason & Bradbury: *"An attitude of inquiry includes developing an understanding that we are embodied beings part of a social and ecological order, and radically connected with all other beings. We are not bounded individuals experiencing the world in isolation. We are already participants, part-of rather than apart-from."* (2008c, p. 8)

The ontological, epistemological and methodological positions of this research are, firstly, based on the premise that questions of method are secondary to questions of paradigm (Guba & Lincoln, 1994), and second, on the implicated relationship between the researcher, truth and objectivity. To position the application of action research into organisational transformation within universities I shall delve deeper into the philosophy of universities, and logically also of scientific inquiry itself. This implies notions of dialectical and hermeneutic examination of the 'truth' and requires an explanation of the form of social science paradigm adopted in the epistemology.

Following from this, it can be said that discussion in the social sciences is ongoing regarding the extent to which an objective view of the truth may exist; for example, if it can be found independent from the researcher, and if there is not an excess of objectivity within science and how it can be used (Brown & Duguid, 2001; Funtowicz & Ravetz, 1993; Guba & Lincoln, 1994; Moses & Knutsen, 2012; Reason & Torbert, 2001; Sarewitz, 2000). From this discussion, relativism is positioned as an ontological concept useful to showing how to approach and inquire into various truth claims regarding sustainability. In relativism, the questions of the inquirer are taken to eventually inform and determine the results of the inquired; for example, in an appreciative inquiry of organisational systems, a form of action research (Cooperrider & Srivastva, 1987; Guba & Lincoln, 1994). Through this navigation of local and specific realities, the inquiry also focusses on value systems underlying different theoretical perspectives. This is very important in this research, as developing a relative view through many theoretical lenses can reveal ideological and value-based distortions to theory, and allow deeper appreciation of diverse yet fragmented knowledge of organisational transformation (Edwards, 2010).

1 *The capability to analyse ideas, theories and concepts, ground them, and engage in action (praxis) as a 'mode of togetherness' is what makes us uniquely human: "distinguishing action (praxis) from fabrication (poiesis), by linking it to freedom and plurality, and by showing its connection to speech and remembrance"* (Arendt, 1958; d'Entrevres, 2014).

Related to relativism in a constructivist view of social science, from the human perspective in an organisation, is the notion that 'facts' appear differently according to the theoretical school of thought or lens through which an inquirer views the world. Interestingly, according to Guba and Lincoln (1994), different lenses of theory may be equally well suited or supported by the same set of facts. In addition, each set of theoretical lenses consist of value statements about the world, through with facts are then seen and interpreted. Ignoring this diversity may therefore result in incomplete, skewed, or even misleading interpretations. Hence, without attention to ontological relativism, unwarranted validity claims that reduce the quality criteria of authenticity and trustworthiness² may be created.

Broadly speaking, this complexity has been explained well by Giddens (1984), whose research proposed that as distinct to the natural sciences, social sciences are involved in the *double hermeneutic*. Various social sciences study people and society differently, as observed in the competing paradigms across their disciplinary spectra in Guba and Lincoln (1994), inter alia. The double hermeneutic, as Giddens explains, is the theory that everyday concepts, and those generated by the social scientific inquiry, have a two-way relationship. A common example cited is that of social class, another includes understanding successful entrepreneurship, which also originates from business, organisational and behavioural science. This is arguably why the university community, or at least the social sciences, should be concerned about their impact on society and the environment as "*the 'findings' of the social sciences enter constitutively into the world they describe*" (Giddens, 1984).

BOX 1: PHILOSOPHY OF SCIENTIFIC INQUIRY

"Workaday scientists rarely have either the time or the inclination to assess what they do in philosophical terms." (Guba & Lincoln, 1994, p. 117)

Ontology: The 'what is', how 'this' is and how 'it' works. The nature of the reality to be known.

Epistemology: How it is known. The relationship between the would-be knower and what can be known about reality.

Methodology: How does the inquirer go about seeking what is believed can be known?

Therefore, in any inquiry to understand how an organisation like a university can transform towards sustainability, it is important to include its own community - the people that constitute it - as well as the people in its surrounding environment; ideally it is the latter group that implement the translated knowledge of science to increase their wellbeing, that of their social group and of the ecosystems we all depend on. I use Giddens' (1984) structuration theory to strengthen this standpoint because it expounds

² With respect to the set of criteria appropriate for judging the goodness or quality of this inquiry, I use the two sets proposed in Guba and Lincoln (1994): 1) Trustworthiness: Attempts to resolve the quality issue in constructivism: Credibility, Transferability, Dependability, Confirmability; 2) Authenticity: Overlaps and goes beyond the set of quality criteria of critical theory: Fairness, Ontological authenticity, Educative authenticity, Catalytic authenticity, Tactical authenticity.

that neither structure nor agency is given analytical primacy, and that neither micro- nor macro- foci are sufficient. Understanding structuration theory is helpful to grapple with the double hermeneutic. To illustrate this, it allows us to situate the agency of the researcher and participant in the structural context within which the research takes place. This perspective can also enable the academic community to leverage the change their research recommends for the world around them as effective and reflexive³ agents of change themselves.

Situated within this longstanding, complex and, at times, contentious discussion in the social sciences, two stances can generally be seen regarding research paradigm; (post-)positivism, and (social) constructivism (Guba & Lincoln, 1994). I use relativism in this research under the paradigm of social constructivism. From this position, it seems necessary to clarify how ‘the researcher’ sees reality (the ‘to-be-known’), which affects, and is affected by, the nature of the relationship between the researcher and the subject matter (the ‘what-can-be-known’). This relationship between inquirer and inquired is the epistemology. In the social constructivist paradigm, the inquirer and the subject of the inquiry are intimately linked (Guba & Lincoln, 1994). They generate knowledge, meaning and insights about the system they both occupy together (Gergen & Gergen, 2008). This is also the case for action research (Reason & Bradbury, 2008b). However, these paradigms also seem to generate different sets of risks and challenges for researcher and participant alike; for example, in social constructivism, there may be secondary accounts with greater risks of misinterpretation, whereas in action research, the accounts are more direct which incur further risks. These may include becoming personally involved with the participants, and beyond a point, emotionally compromised, where fair and authentic conclusions are difficult to draw as one is unable to properly *disembed* oneself. However, a lack of emotional intelligence (empathy) to the participants and stakeholders of the researched system can produce negative outcomes distanced from the targeted beneficiaries, who by constitutive implication are rendered abstract through overly objective claims that are mistranslated to public policy and civil society.

Moreover, an epistemological problem may appear once sustainability scientists do transformational or action research, as this seems in contention under a positivist research paradigm that constitutes the organisational system which provides their scientific and professional legitimacy. That is, their methods, and epistemological stances are not seen to be credible or legitimate – too subjective for other more established disciplines in the social and environmental sciences. The challenge with this problem is that sustainability science that aims to understand, and even to catalyse transformative social action, would imply subjectivity, and render the outcomes invalid under a paradigm of positivism. As a nascent emerging scientific (inter-)discipline,

³ *Reflexive is used throughout to describe being or acting on one’s reflections whilst in the midst of an action, activity or project, for example, whereby the management, research or governance of an institution is reflected upon and adapted in real-time. My use of the term leans on Voß & Kemp’s Sustainability and Reflexive Governance (2006), and Popa, Guillermin, & Dedeurwaerdere’s ‘A pragmatist approach to transdisciplinarity in sustainability research: From complex systems theory to reflexive science’ (2015). Reflexivity is therefore the ability or capacity to reflect on one’s actions on the spur of the moment. However, I use reflection in the basic colloquial sense; you do something then you reflect on it.*

sustainability science has struggled to gain recognition, legitimacy and foundational validity from its more established peer disciplines. This struggle challenges sustainability scientists' agency and capacity to inquire into sub-optimal practices in the complex organisation they belong to. This is a problem insofar as sustainability science institutes, who *write about* transformation for sustainability, may become disenchanted from the capacity to experiment with transformation for sustainability at acceptable scales. The findings of sustainability science, especially when the subject matter concerns social-organisational systems, also enter constitutively into the world they aim to describe, and therefore change. What therefore emerges is a complex barrier to overcome for those who wish to analyse the status quo of sustainability within the university.

Action research and social constructivism appear to form distinct yet mutually useful epistemological standpoints in transformational sustainability science. Hence, it is relevant to introduce and describe the salience of the university itself as a social organisation; how it is impacted by its environment, how it transforms, and how it can navigate transformation in order to positively impact that environment in turn. This now leads us into a philosophy of the transformative sustainable university, whilst strengthening the foundation of the thesis.

2.1.2 PHILOSOPHY OF A TRANSFORMATIVE UNIVERSITY AS AN ORGANISATIONAL SYSTEM

The university can be viewed as an organisation *for* science. The ontology of this thesis rests on the normative claim that the university should enable research into the nature and meaningful structure of existence, and how it teaches its students to interpret that in order to thrive and regenerate their ecosystems at risk of collapse. Yet, different paradigms and worldviews can be seen inherent to how universities function as social systems, in addition to tried and tested theories, and tacit schools of thought which demarcate disciplines, departments and institutes. This social system is composed of individuals working together towards the vision of the organisation that ideally has shared values, norms and mission; these individuals and groups have subconscious, heuristic biases about their surrounding social environment that could hinder transformation towards sustainability at the various scale levels indicated. This implies that in order to see how universities can effectively navigate organisational transformation for sustainability, one has to look into the nature of the university and how its people transform themselves towards more sustainable ways of living. Such a view requires defining the role, purpose and vision of the 'sustainable' university desired, how that university should actually transform, as well as its capacity for transformative change.

Indeed, universities have been subject to great transformative forces in the last decade, resulting in them "losing public credibility" and "becoming increasingly subject to corporate forms of accountability and quality assurance" (Levin & Greenwood, 2008, p. 1). Transformative change is happening to them, so it therefore makes sense to anticipate and adapt to external socio-economic, environmental and even digital transformation makes sense. As observed by key organisational change theorists, "rapidly changing environments demand that organisations generate equally fast responses in order to survive and prosper" (Porras & Silvers, 1991, p. 51). Public administration scholars, and sustainability experts, such as Cortese in his review of

Crow and Dabars' *New American University* (2015a) also make the case for transformative change of universities:

"Transformative change in higher education is needed in order to provide the knowledge and critical abilities an educated citizenry needs as the foundation for the transition to a thriving, just, and sustainable society... Business-as-usual higher education is a recipe for failure in a fast-changing world that calls for transformative action to serve the needs of a complex, interdependent, crisis-prone world in need of a new generation of bold visions, leaders, and institutions." (Cortese, 2016, p. 1)

Transformative change of universities seems possible as they have the capacity for governance, can co-create knowledge, innovate, adapt, and are able to solve societal and environmental challenges in interaction with the outside world. On the other hand, they are constrained by dominant institutional arrangements, governance regimes, market-driven logic, and competitive organisational culture, restricting appropriate and critical responses to changing environments and complex challenges, therewith hampering innovation (Baker-Shelley et al., 2017; Westley et al., 2011; Westley et al., 2013). Universities have perhaps not unrelatedly therefore been conceptualised as complex-adaptive systems⁴ (Crow & Dabars, 2015a; Katz & Kahn, 1978).

Sustainability science that researches how complex organisational systems like universities behave under conditions of high uncertainty and high stakes for decision-making enters into the arena of post-normal science (Funtowicz & Ravetz, 1993; Ravetz, 2004, 2006). This builds the case for interpreting the values and beliefs of social groups (and their mutual philosophies) within an organisation through hermeneutics, which is rooted in theories of interpretative communication. Relatedly, in Anderson's communication theory, he argues that interpretation is all filtered through prevailing cultural values, and that this value stance depends on the lens, paradigm, or worldview being employed by the prevailing vested agents in an organisation (1996). The value of hermeneutics in this study's methodology shall be revisited shortly after uncovering more about the philosophy of the transformative sustainable university.

As explained earlier, action research and social constructivism are similar but not synonymous. Action research is typically constructivist, yet research under the paradigm of social constructivism is not always action research. Gergen and Gergen's (2008) study confirmed a dialogical⁵ relationship between "constructionist thought" and the development of action research, finding "strong convergences ... in the emphasis on research as political action" that substitutes "methodological individualism" with "collaborative epistemology" and from a research vision of mapping "to one of world making" (Gergen & Gergen, 2008, p. 159). The premise emerges from both social constructivism and action research that any research on or about transformative social action can *itself* be a transformative social action. The distinction between the inquirer and the inquired is rendered a porous dialectic, and both form a social group referred to as a *dyad* (Guba & Lincoln, 1994). In this sense, a researcher may see herself as a

⁴ See Chapter 3, for more on the conceptualisation of the contemporary university as complex-adaptive knowledge enterprise, section 3.3.

⁵ I define 'dialogical' as communication in the form of 'dialogue' involving diverse perspectives within a defined socio-organisational, historical or even ecological context.

change-agent in a research project working *with* a co-research team, together seeking to cocreate knowledge that contributes towards positive change in the system under inquiry.

Like Gergen and Gergen (2008), Cook and Seely Brown (1999), and Crow and Dabars (2015a), in this thesis, I prioritise the evaluating research outcomes pragmatically over the vindication of theory. In the former, the pragmatics of research outcomes imply utility and implementation of cogenerated knowledge in an open, productive inquiry of a complex social and organisational system. In the latter, hypotheses are falsified against one theoretical school of thought, rather than an exploration of relative suitable theoretical schools to explain the system under inquiry. In this way, this works' epistemology adopts a pragmatic approach to sustainability science, where *intervention* is reframed as *inquiry*, that becomes "a creative process of collaborative theorising that leads to knowledge deemed relevant for the transformation of the practice in which it is grounded" (Ludema & Fry, 2008; Zandee & Cooperrider, 2008, p. 191): an epistemology of practice, where the researcher "recognises that inquiry and change are not truly separate moments, but are simultaneous. Inquiry is intervention, and the seeds of change ... are implicit in the very first questions we ask" (Crow & Dabars, 2015a; Ludema, Cooperrider, & Barrett, 2001, p. 15).

'Inquiry as intervention' therefore describes the epistemology of thesis, into the university organisation as object of inquiry, as well as regarding the methodological strategies chosen. With an eye to experimentation in the field, then, the notion of pragmatic idealism is methodologically useful to making broad and amorphous concepts like sustainability, public interest, equity and justice tangible through social inquiry (Bozeman, 2007). Citing Bozeman (2007) and Dewey (1938), Crow and Dabars (2015a, p. 222) emphasise the importance of Bozeman's derivation of pragmatic idealism from Dewey for the "fleshing out" of such values like democracy for example, through "discourse and deliberation with the public ... to which the institution is committed".

Relatedly, Dewey's concept of productive inquiry is described by Cook and Seely Brown (1999, pp. 386-388) in their bridging of the epistemologies of possession and practice, which Crow and Dabars (2015a) interpret as aligned with pragmatism. Moreover, its distinction between knowledge and 'knowing' corresponds with the aim of discovering transformative sustainability practices within universities. Their arguments further highlight productive inquiry as key since "what motivates us to action is in some sense a query: a problem, a question, a provocative insight, or a troublesome situation. It is *productive*⁶ because it aims to produce (to make) an answer, solution, or resolution" (Cook & Seely Brown, 1999). Crow and Dabars (2015a, p. 221) use the arguments of Cook and Seely Brown (1999, pp. 386-388) to explain how organisational theorists take up the pragmatist contention that knowledge implies action, claiming an explicit invocation of pragmatism in their analysis of the role of organisational knowledge in innovation:

"In knowledge-based organizations [they] correlate organizational knowledge with what they term the 'epistemology of possession', referring to what is known [knowledge] and 'typically treated as

6 *Italics as in original*

something people possess'. In contrast, the 'epistemology of practice'⁷ designates knowing, which is 'dynamic, concrete, and relational'. Knowing refers to the 'coordinated activities of individuals and groups in doing their real work as informed by a particular organizational or group context.' Because knowledge and knowing are complementary, their interplay has the potential to engender positive outcomes: "Understanding the generative dance (how to recognize, support, and harness it) is essential, we believe to understanding the types of learning, innovation and effectiveness that are prime concerns for all epistemologically oriented organizational theories." (Cook & Seely Brown, 1999, pp. 386-388; Crow & Dabars, 2015a, p. 221)

Fundamentally, in pragmatism, "thought and action are indivisible" as there is an "emphasis on the practical application of knowledge understood within the context of social practice", where the "abstract truth-criterion becomes less important than its effectiveness in solving problems" (Crow & Dabars, 2015a, p. 217).

Crow and Dabars (2015a) continue by paraphrasing Menand: pragmatism "is about how we think, not what we think" and beliefs and ideas tend to serve interests (Menand, 1997, p. xxvi; 2001). Moreover, Levin and Greenwood, observe that pragmatism makes strong validity claims⁸, as "people, whose personal interests (jobs, organisations, committees) are at risk in some way, believe sufficiently in the correctness of the knowledge they have collaborated in creating that they are willing to act on it" (2001, p. 104). Inquiry for Dewey thus represented the "power to reconstruct, or exercise control of transformation" (Crow & Dabars, 2015a, p. 217). Levin and Greenwood's statement that "[f]ew conventional social researchers would risk their personal well-being on the validity of their theorisations" also seems to credit pragmatism as a form of transformative action (2001, p. 104). Relatedly, Crow and Dabars proposed a prototype for a new university institutional design⁹ that embodies an "explicit advocacy of social embeddedness and recognition of its role in societal transformation" (2015a, p. 219). Taking all these standpoints together then, I cement pragmatism as part of the philosophy of a transformative sustainable university.

Building on pragmatism, and the epistemology of practice, a focus on the important notion of praxis as 'action' is also justified. Praxis is taken as meaning the embodiment of freedom manifested through the disclosure of agency in plurality, where freedom is not meant in the liberal tradition, as *liberum arbitrium*, but rather the innate capacity to start something anew and to do the unexpected (Arendt, 1958; d'Entreves, 2014). Arendt's and Gramsci's discourses and analyses of the potential of praxis orientations for emancipation and the overcoming of power imbalances (Gramsci, 1971), subsequently helps position praxis as a key tenet in this thesis. Praxis, as the capability to analyse ideas, theories and concepts, ground them, and engage in action, links with the methodological strategy of hermeneutics. Further explained: "a hermeneutical

⁷ *Emphasis added to emphasise the source of the epistemology of practice, a core concept in this thesis, and the metaphorical generative dance upon the shoulders of giants mentioned in the title and elsewhere.*

⁸ *In terms of John Dewey's notions of warranted assertions and validity claims in Logic: the Theory of Inquiry (1938).*

⁹ *Crow and Dabars (2015a) describe this design in light of the planned transformation experiment undertaken at Arizona State University.*

philosophy of research involves three components: lifeworld (as ontological and strategic), theory (as explanatory), and praxis (as constitutive of culture)” (Hellan, 1998, p. 269). In the sense that *hermeneutic* means the action or verb of understanding and interpretation, various social sciences use it as a methodological position to study people and society; they study what people do *as well as* how these people understand their world, and then how their understanding of their world *in turn* forms and constructs their praxis within it. In constructivism, researchers *subject themselves* into the system of inquiry so that they better understand and interpret the people constituting that social system. We can therefore position hermeneutics, with respect to praxis and pragmatism, where the study of transformative social action can therefore itself be a transformative social action (J. A. Anderson, 1996).

Considering the debate surrounding the role of the university in the 21st century (Collini, 2012; Cortese, 2016; Crow, 2004; Fallis, 2004; Halfman & Radder, 2015), and the complexity, scale and scope of sustainability challenges we face as a species, more reflexive and embedded research methods are required. Therefore, one objective of this inquiry was reflexivity on how action research can generate ways of knowing for stakeholders to better navigate institutional dynamics and complexity. A second objective that arose during the research trajectory was to remediate the contention of trying to apply action research on the university itself. In viewing the university as a culture and as an organisational system, this contention is observed as a systemic limitation to problem solving and transformative change of the academic system towards sustainability (Levin & Greenwood, 2001, 2008). The potential for further implementation of action research *within* universities will be explored and reflected on in Part C. Nonetheless, the role of ‘insider’ academic research within the university shall now be established as the means to ascertain the primary research question.

2.1.3 THE VALUE AND CHALLENGES OF INSIDER ACTION RESEARCH WITHIN THE UNIVERSITY FOR TRANSFORMATION

Action research in the early 21st century, after Guba and Lincoln (1994), has been defined as a ‘major research paradigm’ in itself, being one of three paradigms (including hermeneutics and positivism) under which one can do ‘insider-research’ (Brannick & Coghlan, 2007). It has much in common with traditional ways to engage in knowledge work, which expands knowledge into its counterpart, knowing, to include its practical implementation in real-world settings, and to defragment inquiry and intervention within universities and their surroundings (Cooperrider & Srivastva, 1987; Ludema et al., 2001; Reason & Bradbury, 2001b). However, action research in the specific context of *inquiry from within* universities needs to be delineated. This section will position insider academic research against the imperatives and philosophy of a transformative sustainable university, and the case for insider action research, specific to studying university transformation shall be made. Insider academic research is classified by Brannick and Coghlan’s (2007) as:

“research by complete members of organizational systems and communities in and on their own organizations, in contrast to organizational research that is conducted by researchers who temporarily join the organization for the purposes and duration of the research” (Adler & Adler, 1987; Brannick & Coghlan, 2007).

In insider research, the researchers immerse themselves in the organisation and need to build up knowledge about it from being an actor in the processes being studied (Coghlan, 2007; Evered & Louis, 1981). Whereas insider action research is a distinct strand of action research, insider academic research, although very similar, is not exactly synonymous with insider action research. This study follows Brannick and Coghlan's (2007) interpretation, where action research is one way of doing insider academic research; whereas, insider academic research may not always be undertaken through the paradigm of action research. However: "Action research provides the simplest basis for insider research" as it involves "change experiments on real problems in social systems within organizations" (Brannick & Coghlan, 2007). Hence, insider research that falls under the paradigm of action research is referred to as insider action research in this thesis. It is also identified as having the potential to reconcile organisational complexities specific to university transformation towards sustainability as we shall see.

2.1.3.1 CHALLENGES OF DOING INSIDER ACTION RESEARCH

As is often the case, challenges often come with agreeing on what something actually is before actually beginning to do it¹⁰. An insider academic research project could also be conducted under positivism or critical realism, for example (Brannick & Coghlan, 2007). Somewhat conversely, action research can also involve a wide range of methods, some of which may be viewed under positivist or other paradigms. I therefore try to summarise what I have learnt reflexively about insider action research to be explicit about its definition and application. The difference between action research that is not insider research, and insider action research, can be understood by looking at how 'inquiry from the inside' and 'inquiry from the outside' are similarly distinguished. Whereas inquiry from the inside experientially involves the researcher, requires the absence of a priori analytical categories, and an intent to understand a particular situation, inquiry from the outside calls for detachment, gathering data with a priori analytical categories and uncovering knowledge to be generalized to many contexts (Evered & Louis, 1981).

As well as the distinction between insider research and insider action research, it is therefore equally important to note the distinction between action research 'from the outside', and insider action research, which possesses distinct from an external action research approach (Coghlan & Casey, 2001). In this sense, one might not be a member of the organisation one does action research with, and one might use a number of pre-existing analytical categories to gather the data, but when participatively inquiring with the stakeholders, intimately including them in the research, this may still be defined as action research. More nuanced still, as Alvesson notes, insider action research is interventionist, whereas insider research that is not action-oriented may focus on observation and analysis without the aim to change anything (2003). Coghlan (2007) goes on to explain that while "many of the issues which apply to doing action research as an external agent pertain to insiders" there are challenges that specifically pertain to "executives considering action research in their own organization" (Coghlan, 2007).

¹⁰ *This also seems to be part of the problem, as pragmatists would argue one has to do something first to properly figure out what it is in trial-and-error! Many academics might disagree, which is why I include this section.*

Challenges specific to doing action research in one's own organisation range from being privy to information (whether tacit or explicit), pre-understanding, role duality, and managing organisational politics, associated with the perceived implications of one's research to its stakeholders (Brannick & Coghlan, 2007). Doing insider action research can indeed be political, and considered subversive, since many of its features "may be threatening to existing organizational norms" (Coghlan & Brannick, 2014, p. 151). Moreover, insider action researchers have to be aware of the ethical responsibilities that come with their own organisational and formal research roles, as role duality may create extra ambiguity and unnecessary conflict. Therefore, one may want to temper role duality and ethical responsibility by working more quietly to enact change from inside one's own organisation; what Meyerson (2001) termed as the 'tempered radical' role.

2.1.3.2 CHALLENGES OF DOING INSIDER ACTION RESEARCH WITHIN THE UNIVERSITY

Levin and Greenwood (2001) identified two challenges inherent to insider research; first, the tendency to straddle the hermetic boundaries of professional specialities, academic departments, colleges and the boundary between the university and society. Second, community inquiry initiatives on the organisation from its own members tend to be treated by university faculty and administrators as problems to solve, or as anomalies, rather than positive points of university community growth (Levin & Greenwood, 2001, 2008). Coghlan and Brannick (2014, p. 152) further identify the importance of maintaining credibility, playing the role of an "effective driver of change and astute political player". Whereas Pettigrew (2003) recommends building trust and relationships with people operating from different mental models, as well as being conscious of the fine line between acting in a politically astute manner and acting unethically.

Since action research is difficult to place in one methodological camp or the other, it therefore may succumb to criticisms about academic rigour. This corresponds with the sometimes-contentious experience of doing action research on and within a university. The researcher therefore has to remain realistically aware of the limitations of her prior mental models in representing the intricate and nuanced reality of the phenomena she aims to understand, especially when the researcher herself is also 'in the mix' of the system under investigation, and is unable to form a completely objective view of herself within it.

This is indeed a wicked and contentious issue to resolve, as different paradigms are perceived as incommensurable in the university according to Horgan (2012), based on his interview of Thomas Kuhn in 1991. There are no objective rules, nor common standards of comparison for paradigms, and "[p]roponents of different paradigms can argue forever without resolving their basic differences because they invest different terms - motion, particle, space, time - with different meanings." Thus, scientists themselves do not easily yield to a new paradigm. Horgan notably concludes that "[t]he conversion of scientists is thus both a subjective and political process" (Horgan 2012). Therefore, an essential opportunity and a risk in insider academic research is the political and paradigmatic context under which it operates (Brannick & Coghlan, 2007;

Hoover & Harder, 2014), and how this could then affect the campus laboratory phase of an action research project (Coghlan & Brannick, 2014; Heiskanen & Rask, 2008; Waterman, Tillen, Dickson, & de Koning, 2001).

Therefore, the barriers that the design and philosophy of the university may pose to action research (even when fairly external) are ever-present; “universities do not privilege action research because they have built themselves into self-isolating, autopoietic¹¹ structures dominated by disciplinary departments, colleges and the coercive behaviour of professional academic societies and their journals and presses” (Levin & Greenwood, 2001). Action research *from inside* universities is “rare, difficult to create and even harder to sustain” as Greenwood and Levin (2006) demonstrated (see also Reason and Bradbury (2001a) and Bradbury (2015)). Barriers experienced by insider action researchers can also include vested interests in the status quo blocking planned participative research endeavours that question existing practices, aiming to encourage organisational learning and thus leverage positive transformation of the university (Coghlan & Brannick, 2014, p. 151).

Wicked problems like these, present within the design and agency of the university, are important to realise, as pre-conceptualisation can affect how the research may resolve social complexity, and defragment the understanding of the organisational system (Conklin, 2006; Rittel & Webber, 1973). Moreover, historicity adds to this complexity and inertia since university teaching structures are rooted in institutional designs that are hundreds of years old and not easy to redesign (Crow & Dabars, 2015a, 2015b; Levin & Greenwood, 2001). Non-dialogical communication processes may reinforce mutual unintelligibility between faculties and departments that arise from organisational politics that need to be managed effectively and strategically by insider action researchers (Brannick & Coghlan, 2007). Filiopietism¹² and esoteric principles like the “Inviolable principle of the ‘radical’ separation of the researcher and the subject” (Levin & Greenwood, 2001) can also obstruct actors from undertaking action research, which may increase the likelihood of cogenerating knowledge outcomes and positive societal impact.

Additionally challenging is the paradox nature of universities learning about themselves, as “universities exhibit few of the characteristics of learning organisations” (Argyris & Schön, 1996). This is an odd paradox: “the institutions that claim the position of the premier and most advanced knowledge producers in society frustrate learning and social change in most of their internal processes and in their articulation with the surrounding society” (Levin & Greenwood, 2001). This conditioning runs the risk of leaving universities at the behest of their own arcane mysticism, where traits of self-effacing, world-detachment, and revelation run perilously close to an organisational pathology of schizophrenia – in as much as can manifest in an aggregate organisational psychological distortion of consciousness (Parnas & Henriksen, 2016). Resolving this

11 *Used by Levin and Greenwood (2008, p. 1) to describe the ‘self-producing’ structures of universities that they argue need to be reorganised to meet challenges of universities regaining public support via action research and its strategies of concrete problem-solving and facilitating deeper reflection between various stakeholders and disciplines.*

12 *The worship of tradition, often at the expense of efficacy or reason.*

paradox within universities thus requires epistemological reflexivity on the history and philosophy of science, as well as our scientific institutions: “Ever since Descartes, the western intellectual tradition has suffered from a form of epistemological schizophrenia” Popkin (1979)); it nobly intends to generate knowledge to enhance the human condition, yet the methodological starting point of negation and doubt undermines its constructive intent (Ludema et al., 2001, p. 198).

Insider action research can also struggle with methodological problems that the practice of sustainability science in the post-normal arena generates, resulting in scales of action inquiry – first-, second-, and third-person¹³ as in Torbert (2001), inter alia – being seen as superfluous, over-involved and unnecessary to the core activities of the social science researcher. Academic disciplines, as social constructions, may reinforce entrenchment of identity into research schools and their underlying theoretical perspectives that can act as barriers to transformative change for sustainability¹⁴. Moreover, the capacity to generate performative knowledge in a co-research group¹⁵ inside a university organisation through praxis, may be hindered by unintelligibility and divergence about *how* to do such sustainability-related research. In this project, specific challenges arose from direct opposition and explicit discomfort to the manner the inquiry was being undertaken, as well as the desired access to information. What was espoused at the outset and then allowed were different once the project was underway (Coghlan & Brannick, 2007). Different views were held that were not commensurate with each other regarding what action research was and was not, which therefore affected what forms of (action) research were deemed acceptable. Hence, difficult questions begin to emerge regarding the coresponsibility and competencies for insider action research projects: *“Faculty need skills in working with action research: This may or may not involve a major philosophical orientation of some faculty to include action-oriented epistemology and training to work with action research in order to develop actionable knowledge”* (Coghlan, 2007, p. 303).

Firstly, to what extent can a sufficient level of practical action research expertise be required to direct and supervise insider action researchers in training (Coghlan & Brannick, 2014)?; secondly, what are the actual limitations on the capacity and permission for the insider action researcher to facilitate positive change in collective inquiry with coresearchers?; and finally, what should the preconditions be for experienced social science researchers to work along various principles of action research?

2.1.3.3 CHALLENGES OF DOING INSIDER ACTION RESEARCH ON TRANSFORMATION IN UNIVERSITIES

In the context of researching university transformation towards sustainability, insider action research was seen as being able to disentangle the complexity of doing action research in your own university, and thus augment and clarify the dynamic role science

13 Explained in the next paragraphs with the application in the ICIS-GO PhD.

14 One could argue from the deep ecological perspective that the Earth system is actually adisciplinary.

15 Meant in the sense of an action research community of inquiry and practice; the researcher is not isolated in the research project individually but regularly must share and receive knowledge with the co-research team.

can play in transformation toward greater socio-ecological well-being. This complexity can be framed in the post-normal scientific arena, as it operates under assumptions of unpredictability, incomplete control and plurality of legitimate perspectives (Funtowicz & Ravetz, 1993). Researchers that operate across social scientific and organisational boundaries can come under strain when the legitimacy, saliency and credibility of their research designs are interpreted and evaluated differently by the diverse stakeholders who are involved in their insider action research (Cash et al., 2003; Offermans & Kemp, 2017). This relates back to relativism, where the facts are uncertain as they are rendered by power and agency and interwoven with subjective interpretations and normative judgements from varying value-laden theoretical perspectives.

These complex challenges of doing insider action research for transformations of universities - 'working institutions from the inside-out' - require reflexivity and candidness with oneself and others, regardless of perspective or stakeholder placement. Organisational and social factors, like individual attributes, management style, relational processes, interpersonal skills and culture and organisational identity are all quite subjective concepts that are hard to research well solely from a positivistic stance. The researcher may not have the heuristic tools and manoeuvrability to understand the rich tapestry of mental models actors use to operate and understand their social and organisational environments. Thus, there is a fine tight-rope to walk along the spectrum between honest broker and active team member; between acting as a critical insider and friendly outsider; between researching transformation and actively working for transformation (Baker-Shelley, 2016b; Offermans & Kemp, 2017).

Effectively and reflexively balancing the role of researcher, practitioner and organisational member may therefore reconcile knowledge into being tangible and useful as a targeted outcome for actors working towards positive change in their own university organisation. Balancing roles justifies a focus on social identity processes in organisational contexts, and the ambiguity of organisational roles and memberships. Further, according to Ashforth and Johnson (2001), 'situational axes' create boundaries that push action researchers to beyond the periphery as they remain unsure about the degree to which they have standing as an insider – also known as imposter syndrome. In this framing, organisations are notably depicted as a network of individuals, connected by mutual goals and structures, who move laterally across provisional and permeable boundaries (Ashforth & Johnson, 2001). This has implications not only for the outcomes of such projects, but for the mental wellbeing of the researcher herself, as this situation adds another layer of psychological stress to the project.

2.1.3.4 THE VALUE OF DOING INSIDER ACTION RESEARCH ON TRANSFORMATION WITHIN UNIVERSITIES

To summarise, Levin and Greenwood (2001), amongst others (Coghlan & Brannick, 2014; Greenwood & Levin, 2006; McCormack & Dewing, 2012; Reason & Bradbury, 2001a; Torbert, 2001; Waterman et al., 2001) have shown how despite the challenges inherent to doing insider action research on transformation in universities, complexity and fragmentation may be reconciled by properly designing action research. Crucial for this design is being aware that experimenting with manners of action inquiry

may prove instrumental to forming a novel understanding of how an action research project can create *Möglichkeitsräume*¹⁶ to develop sustainability solutions and outcomes from praxis. Effective design of action research combats and seeks to disclose the foundation of tacit knowing, behavioural patterns and qualities directly through analytical and interpretative rigour, emancipation, and praxis. Insider action research within the university has potential to interweave and enervate three ancient functions:

- *theoria* (thinking/contemplating) in *vita contemplativa*,
- *poiesis* (making/fabricating – *techné*),
- and *praxis* (acting/doing/generating) in *vita activa* (Arendt, 1958)

These are deeply rooted in the design and philosophy of the university. In this sense, it becomes clear that in order to study the complexity of organisational transformation for sustainability from the insider perspective, one needs to take a post-normal approach that is, in this case, operationalised through action research. In this post-normal scientific context, there could be unexpected benefits for higher education, as “[a]ction research can increase the relevance of universities and better use the marvellous intellectual resources which sometimes atrophy in increasingly fragmenting intellectual pursuits” (Reason & Bradbury, 2001b). Ludema et al. (2001) further show that action research “merges professional knowledge with local knowledge in a process of collaborative sense-making” which can help defragment and unscramble the paradox of organisational learning in university communities. Levin and Greenwood (2001) thus proposed making action research a core activity in university life. Importantly, they concluded that action research has a strong case for becoming a more dominant form of social science inquiry in universities and other types of public administration (like government agencies) as all these organisational types make claims to improving our societies through knowledge creation (Levin & Greenwood, 2001).

The structural and cultural inertia of many a university, which erodes the space for praxis¹⁷ to take place amongst its community, challenges and arguably precludes the ability of university actors to understand how their own organisation works with regards to its sustainability. This is particularly prevalent when one considers the paradox of our organisations of learning failing to adequately learn about themselves¹⁸. The forest of branches of academic knowledge in increasing specialisations, and the dichotomisation of theory and practice, critique and appreciation, deficiency and possibility, can hinder the potential of university actors to cogenerate knowledge and

16 From the German, ‘possibility space’, bolstered in practice by Leuphana University’s reference to itself as “*Universität als Möglichkeitsraum*”.

17 To clarify: in thesis, based on Arendt et. alia., I attribute different meanings to ‘practice’ and ‘praxis’. ‘Practice’ I define as an execution or implementation of a particular (professional) discipline, skill or craft, which aims at improvement over time. ‘Praxis’ overlaps with ‘practice, except that it also importantly includes and describes the exercise of action in democratic exercise amongst individuals; a political agency and freedom to act and create new things alongside professional practice.

18 See Chapter 1; despite universities being organisations of learning, they struggle to set up structures to promote their own organisational learning (Stephens et al., 2008).

ways of knowing that increase sustainability outcomes in the real-world. Doing insider action research could therefore be a necessary means to defragment the complexity of organisational transformation for sustainability. In this inquiry, I reflexively learnt that examining and weaving together useful strands of action research could strengthen the synergy of approach needed to understand and tackle the paradox of university organisation. To transition into the next section focussing on synergy, then, I finish with how Reason and Bradbury have described the value of working with this approach, to show how, despite the challenges, this approach is valuable for IAR on transformation in universities: “[I]n action research knowledge may be defined as what we’ve learned working in the context of action, and that is the result of the transformation of our experience in conversation with both self and others that allows us consistently to create useful actions that leave us and our co-inquirers stronger.” (2008c, p. 5).

2.1.4 SYNERGISING ACTION RESEARCH, ORGANISATIONAL DEVELOPMENT & TRANSFORMATION WITHIN THE UNIVERSITY

Given that action research is a family of approaches that has potential to reconcile, resolve and defragment social and organisational complexity, the following sections will explore the strands of action research found most suitable to understanding the ‘how’ of systemic change of universities towards sustainability. Now that inquiry from within universities for transformative and systemic change has been established, more convergence and synergy between organisational transformation and action research is sought to further clarify the importance of this relationship in the methodology.

2.1.4.1 INTRODUCING ORGANISATIONAL DEVELOPMENT & TRANSFORMATION

In recent years, it has been observed that universities begin to experiment with a variety of new forms of organisation to overcome fragmentation and disruptive external perturbations. The fields of organisational development and organisational transformation may help to explain, analyse and evaluate these experiments.

The fields of organisational development and organisational transformation analyse fundamental change in the principles of how a system operates. One commonality in the literature is acknowledgement that organisational transformation takes place through paradigm replacement, where deeper leverage points triggering this phenomenon are both the most effective and most immutable, and should therefore be evaluated at different levels (Cacioppe & Edwards, 2005; Edwards, 2009, 2010; Meadows, 1999; Porras & Silvers, 1991; Romanelli & Tushman, 1994). Porras & Silvers (1991) proposed a model of planned change consisting of functions of organisational development and organisational transformation defined on a gradient of depth¹⁹ from alpha to gamma change (see Table 1). This is useful for understanding the nuanced distinction between organisational development and organisational transformation. They note that “[o]rganizational change is typically triggered by a relevant environmental shift that, once

¹⁹ In this thesis, when I refer to depth of transformation, I mean it in the sense of Porras and Silvers (1991): the level of organisational development and transformation is rooted in cognitive change and the intrinsic logic of an institution; corresponding to alpha, beta, gamma-A, gamma-B change. I highlight gamma change as most associated with organisational transformation, and the deeper pathways required to bring it about and navigate it.

sensed by the organization, leads to an intentionally generated response” (Porras & Silvers, 1991).

Gamma change arguably requires a plurality of theoretical lenses and epistemological flexibility to research. Therefore, an organisational transformation constitutes a shift in mindset to the extent that actors begin to realise the limitations of one paradigm and experiment with seeing and cognizing through others. An *organisational paradigm* may be defined as: a prevailing worldview or collective belief system; the fundamental set of beliefs or organizing principles which are unquestioned and un(der)examined assumptions about the nature of reality (Porras and Silvers (1991). Accordingly, deeper systemic leverage points provide the most resistance to intervention (Meadows, 1999), thus effective attempts at positive transformational change require a shift in organisational paradigm.

In Kuhn’s seminal work on the structure of scientific revolution²⁰, he proposed the notion of paradigms as a shared set of beliefs, methods or practices, which one qualifies within as a doctorate candidate for example. There is usually one upheld paradigm that is resistant to change up until the point where its theorems, hypotheses, propositions and concepts no longer sufficiently explain the phenomena it is meant to accurately encapsulate (Kuhn, 1996). Both Meadows in her leverage points framework, and Porras and Silvers in their research on organisation development/transformation refer to paradigmatic and cognitive change (Meadows, 1999; Porras & Silvers, 1991).

Edwards (2010) posit that organisational transformation can be viewed through multiple theoretical lenses, proposing metatheoretical research to achieve higher sustainability in organisations. In his integral, pluralistic metatheory of organisational transformation for sustainability, he uses a number of such lenses, of which the transformation-translation lens is one (2010, p. 111). Edwards uses this lens for example to contrast theories of transformation with theories of stability, between radical, transformative, translational or regulatory change. This seems consistent with the differences between socio-technical change theories and meta-theoretical research of organisational transformation. This also corresponds to first and second-order socio-organisational change, and the alpha to gamma-change depicted in Table 1 (Porras & Silvers, 1991).

Organisational transformation has also been perceived as “planned and primarily directed at creating a new vision for the organisation” (Porras & Silvers, 1991, p. 54). In this research, I try to understand whether this is actually the case. For example, might organisational transformation occur through the development of a capability for continuous self-diagnosis and change, in turn requiring accurate, meaningful and comprehensive internal evaluation and reporting of organisational performance. It could be said that continuous self-diagnosis and cognitive change at the individual and group level is related to, and precedent to effective organisational learning. Action research is believed to bring about this learning, as it can increase the capacity of the whole system of stakeholders to see deeper systemic patterns present in social and

²⁰ *Ipsa facto a systemic revolution from within the community, administration and philosophy of the scientific organisation itself. When I refer to systemic change of the university throughout my thesis, this is what I mean.*

A- Alpha Change	change in the perceived levels of variables within a paradigm without altering their configuration (e.g. a perceived improvement in skills).
B- Beta Change	change in people's view about the meaning of the value of any variable within an existing paradigm without altering their configuration (e.g. change in standards)
Γ- Gamma (A) Change	change in <u>the configuration of an existing paradigm without the addition of new variables</u> (e.g. changing the central value of a "production-driven" paradigm from "cost containment" to "total quality focus"; this results in the reconfiguration of all variables within this paradigm)
Γ- Gamma (B) Change	<ul style="list-style-type: none"> - the <u>replacement of one paradigm with another that contains some or all new variables</u> (e.g. replacing a "production-driven" paradigm with a "customer-responsive" paradigm) - radical shift in an individual's assumptions about causal relationships, the values attached to various dimensions of reality, and the interpretive frameworks that describe reality... <u>a paradigm shift in organisational members' mental constructs</u> (Kuhn, 1996).

Table 1: Depth of change in organisation development and transformation can be described in levels of cognitive and radical mindset change of the individuals and dyads in organisations, adapted from Porras and Silvers (1991).

organisational life (Ludema & Fry, 2008). Notably, according to Coghlan and Brannick, "action research is one of the distinctive features of organisation development as well as one of its core origins" (2014, p. 54). The link and relationship between action research and organisational development and transformation now appears more cogent. However, this link still needs more justification with an overview of the family action of research.

2.1.4.2 THE FAMILY OF ACTION RESEARCH: AN OVERVIEW

In the hermeneutic tradition of organisational research, the researcher enters the site with as few theoretical preconceptions as possible, given that *tabula rasa* in this context can never be attained under post-normal science and social constructivism (Brannick & Coghlan, 2007; Guba & Lincoln, 1994). Although, there can be a sense of awareness that these theoretical conceptions are not completely predetermined by disciplinary schools of thought. In order to allow for enough diversity in conceptions, perspectives, and knowledge sources, then, this section takes the starting point of Offermans and Glasbergen (2017) that "[a] typical action research design is characterized by continuous interactions between researcher and practitioners in which research questions and approaches are defined in co-construction. Research is a joint endeavour and includes cycles of action and reflection" (Offermans & Glasbergen, 2017).

This design of continuous coresearch in action helps to explain why the decision to actively involve stakeholders is considered a necessity; it allows for the breadth and depth of perspective to emerge from the process. Broadly, action research has been defined as a family of approaches, whose practices are represented in a diversity

of knowledge fields, from community development, organisational development, business management, education, healthcare, medicine, social work, and the human social, psychological and transpersonal sciences (Cordeiro, Soares, & Rittenmeyer, 2017; Reason & Bradbury, 2008b; Torbert, 2001).

Fundamentally, action research can also be seen as a holistic approach to problem-solving (Arslan, 2016). Waterman et al. (2001) have further defined action research as “a period of inquiry, which describes, interprets and explains social situations while executing a change intervention aimed at improvement and involvement. It is problem-focused, context-specific and future-oriented.” According to Cordeiro et al. (2017) action research has four fundamental phases, including the importance of *praxis* and *emancipation*: “participation and collaboration; a constant spiral cycle of self-reflection; knowledge generation; and practice transformation” (Cordeiro et al., 2017). Action research is also inherently participatory, following a democratic approach to knowledge production, with the researcher being actively involved in intentional change to increase the chances of social and organisational learning taking place. We can also use Reason and Bradbury’s definition (2008b) to illustrate the core tenets of action research:

1) It is a “set of practices that responds to people’s desire to act creatively in the face of practical and often pressing issues in their lives in organisations and communities;”

2) It “calls for engagement with people in collaborative relationships, opening new communicative spaces in which dialogue and development can flourish;” the researcher and co-researchers are in a social relationship not an objective distinction.

3) It “draws on many ways of knowing” – it requires a pluralistic exploration of different theoretical and pragmatic schools of thought.

4) Is “values oriented, seeking to address issues of significance concerning the flourishing of human persons, their communities and the wider ecology in which we participate”.

5) Is “a living emergent process that cannot be predetermined but changes and develops as the engaged deepen their understanding of the issues to be addressed and develop their capacity as co-inquirers both individually and collectively.” (Reason & Bradbury, 2008c)

Having now defined and summarised action research, the next section homes in on strands that could best fit the inquiry into organisation transformation for sustainability within the university.

2.1.4.3 FITTING STRANDS OF ACTION RESEARCH TO ORGANISATION TRANSFORMATION WITHIN UNIVERSITIES

There are theoretical and practical underpinnings for using action research to inquire into organisational transformation in the literature. One strand, *developmental action inquiry*, demonstrates correspondence between theories of organisational transformation and action research and was developed in its application to transforming

organisations, leadership and employees by Torbert and colleagues (Edwards, 2010; Torbert, 2001). Both the integral meta-theory of organisational transformation (for sustainability) and action inquiry share the purpose that “it is the developmental structures and processes that explain the transformation of organisations” (Cacioppe & Edwards, 2005). I therefore use the strand of ‘action inquiry’ to characterise the ICIS-PhD project as a *transformative action inquiry*. Yet this does not seem sufficient to help grapple with the aforementioned challenges of role duality, access to information, bias and chicanery.

BOX 2: TOOLS OF ACTION RESEARCH

Usually, a combination of tools are used, as overviewed by
(O’Brien, 1998):

Keeping a research journal

Document collection and analysis

Participant observation recordings

Questionnaire surveys

Structured and un-structured interviews

Case-studies

Search conferences: developed exclusively for action research

Another strand can be seen in the Zurich 2000 description of transdisciplinarity, which operates as a *co-generative* Scandinavian style of action research, where the researcher and practitioner have an intense association, with both sides defining the problems, giving mutual feedback, before retreating back to their conventional work streams (Elden & Levin, 1991; Scholz, 2011, p. 393). The researcher and the practitioner are in it together: a jointly organised transdisciplinary process where the practitioners are viewed as coresearchers, and researchers aspire to an authentic dialogue with their coresearchers, whose content is often ambiguously defined (Argyris & Schön, 1996; Scholz, 2011). This means problem definition is often emergent in the moment, with no prior or explicit deductive conceptual framework, and solution formulation and implementation must be shared. This strand seemed very relevant to working alongside the Green Office in this project; however, it risks becoming very embedded psychologically and emotionally, which may affect the ability to view the whole system.

O’Brien (1998)’s review allows an even better understanding of the different strands of action research. *Contextual action research*, for example, is domain-based, and consists of the reconstruction of social relations among actors in a social environment, or organisational ecology. It is ‘holographic’ in aiming to help each participant understand the working of the whole, where they act as project designers and co-researchers in the process (O’Brien, 1998). This would at first seem appropriate; however, this could not be clearly reconciled to the insider research of the university, which as explained earlier, presents unique paradoxical challenges often involving power-games and academic career struggles. Indeed, relevant to *radical* and *transformative* elements of action

research, Geoff Mead, a police detective cited by Reason and Bradbury remarked “*I think this dimension of action research brings its own pressures. The empowerment offered by action inquiry/research to the managers etc. we sometimes work with is subversive of the status quo of existing power structures. Doing action research in organisations often feels to me like a subtle form of guerrilla warfare – perhaps this is inevitable?*” (2008a, p. 699).

Whereas, *radical action research* emerged from Marxian dialectical materialism and feminism in praxis orientations, and focusses on emancipation and the overcoming of power imbalances (Gramsci, 1971). Similarly, *participatory action research* is rooted in liberationist movements, international development, and *feminist action research*, which both strive for social transformation via an advocacy process to strengthen peripheral groups in society (O’Brien, 1998). Whilst emancipation and feminism are relevant to key constituents in the university (particularly women in academia, and student activist groups), these strands, however laudable, do not quite match the sometimes mundane and subtle bureaucratic and organisational complexity of governing a university. Also, the degree to which women in academia are an excluded peripheral group, and what positive effect their emancipation might have on transformative change for sustainability, might vary according to one’s national, cultural and ethnic background, as well as the researcher’s own privilege²¹.

Another notable strand is *transformational action research*, which “creates the conditions for practitioners and service leaders/managers to take responsibility for the social significance of action and to become empowered to change”, where active learning is a strategy within it. This mode also focusses on praxis, “which Freire articulated as action that is informed (by theory) and embedded in certain values” (McCormack & Dewing, 2012). Titchen and McCormack’s approach to transformational action research synthesises the paradigms of critical social science and critical social theory to arrive at what they term ‘critical creativity’ (Titchen & McCormack, 2010). The criticality deconstructs and diagnoses a problem situation “to develop new understanding for the purposes of transformation of practice and generation of new knowledge”; the creativity uses imagination and expression in order to apply meaning to a holism of transformation. The fusion of the two is a “way of being, knowing, doing and becoming” that enables us as researchers “to understand and facilitate the transformation of practice and, simultaneously, create new knowledge about that transformation” (McCormack & Dewing, 2012; Titchen & McCormack, 2010).

Nonetheless, this strand did not seem to tackle the complexities attributable to researching one’s own organisation, as the last section explained. As such, critical approaches may not quite arrive at the root of the problem, nor adequately discover unknown alternative possibilities of social organisation. With respect to its utility in resolving this, the strand of *appreciative inquiry* seems to operate at a more epistemological level. It is built on the notion that “human systems grow and construct their future realities in the direction of what they most persistently, actively and collectively ask questions about” (Ludema et al., 2001). It is a mode of action research that seeks to

²¹ Given the privilege and power accorded to me as a British white male, I would certainly have had to check mine at the door were I to have adopted these methods. I also consider action research to be generally emancipatory and subversive.

go beyond critical theory efforts (Guba & Lincoln, 1994) to “discover, understand and foster social and organisational innovations through language” (Ludema et al., 2001). Appreciative inquiry was observed to have high potential as a collaborative, strength-based approach for the study *and change* of organisational and social realities. It “invites the researcher to wholeheartedly engage with the complex, messy and emergent nature of organisational and societal life” and should enable innovative research into change-agencies at specific times and places, as well as an “intuitive approach to inquiry rather than a mechanical use of available techniques” (Zandee & Cooperrider, 2008). The employment of this strand may thus encourage and generate alternative and more meaningful ways of social and organisational living in universities. This also has potential to ameliorate the problem experienced in the practice of sustainability science in a post-normal world: the lack of credibility, legitimacy and salience in interpretative communication, that renders sustainability change-agencies subject to deficit discourses construing an isolated negative organisational performance (Zandee & Cooperrider, 2008).

Following this juncture, framing action research as ‘transformative’ (as distinct from transformational) research may reflect its asset specific to this thesis; that it can challenge established theoretical perspectives about the way research is conducted within the academic organisational system, therefore increasing the capacity to transform the system towards sustainability. Hence, action research holds transformation as *both the ends and the means of getting there* for organisational research (McCormack & Dewing, 2012). As well as knowledge communication, the researcher is concerned with the transformation (and learning) of herself, in addition to participants, coresearchers and other stakeholders, whilst also diagnosing whether this is actually happening²² (McCormack and Dewing 2012). Needless to say, this takes a substantial amount of training, learning and failure.

Pursuing this further, interpreting the meaning of accounts and creating recommendations based on their reliability, validity and representativeness seems to also lend itself to the cogenerative approach of *pragmatic action research* (Levin & Greenwood, 2001, 2008). Action research in the pragmatist sense aims to facilitate social learning and the development of novel, scientifically sound, yet practicable knowledge by involving relevant stakeholders, including the researcher, in multiple cycles of planning, action, observation and reflection (Waterman et al., 2001). The advantages of this approach are that it shows different ways of thinking about causation and new venues for inquiry and collaboration. It is inter-methodological, and additionally useful when combined with cross-case comparison²³ to address non-causality in disentangling a complex web of connections (Collingwood in Moses and Knutsen (2012)).

Accordingly, *pragmatic* as well as *insider* forms of action research seem appropriate for seeing how deeper ‘gamma’ change (see *Table 1*, Porras and Silvers (1991)), or organisational transformation, may take place from within the thinking and behaviour

22 This can, and has been in this project, very difficult to maintain, yet incredibly rewarding in terms of findings, as we shall see in Parts B and C.

23 This supports the combination of action research within UM, with the external embedded university transformation case studies abroad.

of the individuals and groups that belong to a university. To counteract the doubt and negation sometimes observed in the university (Ludema et al., 2001; Popkin, 1979), *appreciative inquiry* is also integrated in the research practice. In conclusion, focussing on action inquiry, appreciative inquiry, insider, and pragmatic strands of action research can now be supported in the methodology, as they fit the conditionality, purpose and subject matter of the inquiry into organisational transformation for sustainability of universities, from within.

2.1.5 PRAGMATIC INSIDER ACTION RESEARCH WITHIN UNIVERSITY ORGANISATIONS

Thus far, it can be seen that insider action research projects, especially those that ascertain elements of organisational transformation for sustainability, create the conditions for experiential and reflexive practice (Baker-Shelley et al., 2017; Popa et al., 2015). Yet there is no perfect fit between the numerous and diverse strands of action research and the research topic, aim and methodological challenges, because its conditions are unique, as are the conditions under which any of these strands took shape. With respect to this observation, we can see that under conditions of fragmentation, social complexity, high stakes and uncertainty, a fusion of the pragmatic and insider strands of action research has the most synergy with understanding and navigating transformative change of universities towards sustainability.

During the 5-year inquiry at UMGO and sustainability research institute, ICIS, the ICIS-GO PhD aimed to engage both agencies, hence the name ICIS-GO, as a living laboratory using action research to find tangible systemic rubrics for organisational transformation towards embedding sustainability. When the first and second-person inquiry was followed as to what sort of research praxis encourages self-reflection in organisations, the realisation central to appreciative inquiry seemed to fit the problem situation the most: is not inquiry itself a means of intervention? This was found to be one promising solution to complex and systemic problems experienced by scientists, practitioners and change-agents engaged in sustainability work as subjects of this inquiry. This insight emerged and was shared with the Green Office in 2017 in the design of an SDG-mapping project, as well as other related stakeholders.

From this standpoint, three strands of action research are interwoven for their best fit to this inquiry. It will be seen later what the relevance of this diversity in approach has, both in terms of better explaining how the research was undertaken, and evaluating other kinds of transformative sustainability research, education and practice originating from the case-studies. It was therefore envisaged that being aware of the overlaps and distinctions between appreciative inquiry and an adaptive form of *pragmatic insider* action research was very important as the ICIS-GO PhD project's trajectory developed, especially in its latter stages. Indeed, the form and nature of action research approach was mostly informed through grounded experience and interpretative necessity.

As *Chapter 3* will show, the search for core elements of organisational transformation for sustainability was also grounded in workshops and interviews with UMGO and ICIS actors and change-agents in 2014 and 2015, as well as the conventional desk research. This allowed insight into the experience and patterns of transformation for sustainability such as multi-scalar triggers, leverage points or determinants that imbue

the organisation with energy for positive change. The decision was therefore taken not to pre-select existing frameworks for usage in order to answer how transformation *of, by and for* university actors themselves takes hold and propagates. This seems to be because the phenomenon of organisational transformation is rooted in the intrinsic logic of the institution itself.

The reasoning behind this chapter's defragmentation of strands of action research, implementable within and by universities has hopefully now been established. The imperative of integrating action research's with more established approaches to scientific inquiry grows as does the scale and scope of our species' ecological overshoot, as well as social dislocation from each other, which comes "precisely at a time when seeing the whole and acting appropriately in light of the insights is so important" (Reason & Bradbury, 2001b). It may thus be concluded that in the context of transformative sustainability within universities, approaches to action research can be grounded in productive inquiry and pragmatic idealism, applying innovation and experimentation within the university itself. This is because such qualities seem necessary for sustainability solutions to be shared and actualised sufficiently to keep pace with the rate of increase and complexity of sustainability problems we see at a global level. To work in tangible solution formulation for society's problems thus requires recognition of the deeper leverage points in the systems in which we all operate; in other words, increasing awareness of the mind-set from which the system's *modus operandi* springs, as well as of our adherence to it, enabling the capacity to transcend problems inherent in it (Meadows, 1999). These leverage points can be mind-sets, exemplars, incentives and constraints that are often unconscious, disguised by our belief and self-worth with respect to our work and the organisation to which we belong (Abson et al., 2017; Mlodinow, 2013).

This thesis is also rooted in an evaluation and reflection of 5 years of pragmatic-insider action research, based at Maastricht University, UMGO, and ICIS. This inspired the investigation of pioneering and alternative experiences of organisational development and transformation seen in the external case studies. Fundamentally, the operative concept is that of encouraging deeper, more meaningful ways of social and organisational life, to study that which generates energy for transformation within a human system like a university. This is therefore what grounded the primary research question: *how can universities (and actors within them) effectively navigate organisational transformation for sustainability?*

APPLICATION OF PIAR IN THE ICIS-GO²⁴ PHD: SCALES OF INQUIRY

Under conditions of fragmentation, social complexity, high stakes and uncertainty, a fusion of the pragmatic and insider strands of action research now seems suitable for navigating transformative change of universities towards sustainability. It can be said that a systemic *inter-relationship* exists within the university and with its surroundings. Accordingly, I approached researching transformation of universities through the lens of holism and duality (Giddens, 1984), understanding universities as complex-adaptive organisational systems which are furthermore embedded in natural systems (see *Chapter 3*). UMGO,

24 'ICIS-GO' - Maastricht Sustainability Institute (MSI, formerly, ICIS) and Green Office (GO).

ICIS and UM were viewed as systemically interdependent, all affected by similar contexts, conditions and perturbations. The inquiry is framed as an intervention (Ludema & Fry, 2008; Zandee & Cooperrider, 2008); organisational transformation for sustainability of universities was investigated, alongside UMGO, ICIS and UM staff, so as to ascertain how universities navigate transformative and systemic change, where inquiry and change were simultaneous rather than separate (Ludema et al., 2001).

This project's organisational research therefore aimed at the active participation with UMGO and other UM actors, as well as positive social impact on the relationship of the university with itself and its surroundings. This aimed at the active participation with(in) UMGO and ICIS, *as well as* the social impact of this research on the university and its surroundings. Based on Reason and Bradbury (2001b), action research efforts are characterised via *first*, *second*, and *third-person* inquiries in respective scales of inclusion of individuals and groups, aspiring towards creating a 'wider community of inquiry' at the organisational level. These scales of action inquiry, as above with the synergy of certain strands, can be applied in the following ways: firstly, in first-person inquiry, conscious learning and reflection on the experience of implementing action research; secondly, with the second-person inquiry, transparency and clarity about failures in the research design; and thirdly, with the third-person inquiry, awareness of which conditions hinder an enlarged community of inquiry based on an epistemology of practice (see *Figure 3*).

In the ICIS-GO PhD's inquiry itself, these equate to: the UM campus-level test bed (third-person), interpersonal dialogue and collective inquiry within UMGO of the researcher and GO team as 'co-researchers' (second-person), who address issues of mutual concern in improving professional sustainability practice within universities (Reason & Bradbury, 2001b). The first-person inquiry consisted of my own observations of: the organisational-social environment hosting this project, the participant's experiences of organisational life, personal and professional aspirations, principles and experiential learning in the research, and the reflection, evaluation and feedback on interventions and inputs received in the project. The raw data for this first-person reflection, that of the second-person collective inquiry alongside the GO, as well as how these may constitute a third-person organisational learning and development, were five years of research journals that formed the backbone or red thread of the project, recording learning, evaluation, realisation, and development for more than five years.

Now that the guiding vehicle of pragmatic-insider action research has been established, it is time to move to the next chapter which examines what organisational transformation for sustainability actually entails and what its core elements are. The methods, case-study approach, and operationalisation of what organisational transformation for sustainability entails is covered in *Chapter 4*.

Figure 2: Action research project progression and iterations – itemised from steps 1-5 - towards the target of cognitive change and transformative change-agency, through collective understanding, and shared problem and solution formulation, which validates knowledge that is dialogically generated and communicated over time, with the aim of increasing positive social and environmental impact.

Figure 3: A visual of scales of action inquiry mapped out over time with interaction across scales represented as dots and arrows.

APPENDIX CHAPTER 2: ONTOLOGY, EPISTEMOLOGY AND METHODOLOGY OF TRANSFORMATIVE ACTION INQUIRY

As Chapter 2 outlined, the foundation of this project's methodological (bottom), epistemological (middle), and ontological (top) positions taken in transformational sustainability science can be presented visually below.

This inquiry followed the action research approach presented by Coghlan and Brannick (2014), adapted in Baker-Shelley (2016a):

CHAPTER 3. CONCEPTUAL SYNTHESIS OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY AT UNIVERSITIES

AN INTEGRATED METATHEORY OF TRANSFORMATION ALLOWS A DEEPER APPRECIATION OF THE RULES OF GAME

Based on Baker-Shelley, A., van Zeijl-Rozema, A., & Martens, P. (2017): A conceptual synthesis of organisational transformation: How to diagnose, and navigate, pathways for sustainability at universities? In the Journal of Cleaner Production, 145, 262-276, 1st March 2017

“A more scientific way of developing new perspectives on truly sustainable forms of growth is called for, and the vantage point of meta-level studies is one way of achieving that. Metatheorising offers the capacity to evaluate not only middle-range theory but the distortions in theory which create ideology and the imbalanced forms of organisational activity which pursue narrow and damaging conceptualisations of growth.”

(Edwards, 2010, p. 229).

SUMMARY

In this chapter, clusters of theories are categorised that describe and explain organisational transformation and systemic change for sustainability from a meta-theoretical perspective. As Edwards explains above, developing metatheoretical perspectives reveal ideological and value-based distortions in theory. Furthermore, they allow a deeper appreciation of a diverse and fragmented knowledge stock regarding the phenomenon of organisational transformation. Accordingly, a conceptual synthesis of five metatheoretical perspectives, at three levels of socio-organisational activity was conducted.

A public research university is a complex-adaptive system with many facilities, faculties and sub-organisations. Arguably, a researcher needs a close-up organisational framework to analyse these components and evaluate models, strategies and experiences of organisational transformation for sustainability. In this chapter, I outline the development of such a meta-framework.

The core elements identified which entail organisational transformation for sustainability at public research universities were developed by the metatheoretical review of each perspective and scale. The diagnostic criteria that emerged, as well as being grounded in the literature, are the outcomes of the reflection and dialogue between UM sustainability actors and myself. The analytical framework which the criteria constitute have been validated in the field at three external case sites, and one insider case, to attain data saturation, as well as its flexibility. This is covered further in Chapter 4 and Part B.

The objective was to put theories of change themselves into the university context by learning through evaluation (Luederitz et al., 2016). The focus of this evaluative learning were the heuristics, or mental models - used by stakeholders in the systems under study, as well as the search for complementary ones from the literature to increase the chances of actors understanding the dynamics of the complex institutions that surround them. The purpose being the cognition of the complex through simpler 'rules of the game'. Five multi-scalar meta-theoretical lenses are introduced as paradigms of organisational transformation for sustainability, with action research as the vehicle and orientation to this inquiry, as Chapter 2 has shown.

3.0 INTRODUCTION

3.1 WHAT DOES ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY ACTUALLY ENTAIL FOR UNIVERSITIES?

A great deal of research has been undertaken regarding the 'what' of organisational development and transformation (Cacioppe & Edwards, 2005; Edwards, 2010; Hind, Smit, & Page, 2013; Porras & Silvers, 1991; Romanelli & Tushman, 1994; Sisaye, 2011), as well as the related fields of corporate social responsibility and sustainability reporting and accounting (Aras & Crowther, 2008, 2009; L. Clark & Master, 2012; Eccles, Krzus, Rogers, & Serafeim, 2012; Lozano, 2006a; Zadek, 2006). However the transformation that is supposed and recommended as needing to take place at an organisational level is not well understood (Hoover & Harder, 2014), and relatively little is known about how organisational transformation that embeds principles and practices of sustainability

takes hold and propagates. Stephens and Graham (2010) thus recommended greater focus on the processes by which transformations towards sustainability occur. Some research has also focussed on pathways of societal transformation towards sustainability (G. Trencher, Bai, Evans, McCormick, & Yarime, 2014).

So, while there has been a lack of “clear orientation on exactly what a sustainable university should be” (Velazquez, Munguia, & Sanchez, 2005), phase one of this project - from early 2014 to 2016 - aimed to take into account the deeper structure, power, agency and inter-personality of a university, including the interdependencies of its sub-systems, facilities, units and departments in a systemic and dynamic understanding. Hence, while the overall question guiding the meta-theoretical review and conceptual synthesis was which core elements are needed to enable the organisational transformation of universities towards sustainability and how they can be operationalised, the subject matter was approached through the following sub-questions:

- 1) What does organisational transformation towards sustainability entail for a university specifically?
- 2) Where are the theoretical blind spots with potential to advance knowledge on organisational transformation for sustainability from niches and underexplored connections in the literature?
- 3) What is the philosophy, responsibilities, and values of a university¹ that is undergoing organisational transformation for sustainability?

In order to begin to answer these, the following section begins to describe the theoretical blind spots, and the nature of organisational transformation for sustainability at the university. The next section then offers a review of current policies in place in the governance of sustainability in higher education. Thereafter, I trace out elements of organisational transformation towards sustainability at universities from different schools of thought in Section 3.2. In Section 3.3 I present a conceptual synthesis of these elements as an analytical framework of diagnostic criteria that can identify leverage points for transformative and systemic change. Finally, this chapter ends with describing how this framework can be operationalised to make it applicable for embedded case study research on universities as socio-ecological and organisational systems. This leads into the *Chapter 4* that circumscribes the operationalisation of the core elements of organisational transformation for sustainability into rubrics.

3.1.1 ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY AT THE UNIVERSITY

As *Chapter 2* introduced, there were epistemological as well as administration reasons that justified embarking on a meta-theoretical review of the phenomena of organisational transformation for sustainability specific to the university. Edwards and Cacioppe similarly synthesised organisational and corporate transformation, integral theory and action inquiry (2005), whilst Edwards later advocated for an integrative metatheory towards organisational learning and sustainability in turbulent

1 Previously outlined in *Chapter 2* as the ‘transformative sustainable university’.

times, and that theories of organizational learning and sustainability must be able to respond to contemporary social issues and accommodate the multiplicity of societal perspectives on these topics (Edwards, 2009). Hence multi-perspectival capacities in the scientific understanding of organisational transformation for sustainability can be achieved through integral metatheory. Albeit many studies reviewed below, appear to reside on the assumption that one theoretical lens is sufficient through which to view transformative change towards sustainability. Each research school tends to have its own set of accepted conceptual frameworks and paradigm, which in turn defines that school's identity and can lead to a reinforcement of disciplinary divisions, mutual unintelligibility and a lack of sufficient unity in the campus community. This can be explained by the "extraordinary stasis of disciplinary social structure", despite the epistemological flux of academic disciplinary socialisation (Andrew Abbott (2001) in Crow and Dabars (2015a, p. 186)). To qualify this statement, Crow and Dabars (2015a, p. 186) refer to Immanuel Wallerstein et al. (2003) to characterise academic disciplines with three concepts: intellectual categories, institutional structures and specific cultures. Hence the reasoning follows that as specific academic cultures, scientific disciplines and interdisciplinary fields are represented primarily as epistemological categories ('stocks of knowledge'), and secondarily as their administrative contexts (Crow & Dabars, 2015a).

Academic disciplines are thus formulated as social constructions, corresponding respectively to the administrative and epistemological organisation of universities themselves. This observation moreover demonstrates the link between practical and theoretical elements of the organisational development of universities towards sustainability. It acts as a precursor to explaining the complexity of the organisation of public research universities, both as a *barrier to* and *justification for* transformative change towards sustainability. As Crow and Dabars (2015a, p. 187) observe, "rather than exploring new paradigms for inquiry, academia too often restricts its focus to existing organisational models"; it was posited in the previous chapter how universities "have built themselves into self-isolating, autopoietic structures dominated by disciplinary departments, colleges and the coercive behaviour of professional academic societies and their journals and presses" (Levin & Greenwood, 2001). Yet, in recent years, a few pioneering universities experiment with a variety of new forms of organisational design. Furthermore, Edwards' research on what organisational structures and processes are best suited for the scientific endeavour to tackle the global challenges of the 21st century, shows that views indicative of academic narrow-mindedness and inter-research school competition are not capable of dealing with the theoretical pluralism that characterises all social sciences (Edwards, 2010).

From this necessary standpoint of theoretical pluralism therefore, socio-technical transition, and transition management could also be considered valid lenses to understand transformation, especially from the perspective of governance. However, in the context of longstanding debates in science and technology studies, concerning deliberative democratic processes and authentic public participation in policy development and technological innovation, socio-technical transition "has paid relatively little attention to public consultation", nor to "the role of policy legitimacy within transition management processes" (Upham, Virkamäki, Kivimaa, Hilden, &

Wadud, 2015; Wynne, 1973). Without deliberation - or reflection on deliberation - technocratic, abstracted concepts are not sufficiently operationalised for non-academic actors, and make participatory work hard.

With the stream lens of understanding organisational transformation for sustainability, presented in Edward's integral metatheory (2010), variables can range across organisational arrangements such as: goals, strategies, formal arrangements, governance; social factors: culture, attitudes and beliefs, management style, language and communications; technology: tools, design, technical policies and systems; physical setting: light, heat, air quality, architectural design (Porras & Silvers, 1991). These components also undergird internal validity in studies of organisational transformation. The ability to "be ambidextrous in handling both incremental and transformational change" is also described in the hybrid theory of the ambidextrous organisation by O'Reilly and Tushman (2004). Organisational behavior can thus be presented as another lens with which to view a sustainable or resilient organisation as an ambivert, utilizing group-level characteristics of introversion and extroversion.

In summary, the fields of organisational development and organisational transformation are broad and diverse, requiring multiple theoretical lenses to apply to real-world circumstances. Organisational transformation in particular refers to fundamental change in the principles of how a system operates, a paradigm replacement involving cognitive change of individuals and groups (Porras & Silvers, 1991; Romanelli & Tushman, 1994). They are therefore considered useful to generate enough theoretical diversity to describe the phenomenon of exactly how universities are to become more truly sustainable by attaining enough depth and breadth of insight. Given that university organisations, their processes, practices and structures, are extremely complex, with high uncertainty and (political) stakes and machinations, the study of multiple theoretical perspectives and scales in organisational transformations for sustainability could shed light on novel ways of understanding and practicing such transformations.

3.1.2 GLOBAL GOVERNANCE FOR SUSTAINABILITY IN HIGHER EDUCATION

In recent years, much headway has been made with respect to the post Rio+20 agenda; for example the Higher Education Sustainability Initiative commitments (HESI), and the Global Action Programme (GAP) on Education for Sustainable Development (ESD), are said to play an enabling role in mobilising universities to ensure a sustainable future (Simon & Haertle, 2014). Another encouraging trend is the rate of uptake of sustainability standards, social impact measures, and corporate social responsibility (CSR) communications strategies by universities, as well as the exploration of partnerships and collaborations with government agencies, corporations, NGO's and civil society. The grand challenges of sustainable development, indeed, have been said to go well-beyond the expertise, abilities, and resources of "any single player or organisation" (Kania & Kramer, 2011). Over the last decade this has done much to change the landscape of superficial and reactionary policy for sustainable development towards the intent of a deeper recognition to make it part of 'organisational DNA' (Gray & Stites, 2013; Hespenheide & Koehler, 2012; KPMG, 2013). Moreover this plays against the backdrop of a series of charters and declarations signed by global networks

of universities to cement their commitment to the global transition toward a more sustainable society, such as: the Talloires Declaration (1990), the Copernicus Charter (1994), the Handvest Duurzaamheid HBO1 (1999), Agenda 21 (1992), the UN Decade for Education for Sustainable Development (2005–2014), and the recent Sustainable Development Goal (**SDG**) Accord of University and College Sector's Collective Response (Boer, 2013; EAUC & ACTS, 2018; Lozano & Young, 2013; Sylvestre, McNeil, & Wright, 2013). These are mapped into trajectories of future sustainability scenarios of universities by Beynaghi et al. (2016), who identified qualitative trends from their analysis: the extent to which sustainability has been tackled by the Higher Education sector (described as the nexus between SD and HE); the development of HE in response to core functions reflected by expected contributions to economy and society (for example, industry stakeholdership, pressure for accountability, knowledge-society challenges and entrepreneurial behaviour); and the development of sustainable development itself from the human environment starting point to sustainable development ostensibly “becoming a core global paradigm” (Beynaghi et al., 2016).

Such scenarios are indeed reflected in the emerging paradigm of institutional governance of co-creation for sustainability that are said to go beyond the traditional ‘third-mission’ (G. Trencher, Yarime, McCormick, Doll, & Kraines, 2013) of an entrepreneurial, knowledge producing, and technology-innovating university. Accordingly, recent studies have shown that the co-production and design of actionable knowledge, solutions and societal transformations for sustainability will grow with the uptake of global trends, like the Future Earth initiative, the renewal of the UNDP's Millennium Development Goals into SDGs, the Paris Accord, and the growth of ‘sustainability science’ in the post-2015 agenda (G. Trencher et al., 2014; UN General Assembly, 2015; Wiek, Ness, Schweizer-Ries, Brand, & Farioli, 2012). We can now observe this trend and paradigm advancement in action with the usage of the UN's SDGs in multiple sectors and contexts, whether in corporations, universities, schools, governments or civil society (Foundation for Environmental Education & Eco-Schools programme, 2018; Osman, Ladhani, Findlater, & McKay, 2017; J. Sachs, Schmidt-Traub, Kroll, Lafortune, & Fuller, 2019; UCLG, 2018; UNESCO, 2017).

3.1.3 ANALYTICAL METHODS OF ORGANISATIONAL SUSTAINABILITY

Against this evolving landscape of governance for sustainability in Higher Education, the complex challenges of evaluating and assessing sustainability performance and organisational trajectories is ever more pressing (Koehn & Uitto, 2017). The meta-study of the literature found that frameworks of analysis of organisational sustainability tended to neglect the development of tangible systemic rubrics. Relatedly, models have been proposed that aimed to overcome complexity and institutional inertia, such as the four-pronged strategy approach of Velazquez et al. (2006), and the portfolio approach towards integrating sustainability at organisations of Bertels, Papania, and Papania (2010a). Other similar methods may have been developed for visualising or prompting university transformations towards sustainability in the literature: for example a Graphical Assessment of Sustainability in Universities (GASU), that prescribes recommendations for where a university should leverage its system to become more aligned with the UNDESD (Lozano, 2006b), as well as the Graz model

for Integrative Development in sustainability process assessment (Mader, 2013). The ostensible purpose of these frameworks is to help organisations monitor, evaluate and report on their sustainability efforts, however their numerousness and diversity makes choice of implementation difficult for administrative and academic actors alike, who are already under increasing pressures from university management, governors, and civil society. As such, internal barriers and external drivers to embedding sustainability and innovative practices exist (Ávila et al., 2017; Lozano, 2006a), in particular for universities struggling with historically low levels of government funding, policy changes and political instability at the national level. So, despite transnational progress outlined in global governance for sustainable development, universities lack descriptive or evaluative tools to operationalise their aspirations to become more socially and environmentally responsible at deeper systemic levels.

This section, therefore, investigates theories from other academic fields that could assist in the development of such tools. The objective was to integrate operational sustainability with approaches in research and educational agendas as well as community engagement in a whole-institutional approach. Essentially, the thrust of this meta-study was to unearth rules of the game in terms of working definitions, theories, heuristics, niches, and nuances in the corpora of literature. The construction of the analytical framework draws on these sources to cluster theories together into core elements that unearth the system under study, and eventually bear fruit for the actors in these organisational systems.

The conceptual synthesis subsequently focuses on the complexity, causal-symptomatic relationships, and the dynamic socio-organisational nature of unsustainability. It works towards the meaning-making of the temporal and spatial elements of sustainable development pathways at universities. Moreover, this initially descriptive-analytical approach (Spangenberg, 2011) could then inform optimal solutions to problems of embedding sustainability into management, governance, strategy, culture and the ‘core-business’ (research and education) of universities. Then, real-world, real-time data is used in the evaluation and interpretation of the dialectic present in various accounts of sustainability solution formulation.

The literature was collated and organised by keyword terms using the primary academic research search engines and databases, like Web of Science and Google Scholar. Both academic and practitioner works were included. Because of the newness of sustainability science and policy as a body of integrated disciplines, no time limits were imposed (for example, the inclusion of articles published after 1990 only). Literature themes were broken down into more distinct concepts as articles were reviewed according to their core findings, and semantic content. These concepts were eventually organised into five theoretical perspectives and three scale levels of socio-organisational activity, as the next section presents.

3.2 A REVIEW OF META-THEORETICAL PERSPECTIVES ON ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

A university’s core-business is research, education, and creating public good with the knowledge it produces. It fundamentally operates within the world, composed

of people that are organised into faculties, facilities and other social sub-systems. Systemically, this comprises of three entwined dimensions in a multi-layered view of governance and organisational transformation for sustainability: individuals (the micro-level), the organisation itself (meso-level), and the system's interaction with the outside-world (macro-level) at the local, municipal, regional, and global scales of societal engagement (Geels, 2002; Giddens, 1984; Turnpenny et al., 2008). Despite the need to make organisations like universities more anticipative and more responsive to environmental shifts, generally accepted, unified theories of organisations and organisational change are lacking (Edwards, 2010; Porras & Silvers, 1991). Indeed, as Edwards observed: "The number and diversity of theories being proposed, tested, and applied has resulted in a highly diverse and even fragmented knowledge base for the study of organisational transformation. The development of metatheoretical perspective can, at least, engender a deeper appreciation for, and understanding of this diversity." (2010, p.231).

Therefore, developing and synthesising meta-theoretical perspectives can produce deeper appreciation of the diversity of theories at play to defragment the knowledge base. These perspectives are subsequently presented, painting a more nuanced picture of what organisational transformation towards sustainability entails for universities, summarised in *Table 1*. Why and how these theoretical lenses are arrived at are also justified in the following sections.

Theoretical lens for understanding Organisational Transformation for Sustainability	Micro-level: Individual	Meso-level: Intra-organisational	Macro-level: Extra-organisational
Behavioural Science and Psychology (BSP) - section 2.1	X	X	
Organisational Change Management (OCM) - section 2.2	X	X	
Socio-Ecological Systems (SES) - section 2.3		X	X
Corporate Governance & CSR (CGS) - section 2.4		X	X
Sustainability in Education and Research (SER) - section 2.5	X	X	X

Table 1: *Overarching themes identified were grouped into theoretical perspectives from the literature reviewed and the organisational scale at which they operate (micro, meso, and macro).*

3.2.1 BEHAVIOURAL SCIENCE AND THE PSYCHOLOGY OF SUSTAINABILITY

The essential building block of organisations and institutions are people on an individual level. They maintain systemic resilience through "function, self-organisation, learning and adaptation (Clifton, 2010). Behavioural science and psychology allows an understanding of how individuals undergo cognitive or personal transformation (Pfeffer, 2010). Individual behaviour affects a university's shift in awareness on aggregate as an organisation, whilst organisational culture and social norms act as

determinants of individual behaviour in turn (Ajzen, 1991; Lo, Peters, & Kok, 2012); a cross-scalar behavioural interplay.

Key Theories from behavioural science and psychology	Description
Ajzen's theory of planned behaviour (1991)	Three determinants predict a person's intention to perform a certain behaviour: personal attitudes, social norms, and perceived behavioural control. By altering any of these three selectively, a person's intention can change. This can predict and thus change behaviour; a simplified relationship.
The 'intention-behaviour' gap (Kollmuss & Agyeman, 2002)	Although individuals might have the intentions to live in a 'sustainable' way it is still possible that they will not.
Determinants for individuals in pro-sustainability behaviour (Adpated from Ajzen, 1991; Lo et al., 2012)	Whether or not an individual is convinced that sustainability is a good thing to do or aim for. What the people who are important or influential in these individual's lives think, and if action is required. Whether they have the capacity and control to change.
Ethical organisational norms (Trevino, Weaver, & Reynolds, 2006)	Ethical behaviour of individuals in organisations, influenced by rules and regulations, organisational culture, and the moral judgement of individuals that determine more explicit social norms and orientations.

Table 2: *Theories identified from the literature for their applicability to the challenge of individual or organisational transformation for sustainability.*

Psychology and the behavioural sciences have increasingly recognised the need to tackle complex sustainability problems, whether socio-ecological, economic or cultural, in terms of the physical context of human wellbeing (Gifford, 2007; Oskamp, 2000; Schmuck & Vlek, 2003). There are relatively few studies from this field that specifically focus on individual transformation within universities for sustainable development. Conceptualising transformations as wicked problems, where the social complexity of the university itself proves an obstacle, a solution presumably requires a psychological shift from denial to acceptance to recognise the nature of the problem and how to overcome it as an organisation (Conklin, 2006). Organisations should then have to consider that threats to the future inhabitability of the Earth by humanity, such as increasing atmospheric concentrations of greenhouse gases (GHG's), the exhaustion of fisheries and agricultural fertility, and ocean acidification, have been caused by overconsumption and overproduction in aggregate human behaviour since the industrial revolution (Steinfeld et al., 2006). In terms of these threats therefore, a psychologist could investigate their effect on an individual's wellbeing and quality of life (Oskamp, 2000). Indeed the physical context of human behaviour is considered highly important (Pfeffer, 2010). It frames behavioural patterns, decisions, beliefs and

how these can be determined by intrinsic motivations or extrinsic ones to model an organisation (Bridges, 2000).

This leads to studies examining the role and importance of social norms in the function of organisational pro-environmental behaviour. Focus is recommended more on the role of the organisation's structure, sub-groups and culture, the latter of which is manifested in perceived support of superiors for environmental sustainability (Lo et al., 2012). According to Lo et al. (2012) there is a "lack of integrated analysis between individual and organisational determinants" illustrating a gap between these two behavioural levels. Furthermore, Schmuck and Vlek (2003) have framed environmental problems as 'common dilemmas', where individuals, by pursuing their own interests, freely shirk responsibility or recognition of the negative effects on their common physical and social environment. Other 'common dilemmas' include myopathy, having vested interests in the status-quo, technological determinism, nature-extractivist attitudes, and perceived lack of societal control over environmental sustainability problems (Schmuck & Vlek, 2003). This exemplifies social complexity in sustainability transformation: people who are confronted with the realities of environmental, social and economic challenges understandably often respond with dysfunctional psychological attitudes rooted in cognitive and heuristic biases. Decision-making of individuals with respect to sustainability is affected by simple heuristic biases for example, and errors come into play, even when we assume, at a profound level, that we are right, rational and objective in our approach, we are always subject to such biases. The more aware, willing to learn and to suspend judgement, and less egotistical we are of these influences, the more we have the likelihood of counterbalancing their effects (Kahneman, 2011; Tversky & Kahneman, 1973, 1975).

With respect to the linkages between social sustainability and organisational effectiveness, there has been "relative neglect of the human factor in sustainability research" (Pfeffer, 2010). For organisational transformation for sustainability at universities, this translates into a determinant for organisational effectiveness that depends on maintaining the psychological wellbeing of students and staff, since "as in the case of environmental sustainability, human sustainability pays off", increasing the chances of cautious optimism rather than pessimism (Gifford, 2007; Pfeffer, 2010). Remaining applicable to the individuals populating universities, some studies point out how the resources – both social and psychological – of employees (and in this case, academic and administrative staff as well as students) can overcome negative reactions such as cynicism, deviance and apathy associated with organisational change towards a desired end state (Cameron, 2008). The psychological state development of individuals can also be positively accelerated toward authentic leadership. This links the operative concepts of 'psychological capital' and 'positive organisational behaviour', identifying how self-awareness, balanced decision-making, and ethical moral reasoning improve the human condition at the multiple levels (Luthans & Avolio, 2009).

Gifford, in his summary of environmental psychology as a contributor to sustainability science determines a spectrum of psychological states towards environmental problems, by concluding that "pessimism ... versus cautious optimism... depends on how one weighs the growth, maturity, and future potential of environmental psychology

against ... challenges and barriers” (2007, p. 210). Therefore, those who collectively work towards sustainability solutions to overcome environmental numbness might invisibly guide those pessimists, fatalists and individualists whose seek self-interest promotes an end which was no part of their intention. The overview of behavioural science and psychology literature highlighted suggests how change-agents in universities might construct strategies for influencing entrenched behaviour in *Table 3*:

Methods of Achieving Behavioural Change for Sustainability	Description
Obstacles to overcome	<p>Socio-behavioural problem perception: a lack of collective problem awareness driven by personal interests.</p> <p>Myopathy, interests in the status-quo, technological optimism-determinism, nature-extractivist attitudes, lack of societal control over environmental sustainability problems</p> <p>Realities of climate change, environmental destruction, inequality, poverty, drive negative, dysfunctional psychological attitudes: apathy, denial, anxiety, depression, despair, despondency and fear</p>
Interventions	Design, testing and evaluation of empirical studies and conceptual models about [sustainability] problems; appropriate physical facilities by providing the space for collaboration and technical innovation
Determinants	<p>Cooperation with policymakers and other societal actors</p> <p>Tailoring persuasive communication campaigns and decision environment design</p> <p>Active engagement of middle management.</p> <p>Maintaining the psychological wellbeing of individuals increasing the chances of cautious optimism</p> <p>Psychological capital and positive organisational behaviour: better self-awareness, balanced decision-making, transparency and ethical moral reasoning</p>
Strategies for behavioural change	<ul style="list-style-type: none"> • provision of physical alternatives, • regulation and enforcement, • financial-economic stimulation, • provision of information and education, • social modelling and support, • organisational change, • changing values and morality.

Table 3: *An overview of contributions relevant to achieving behavioural change to sustainability (Adapted from Cameron, 2008; Gifford, 2007; Lo et al., 2012; Luthans & Avolio, 2009; Pfeffer, 2010; Schmuck & Vlek, 2003; Swim et al., 2011).*

This section therefore finishes with the elements most relevant to organisational transformation for sustainability at universities. These have been translated into diagnostic questions where it is indicated at which level they occur in *Table 4*.

No.	Behavioural science and the psychology of sustainability	Micro-level	Meso-level	Macro-level
BSP 1.1	Are negative or positive reactions prevailing to sustainability with regards to personal attitudes, social norms, and perceived behavioural control?	X		
BSP 1.2	What are the rules and regulations, organisational culture, and the moral judgement of individuals towards sustainability?	X	X	
BSP 1.3	Are negative reactions towards sustainability overcome by maintaining positive psychological/social resources of individuals?	X		
BSP 1.4	Are there appropriate physical facilities, tailored persuasive communications, and active engagement of middle management regarding sustainability?		X	
BSP 1.5	Is positive organisational behaviour maintained in terms of better self-awareness, balanced decision-making, transparency and ethical moral reasoning?	X	X	
BSP 1.6	Is there cooperation between disciplines, faculties and with policymakers regarding sustainability problems and changing behaviour?		X	X

Table 4: *Diagnosis of organisational transformation from behavioural science and psychological perspectives for sustainability.*

3.2.2 ORGANISATIONAL CHANGE MANAGEMENT

At the organisational level, processes of change are based on how individuals are managed and governed around common strategic goals, purposes and the core mission that defines their group; so to seek an understanding of the ways universities understand the imperative for change processes, manage these effectively, and internalise “the changing nature of management, leadership and organisational change” is important (Howells, Karata -Ozkan, Yavuz, & Atiq, 2014). All the more so because of the paradox of little focus being paid to organisation learning in universities; despite their being organisations of learning, they struggle to set up the structures to promote their own organisational learning (Stephens et al., 2008).

In an effectively functioning organisation, every organisational member should represent its function, charter and goals, however these are fragmented “between the technical, managerial and institutional levels”, driven by decentralisation of organisational core and periphery in relation to its vision, mission and ethics (Hannan & Freeman, 1984;

Howells et al., 2014). A top-down command and control paradigm is incommensurate to resolving this problem because it “reinforces blindness about the true nature of the problem” leading to systematic denial of the complex and ill-structured dynamics of wicked problems (Conklin, 2006).

It is worthwhile investigating how universities actually ‘do’ change, as evidence-based knowledge on “processes through which organisational change in public organizations come about have received relatively little attention in academic research” (van der Voet, 2014). In seeking elements that describe transformation of universities towards sustainability, the six categories proposed by Kezar (2001) provide some insights to better describe the various aspects of organisational change management (A. Kezar, 2001), see *Box 1*. For example, the evolutionary and teleological change modes reflect the interconnected nature of the complex and porous relationship between and organisation and its environment, whereas other modes are more descriptive of states of change as developmental, political processes, as well as the aggregate phenomenon of social cognitive change:

**Box 1: SIX CATEGORIES OF ORGANISATIONAL CHANGE RELEVANT FOR TRANSFORMATIONS
TOWARD SUSTAINABILITY AT UNIVERSITIES**

(A. KEZAR, 2001).

- Evolutionary: change is a response to external circumstances, situational variables, and the environment the organisation faces. Change is rational and linear.
- Teleological: planned-change models; organisations are purposeful and adaptive, and change occurs through change-agents and leadership, as well as being linear and rational.
- Lifecycle: change is a natural part of human and organisational development, from infancy to maturity and decline.
- Dialectical: political models; change as a result of clashing ideology or belief system, where conflict is inherent; processes of change are predominantly consisted of bargaining, consciousness-raising, persuasion, influence and power, and social movements.
- Social Cognition: change is linked to mental cognitive processes of learning at an individual level and driven by the individual's need or will to grow, learn and change their behaviour.
- Cultural: change occurs naturally in response to alterations in the human environment, and the conditions under which the social systems operate.

The network for business sustainability (NBS) relatedly produced an assessment tool for embedding sustainability into organisational culture. Practices have two dimensions and four goals based on intent - fulfilment and innovation - and actuality - formal and informal practices. The quadrant's contents are further divided into ‘fostering commitment’, ‘clarifying expectations’, ‘instilling capacity for change’, and ‘building momentum for change’ (Bertels, Papania, & Papania, 2010b). Applying this to the university, it manages the triple bottom line, “delivering on a lofty triptych of

environmental, social and economic goals” (Dixon & Clifford, 2007; J. Elkington, 1999) of its operations and decision-making, taking account of risks and opportunities. This approach arguably builds resilience, economic value, healthy ecosystems and strong communities; such an organisation can therefore innovate over the long term because of this practice’s embeddedness (Bertels et al., 2010b).

Figure 1: A simplified model of the dynamic process of organisational and societal learning for sustainability. Adapted from Zadek (2006) in Baker-Shelley (2013).

Organisational change can also be framed as organisational learning. Zadek (2006) distinguishes five organisational learning stages, from defensive to civil stances (Figure 1), in a process “driven by contextual imperatives”. Societal learning consists of the extent these imperatives “are driven in turn by changing expectations based on what society thinks is possible and desirable”, in four stages presented with respect to the maturity of an environmental societal or governance (ESG) issue: from latent to institutionalised stances (Forstater et al., 2006; Zadek, 2006). At C, an organisation complies by responding to latent imperatives from issues on the societal agenda, such as refugee crises or automation. At B, an organisation is still compliant or managerially engaged, yet this is driven on a reactionary basis from institutionalised societal learning, for example, an external partner network’s discussion about the importance of the SDGs leads an executive board member to initiate internal processes that ensures the organisation is not perceived as lagging. Pioneers, at A, however, respond to and anticipate mature issues whilst adopting a civil engagement stance commensurate with their external task environment, for example by running external grass-roots consultations to determine societally-relevant issues in advance of their later manifestation, or design processes with civil society that co-generate sustainability solutions. Incorporating the organisation-society learning dynamic element undergirds the understanding of how

universities position themselves relative to societal expectations of their behaviour and their own organisational learning.

The Bridges Model of organisational development, follows a more evolutionary process which describes the life-cycle of an organisation, progressing from the ‘dream’, to the ‘venture’, through ‘getting organised’, ‘making it’, ‘becoming an institution’, ‘closing in’ and ‘death’ (Bridges, 1986). Roorda (2010) makes it clearer in the AISHE framework (an Audit Instrument for Sustainability in Higher Education) how the learning process is applicable to universities. Subsequently, one of the four dichotomies used by Bridges in his characterisation of organisational traits, the spectrum between introversion and extroversion, is an important element. This spectrum describes organisations as on one hand having closed boundaries, reacting to external changes slowly after reflection, and on the other, open boundaries being focussed on the outside world, reacting quickly to external changes (Bridges, 2000). In comparison with Zadek (2006) this would be similar to the difference between laggards and pioneers (A & B, *Figure 1*). We can therefore postulate that universities transforming towards deep sustainability may exhibit pioneering, or even ambiverted qualities, perhaps after a period of internal reflection characterised by introversion.

No.	Organisational change management towards sustainability	Micro-level	Meso-level	Macro-level
OCM 2.1	Do both change-agents and leadership manage the triple bottom line of environmental, social and economic responsibility?	X	X	
OCM 2.2	Do change-agents exhibit vision, alignment, strategic collaboration and innovation to engage in partnership and collaborative governance with wider society?	X	X	
OCM 2.3	Is the response to the external task environment purposeful and adaptive, resembling the evolutionary and teleological change-modes?		X	X
OCM 2.4	Is the societal agenda approached and internalised by taking a civically engaged stance on institutionalised issues on the public agenda?			X
OCM 2.5	Is an extroverted and pioneering role adopted that exhibits porous organisational boundaries focussed on the outside world, reacting quickly and proactively?			X

Table 5: *Diagnosis of organisational transformation from the change management*

Few studies in the organisational change literature have specifically linked the management of universities and institutional theory. According to Howells et al. (2014), a combination of drivers has caused the external task environment of universities to change significantly². This reflects the evolutionary change model from Kezar (2001). Such drivers are listed as increasing the globalisation of the educational system, the

² As summarised in Chapter 1 with arguments about the megatrends of governance, innovation and sustainability, and expectations from boards investors and stakeholders.

international mobility of the staff and students, as well as the marketisation of higher education. They define institutional agency as “an organisational actor’s ability to make an impact on the social order, changing the rules, relational ties or allocation of capital” and advocate four key themes as enablers of institutional change agency: vision, alignment, strategic collaboration and innovation (Howells et al., 2014).

In conclusion to this section, the elements included from organisational change management are translated into diagnostic questions and indicated at which level they occur in *Table 5*.

3.2.3 SOCIO-ECOLOGICAL SYSTEMS PERSPECTIVE

The university as a system under study has multi-levelled properties emerging from its people, their interactions amongst sub-organisational units, and aggregate relationships between these units that form the organisation’s external relationship. This interwoven relationship between social, economic, and biophysical systems applies to a university as an institution. It has the capacity for governance, co-creation and production of knowledge, innovation, adaptability, and the ability to solve societal and environmental challenges in interaction with the outside-world, and can thus be conceptualised as a complex system (Posner & Stuart, 2013).

Theories and models from socio-ecological systems (SES) theory and coupled human-environmental relationships have been identified that help to frame a university’s potential to transform itself. This leads to social resilience of individuals educated within it, and ecological resilience of the wider world through its research and education functions. It recognises itself as a system inextricably interconnected with society and grounding ecosystems in a dynamic, stochastic and complex manner.

Relatedly, the university has recently been coined as a complex-adaptive knowledge enterprise by Crow and Dabars (2015a)³. In so doing they refer to Katz and Kahn’s study on the usage of open systems theory and the biological metaphor of an organisation as an organism. In this theory, throughput - an important concept for this thesis’s conceptualisation of organisational transformation for sustainability - is framed as part of the facilitation of survival and growth (input-throughout-output) of an organisation with its environment as part of open systems theory (Katz & Kahn, 1978). In the university context, adaptation involves the “evolution of fitness” at the micro-individual-scale, and the meso-collective-scale to “respond to the scale and complexity of the emergent challenges that confront the global community”; it also “assumes institutional evolution, or innovation, which is the aggregate product of interaction between ‘fit’ agents” (Crow & Dabars, 2015a, p.63).

Universities are also affected by dominant institutional arrangements, governance regimes, market-driven logic, and competitive inter-organisational culture, shaping the emergence of socio-technical innovation and restricting appropriate and critical

3 Describing the New American University institutional design experiment, for which case study 2, Arizona State University, is the prototype. Noteworthy in this perspective, Crow and Dabars remarked that for universities – in their terms, ‘knowledge enterprises’ “information is the principle input, and with throughput, yields outcomes useful to society (2015a, p.63).

responses to complex challenges (Westley et al., 2011; Westley et al., 2013). They reinforce the resilience of unsustainable patterns of consumption and production in complex adaptive systems, getting stuck at the ‘conservation’ phase of the adaptive cycle in *Figure 2* (Holling, 1986). Navigating the reorganisation phase, transformative agency enables “a transformation of the broader institutional system ... into a new configuration”. “Ecosystem stewardship” uses a “fitness landscape” that links strategies, opportunity context and disruptive innovation for institutional entrepreneurs at key points in the cycle (Westley et al., 2013). Applying the adaptive cycle to university transformation, it has the capacity for leadership, institutional entrepreneurialism, and socio-technical innovation toward an integrated governance and management of natural resources and ecosystem services (Westley et al., 2013). They may also implement knowledge of how to do this for other organisations and societal actors.

Figure 2: *The adaptive cycle of an SES (Holling, 1986): illuminates the dynamics present in resilient social systems: innovation, adaptation and transformation (Folke, Hahn, Olsson, & Norberg, 2005; Gunderson & Holling, 2002)*

Further to Holling’s adaptive cycle, Scholz’s (2011) human-environment systems (HES) postulates seem useful in analysing the step-change processes that iteratively determine the trajectory of organisational transformation for sustainability. This ranges from the internal functioning of an organisation to how it interacts with the corpora of institutions and ecosystems that make up the local, regional and global scale. In such complex relationships, these postulates can be a heuristic for understanding and structuring the investigation of human-environment interactions and managing their complexity. The framework is also meant to empower environmental literacy in science and society (Scholz, 2011). This section reframes HES under the banner of SES due to their similarity, and due to the scientific research on planetary boundaries, systems

change and transformation at Stockholm Resilience Centre that grounds this thesis's vision and conceptualisation of sustainability.

Binder, Hinkel, Bots, and Pahl-Wostl (2013) classify HES as an analytical framework, applied when complex social-ecological issues involves a dynamic perspective on the social as well as on its interaction with the ecological system. The natural environment is only able to provide a limited number of benefits against human appetites for resources and technologies. The critical challenge is hence knowing these limits in terms of the throughput of our economy against planetary boundaries (Daly, 2006; Rockström et al., 2009) and avoiding unwanted transitions beyond them, which may have already occurred. Thus, a university needs to identify its complex relationship with the ecosystems and societies that it relies upon, aiming to improve their wellbeing - P6 & P7 in Scholz (2011), see *Table 6* - and becoming aware of and reading the 'potential' of the external environment. Furthermore, postulate three illustrates how the micro-level dynamics of a university affect its capacity to read its environmental and social potential to beneficially or detrimentally impact the macro-level wider world⁴.

Label	Postulate
1. Complementarity	Human and environment systems (HES) are complementary
2. Hierarchy	HES both have hierarchical structures, in terms of scale and scope
3. Interference	There are disruptive interactions among and within different levels of HES, in particular between the micro and macro levels: power & agency
4. Feedback	There are different types of feedback loops within and between HES
5. Decision	Human systems are decision-makers with drivers, who act to satisfy goals: deterministic
6. Awareness	Human systems (social groups) have different types of environmental awareness on potential impacts and feedbacks of their actions: motivations & knowledge
7. Environment-first	The effective analysis of inextricably coupled HES planning for sustainable human-environment interactions, by substantiating material and social environment, thus forming a matrix of the human-environmental system

Table 6: *The seven proposed postulates of the Human-Environment Systems (HES) framework, Adapted from Scholz (2011).*

Transformations can have both a beneficial as well as detrimental effect on an SES. In terms of the relationship between open dynamic systems and their external environment, states of response may comprise vulnerability, resilience and adaptive

⁴ This corresponds neatly with Giddens' overarching structuration theory (1984) further referenced by Bradbury's description of micro-meso-level dynamics in her action research with the 'Natural Step' in Sweden (Bradbury, 2001).

capacity, which apply as interwoven components in biophysical (the ‘natural’) and social (‘the human’) senses (Gallopín, 2006). As an applied human system with the capacity for learning, knowledge, discovery, innovation and change, a university can improve its condition and in so doing, that of its environment. General systems theory frames what this transformation for sustainability entails for a university as a SES through the Panarchy framework, determining its relationship to multiple actors, scales and levels, in the biophysical and social spheres (Gunderson & Holling, 2002; Wiek et al., 2012).

Pursuing this heuristic further, system qualities might include institutional purposes and challenges where components – for example formal organisational branches (services, operations, and communications) and stakeholder subcultures (students, staff, and faculty) – interact in complex ways determining the behaviour of the institution. As Posner and Stuart (2013) have put, this behaviour is a quality emerging from interactions within an institution and between the institution and the environmental and social contexts within which it functions.

Further elaborating this interaction at the macro-level, Manning’s (2014) case-studies of two complex socio-ecological regional systems using the Panarchy framework (Gunderson & Holling, 2002), specifically emphasise the important role for universities, where “students, educators, researchers, and academic practitioners” lead by forging collaborative partnerships with local stakeholders in, firstly building and maintaining resilient and sustainable SES and secondly, encouraging innovation and transformability in achieving sustainability (Manning, 2014).

No.	Transformational university as a socio-ecological system	Micro-level	Meso-level	Macro-level
SES 3.1	a) Do institutional entrepreneurs enable bottom-up governance to challenge predominant suboptimal practices? b) How do they link strategies, opportunity context and innovation in doing so?	X	X	
SES 3.2	a) Does the organisation take responsibility that natural resources/ecosystems services are managed and governed correctly by individuals and social groups practicing leadership, entrepreneurship and sociotechnical innovation? b) Is knowledge about management and good governance of ecosystem services implemented externally?		X	
SES 3.3	Are the skills and competences for environmental literacy exhibited?		X	X
SES 3.4	Do students, educators, researchers and practitioners lead by forging collaborative partnerships with local stakeholders, encouraging innovation and transformability?		X	X

Table 7: *Diagnosis of organisational transformation from the socio-ecological systems perspective for sustainability.*

Elements identified from the socio-ecological systems perspective, which functions at the interface of the internal properties of the university as an SES and its external environment at the societal or regime level, are translated into diagnostic questions of organisational transformation for sustainability⁵, Table 7.

3.2.4 CORPORATE GOVERNANCE FOR SUSTAINABILITY

Whereas a socio-ecological system describes a university in terms of its interactions with the outside world, it arguably also has an extrinsic responsibility towards the world, expressed in corporate social (and environmental) responsibility, and moral agency as a response to obligations of justice driven by its social connections (Young, 2006). The transformational process towards sustainability can be guided by CSR principles, but might also result in a managerialist logic culture (Howells et al., 2014). Although observing corporations that authentically learn to become more environmentally and socially responsible can help to frame what constitutes organisational transformation towards a sustainable university.

Our future leaders, in public, private and civil society are educated by our universities. We therefore move to the perspective of corporate governance for sustainability. This is derived from corporate governance, corporate sustainability and CSR literature, and made distinct in order to gauge corporate governance for sustainability in the Nordic mining sector (Baker-Shelley, 2013)⁶. In viewing sustainable development as a sustained and balanced physical throughput⁷, flowing from natural resources through the economy and back to natural sinks in a non-diminishing manner (Daly, 2006), social and environmental externalities of incorporated economic actors should be internalised so that no one human group has to bear the costs without compensation (Porter & Kramer, 2011). There is thus need for greater accountability of organisations beyond their traditionally introspective cultures and a revision of the neo-liberal free market ideology (K. W. Abbott, 2012; Crouch, 2006; Warhurst, 2005; Zadek, 2006). Arguably, as a knowledge broker, innovator and implementer, the university can have a defining role in such a market transformation. However, converse to universities setting the tone in knowledge brokerage and implementation towards global standards of social, environmental and economic responsibility they have been subjected to what Bleiklie and Kogan (2007) call the global yardstick of emerging academic capitalist and managerialist regimes. In the last couple of decades, this phenomenon translates as homogenising managerial standards so swiftly becoming the norm that they “are far from always backed up by organisational arrangements and practical realities” inside universities (Bleiklie & Kogan, 2007, p. 490); thus connecting us with the literature on corporate governance. This represents the shift from the ‘republic of scholars’ model to the ‘stakeholder university’ model of governance in the public administration of universities.

5 3.1 & 3.2 have two components: whether a practice is being undertaken and how at the internal learning level (3.1), and the external knowledge valorisation level (3.2)

6 This perspective was the most present in the author’s background, so extra effort had to be put into sufficiently framing, grounding and integrating the other four theoretical perspectives that emerged from the academic literature. Corporate governance for sustainability produced important grounding codes in the qualitative data analysis of the case study universities.

7 The term throughput is meant herKatz and Kahn (1978), who conceptualised throughput before Daly (2006), however later used it in the context of corporate sustainability.

Demonstrably, corporate governance for sustainability – whilst usually targeted at corporations - is applicable to universities too. Universities must also manage the inflow and outflow of natural capital. Relatedly, Scherer, Palazzo, and Matten (2009) argue for a reconsideration of two assumptions based on the 20th century model of the firm in a democracy: firstly, that of “the sustained capacity and efficiency of the nation state system” and secondly, “the separation of public policy and private business”. The boundaries between public and private have thus become increasingly blurred. Managerialist, myopic logics have been superimposed over bureaucratic ones, adding to complexity and obfuscation of organisational processes and leading to a ‘marketisation’ of universities (Howells et al., 2014).

CSR is moreover a tool in organisational development, applied to the university context in terms of tendering and external contracts to corporations. At an individual level, a case-study of a Dutch subsidiary of a US-based carpet-tile manufacturer, Interface, sheds light on current university CSR models. Internal change-agents were identified as central to the learning process of embedding sustainability into corporate governance, articulating new ideas through sensemaking and emergent change. Top management were persuaded to provide resources due to the increased prevalence of sustainability in the societal learning agenda, and the agents’ communications and action strategies as brokers, bricoleurs, and connectors, operationalised sustainability to the organisational context (van der Heijden, Cramer, & Driessen, 2012).

Garriga and Melé (2004) classified forms of CSR in terms of instrumental theories: what an organisation does within the logic of its own interests to maximise value for shareholders as its sole social responsibility; and political theories: realising its social power specific to its relationship with society as well as its responsibility in the political arena. The latter reflects the possible systemic effects over time of how the organisational community responds to calls for greater responsibility as a political economic actor in society (Söderbaum, 2008, p. 61). Thus it accepts social duties and rights or participates in deigned social cooperation (Garriga & Melé, 2004). Is the organisation reactionary in framing their sustainability strategies and governance using smart public relations jargon, in project acquisition, procurement or student recruitment? Or does it behave proactively as an engaged political economic actor accepting its social duties or participating in deigned social cooperation (Garriga & Melé, 2004)? According to a Turkish case by Atakan and Eker (2007), a socially responsible university harnesses its assets and knowledge for addressing the needs and problems of the local community. This simultaneously requires a management of corporate identity that “is of great importance for organisational success” (Atakan & Eker, 2007).

Apart from individual and organisational issues, CSR monitoring plays a significant role as an organisation’s means of communicating the extent of ESG issues and their materiality: how important it considers them to be, and how they should be valued and disclosed externally according to key stakeholders (KPMG, GRI, CCGA, & UNEP, 2013). Eccles and Krzus (2010, p. 93) define ESG metrics as measuring an organisation’s performance in each respective non-financial domain of environment, society and governance; these agree respectively with the forces creating pressure for greater disclosure such as the environmental movement, the increasing consciousness

about the role of business in society, and consistent concerns about lacks in corporate governance. Materiality describes the threshold at which issues become sufficiently important that they should be reported, or beyond which the decisions of those accessing organisation's statements are influenced (GRI, 2011).

Thus, external reporting and internal monitoring processes of the sustainability performance of universities influences the decisions of stakeholders and the university's communications strategies as well as its positioning. How universities position themselves relative to societal expectations of how they should behave, and what sort of social and environmental responsibility they have is therefore important as it links public relations and reputational risk with ESG/sustainability reporting intelligence, where claims, metrics and performance are substantiated⁸. This has shown how deep issues that are considered material at different levels are reflected in their management practices. By incorporating this element on the learning processes of universities - or pathways of CSR - it is therefore argued that the organisation-society learning dynamic affects how efforts can be dialogically communicated across the 'membrane' between intra and extra-organisational levels, in order to account for sustainable development. This can occur in a reactionary manner to the demands of societal pressures, as well as in managerial actions taken ex ante to anticipate and model future ESG risks and

No.	University corporate governance for sustainability	Micro-level	Meso-level	Macro-level
CGS 4.1	Do change-agents employ communications & action strategies to persuade policymakers and management to allocate resources to raise sustainability on the learning agenda?	X	X	
CGS 4.2a	Are ESG issues, material to the organisation and its stakeholders, measured, managed and monitored internally by integrating sustainability strategy into governance, management and administrative structures?		X	
CGS 4.2b	After 4.2a) are ESG metrics disclosed to key external stakeholders, in substantiated and understandable report of sustainability performance?			X
CGS 4.3	Is there a sustained and balanced physical throughput where social and environmental externalities are internalised?		X	X
CGS 4.4	Is responsibility adopted to be an engaged political-economic actor, accepting social duties, participating in deigned cooperation by partnering with external actors for collaborative governance and positive societal impact?			X

Table 8: *Diagnosis of organisational transformation from the corporate governance and CSR perspective for sustainability. Simplified into Corporate Governance for Sustainability - CGS.*

⁸ Thus, importantly distinguishing the blurry spectrum between greenwashing and authentic and effective assumption of social and environmental responsibility in good governance.

opportunities. Notable examples in higher education include the fossil fuel divestment movement, and the debate of the role of universities in the 21st century, kicked off in the Netherlands by the student sit-in at the Maagdenhuis of the University of Amsterdam in 2015.

Another challenge is the diversity of sustainability assessment standards, with the likes of STARS for the North American institutional culture and AISHE for the European. But on a more general note we can say that the presence of a substantiated ESG reporting system is an important element. This leads us to conclude with diagnostic questions of what organisational transformation for sustainability entail at universities in *Table 8*.

3.2.5 SUSTAINABILITY IN EDUCATION AND RESEARCH: HIGHER EDUCATION SECTOR SPECIFIC

Interaction with the outside world also occurs through educating graduates and pure and applied research that produces knowledge. This perspective differs slightly as it is sector-specific, whereas the others may be applied in other organisational settings. With respect to education, I focus on how it prepares students for the transformational sustainability challenges the world increasingly faces in response to what the IGBP calls the Great Acceleration: the collection of exponential trends of human development that shift our planetary influence to that of a geological force in its own right (Steffen et al., 2004; Stephens et al., 2008). This also involves didactic and pedagogical considerations. With respect to its other core activity of research, universities can encapsulate and reflect transformative capacity, notably by looking into sustainability science, policy and integrated assessment. The latter also translates into elements important for public policy and academic administration. Common to both sub-sections, however, is the already established moral imperative for navigating organisational transformation for sustainability in the Higher Education Sector.

The university can play a role as a trans-sectoral actor and facilitator of transformational change in the 21st century; a tremendous opportunity to prepare the entire campus community to be better equipped to make decisions for a future that rapidly becomes more complex, dynamic and uncertain (Glasser, Calder, & Fadeeva, 2005; Yarime & Tanaka, 2012). Some studies notably discern Higher Education for Sustainable Development (HESD) towards these transformational challenges: (Adomßent et al., 2014; Barth & Timm, 2011; Lozano, Lozano, Mulder, Huisingsh, & Waas, 2013; Müller-Christ et al., 2014; Yuan & Zuo, 2013). Cross-sectoral partnerships, according to G. Trencher et al. (2014), play a fertilising role that increase the chances of hurdling challenges in societal sustainability transformations, encompassing the university and diverse societal actors. Several studies also reflect on the historical development and centrality of universities in post-industrial society and the paradox of organisational learning in universities (Fallis, 2004, 2011; Sedlacek, 2013; Stephens et al., 2008; G. Trencher et al., 2013). Sedlacek (2013) focusses on their actual and potential roles with respect to “fulfilling educational, research, governance and economic development functions [and] facilitative and mediating functions”, after significant changes in these dimensions and the public sector as a whole in recent decades. Whereas, Fallis frames the challenge to universities culturally and democratically, in his discussion of the

multiversity:

“The university is a primary institution of post-industrial society. It is one of the chief innovative forces of the society, one of the chief determinants of social opportunity and social stratification and a focus of intellectual and cultural life.” (Fallis, 2011, p. 53)

This adds to the moral imperative of the university in society. Collini (2012) takes the stance that the university has been modelled more as an actor for the global market rather than an advocate for civil society or the environment. Moves toward securing private funding for the continuation of research, education, other quotidian operations, and the incursion of commercial logic into public institutions and governance structures have been imposed, including successive waves of misguided assessment procedures (Collini, 2012). If this indicates predominant university organisational models in a globalised world, then to assume tools that substantiate social and environmental responsibility might counter this. An example of one such tool would be UNEP’s ‘Greening universities toolkit’ that provides interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility (UN, 2012; UNEP, 2013).

Cortese (2003) elaborates on the critical role of universities in meeting international challenges, proposing the model of a university that has fully-integrated sustainability across four portfolios of research, education, operations and community. Velazquez et al. (2006) conceptualise a sustainable university as one that holistically or partly addresses, involves, and promotes, on a regional or global level, the minimisation of negative environmental, economic, societal, and health effects generated by the flow of resources through the system in order to fulfil its functions of “teaching, research, outreach and partnership, and stewardship”; thus improving the likelihood of achieving sustainable life-styles societally. Indeed, Posner and Stuart (2013) support viewing universities’ behaviour as complex systems, making a clear link with sustainability in Higher Education (SHE).

However, there is a gap between how the functions of a university are perceived by the outside world and by the individuals that constitute it, which depicts a defragmentation of academic knowledge from the quotidian reality of other social actors. Within these two groups many different ideas exist about sustainable development. Accordingly, Lozano et al. (2014) found that efforts to implement sustainable development representative of 70 institutions were largely compartmentalised and recommended that institutional systems were composed of several inter-related elements. This indicates the disconnect between what the university teaches the youth with respect to future scenarios of sustainability challenges, what it envisages its own societal and governance purposes are, and finally what it is actually capable of doing (M’Gonigle & Starke, 2006). After providing general elements, this perspective thus now breaks into two further dimensions: Education for Sustainable Development (ESD), and Sustainability Science, Policy and Integrated Assessment (IA).

3.2.5.1 Educational Perspective: Pedagogy, Didactics in Higher Education for Sustainability
UNEP has defined education for sustainable development as “actually just a higher

stage of development within the very powerful and inclusive realm of environmental education”(UNEP, 2013). Whereas others have taken a contextual stance: “a learning process ... based on the ideals and principles that underlie sustainability ... is concerned with all levels and types of education” (Karatzoglou, 2013). Moreover, Daly’s view of sustainability (2006) emphasises that the youth of today have a stake in the future state of the world that is left to them. Considering globalisation, climate change, infectious diseases, biodiversity loss, water scarcity, social immobility, inequality, ecological deterioration, and a void of trans-boundary governance on a global-level - the potential universities possess to prepare the youth for such a future is inimitable. This mission embodies principles of intergenerational justice and socio-ecological equilibrium, teaching students to navigate complex sustainability challenges of the rest of the 21st century.

UNEP and UNDP have both spearheaded measures to form strategic partnerships with young people, governments and businesses in order to deliver the vision that the United Nations Decade of Education for Sustainable Development (UNDESD) posed (UNEP, 2013). Their guidelines illustrate how different methods and strategies to initiate transformations towards sustainable development might be used. Their greening universities toolkit provides interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility (UN, 2012; UNEP, 2013). Other examples include the UNGC’s guide for universities to implementing the global sustainability standard’s principles and communicating on progress made (UN, 2012), and the recent GAP (UNESCO, 2014). Standards and guidelines such as these highlight the role ESD plays in a university’s transformation as a complex system towards sustainable development. It imbues graduates with the innovativeness, adaptability, and knowledge to solve societal and environmental challenges to make decisions for an increasingly complex, dynamic and uncertain

Figure 3: Key competencies in sustainability intended for graduates (Adapted from Wiek et al., 2011).

future (Glasser et al., 2005; Posner & Stuart, 2013; Yarime & Tanaka, 2012). Relatedly, Wiek, Withycombe, and Redman (2011) presciently synthesised sustainability research and problem-solving competencies to prepare graduates for this future. They focus on five key competences: systems-thinking, anticipatory, normative, and strategic with the crosscutting interpersonal competence in sustainability linked to basic competences, see *Figure 3*.

3.2.5.2 Research Perspective: Sustainability Science, Public Policy, Integrated Assessment and Academic Administration

A research perspective for sustainable development, encapsulates the fledgling discipline of sustainability science, and yields answers about transformative processes. It implies that complex concepts require equally complex framings, bringing temporal and spatial dimensions into account as well as the stakeholders involved. It refers to a societal process of change towards a desired quality-of-life, now and in the future, and pluralistic approaches that engage diverse actors at multiple levels, creating an integrated vision built on shared concern towards a shared solution, resolving trade-offs iteratively (Baker-Shelley et al., 2017; van Zeijl-Rozema et al., 2008). To attempt to capture the fundamental paradigm, function, and goal-related shifts that have taken place for sustainability science, a variety of lenses are proposed, additionally useful for understanding complex sustainability problems: post-normal science, mode-2 science, action research, and integrated assessment (IA) amongst others (Funtowicz & Ravetz, 1993; Rotmans, 2006; Waterman et al., 2001). This is said to indicate a paradigm shift of scientific method from a descriptive-analytical mode-1 type knowledge production to a transformative, solutions-orientated and transdisciplinary mode-2 type (Spangenberg, 2011).

Leading on from this, Lang et al. (2012) make the distinction between the paradigms (post-normal, mode-2, triple helix) and their corresponding research practices (transdisciplinary research, community-based, interactive, or participatory approaches). Action research is one of these research practices for ‘doing’ sustainability science as a problem and solution-oriented field. This method is hence valuable for novel approaches to sustainability transformation via “collaborations among scientists from different disciplines and non-academic stakeholders from business, government, and the civil society in order to address sustainability challenges and develop solution options” (Lang et al., 2012). This responds to the call for participatory procedures involving scientists, stakeholders, advocates, active citizens, and knowledge implementers (Kates et al., 2001).

IA can also be seen as a toolbox of transformation; a means of leveraging research in Higher Education, and for translating practicable societal outcomes from sustainability science. A scientific framework of the selection of multiple tools in an IA is presented in four generic phases by de Ridder, Turnpenny, Nilsson, and von Raggamby (2007), summing up solution development to complex challenges regarding research and sustainability science:

1. Problem analysis: understand and frame the problem in the light of various perspectives.
2. Finding options: an exploration of possible scenarios that elucidate visions

No.	Diagnosis of Sustainability transformation from educational and research perspectives	Micro-level	Meso-level	Macro-level
SER 5.1	Are students and staff educated or trained in the five sustainability competences for transformation: systems thinking, anticipatory, normative, strategic, and interpersonal?	X		
SER 5.2	Are principles of intergenerational justice & socio-ecological equilibrium embodied in practice?	X	X	
SER 5.3	Is sustainability strategy integrated across all portfolios of research, education, operations, governance and communications?		X	
SER 5.4	Ideal-typical transdisciplinary research process followed: (Phase 1) collaboratively framing the problem; (Phase 2) co-production of solution-orientated transferrable knowledge, (Phase 3)(re-) integration and application of such co-produced knowledge in scientific and societal practice (Lang et al., 2012).		X	X
SER 5.5	Are interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility used?		X	X
SER 5.6	Is the minimisation of negative environmental, economic, societal, and health effects generated by the flow of resources holistically driven?		X	X
SER 5.7a	Does substantive content of research and education functions target generation of societal impact?	X	X	
SER 5.7b	Is a significant level of public consciousness identifiable that the research & education the university does has positive societal impact?		X	X
SER 5.8	Are global, regional & national sustainability standards, assessment frameworks & principles relevant to university-contexts (UNGC, STARS, GRI, IIRC, AISHE) implemented and is progress and performance communicated?		X	X

Table 9: *Diagnosis of organisational transformation from the educational (pedagogy, didactics in higher education for sustainability) and research (public policy, integrated assessment and academic administration) perspectives for sustainability.*

- of pathways to sustainable futures.
3. Analysis: the characterisation of plausible scenarios and policy interventions in order to select options and solutions for intervention.
4. Follow-up: the reflection on the entire process in order to deduce and

integrate lessons that improve future assessment processes from the evaluation of the results of the analytical phase.

These show a resemblance to the three phases of an 'ideal-typical transdisciplinary research process' in Lang et al. (2012) (Wiek & Lang, 2014). These are conceptualised as: collaboratively framing the problem (Phase A), the coproduction of solution-orientated transferrable knowledge (Phase B), and the (re-)integration and application of such co-produced knowledge in scientific and societal practice (Lang et al., 2012).

The interdisciplinary and post-normal nature of sustainability science is, in conclusion, appropriate for enhancing the role of universities. With the outcomes of GAP for ESD (UNESCO, 2014), of the UNDESD (2004-2015), a movement of diverse organisations and institutions attempt to align their work towards the UN's SDG's to better equip communities to make decisions for a complex and uncertain future.

Table 9 summarises the elements derived from educational (pedagogy, didactics in higher education for SD) and research (public policy, integrated assessment and academic administration) perspectives in diagnostic questions.

3.3 CONCEPTUAL SYNTHESIS OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

We can now progress into a conceptual synthesis of organisational transformation for sustainability, based on previous section's metatheoretical review of the elements from the five theoretical perspectives. It answers which core elements are needed to enable the organisational transformation of universities towards sustainability and forms the basis of an iterative evaluative learning process described and discussed in Part B of the thesis. In order to enable future projects to increase traction and decrease inertia, the elements have been translated into criteria that are used for practical evaluation and diagnosis to analyse the three case-studies. The results of the conceptual synthesis formed an analytical framework at the micro (individual), meso (organisational) and macro-level (extra-organisational wider world) traversing the five theoretical perspectives that were surveyed and integrated. This analytical framework is designed to diagnose organisational transformation, with each of the elements synthesising useful theories from the above sections into 31 criteria. These are also informed by three dimensions:

- 1) Multiple actors: in terms of the individuals or stakeholders constituting universities: the micro-scale.
- 2) Multiple sectors: in terms of disciplines and organisational types: the meso-scale.
- 3) Multiple scales: between institutions, at the national or policy-making level: the macro-scale.

This model is bolstered by insights gained from the review of literature on integrated assessment, influenced by the dynamic multi-level framework of transitions studies for socio-technical change (Geels, 2002), transition management for sustainability (Kemp, Loorbach, & Rotmans, 2007; Loorbach, 2010; Loorbach & Rotmans, 2010), and

integrated policy assessment. This conceptualisation particularly pinpoints institutional capacities and constraints respective to the scales of individual agency, institutional structure and national and international policy landscapes, and corresponds to the necessary dialectic between structure and agency (Turnpenny et al., 2008). International policy landscapes are seen as restricting or enabling (to various extents) universities' ability to assess and independently choose their contractual arrangements through tendering for example, or the numbers of students they can admit from lower socio-economic brackets.

A holistic conceptualisation means viewing the university as an institution that extends to "multiple and complex causal relationships between agency and structure, [concerning] issues driving and affected by social change in different ways... contexts... and at different levels from macro to micro" (Turnpenny et al., 2008). This interconnected scalar approach finds credence in how the behaviour of individuals and the organisation itself is determined through social structure in structuration theory, which sees no split between the individual and the social because of their reflexive relationship, as discussed in Chapter 2 (Bradbury, 2001; Giddens, 1984). This bears significant implications for learning and knowledge creation (Stacey, 2001), especially as a prerequisite for organisational behavioural change nested in larger societal transformation.

Hence, this research conceptualises an organisational transformation of a university towards a more sustainable end state, shifting the nature of the system to more optimal and functional equilibria. Organisational transformation for sustainability manifests itself through each of the five lenses sampled at each of the three scales of socio-organisational activity. Pathways of organisational transformation for sustainability require periods of radical change punctuating persistent sub-optimal practices and equilibrium. This involves a capacity for continuous, purposeful and adaptive self-diagnosis and change management: a learning organisation therefore evolves in a dialogical process of organisational-societal learning. This phenomenon can be understood in a holistic sense. Interconnected qualities demonstrated by organisational transformation for sustainability taking place may include:

- A substantive change in the means, methods and processes by which the subject organisation functions.
- Effective management leading to societal wellbeing and resilience that allows actors 'equifinality': a choice in the manner of navigating toward its vision, a shared end-goal that is not absolute but guiding. This holds true concerning its environmental relationship with its surroundings, in addition to it having a developmental growth pattern.
- Transformation at an individual group-scale (micro) being nested within organisational learning and self-reflection (meso), which in turn is nested in societal transformation (macro).
- Tending towards a steady state - in terms of the throughput of an organisation's metabolism - because this state corresponds to a minimum entropy production.

- Evolving towards a state of higher resilience in bursts of rapid, discontinuous change, punctuating the sub-optimal equilibrium of the prior system state.
- Extroverted engagement with a prioritised array of environmental-social-governance issues.
- Collaborative governance with organisational actors, from across different sectors (private, public, social – e.g. social enterprises, and civil-society).
- A dialogical process of organisational-societal learning.
- An evolutionary, purposeful-adaptive approach to change management.
- Benefits to individual psycho-social wellbeing.

This conceptualisation of what organisational transformation for sustainability entails has been additionally structured from a number of key studies (Bradbury, 2001; Brauckmann, 2000; Daly, 2006; Geels, 2002; Giddens, 1984; Katz & Kahn, 1978; Romanelli & Tushman, 1994; Spangenberg, 2011; Stacey, 2001; Turnpenny et al., 2008; Vos, 2007; Voß & Kemp, 2006). It also draws on integrated, holistic and systems thinking that generates channels for action, across multiple levels and disciplines, involving a diverse network of social actors. This section can therefore finish with a proposition built on the aforementioned works concerning the nature of effective and resilient organisational transformation for sustainability⁹:

Organisational transformation for sustainability of a system evolves towards a state of higher resilience, responsiveness and purposefulness, in synchronicity with its socio-ecological surroundings, in bursts of rapid, discontinuous change that punctuate the prior dynamic equilibrium, or system state. Actors challenge sub-optimal practices and are allowed room to experiment, and space for deliberative dialogue to achieve the change desired. Adaptive management has the purpose of societal wellbeing and resilience, allowing equifinality as choice in the manner of navigating toward a shared community vision. This vision concerns its environmental relationship with its surroundings, evolving along a developmental growth pattern. The throughput of resources for the organisation tends to a steady state of minimal entropy. Much like an organism is the counterbalance to the natural entropy of the universe, an organisation should not be entirely unlike this, operating at a physical and social level in organic symbiosis with its surroundings.

3.3.1 FROM CONCEPTUAL SYNTHESIS TO ANALYTICAL FRAMEWORK: DIAGNOSIS OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

Since no single perspective provides a full overview of core elements identified that constitute organisational transformation for sustainability, the five perspectives are integrated and structured according to the scale level at which they operate as in *Tables 4, 5, 7, 8 and 9* of this chapter. *Figure 4* shows an early schematic of the 31 elements generated in 2015 from the metatheoretical research on organisational

⁹ *Resilient and effective organisational transformations may denote different pathways, scenarios or outcomes. A holistic and integrative approach for increasing sustainability performance of the organisation may have involved effective transformation; however, the new state might not be resilient in the sense that it is susceptible to perturbation or even slip-back to previous less-optimal scenarios. These nuances have not been investigated in the scope of this PhD research; another major research project would be needed for this!*

transformation for sustainability. The design of the framework was holistic since organisational transformation for sustainability appears to manifest itself through the lens of each of these five perspectives. In this sense, analysing through the use of just one perspective at three levels is not enough. To properly gauge the full extent of what the organisational transformation for sustainability entails and where on the pathway an organisation lies, the use of all them is required. They are complementary. Yet this does not mean these lenses are exhaustive, as there are inevitably associations across perspectives and scales that will likely emerge from its use to evaluate the real-world organisational-social data in the case studies.

The analytical framework appeared equally suited for assessing organisational transformation, as well as for a more comprehensive implementation of planned adaptive change processes. However, in 2015, the co-research team was well aware the framework presents the current state of the art theories, but it had not yet been tested. The decision was therefore made to perform a plausibility probe where measuring organisational dynamics and intra-social system relationships with it was recommended (Moses & Knutsen, 2012). This first application aimed to take a whole-institutional view, in order to make the nature of complex systems under study more salient. This takes general systems theory (Gunderson & Holling, 2002; Wiek et al., 2012) as the lens for how the phenomenon of organisational transformation towards embedding sustainability takes place. The intrinsic and extrinsic context of an organisational system's transformation for sustainability were also important to consider. Although establishing clear boundaries between scales, perspectives and organisational limits was a limitation, these still render valuable insights. An organisation's transformation towards sustainability can therefore be viewed on a spectrum between:

- Change from within, intrinsic perspective: how the actors and groups work for transformation of the university itself. Using criteria – for example from behavioural science – that function from the intrinsic logic of an organisation for “adaptation, innovation and evolution” (Crow & Dabars, 2015a; p.8)
- Change from without, extrinsic perspective: a) how the university transforms itself along various pathways – e.g. Scholz's (2011) postulates of reading the systemic background, or Zadek's (2006) model of dynamic organisational-societal learning; b) how the university stewards society along various pathways towards sustainable and harmonised ways of life, in spatial and temporal terms.

These dimensions are practically relevant for navigating pathways of organisational transformation for sustainability at universities. Similarly, Beynaghi et al. (2016) delineate project scenarios as policy tools for internal and external decision-makers in their analysis of the post Rio+20 UNDESD agenda.

Figure 4 (below) depicts three concentric circles of elements at various levels, together provide a holistic picture of what organisational transformation for sustainability entails. This design originated from an early research group meeting in 2015, working on a white board with how to visualise the elements of the conceptual synthesis. This basic framework underwent many learning iterations throughout theoretical, empirical and interpretative stages of the PhD research. The process followed is described in *Chapter 4*. For now, a simple example of its utility is shown in *Box 2*.

BOX 2: HOW THE ELEMENTS OF THE ANALYTICAL FRAMEWORK CAN BE APPLIED IN CONTEXT

A university might be, under a more descriptive diagnosis, implementing sustainability standards for reporting and communicating their progress (*SER 5.8* and *CGS 4.2b*). However, after evaluating activities, it is found that it needs to perform behavioural interventions using pro-sustainability determinants of staff and student intentions (*BSP 1.2*), because there is an identified behaviour-intentions gap in a representative sample of the population. Further, it might then need to provide physical facilities, tailor communications, and actively engage middle management for the behavioural intervention to be successful (*BSP 1.4*).

The procedure of developing the framework followed the approaches of metatriangulation and multiparadigm inquiry (Edwards, 2010). Metatriangulation uses multiple frames of reference (for example, the five theoretical perspectives reviewed herein) to build a theory, and uses several research paradigms or theories to construct a metatheory for a complex social phenomenon (Lewis & Grimes, 1999) such as how a university organisation transforms towards sustainability. Whereas multiparadigm inquiry reviews linkages between paradigms and their associated theoretical schools, by describing the undergirding themes and elements used in various organisational theories to better understand socio-organisational and even cultural phenomena (Edwards, 2010; Lewis & Kelemen, 2002). For example, in this thesis, schools of behavioural science and psychology, socio-ecological systems, organisational change management and corporate social responsibility, have proven useful but not adequate on their own to describe organisational transformation for sustainability at universities, and there are surely others. These perspectives helped with the organisation and relationship of the core elements across three interacting scales of organisational-social activity. Furthermore, three *modus operandi* arose to gauge organisational transformations for sustainability, which also correspond with the types of knowledge expected as outputs in transformational sustainability science research:

- **Descriptive-Analytical:** This describes the current state of affairs, observations useful for analysing the current situation of an organisation: a snapshot of systemic sustainability performance. I.e. what do we see now? Where do we stand currently? What is our current performance?
- **Evaluative-diagnostic:** The difference in performance between the aspired end-state and the state-of-the-art. Normative vision of a sustainable (university) organisation, the design aspirations of the type, qualities and nature of sustainability desired in the 'end-state'. I.e. where are we aiming for? How will our sustainable organisation function, and what goals will we have to attain?
- **Interpretative-therapeutic:** Emergent identification and implementation of different pathways of organisational transformation towards sustainability, the interpretation and representation of stakeholder accounts, initiatives and forms of change-agency. I.e.: What can we see and be conscious of in our surroundings? How did/can they proceed and progress? Which leverage points can be triggered to enable effective pathways of transformative change?

Many of the elements identified, once streamlined and operating as criteria, can be

interpreted through all of these lenses. As criteria these could encapsulate where on their transformation a university is, how to map out their progression, and what this means to actors. The overlaps between perspective and scale add an interesting intersectionality to the framework. This intersectionality is discussed in Chapters 7 and 9; for example, the extent to which the fifth perspective may change depending on the sector. To this end, the micro, meso and macro levels are an important entry point, as are the perspectives themselves in

Figure 4: Schematic outlines of how the analytical framework arose from the conceptual synthesis of core elements of transformation.

order to research the transformation of living organisations from the respective fields.

The moral arguments in this chapter's synthesis and the practical implication of the analytical framework seem to apply more to young public research universities, as their explicit missions are founded not just on knowledge enterprise, but on public good and societal impact (Morphew & Hartley, 2006), whilst also being "uniquely positioned to assume an obligation to construe their purposes" in these contexts (Crow & Dabars, 2015a; p. 25). Although, before the conceptual synthesis, it was not clear which institutional models held the highest quality and capacity for organisational transformation, beta-testing a tool on targeted external cases (Chapters 4-6), and at the insider action research case (Chapter 8), seems to highlight public research universities as a unique and pioneering group.

The tool developed synthesises state-of-the-art theories that have been designed with an eye to experimentation in the field, commensurate with the pragmatic idealism required to crystallise broad and amorphous concepts like sustainability, public interest, equity and justice through social inquiry (Bozeman, 2007; Crow & Dabars, 2015a, p. 222; Dewey, 1938). In addition, by adopting holism for 'thick' or more profound sustainability (Vos, 2007), the nature of complex institutions are rendered more salient as they are understood operationally as analytical units (such as faculties, facilities, student organisations, committees and boards) to examine underlying social relationships and mechanisms ((Immanuel Wallerstein, 1974) in (Moses & Knutsen, 2012)). In the context of this work, these conceptualisations about the phenomena studied allowed the framing and development of useful insights during the field work, as if apply an ecological lens, then organisations are subject to pathologies also.

Substantial theoretical, empirical, and methodological research has been undertaken by hundreds of researchers in the respective fields of organisational transformation for sustainability. This chapter was not able to do sufficient justice to the true depth and breadth of prior research pertinent to this analysis. To even adequately encapsulate and articulate the insights required to understand organisational transformation, sometimes referred to as a 'mysterious' or even 'spiritual' journey towards a better way of being, knowing and living, is beyond the scope of one PhD thesis. Answers to this inquiry - which tend only to come in terms of experience - will only emerge after great effort by generations of researchers and inquirers into how humanity can resynchronise and re-enchant itself with its environment, and itself. However remarkable connections, overlaps and associations appear to emerge between organisational transformation and action research, previously considered in this research as somewhat distinct fields, as the previous chapter showed.

Irrespective of this larger inquiry, in the context of this research, we are now able to better understand what organisational transformation for sustainability entails at the university. This understanding has reinforced the importance and profound difficulty of transformative change for sustainability from the inside-out. This mode of change necessarily works at deeper leverage points in a socio-organisational system (Abson et al., 2017; Meadows, 1999), where actors undergo a cognitive change in how they perceive and understand sustainability problems most tangible to them, which could necessitate a shift in organisational paradigm (Porras & Silvers, 1991).

CHAPTER 4. FROM THEORY TO PRAXIS: MIXED METHODS & OPERATIONALISATION

OPERATIONALISING CORE ELEMENTS OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY INTO TANGIBLE SYSTEMIC RUBRICS

“Bringing scholarship and praxis back together, thereby drawing on long cultural traditions, our immodest aim is to change the relationship between knowledge and practice, to provide a model of science for the 21st century as the Academy seeks additions and alternatives to its heretofore ‘ivory tower’ positivist model of science, research and practice.”

(Reason & Bradbury, 2008c, p. 8)

SUMMARY

With this chapter, I trace out the transition from the theory of Chapters 2 and 3 to the empirics and experiences of the international case studies in Chapters 5-7. I present how this PhD research has been undertaken by weaving the twofold research approach of pragmatic-insider action research (as conceived in Chapter 2) and external case studies into an integrated research design composed of various triangulated qualitative research methods.

I also outline the operationalisation of the analytical framework shown in Chapter 3 and how it was applied to the case-study data. Analysis began during and after the field work from 2016-2017 and took 14 months consecutively; this consisted of research annotation, revisiting transcripts, structuring the data, and planning next phases. In the analysis process, 33 categories were formed based on the analytical framework shown. Eventually, a diagnostic tool was developed, formed of a system of tangible systemic rubrics. The purpose was reproducibility and applicability. The aim, to provide clear and consistent conceptualisations of the categories based on their grounding in the internal evidence. To demonstrate how their meaning and definitions changed as they were applied to the empirics, various scopes and sets of code-names were used. Having explained the operationalisation of the diagnostic tool applied to each case, this thesis moves to the case-study chapters. Each case overlapped to a certain extent, and different stages of the data organisation, analysis, and interpretation were pursued at different points in 2017.

This process of reflexive evaluation and operationalisation allowed me to keep track of categories assigned to the data per hermeneutic unit - the whole dataset collected per case that was analysed - as well as to support how they changed over time. In this way, categories were refined from the conceptual synthesis of 2015, throughout the field work of 2016, and the qualitative data analysis of 2017, into the verification of quality and conceptual distinction in 2018. The eventual knowledge outcome was a Codex of the diagnostic tool. This is presented in detail at the end of the main thesis to ensure a seamless progression. The Codex acts as a user's coding guide and follows the operationalisation process described, as well as substantiating each of the 33 tangible systemic rubrics of organisational transformation for sustainability.

4.1 TOWARDS A DIAGNOSTIC TOOL OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

This chapter presents how the core elements of organisational transformation for sustainability were operationalised into a diagnostic tool in four stages: from core elements, to diagnostic criteria, categories of analysis, then, eventually into tangible systemic rubrics. The goals of this process were to develop the explanatory power, foundational validity, conceptual distinction and salience of the framework into a system of tangible rubrics for organisational actors. The diagnostic criteria were operationalised using the case-study empirics to gauge and then code information into distinct categories of analysis. This process eventually generated a diagnostic tool. *Table 1* presents logical steps towards attaining the tangible systemic rubrics which constitute the tool. The intent inherent to the design of the rubrics is to allow richer more meaningful explanations and experiential learning to emerge from the empirics,

in terms of the language, narratives and experiences that the data represent; the data, after all, are the lives of individuals and groups in their organisations. From these rubrics, we may be able to see action strategies that groups took and the transformation signatures that characterise the organisations researched.

Stages of Operationalisation	Process	Inquiry	Function: Types of Knowledge in Transformational Sustainability Science
Core Elements	Deductive reasoning	What does organisational transformation for sustainability entail at universities?	Meta-theoretical perspectives; Descriptive; Hypothetical; Conceptual
Diagnostic Criteria	Deductive reasoning	How can universities navigate organisational transformation for sustainability?	Analytical Framework; <i>Descriptive-Analytical</i> ; Conceptual
Categories of Analysis	Inductive and Deductive reasoning	How do universities navigate and manage their pathways of organisational transformation for sustainability?	Evaluative Instrument; Diagnostic Tool; Hermeneutics; Scenario/pathway elucidation; <i>Evaluative-diagnostic</i>
Tangible Systemic Rubrics	Inductive and deductive reasoning	How do intrapreneurs, change-agents and units navigate their own pathways transformation to sustainability within their organisations? How do they comprehend their surroundings and achieve cognitive change with a view to effectuating organisational transformation for sustainability?	Evaluative Instrument; Interpretative-Diagnostic Tool; Holistic Evaluation; Experiential Representation; <i>Interpretative-therapeutic</i> Lived experiences based on organisational actor's accounts. Prognosis from Interpretative-Diagnosis.

Table 1: *Stages of Operationalisation from Elements to Rubrics. The terms, concepts and functions used in the transition from the findings of the conceptual review to the stage of readiness of application to the case studies. This is the moving target that was used in consistent self-reflection, 1st and 2nd person action research and practice (Reason & Bradbury, 2001b).*

The functions of the different stages of operationalisation, and types of knowledge represented in *Table 1*, operate across the three *modus operandi* for gauging organisational transformations for sustainability presented in *Chapter 3: Descriptive-Analytical, Evaluative-diagnostic, Interpretative-therapeutic*. These three types of knowledge

were framed as markers with which the status of *Interpretative-Diagnostic* could be validly applied to the tool, corresponding with the types of knowledge expected as outputs in transformational sustainability science research. Threshold criteria for judging this included *data saturation*, where the categories of analysis could not change drastically when the tool was applied to another case. This is why it was crucial to study three external case-studies in diverse contexts. Also, the accounts produced by the diagnosis had to be balanced, juxtaposed and reflexively assessed according to the data analysis and sources. This provided a means to ensure the *authenticity* and *trustworthiness* of the intelligence generated. Lastly, *reproducibility* of the approach, and the coding process followed in the analysis, needed to be comprehensive and coherent with regards to how the data was actually analysed. The second Intermezzo presents how this worked in practice by building on previous research and clarifying the language and manner of usage in the rest of this thesis. The following sections describe the process stages of the operationalisation of the core elements, and what occurred at each of the stages.

4.1.1 STAGE 1: CORE ELEMENTS TO DIAGNOSTIC CRITERIA

Core elements of the phenomenon of organisational transformation towards sustainability were discerned by using theories that move from the ‘cellular’ level of a university to its interactions with the outside world. A university is thus defined by *individual behaviour* as well as that of the organisation: how it accounts and measures its internal processes and its external interaction and responsibility to the wider world. Early working versions of the paper Baker-Shelley et al. (2017) were coded into sections using three functions for gauging organisational transformations for sustainability (see above) in order to discern the origin, diagnostic capacity, and validity of the elements. As such, in the (re)-reading of the papers, I asked myself whether a core element, and its undergirding theories, was:

- 1) Useful for describing the current situation of a university organisation: what do we see now?

If so, it was considered as passing the *Descriptive-Analytical* marker;

- 2) Useful for generating recommendations for the organisation’s pathway/s of transformation to sustainability: what can/should be done based on the cross-sectional analysis? This may include a number of ‘snapshots’ that create a series of episodes leading to the diagnosis.

If so, it was also considered as passing the *Evaluative-Diagnostic* marker;

- 3) If it can be seen as both descriptive-analytical, and diagnostic-evaluative, and helpful in determining a pathway of transformation: How do we arrive at our aspirations? What needs to occur on the ground, with the ‘people’ of the university? How can they act together in *concerto* for this to happen?

If it covered 1 & 2 and was seen as useful for interpreting different possible pathways, as well as having potential for therapeutic approaches to transformation, then it was considered as passing the *Interpretative-therapeutic* marker.

This systematic reflection of different formulations of the concept paper allowed a distinction to arise therefore between theoretical core elements, synthesised diagnostic criteria, and to a certain extent - through their interconnection and further reflection - the formulation of the categories of analysis in the field that followed. The three provisional steps made above were therefore further substantiated, refined and validated as the case-study period and data analysis progressed. This refinement required feedback from the data, which is where the next stage began. The analytical framework, which represents the shift to Stage 2 of the operationalisation, is shown below in *Figure 1*.

4.1.2 STAGE 2: DIAGNOSTIC CRITERIA TO CATEGORIES OF ANALYSIS

This section pivots towards the development of categories of analysis from the diagnostic criteria which form the analytical framework in *Figure 1*. The rationale for applying an analytical framework at pioneering public research universities is to identify the existing strengths in the system and the possible pathways of the university's organisational transformation for sustainability. The framework presented was initially designed through comprehensive literature review as well as insider action research at Maastricht University (UM) and its Green Office (Baker-Shelley et al., 2017). Its aim was to apply the 31 criteria to current activities in order to recommend future policy and management strategies.

The criteria aimed to move from describing the current process towards evaluating the overall process of transformation using the five different perspectives and three scales. This aimed to go beyond the descriptive-analytical approach to evaluate accounts and experiences of stakeholders to help inform optimal solutions and recommendations that could be chosen to be implemented based on the diagnosis. This corresponds to a transformational sustainability research process in post-normal science (Spangenberg, 2011; Wiek & Lang, 2014, p. 4). The analytical framework was thus refined into an evaluative instrument using dialogical and experiential feedback in the field work of each case study. An aggregated coding table and hand-drawn charts of the analytical framework (see *Appendix of this chapter*) were used in order to continually refine

the categories used to assign to the data through coding in Atlas. Codes were developed based on the diagnostic criteria and in parallel with the categories of analysis for use in the qualitative data analysis software Atlas.ti. These were used for assigning and categorising the data. The process was the same for each case, however the substantive content assigned to the codes, and their own semantic meanings presented some variability as the learning trajectory progressed. To this extent, as the analysis was undertaken, codes were adapted, refined, spliced or merged dependant on their effectiveness in explanatory or interpretative power.

BOX 1: NOTE ON THE DESIGN OF THE DIAGNOSTIC TOOL

The analogue form of the diagram in Figure 1 allowed more flexibility and interactivity before, during and after the case studies, as certain categories were adjusted based on the increased understanding of the case study organisation. As such, the diagram is a digitized version that does not quite do the information included in the original justice. Its main quality was adaptability to the learning trajectory traced out from 2015-2017.

Figure 1: Analytical framework of diagnostic criteria of organisational transformation for sustainability, grouped according to their respective theoretical perspective (coloured sections) and systemic level function (concentric rings from centre). As in Baker-Shelley et al. (2017).

The actual coding method common to each case is further described in the introduction to the case-study chapters at the start of Part B.

4.1.3 STAGE 3: CATEGORIES OF ANALYSIS IN REFLEXIVE QUALITATIVE EVALUATION

After internal discussions at ICIS in a series of lunch lectures, and feedback and knowledge exchange at similar Green Office retreats in late 2016, early 2017, based on each case study, the dialogue covered whether the analytical framework could actually be called a tool. Inputs from senior sustainability scientists helped to establish the criteria beyond which the framework could be called a tool, in particular ‘data saturation’¹ and ‘conceptual distinction’. These outline that there had to be supportive evidence from the case-study analysis (with a final application at UM) that could establish the utility of the tool by assessing its capacity to substantiate the qualities and characteristics in the universities’ organisational transformations for sustainability.

Now that the steps taken to refine and validate the diagnostic criteria as categories for analysis have been outlined, as well as the reflexive process taken in the evaluation of accounts and intelligence gathered by the analysis, the next section looks at how tangible systemic rubrics were formed through testing in the field to enhance their

¹ The quality criteria of data saturation in the context of the Diagnostic Tool must be credited to discussion in 2016-17 within the research group with Annemarie van Zeijl-Rozema, and a conversation with Joop de Kraker..

explanatory power, conceptual distinction, diagnostic validity, and to attain some level of data saturation. Core to this progression was framing the case study data as a representation of a holistic and living organisational system, rather than an inert, static reduction of components and processes. This iterates between abstracted diagnostic criteria and categories of analysis coded (grounded) in the data, and the stakeholder experiences sampled and validated using the secondary documentary intelligence. The transformation signatures of each case (see following chapters) were formed based on the template prescribed by the tool, with each category enlarged proportional to groundedness, and linked according to conceptual density².

Proposed code names were allocated to each of the diagnostic criteria in this template, as used in the coding process in Atlas. The iterative, reflexive element came once a code no longer adequately encapsulated the data seen, or that two codes' descriptive content were not sufficiently distinct (conceptual distinction), or even that one code no longer appeared pertinent to the data seen across cases, or finally, that substantive descriptive and evaluative content was added to a category as a result of a significant 'singularity' in the data at one case. In this latter case two things occurred: firstly, categories were adapted semantically or conceptually, for example, *SER 5.5*, formerly *Inter-disciplinary resource implementation*, became '*Sustainability research demonstration, knowledge enterprise*' based on the data patterns seen at ASU and HKUST; secondly, several distinct Data-informed Categories were created anew, for example *SES 3.1.1 Effective intrapreneurship* was added based on the data at LU, whereas *SES 3.2.1 Transformative leadership* and *BSP 1.6.1* were added at ASU.

4.1.4 STAGE 4: REFLEXIVE QUALITATIVE EVALUATION TO TANGIBLE SYSTEMIC RUBRICS

The purpose of the design of a tool was to equip researchers and practitioners that have begun, or plan to begin, researching and redesigning their own organisations with rubrics which could help them navigate the pathway of their organisational development and transformation. Fundamentally this aimed to provide tangible mental models for these actors to better make sense of the obfuscatory and complex systemic environment that surrounds them in university organisations. Hence, *tangible systemic rubrics*. The tangible systemic rubrics were eventually arrived at by means of an iterative, reflexive process of evaluative learning (Luederitz et al., 2016). This section presents the final stage of operationalisation. The process so far explained can be visually depicted in *Figure 2* below. The tangible systemic rubrics, after application to the cases and reflexive evaluation, at Stage 4 of the operationalisation, are shown in *Figure 3*. To conclude, the process of refinement was iterative, reflexive and eventually generated the 33 rubrics for organisational transformation for sustainability. This added another layer of applicability and credence to the tool in that it moved from the *evaluative-diagnostic* denomination to one of *Interpretative-therapeutic*, encapsulating the three modus operandi and henceforth referred to as a *diagnostic* tool for simplicity.

Success in applying the diagnostic tool was expected to arise through the primary research question of how actors within university organisations actually navigate their organisational transformation, from the perspective of the researcher

² These can be seen in section 3.3 of each of the case study chapters and represent visually Stage 3 of the operationalisation outlined above.

Figure 2: Operationalisation Process followed. Each of the coloured numbered boxes shows each of the four stages – see Table 1 – which correspond with the Codex structure per rubric. At each end, the problem and solution formulated demonstrate the iterative design approach to the action research. Sustainability praxis is further explained in later chapters but can largely be equated with Arendtian action/praxis, recognising and giving space to the inherent capability of human beings to create new ‘things’ in plurality.

diagnosing this, but also from the perspective of the actors themselves being better able to navigate it. In specific terms, outcomes expected were that sustainability performance could be better tracked and pathways more clearly interpreted, and that decisions made by actors within the organisation seeking to navigate or trigger transformation for sustainability can be better substantiated. It was also supposed that heuristic biases extant in the actors’ own conceptualisation of how the organisation worked could be lessened through the corroboration inherent to the diagnostic tool’s application. Once the quality criteria for the tool were fulfilled, we arrived at the point where we could start to refer to the need and value of *navigational* or *intrinsic* competencies of change-agents for *systemic change*. The quality criteria presented in Figure 2 correspond to the quality criteria for action research of *authenticity* and *trustworthiness*, as well as the qualitative research standards of *reproducibility* and *data saturation*. Leading from this understanding, learning throughout the organisation could bolster the university’s

reputation as a centre for excellence in teaching and research intrinsically, whilst also exemplifying motivations for organisational development and/or transformation towards an aspired vision of sustainability extrinsically.

4.2 INTEGRATED RESEARCH DESIGN & MIXED METHODS

To resolve the problem of university self-transformation, *Chapter 2* synthesised an approach to investigating organisational transformation for sustainability from within universities from various appropriate strands of action research. This has been reflexively applied at the main case-study of UM. The research design is integrated because a distinction is made between embedded case-study research on organisational transformation at external case sites, and the pragmatic-insider action research at UM.

It has now hopefully been established that the experimental and explorative approach taken towards the methods is justified. Good action research requires us to reflect on the decisions we have made during the course of the research and action trajectory, as well as how these decisions may have affected the participants and co-researchers in the study and the findings. The questions we ask later determine the bounds of discovery. The questions asked of you as the insider action researcher are also important for knowledge outcomes, as well as the choices, decisions and actions of the co-researchers and organisational stakeholders who may affect the research trajectory in turn.

The strategically selected case-studies can be described as “[h]istories with a point” (Moses & Knutsen, 2012). They are performed based on the assumption that there is a larger ‘*big picture*’ theoretical backdrop for a specific research project. Several external case studies have been performed, from which the objective was to identify hypothesised causal mechanisms buried in the experience of each of them. The home case and the first case therefore employed the methodological strategy of a ‘plausibility probe’ to inform the approach to the others, in iterative cycles of experiential learning by the researcher ((Eckstein (1975) in Moses and Knutsen (2012, p. 138)).

4.2.1 CASE-STUDY METHOD & APPROACH

The external case studies of pioneering universities were designed to form part of the overarching action inquiry; their methods, as distinct from the action research approach described earlier, are outlined in *Section 4.2.3*. As has already been established, the inquiry itself can be reframed as an intervention, undergone with and for the primary stakeholders and co-research team. This departs from the methodological position held in post-positivism as modified experimental or manipulative (Guba & Lincoln, 1994). This also defines action-based inquiry’s difference from empirical research and grounded theory. The methodological strategy of the external case-studies’ embedded, insider, and open approach is derived from action research (Scholz, Lang, Wiek, Walter, & Stauffacher, 2006); the case-study findings contribute to the shared formulation and implementation of interventions by a co-research group back in Maastricht via and with the UMGO. To this extent, if one isolates the external case study method from the overarching whole, it is not action research per se. However, this thesis takes a holistic view in a hermeneutic evaluation of transformation by university actors. Therefore, the links outlined above retain their methodological credence. In the literature surveyed, there are many prescriptive studies on the ideal of a sustainable university and examples

of good practice are plentiful. But what was identified as not so well understood is how exactly universities can transform towards sustainability (not only defined in terms of longevity of success). This provides further justification for the undertaking of deep-divide, embedded, or small 'n' case-studies.

According to definitive case-study research literature (Eisenhardt, 1989; Yin, 2013), a case-study is defined as “an empirical inquiry that investigates a contemporary phenomenon...” - in this case a second-order socio-organisational transformation for sustainability at universities - “within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined”. The case-study research method is thus applied to pioneering universities – see *Figure 4* that visualises how the action research project progressed. It uses UM and the UMGO as a base of inquiry that iteratively experiments and implements its findings. The case-studies themselves have furthermore reinforced a template approach to organisational transformation for sustainability at universities according to action research. This is to the extent that each cycle of analyse-plan-act-evaluate-reflect may trace out how a university embarks on its specific organisational transformation at various scales, where the challenges met are the focal point of the problem reconnaissance, intervention and evaluation. This case study approach draws from the model of creative design as “co-evolution of problem and solution spaces”, established by Dorst and Cross (2001). The central notion of relevance is that the core solution idea can change the designer's view of the problem. An iterative and dynamic path is taken through analysis, synthesis and evaluation, across two notional spaces of design and problem space. Analysis consists of a formulation of a structured problem; synthesis consists of a structured solution to the formulated structured problem; evaluation consists of the structured solution's capacity to solve the problem formulated previously (Dorst & Cross, 2001).

The research was divided into three phases (see Table 2, Chapter 1). This design drew from a strategy of methodological bridge-building (Moses & Knutsen, 2012, p. 303). *Table 2* illustrates research questions answered by each phase. A literature review culminated in an analytical framework for organisational transformation towards sustainability at universities. This was undertaken in addition to a review of policy and planning documentation at UM and the UMGO, amongst others, to inform the methodology, methods, and theoretical foundations of the study. Regular engagements with UMGO and other UM actors through weekly meetings, operations and coordination meetings, as well as biweekly meetings with the environmental and sustainability advisor (and UMGO coordinator) were concurrent throughout the duration of the project and provided key moments of validated learning. These engagements were formative for each phase and also provided further guidance on the direction and nature of the case-studies. More detail on the longitudinal action research within UM can be found in *Chapter 8*. The conceptual synthesis of the analytical framework frames the approach and empirical findings of the case-studies. It was tested in the plausibility probe (Moses & Knutsen, 2012, p. 138) at UM early on and at the first case-study, which aimed to validate and warrant the approach for the rest of the cases.

Figure 3: Tangible Systemic Rubrics of Organisational Transformation for Sustainability at Universities

Figure 4: Integrated Research Design of ICIS-GO PhD. Phases of the project are indicated by the curved dotted lines transverse to the **maroon** and **orange** research progressions. Blue

boxes indicate the methodology. Light blue the methods chosen and stages of research (e.g. formative research at GO in 2014-15). Red boxes show the targets held throughout regarding process and knowledge outcome. Action research iterations (as in Figure 2, Chapter 2) are rooted in experiential learning, and the attempt to expand a community of inquiry with core-researchers and participants. Inherent in this formulation, progress of action research projects is defined as an appreciative drive and an emancipatory goal through praxis, whether at the embedded case studies or in the pragmatic insider action research within UM.

To better perceive and understand organisational transformation requires the researcher to draw from a within-case approach (Moses & Knutsen, 2012, p. 319), in order to gain access to the intricate relationships in the complexity of the organisation as a social system, in addition to its development along a pathway to integrating sustainability. This justifies spending some length of time at the case-study organisation depending on accessibility, budget and time constraints.

		RQ 1-3	RQ 4-6	RQ 7-9	RQ 6, 8 & 9
Conceptual synthesis, Meta-theoretical review & development of analytical framework at UM; 2014-2015		X			
External Case-Studies: Embedded Insider Research; 2016	Case 1: Leuphana University Lüneburg		X		
	Case 2: Arizona State University		X		
	Case 3: Hong Kong University of Science and Technology		X		
Analysis & Synthesis of External Cases 1-3; 2017-2018					X
Longitudinal Action Research Case: Maastricht University and the Green Office; 2014-2019			X	X	

Table 2: Research questions planned to be answered at each phase of the ICIS-GO PhD Research Project.

The case-study method is therefore designed to answer questions on what sequences of events characterised the organisational trajectory of transformation for sustainability. It was employed to identify behavioural patterns and mechanisms, and what the meaning and drive behind the actions of those consciously navigating organisational transformation are. Another objective was to ground the diagnostic criteria of the analytical framework in the data. Here, the data collected represents a system of people working together towards a common cause. An example of such data is information demonstrating that the research and education undertaken has societal impact, and that the public are aware of this. Thus, the field research aimed to answer these questions from the perspective of the agents of transformation, using freely available and privately obtained documentation to corroborate analysis and interpretation.

Types of data expected included conversations, observed social behaviour and physical aspects of the campus environment, documentation (e.g. internal strategic reports, sustainability reports for disclosure of performance, and external documents based on third-party, independent sources), and semi-structured and open-ended interviews.

The data are highly qualitative, being processual, narrative, subjective, and interpretative in nature (Pentland, 1999). However, the aim was also to put an evaluative lens on the qualitative analysis, allowing the possibility of weighting categories of analysis according to frequency in the data. Each of the case study chapters and *Chapter 7*'s synthesis aims to put such an evaluative lens on organisational transformation for sustainability.

4.2.2 CASE-STUDY SELECTION

The integrated research design was used as a starting point, as it could overcome confirmation and availability bias. Building on the empirical analysis of previous similar studies as a means of diversifying case-study selection allows different pathways and points of evolution along transformations towards sustainability to come under analysis. Although cases of campus sustainability management and sustainability in higher education in the last two decades are numerous and diverse, less is known about the outliers, and it is rare that studies focus on small-‘n’ embedded cases (Baker-Shelley et al., 2017). Thus, a body of potential cases was built up systematically, based on large-n case-studies of project-based university co-creation for sustainability in G. Trencher (2014) and the researcher’s adapted and updated criteria for inclusion in this study. They were used to select several pioneering cases relevant to the problem situation and circumstances experienced at the home case, in effect boiling down the macro-level playing field to the micro-level ‘deep-dive’. Large ‘n’ insights guided the direction of where and how to focus in the small ‘n’ cases. Three macro-level groups of potential cases, or lenses of selection, are used, based on the North American, European and Asian regions used in previous studies (G. Trencher, 2014; G. Trencher et al., 2014; G. Trencher et al., 2013). The case study groups have unique region- and nation-specific characterisations that inform the cultural, geographical, legislative and socio-ecological conditions present at the case universities, which may influence their capacity for organisational transformation.

Subsequently, three case study regions were chosen with a view to testing the analytical framework for development into a tool for organisational transformation for sustainability on pioneering public research universities. This decision was based on previous macro-empirical research. For example, G. Trencher et al. (2013), and G. Trencher, Yarime, Doll, and Kharrazi (2012) showed that the formation of co-creative partnerships for sustainability transformations is not confined to several locations. Rather, they posit that these are significant and relatively widespread in academia, “observable in a diverse array of academic institutions from all over the world” (G. Trencher et al., 2013). Having selected 39 cases for analysing the emerging co-creation for sustainability function of universities, they divide these into three groups representing the supra-national regions of North America, Europe and East Asia. It was decided, in 2014, to follow this grouping of potential cases from Europe, North America and East Asia as three global regions of selection, to incorporate newer developments in the higher education sector; including China’s transformation and substantial investment in research and development, and science and technology over the last decades. This was to avoid overly Eurocentric or westernised skews in the results, and secondly to encapsulate the unprecedented growth of the higher education sector in East/South-east Asia. Ignoring this Asian development would be to ignore

the role of universities in the 21st century's shifting geo-politics, and therefore to also ignore how different modes of governance for sustainability might necessitate and make manifest organisational transformation.

Criteria for Case Study Selection	1. Leuphana Universität Lüneburg	2. Arizona State University	3. Hong Kong University of Science & Technology
It has the terms 'Sustainability' or 'sustainable development' (SD) in its strategic documentation and reporting.	X	X	X
Its management makes direct reference to 'Sustainability' or 'sustainable development' in its policies and meeting-minutes as part of its communications strategy.	X	X	X
Some of its student organisations, committees, and/or working groups are active in sustainability-related aspects.	X	X	X
Its student organisations, committees, and/or working groups communicate their activity using official-website platforms, social media and the like	X	X	X
Its documentation and lingua franca are in accessible languages for the researcher		X	X
It reports and assesses its sustainability performance.	X	X	X
It has a mandated, official governance structure dedicated to sustainability performance		X	X
Its facility services/operations/environmental department is mandated to at least partially manage sustainability performance	X	X	X
It has a mandated, official department for the management of sustainability, or a formalised portfolio of specific sustainability-related activities within facilities, operations and environmental management programmes.		X	X
It is a partner in the NEPS international network on Sustainability Science *	X		
It has a formalised and accredited sustainability-education program at Bachelors, Masters and/or PhD-levels.	X	X	
Complies with/applies Global Reporting Initiative (GRI) and the ISCN/GULF Sustainable Campus Charter, and others.	X	X	

Table 3: Criteria used to select three case-studies from a list of large-n research sampled, which numbered 39 to 45 depending on the organisational type.

Within these three regions, universities in Germany, the USA, and Hong Kong were chosen according to criteria found in previous research. *Table 3* provides an example of how I applied these criteria to the cases selected. In this way, the case-study selection used key 'large n' case-study research studies to determine the small 'n' selection in

fields of relevance; in other words, lists of possible cases from these studies were collated and filtered using the case-selection criteria (Disterheft, Caeiro, Azeiteiro, & Filho, 2014; G. Trencher et al., 2012; G. Trencher et al., 2013; Yarime & Tanaka, 2012). The three universities selected are Leuphana University Lüneburg (LU), Arizona State University (ASU), and Hong Kong University of Science and Technology (HKUST). These cases were arrived at by scanning university websites and their published documents and reports from a group of potential case study candidates to confirm whether certain aspects were present using the criteria shown in *Table 3*. A limit of three case-studies was imposed in spite of the sheer quantity of potential cases that could be studied due to the rate of uptake of sustainability-initiatives by universities in the last decades; organisational research can yield vast and complex datasets.

Each region has distinct characteristics and social, environmental and economic drivers that in turn affect the task environments the selected cases have had to adapt, anticipate and react to. In doing so, they have to stay credible, legitimate and salient to their surrounding society. University leaders, scholars and academics remark, understandably, that they cannot be completely transparent to the public about all the detailed processes and dynamics of their organisations lest they risk the academic autonomy that sets universities apart for their historical impact on the ways in which we live. In the case of public research universities, they have more pressure and moral obligation to serve the community that provides their public funding through a portion of their taxes. *Chapters 4-6* open with a focus on the macro-level empirics of basic attributes, drivers, and barriers characterising the environments of each case, leading into the evaluation of the cases taken into the selected embedded field work.

4.2.3 EMBEDDED CASE-STUDY METHODS

In embedded case studies, the case is faceted for the analyses in different perspectives of inquiry. The case is moreover embedded in a defined orientation to inquiry. The process of decomposition and synthesis within methodological strategies is considered an essential aspect of the epistemology of the transdisciplinary case study approach (Scholz et al., 2006). As explained in *Chapter 2*, experiential as well as empirical evidence guided the emergence of key themes and concepts in insider research (Brannick & Coghlan, 2007; Waterman et al., 2001).

Concerted efforts by actors were perceivable from the background documentation collected in preliminary scans of each case. This further justified an embedded approach, with a focus on individuals and groups of change-agents in the field work. For example, Walter Leal Filho commented that education and spreading the word about sustainability in HE “is usually left to one or two enthusiastic members of staff” (Leal Filho, 2000). Furthermore, such ‘champions’ or ‘committed individuals’ often lead change and are essential to developing sustainability within their institutions (Barlett & Chase, 2004). Broadly speaking, having ‘front runners’ and people who think ‘out of the box’ is also deemed essential for any transition to sustainability (Hoover & Harder, 2015; Loorbach & Rotmans, 2010).

Observations on site also allowed insights to emerge independently from the analytical framework deduced earlier; hence a meaning-making procedure was employed

that set the scene for eventually applying the diagnostic tool. The observation and understanding of the consequences of their signature approaches to transformation was the key tenet guiding the field work at all three cases. Fundamentally, according to principles of transformative action-oriented research seen in the action research community (Bradbury-Huang, 2010; Bradbury et al., 2019) the approach itself evolved due to reflexivity and experiential learning at each case progressively. To attain the level of embeddedness required to analyse internal mechanisms determining a university's specific pathway of transformation, sufficient trust from the stakeholders was essential, which secured access to document and reporting analysis, face-to-face interviews, as well as some meetings. The time spent at each case was 3-4 weeks, within which the data collection and rapport building, and all described field work took place. Evidently this was not long enough to build relationships, so contacts were maintained both before and after each case.

Two modes of investigation were pursued: firstly, knowledge of the case was validated using an inductive organisational mapping procedure which also allowed a more holistic view of the organisation, within which stakeholders could be targeted for conversation and interview; secondly, primary data from interviews of identified stakeholders were corroborated against secondary data in documentary and experiential data. Effectively, as recommended by Dey (1993), the pathways taken through the analysis in the previous steps were retraced.

4.2.3.1 TRIANGULATION OF METHODS

The methods of the case-study involved an investigative form of triangulation; a qualitative research strategy to test validity through the convergence of information from different data sources (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). Triangulation has been defined as “a vehicle for cross-validation” when the use of multiple methods or data sources in qualitative research “are found to be congruent, and yield comparable data” (Jick, 1979; Patton, 1999). The triangulation consisted of: a qualitative within-case study using a combination of semi-structured interviews and documents, whose content were analysed with codes generated and validated in an iterative and reflective process of evaluation and interpretation. The data set includes quotes, documents, diagrams, digitalised mind maps drawn in meetings, and direct observations in-situ. All these types of data were able to be synthesised in such a manner so that they could then be organised and coded in Atlas.ti because of the logs I took throughout the research project. The journals stretch from 2014 to 2019 and throughout this period, at regular intervals, these themselves were ‘coded’ using various colours, and cross-referenced between significant time periods, events and themes as these cumulatively emerged. As mentioned in *Chapter 2*, these data formed the backbone of the action research followed. In terms of the case-studies, however this should suffice to explain the importance of the early analysis of the journals with respect to the following methods employed (for example, key organisational charts were first drawn by hand with key actors labelled in).

Organisational Mapping

Each university case study's organisational structure was mapped in order to arrive

at the most visible persons associated with embedding sustainability. This mapping helped zoom in to key actors in context of the unit in the organisation and their role and responsibility as part of the whole. They were also identified in conjunction with referral and literature research; the target group of interviewees were found this way. The rationale for the organisational mapping was that interpretative, therapeutic, experiential and dialogical components have been somewhat lacking in auditing procedures, assessment tools, and sustainability performance research. These components could arguably be put to use alongside descriptive-analytical and diagnostic-evaluative ones as mentioned elsewhere in this chapter. This expansion of the scope and purpose of organisational mapping links back to the arena of post-normal scientific practice, and mode-2 science, suitable to evaluating systems where uncertainty and the stakes held in the status quo are high (Funtowicz & Ravetz, 1993). This can be seen as an underexplored dialectic in public institutions due to a fostered “culture that glorifies arcane unintelligibility while disdaining an audience” (Crow & Dabars, 2015a; Kristoff, 2014). It was this logic that undergirded the need to substantiate living organisational experiences at each case.

Semi-structured Interviews

The 38 interviews were qualitative, semi-structured, and had mostly open questions. A focus was put on the interviewee’s experience and understanding; therefore, leading questions were avoided and if the narrative diverged from the framework in a significant manner, this was followed with targeted questions. They ranged from 35-50 minutes at a maximum, to 15 minutes with high-level actors with busier schedules. An exception was given if interviewees opened up a new avenue of inquiry that deepened or restructured the problems experienced. The researcher’s perception of the problem may hold heuristic biases and was therefore redefined reflexively after each interview. Several interviewees, being experienced sustainability scientists or administrators, also shared advice about the research itself, as well as asking important questions which enhanced the direction and manner of the inquiry as well as the developing understanding of the practice of insider field work. The objective of the interviews was to paint a more thorough picture of organisational life with respect to change efforts towards sustainability using actor’s accounts. Observations of individual and group-level behaviour were sought from historical and current accounts. Subsequently, through trust-building and gaining access, actors articulated their beliefs, concerns and worries through formal interviews and informal conversations. The expectation was that tapping into conscious (or indeed unconscious or tacit) understanding might provide insights previously unseen into the deeper leverage points for transformation in an organisational system. The meaning and interpretation of actions, behaviours and feelings are also important to draw from the interviews. The following semi-structured interview framework was applied commonly at all cases, not including targeted questions that arose whilst on site. Sections of questions, ranging from ‘A’ to ‘E’, correspond to the various scales of organisational transformation. Questions began with an individual focus, before zooming out to the group, project, intra-organisational, and extra-organisational levels.

Questions for University Actors:

A: Personal Association and Relation to Sustainability Efforts: [Corresponding code family in Atlas.ti: Individual, micro]

- 1) What position do you have in the organisation?
- 2) Do you know anything about sustainability efforts on campus?
- 3) How are you involved with sustainability projects?
 - a) How so? Please provide some examples.
- 4) How would you individually define sustainability?
 - a) What does it mean to you?
 - b) Do you know if the university has a definition?
 - c) Do you have a view on this?

B: The University's Sustainability Performance: [Corresponding code family: Intra-organisational, meso]

- 5) Are you aware that there is a sustainability report that tracks the progress of the university?
 - a) Do you have opinion on it?
 - b) How do you think the university's overall sustainability performance is going?

C: Sustainability Transformation Pathway: [Corresponding code family: Intra-organisational, meso]

Assuming all organisations should partake in a transformation to higher sustainability and better resilience (of our economies, societies and environment), we can see them as having certain pathways to this end.

In policy, this is usually called the sustainability 'vision', 'mission' and/or mid-term and long-term goals.

- 6) What direction is the university taking here?
 - a) What roles are people taking?
 - b) Do you think the university is on the right track?
 - c) How does your organisation's path to sustainability look, in the near-term, 2-5 years?

D: Levers for Action: Implementing Paths to Sustainability: [Corresponding code family: Intra-organisational, meso & Extra-organisational, macro]

Leveraging pathways towards sustainability, we can find internal and external factors that help the transformation along. Sometimes located internally as groups of people, policies or practices, but also externally in the same light. We can call these 'levers for action'³.

- 7) What actions have been taken or are currently being used to implement the path to sustainability.
- 8) What barriers or obstacles have there been/ are there preventing this pathway

³ This term was later reframed according to the 'leverage points' framework (Meadows, 1999), and active project and research group at Case-study One (Abson et al., 2017).

taking shape? Please give some examples?

- 9) *How can internal and external levers for action be best put to use to surmount or overcome these barriers?*

E: Stakeholders and agents in the transformation pathway: [Corresponding code family: Intra-organisational, meso]

Once specific individuals are involved and invested in the transformation, we can see different types of social groups working, such as: social entrepreneurs (not embedded in the organisation), social intrapreneurs (nested in the university), change-agents, sustainability champions, and/or liaison officers (often the sustainability coordinator must liaise and coordinate between faculties).

- 10) *Do you know of any people engaged as agents and/or stakeholders in the sustainability transformation at Leuphana?*
- a) *What types of stakeholders are there in the implementation of the pathway to sustainability?*
- b) *What role do these parties have in the sustainability transformation?*
- 11) *Would you classify these stakeholders and the roles they play as social intrapreneurs, entrepreneurs or change-agents?*
- a) *Which of them are most effective at playing their role?*
- 12) *Is there anything you would like to add? Who do you think I should be talking to?*

Document Analysis

The document analysis was used to establish the empirical context, and to ground and corroborate accounts given in the interviews, conversations and presentations. The documents analysed consisted of publications, and internal, unpublished or not widely distributed documents. The latter were received from stakeholders when asked questions in the interviews, or unprompted as they recognised they could assist in this investigation. Informal conversations with stakeholders, defined as emergent, without structure, precedent, or audio record, prompted notes and annotations on documents, as well as referrals and recommendations towards particular actors to be interviewed. A table of documentation collected, and interview transcripts and summaries used in the analysis can be found in the Appendices.

4.2.3.2 COMMON METHOD OF APPLYING THE TOOL PER CASE

In each case study chapter, a detailed description of the application of the tool to the data is provided. This application represents stages two and three of the operationalisation of the tool described earlier. Besides evaluation, the objective was to refine the diagnostic capacity of the framework in the field. The internal validity of the diagnostic criteria was assured as to their explanatory power through testing the framework at the first case⁴ in Lüneburg. Subject to the experience with the first case, at the second case study, categories were refined, and the tool appeared more workable in the ensuing analysis. Another application was performed at the third case to further develop the framework into a feasible and comprehensive tool. During this third case

⁴ At LU, the framework had been prototyped and some experience and results of using it were gained. Categories were refined further at ASU, and HKUST. This generated progress, developing the framework into a tool.

study, the framework had been prototyped at Leuphana University Lüneburg, and had then been tested and applied at Arizona State University. Subject these experiences, categories were further refined, and the tool began to show some aspects of data saturation, with not so many adjustments needed as after case study one. Thus, after the analysis of the third case, the framework developed into a diagnostic tool.

The application of the analytical framework departs from how the university articulates its own achievements and tries to describe what has actually been occurring under the bonnet inside the organisation; the state of affairs with respect to its sustainability performance trajectory. These sections of each case study chapter are structured according to scale and perspective, corresponding to a view of multiple actors, sectors and levels of operation. At this level of granularity, the framework's criteria are assigned to all the intelligence gathered through interview transcripts, extensive notes, informal conversations, reflections, governance and strategy documentation, as well as the social atmosphere that was experienced through the fieldwork. The data collected are rich and diverse and was categorised using refined versions of diagnostic criteria and shorter coding sequences.

A simple equation for weighting coded categories

In the analysis, links were automatically made by Atlas between categories that coded the same sources in the hermeneutic units (data packages per case). The nature of that connection was evaluated based on the content. The coded data for each category formed specific associations that often spanned both scale and thematic areas, forming distinct action strategies. Based on Dey's approach (1993), these operative concepts were applied:

- Groundedness, Gr.: the number of quotations to which a code is connected, representing how grounded each code is in the evidence.
- Conceptual density, De.: the number of times one code is connected to another via a shared databit; or, the number of other codes each code is associated with using common internal evidence (NB: if two codes share more of the same quotations/data this increases the significance of connection to the extent that a substantiated pattern of behaviour is outlined).

In order to attain some level of proportionality, an evaluative lens was applied by performing a weighting exercise. In this exercise, the numeric outputs are shown per scale for each category, then for averaged weights of all categories per perspective. There was uncertainty over whether to aggregate or average weights per category that occurred at each scale, however, in the end, it was found that each had its own purpose, and that an average weight per perspective at each scale would be a fairer visualisation of performance and transformative capacity:

The results – with diagnoses per scale, perspective and in detail for each category - are shown in *Sections 5.3.2, 6.3.2 and 7.3.2* in the following chapters, and the aggregation of the data from all three cases in *Section 8.3.4*. An experimental weighting exercise was conducted using the numerical values. This allowed a level of proportionality which could be clearly visualised in the charts used to illustrate the pathways which emerged

Aggregate Weight per Perspective	<i>Tells you <u>proportionally</u> how much (on aggregate) data has been weighted/assigned to <u>one perspective compared to the others from the dataset at this scale</u>. Not adjusted for number of rubrics per lens as with the average.</i>	Average Weight per Perspective	<i>Tells you <u>transformative performance/capacity for each perspective at this scale</u>. The <u>average is a fairer measure of performance</u> as the number of rubrics per perspective is not equal.</i>
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Table 4: Distinction between Measurement of Aggregate and Average weight per Perspective used in the Analysis.

from the data by adjusting the size of the rubric in question in the mind mapping software EDraw. The following equation was used to weight categories according to Dey's approach (1993) by applying functions of groundedness and density. Gr_c and De were combined in a function to arrive at a proportional numerical representation of weightedness, W .

See equation:

$$W = \frac{Gr_c}{N_q} \times \left(100 + \frac{De}{10} \right)$$

The equation for Weight W , factors the numeric values for groundedness of a category Gr_c , Frequency of Groundedness per code: number of quotations which a code is connected to, with respect to the total number of coded quotes, N_q , taking into account the function of conceptual density, De , the number of other codes each code is associated with corresponding internal evidence – a measure for connectedness. Dividing by 10, plus 100, made the weighting value easier to scale and visualise with respect to their distribution and frequency.

How to interpret the transformation signatures

Weights were assigned and calculated according to each code's groundedness in the data. Colour-coding each thematic area and re-sizing each rubric larger for higher weight values denotes groundedness and density per case. The values correspond to the application of the weighting equation to respective values of groundedness and density. The density values showed the connections in the Atlas.ti maps used in the analysis (see Appendices); these were mapped onto the diagnostic tool (see Sections, 5.3.3, 6.3.3 and 7.3.3 in the case-study chapters) at the three scale levels across five thematic areas, visually depicting associations between rubrics with the density connection function. These are denoted by the various dashed outlines surrounding, and arrows connecting each. This illustrates visually how the code links were used to form the action strategies, whose associations, once tested and corroborated, eventually formed the transformative signatures of LU, ASU and HKUST. These were made when more than two quotes were shared between codes and where linkages were verified by other sources in the internal evidence based on the hyperlinks. The

hyperlinks and notes made on these connections in the memos formed the content for establishing interpretations of the accounts according to the research questions.

CONCLUDING PART I

Pragmatic knowledge is still needed on how organisational transformation for sustainability takes hold and propagates. This is geared towards better understanding of the barriers change-agents, intrapreneurs, sustainability scientists, professionals and coordinators have to navigate. Equipped with this pragmatic knowledge, we may be able to facilitate valuing what we measure as researchers and measuring what we value as intrapreneurs who seek to remedy socio-ecological imbalance. This is the objective of *Part B's* embedded case studies and synthesis: to provide in-depth examples of transformation pathways towards sustainability being navigated by universities and actors within them. This concludes the approach to the case-studies.

PART II. INTERNATIONAL CASE-STUDIES OF PIONEERING AND TRANSFORMATIVE PUBLIC RESEARCH UNIVERSITIES

“Their power comes from the fact that they spot dysfunction in the current system, and, unlike, reasonable people who accommodate themselves to the status quo, they try to work out how to transition the system equilibrium to a different – and more functional – state.”

(John Elkington & Hartigan, 2008)

INTRODUCTION TO THE CASE-STUDY CHAPTERS

This thesis is about whether or not one can diagnose and navigate organisational transformation for sustainability; as a prerequisite to this inquiry, it must be assessed whether pathways of organisational transformation for sustainability can actually be identified. The following research questions were, therefore, designed for the case-study phase of the research:

- What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to the case?
- What is the signature pathway of organisational development/transformation for sustainability?
- What is the role of specific actors and groups (for example, intrapreneurs, change-agents, and the sustainability department) in the pathway of organisational transformation for sustainability?

RATIONALE

Contemporary universities are constructed on a millennium of scholarship tradition (Alison Abbott, Zastrow, Gibney, & Nording, 2014). Hence, they tend to struggle to adapt to the challenges of the 21st century, in light of their external task environment and internal structural inertia and socio-cultural disciplinary siloes. There are however, increasing numbers of universities undertaking novel organisational and institutional design experiments, like interdisciplinary configurations that encourage innovative ways of thinking about and acting towards improving the world, in core, applied, and action-oriented research that drives their prosperity and that of the wider-world (socio-ecological systems) in which they are embedded (Alison Abbott et al., 2014). An innovative, as well as a pragmatic approach to sustainability and resilience of the university organisation (Crow & Dabars, 2015b), seems to be one amongst several pathways of transformation that universities are striving to navigate, through experiment against inertia, into uncharted waters.

This falls under an established body of work on epistemologies of practice and pragmatism (see *Chapter 2*) which speaks to novel epistemic communities of practice to be observed in the cases (Bozeman, 2007; Cortese, 2012; Crow & Dabars, 2015b; Dewey, 1927, 1938; Menand, 1997, 2001). Part B builds upon this foundation in an empirical investigation of how these epistemic communities¹ undertake productive inquiry using pragmatic idealism to conduct sustainability transformation experiments. This is commensurate to creating solutions that can keep pace with rate of increase of sustainability problems. These knowledge actors seem to recognise the need for sustainability solutions to be shared and actualised at sufficient scope and scale to keep pace with the incidence, frequency and complexity of sustainability problems seen globally. In the context of researching the pathways, channels and actions that leveraged organisational development/transformation for sustainability at each case, it is necessary to evaluate to what extent a systemic equilibrium has been perturbed, and if a new state has been achieved, seeking substantive evidence for change in organisational governance, design, and behaviour. This extends to the perspective of the stakeholders identified - whether intrapreneurs, insider change-agents, bureaucratic infighters or action researchers - attempting to enable and navigate organisational transformation for sustainability in their university. This additionally focussed on

¹ “Epistemic communities (or ‘knowledge communities’) are networks of expertise, knowledge, and practice around specific challenges... When goals [like the SDGs] are set, those communities of knowledge and practice come together to recommend practical pathways to achieve results” (J. Sachs, 2015, p. 490)

how the university subsequently anticipates and adapts to a changing macro-level of societal, political, cultural, environmental and economic drivers. Hence the following sections aim to draw out the intelligence necessary to paint this picture of transformation.

Case-Study Chapters and Report Structure:

The case study reports at each university site, were initially prepared holistically and experientially, for the understanding of the stakeholders most involved in hosting and guiding the field work. This means that sections had to be included that explain the research design, methodology, types of data collected, and organisation of the data, so that the reports remained comprehensible and transparent. In the thesis however, these sections are constant for each case study, and therefore are included here above. The three case study chapters primarily focus on the case-specific contexts, the analysis, outputs, interpretations and evaluation of organisational transformation. This first section of each case study presents a synopsis, context and evolution of sustainability in the university over time, and the presence of sustainability in its vision, mission and values. Most of this information is derived from the analysis and university publications. However, the aim of the case studies is to explore organisational transformation for sustainability in a more systematic (and systemic) way. The three-pronged research design - organisational mapping, semi-structured interviews, and document analysis - is covered in section two. Thereafter, section three uses data derived from literature, documents, interviews, and observations at the micro, meso and macro-scales of the university organisation, from five different theoretical perspectives. Section four interprets the intelligence gleaned from the application of the ID-tool across the categories of analysis, allowing for patterns and action strategies to emerge which appear to explain how groups within the case organisation navigated its transformation towards sustainability. Section five concludes by presenting the holistic nature of the transformation and what the identifiable actions were that constituted it, by zooming out to the bigger picture of sustainability, innovation and societal impact, from the previous section's analysis, evaluation, and interpretation. Now that the approach and structure common to each of the following chapters has been covered, we can begin the presentation of the case-studies, starting with Leuphana Universität Lüneburg, Germany.

CHAPTER 5. CASE-STUDY ONE: LEUPHANA UNIVERSITY LÜNEBURG

AGILITY, GOVERNANCE & INNOVATION FOR SUSTAINABILITY - EINE UNIVERSITÄT
DIE RAUM FÜR MÖGLICHKEIT SCHAFFT

*“Power has less to do with pushing
leverage points than it does with
strategically, profoundly, madly
letting go...”*

Donella Meadows

SUMMARY

Despite its size, at over 9000 students and 1160 academic and administrative staff, Leuphana University Lüneburg is renowned, in Germany, and across Europe for its approach to sustainability, innovation, and entrepreneurship (Kempton & Hofer, 2015, p. 5). It underwent an extensive period of experimentation and restructuration, guided by key roles, including a dynamic President, university management, administrative staff, as well as the engagement and intrapreneurship of teams of professors and students. Numerous student associations, agencies, councils, and start-ups also appear to have driven this organisational transformation. Through the formal and informal efforts of the faculty, students and staff, initiatives coalesced in high-level leadership support, and the implementation and formalisation of a whole faculty for social and natural sustainability sciences. Representatives from each faculty were installed in liaison with the environmental coordinator, via various sub-units, with explicit legitimacy, resources and decision rights allocated. This resulted in an evolution in governance for sustainability, performance enhancement and social responsibility. LU's sustainability coordination forms a cohesive network for dialogical (effective/two-way) communication throughout the organisation (Bakhtin, 2006), working against the tendency for decentralisation and inertia in traditional university models. The results of the OECD-funded Innovation Incubator (Kempton & Hofer, 2015), positively exemplifies the initiatives, strategies, action research programmes and structural reconceptualisation kicked off by the Faculty of Sustainability's practice of transdisciplinarity, and sustainability competence training. The structures of governance for sustainability at LU are an outcome of this, representing formalised evidence of intrinsic systemic change and the triggering of awareness for the necessity of sustainable development in the region.

5.1 INTRODUCTION TO LEUPHANA UNIVERSITÄT LÜNEBURG

In this chapter, the first organisational case-study will be presented. The field research took place in the eastern part of the German region of *Niedersachsen*, Lower Saxony, at Leuphana University (LU)² in the city of Lüneburg, during the period April-June 2016. The specific research questions I aim to answer in this chapter are:

- What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to LU?
- What is LU's signature pathway of organisational development/transformation for sustainability?
- What is the role of specific actors and groups (for example, intrapreneurs, change-agents, and the sustainability department) in the pathway of organisational transformation for sustainability?

² Abbreviations: **LU:** Leuphana University; **BSP:** Behavioural Science and Psychology; **CGS:** Corporate Governance for Sustainability; **DESD:** Decade for Education for Sustainable Development; **EMAS:** Eco-Management and Audit Scheme; **ESG:** Environmental Social Governance; **HESD:** Higher Education for Sustainable Development; **GCSO:** Global Consortium for Sustainability Outcomes; **ID:** Interpretative-Diagnostic; **OCM:** Organisational Change Management; **OECD:** Organisation for Economic Co-operation and Development; **PRU:** Public Research University; **SES:** Socio-Ecological Systems; **SER:** Sustainability in education and research; **UNESCO:** United Nations Educational, Scientific and Cultural Organisation;

5.1.1 CONTEXT & EVOLUTION

The roots of Leuphana's organisational transformation were observed in the 'Agenda 21 and the University Lüneburg' project in 1999 (LU, 2010). From the interviews, documents, and conversations, this appeared as the earliest reference to sustainability in the context of LU's aspired journey towards it. Next in 2000, came a series of environmental working groups and guidelines being adopted, which culminated in the certification of campus Scharnhorststraße according to EMAS (Eco-Management and Audit Scheme) standards. In 2001, the Lüneburg declaration on Higher Education for Sustainability was made. Moreover, the position of Environmental Coordinator was created in 2002, which has now developed into a formalised representative in the governance of LU of Sustainability Commissioner for 2016/17. 2004 saw the establishment of the first world-wide MBA in Sustainability Management at the fledgling Centre of Sustainability Management, spearheaded by a team of creative academics (LU, 2010). Pivotaly, a project was initiated in 2004 called 'the Sustainable University' project (LU, 2010), which involved internal investigation and reflection, as part of a broader process of social-organisational experimentation. This appeared to set a new precedent in LU's re-design process.

The reorganisation showed strong indications of progress in 2005, when the Institute of Ethics and Transdisciplinary Sustainability Research within the new Faculty of Sustainability was awarded the UNESCO chair 'Higher Education for Sustainable Development' (LU, 2010). Also, in that year, the fusion of two previous institutes, Lüneburg University and the University of Applied Sciences was completed. As if to punctuate this, a young, charismatic President, Sascha Spoun, was instated from his prior positions at St. Gallen and ETH Zürich, Switzerland; another frontrunner in the European landscape of university sustainability, yet with higher ranking on traditional metrics, more resources and established elite status. It can be seen that sustainability started being embedded in managerial and academic policy when the LU Senate explicitly adopted the general principles of a humanistic, sustainable and entrepreneurial university in 2006 (LU, 2010). By 2007, when the first sustainability reporting effort was made, there was a general decision that the university would take actions to establish the first climate neutral campus world-wide (LU, 2010). Seven years later, LU was officially certified as climate neutral, without the need for carbon trading schemes (Brüggen, 2016).

In the area of research, Leuphana has been internationally recognised. In 2008, it gleaned two awards for research projects it conducted as part of the UNESCO DESD (Decade for Education for Sustainable Development), having been awarded six project awards since 2006 in total. That same year, the foundational 'Science Initiative Sustainability Research' was established, applying trans-disciplinary sustainability research with a foot in both the social and natural sciences. Transdisciplinarity formed one of the four pillars of this research initiative, specifically attributed to creating positive social and environmental change. It also articulated the capacity for the natural and human environmental and sustainability sciences to work together for transdisciplinary innovation and knowledge creation towards 'international sustainable development' (Schaltegger, 2009).

	2007 (approx.)	2014 (approx.)
Number of students	9348	9076
First semester students	1404	2339 ⁽¹⁾
Professors ⁽²⁾	179	184
Researchers/lecturers ⁽³⁾ other teaching staff	452	744
Administrative staff	315	465
University budget	67.003.062 €	113.927.648 €
Third-party funding	8.260.511 €	35.926.115 € ⁽⁴⁾
Peer-reviewed publications	251	712 ⁽⁵⁾
Total publications	1 329	1 297

Notes: (1) The total number of first semester students in 2014 is composed of 1 536 in the College, 711 in the Graduate School, and 92 in the Professional School; (2) Professors include Leuphana regular professors, visiting professors and interim professors (*VerwalterIn einer Professur*); (3) No distinction is made between researchers and lecturers in German statistics; (4) As of 2013; (5) This includes 220 publications listed in the Web of Science.

The Leuphana University of Lüneburg has been the winner of the German Science Foundation's "Excellence Award of Small- and Medium-sized Universities" (several times in a row), the International Award for Innovative Practices in Higher Education by Arizona State University, and several German government awards (e.g., EXIST Entrepreneurial Universities, 365 Innovative Places).

Source: Leuphana University.

Box 1: LU Key Figures; source OECD report on LU Innovation Incubator (Kempton & Hofer, 2015).

For the period which this analysis is primarily based on, 2007-2014³. LU's student numbers on average have decreased slightly, whilst incoming students have increased, along with Professors, researchers, administrative and other teaching staff. University budgeting has nearly doubled in this period, whereas third-party funding has quadrupled. We can also see that the quality of publications has greatly improved, with peer-reviewed articles up 283% yet total publications diminishing slightly. 2007-2014 was an intense period of reconceptualisation, redesign and reorganisation in LU's organisational transformation.

Subsequently, from 2009-2010, seven full-time professorships were appointed within this initiative, and the university had its third revalidation according to the EMAS II standards. It seems 2010 was a milestone of achievements, as the second sustainability report was published according to the GRI G3 guidelines; LU added to its arsenal of research project awards under the Leuphana Science initiative, receiving one again under the framework of the UNESCO DESD (making nine altogether since 2006). For a fourth time in 2010, the university was revalidated according the EMAS II guidelines. Key figures denoting the growth in LU's academic mission from 2007-14, are shown in Box 1.

5.1.2 VISION, MISSION, VALUES

Stefan Schaltegger from the LU Centre for Sustainability Management (CSM) emphasises sustainable development as "without a doubt one of the meta-themes of the 21st century" (Schaltegger, 2009). This is reflected in the rather vague statement concerning "LU's development of an all-encompassing idea of education" and a

³ This period is combined with updated developments from 2015, direct accounts from the field work in 2016, and more recent relevant information from 2017 onwards. Student numbers have since rebounded, but not substantially, to 9888, according to Leuphana's own website at the time of writing (<https://www.leuphana.de/en/university.html>. Accessed October 2018).

“value-orientated implementation of its activities”, if sustainable development is indeed the meta-theme driving LU’s value-orientation. It also complements the view of an actor-oriented approach to sustainability science. However, this is rather more grounded in the humanistic philosophy (rather than also considering animism in the dialectic) - as reflected in the mission statement of LU.

Based on the information available in 2016, LU, by its own definition, seeks to imbue itself, and all its governance structures, with a more humanistic, sustainable and proactive ethos:

1. Humanistic: in terms of its understanding of education, combining personal and academic development whilst placing the process of acquiring knowledge into a concrete context.
2. Sustainable: through its education and research; contributing to the sustainable development of society. Fostering competencies in dealing with complexity and problem-solving in an interdisciplinary manner. Engaging in responsible and self-directed learning. Developing a readiness and willingness to take on social responsibility or shaping the future in a sustainable manner
3. Proactive: by fostering the development of responsible and proactive individuals who demonstrate the creativity and thoughtfulness as well as the willingness and ability to creatively shape society. And by contributing significantly to the solution of social problems through research, education, continuing education and academic services.” (LU, 2015)

Since 2016, LU has updated its third pillar from ‘proactive’ to an ‘application orientation’, implying an application-oriented education based on the “recognition of opportunities as much as the courage and ability to act with self-reliance for the common good”. They give examples of practical projects students can get involved with, having a particular focus on entrepreneurial thinking and action. In addition, a reference to the start-up consulting services offered to students and alumni, and specialisation in social enterprise (e.g. Social Change Hub). This mission statement also reflects more recent recognition, after this field work, for LU as the most entrepreneurially friendly medium-sized university in Germany, with many of the “student-founded businesses ... built on the idea of sustainability” (LU, 2018a).

The common theme is that LU articulates itself as a socially responsible university; a university for civil society in the 21st century. It strives to contribute to the common good through its research, teaching and transfer, and “to support mutual learning processes between researchers and different experts from economic, political and administrative practice, and to anchor them as an important practice of a modern knowledge society within the framework of their institutional profile” (LU, 2015).

LU augments its role as a proactive and principal change agent in its surrounding society in the mission statements from this period (2014-2017). This is important as the language they employ regarding sustainability has since become more popular in HE leadership circles; indeed, LU set its sustainability transition in motion using the language of entrepreneurship, innovation and ethics early in the game. This is represented by the following selected quote, in which LU emphasises moving “*away*

from the pure mediation of knowledge from the university to the consideration of the self-logics of the different social systems and their ways of thinking. The handling of societal challenges, which is relevant to science, takes place in a highly differentiated society with a great value-based approach and against the backdrop of complex global problems, usually in conjunction with politics, administration, business and civil society” (LU, 2015). LU continues in framing the handling of societal challenges broadly in terms of sustainability science, in various fora, workshops and cross-stakeholder participatory working groups, in addition to living laboratory-type platforms and experiments, and transdisciplinary research projects. A final conditional imperative is also made regarding the intention of these practices not being “understood as the use of science by politicians or companies” (LU, 2015).

We shall see in following sections how the language of the mission statements, which imply certain innovation claims regarding sustainability, are substantiated by the data. However, it is pertinent to mention that the impression one receives notably highlights the moral obligation of universities to provide the resources and knowledge required for increasingly complex challenges throughout the rest of this century. LU certainly seems to have moved strongly towards embracing sustainability. In section three, I will evaluate this in more detail, and will try to identify those elements that were driving this change. After this section’s description of the context and evolution of LU as a university, as well as its apparent core vision, mission and values, the next section focusses on the research design for this case study.

5.2 METHODS OF THE LU INQUIRY

5.2.1 ORGANISATIONAL MAPPING

LU’s organisational structure was mapped in order to locate the most significant persons associated with embedding sustainability, and to gain knowledge about the distribution of governance and responsibility for sustainability horizontally and vertically across of the organisational architecture. Key actors were identified through referral (for example from initial contact points) and literature research, whose insights were considered valuable due to their own structural embeddedness and place in the system. The list of significant stakeholders and targeted group of interviewees, and more detailed organisational charts - in addition to what is already presented in Section 4.3.1 - can be found in the Appendices. The organisational mapping represents an integration of creative and analytical visualisation of the university organisation that generated knowledge about the culture that actors at LU participated in tacitly.

5.2.2 SEMI-STRUCTURED INTERVIEWS

10 semi-structured interviews, several formal meetings (i.e. with prescriptive agendas and e-mail correspondence), and around a dozen informal ones (i.e. emergent, on the spot, conversational) were undertaken; this progressed in conjunction to an open and systemic organisational mapping exercise (see Section 5.3.1), which identified the most significant actors. Broad distribution throughout the structure vertically and horizontally, as well referrals and recommendations from initial contacts (e.g. Daniel Lang, Fabienne Gralla) was targeted. This yielded unexpected explanations of the historical development of LU, and allowed, by emergent targeted questions, much insight into the evolution of LU’s organisational transformation. The interviewees, their roles and responses can be found in Table 1. The structured questionnaire framework can be found in Chapter 4. This was used on site in combination with referrals from interviews and conversations to determine interview targets.

Table 1: Organisational sustainability stakeholders identified. Targets, interviewees, their roles, and notes on communications, actions, stakes and responses are included.

Interviewee Targeting Key			
			Not interested or open: difficult to commit
			Of interest: Contacted or No response
			Meeting: Interview Pending
			Interview Confirmed
			Interviewed
Contact	Date	Role; Place in Leuphana	Stake, Comms, Actions; Ideas
Lars Pöppel	27.04.2016	Head of Internal Audit Unit	Administrative/supportive staff perspective
Fabienne Gralla	26.04.2016	PhD, Faculty of Sustainability	Host
Beatrice John	03.05.2016	PhD, Faculty of Sustainability	Host
Daniel J. Lang	03.05.2016	Former-Dean of Faculty of Sustainability	Positive, sponsor, entry-point
ANONYMOUS 1	03.05.2016	Project Manager & Coordinator	Condition of anonymity
Irmhild Brüggem	28.04.2016	Environment Coordinator, Sustainability Commissioner	Positive, two meetings and close correspondence
Enno van der Linde	27.04.2016	3 rd Year Bachelors Student	Positive; student perspective of sustainability within LU included
Phillip Bernert	02.05.2016	Masters Student transitioning into a PhD	Positive; student perspective of sustainability within LU included
ANONYMOUS 2	04.05.2016	Senior Sustainability Scientist	Condition of anonymity
Jens Schmidt	02.05.2016		Positive – but no formal interview
Kirsten & Felix Rinke	28.06.2016	Local radio journalist and head of doctor's praxis.	Well known in Leuphana-Lüneburg community. Interviewed briefly on Lüneburgers' overall opinion of the university
Sven Prien-Ribcke	N/A		Identified as an 'actor-node' in organisational mapping
Sascha Spoun	N/A	President of Leuphana University Lüneburg	None: Daniel Lang confirmed willingness but no response: (Invite to review and contribute to final case research output)
Sebastian Weiner	N/A	Executive Assistant to President Spoun	Negative. Reasons for interview with President ostensibly not clear.
Gerd Michelsen	N/A	Senior Professor in Sustainability Science	Busy, but willing. Not interviewed: (Invite to review and contribute to final case research output)
Ute Stoltenberg	N/A	Senior Sustainability Scientist	Referred significantly to contact from other interviewees. No response received.
Henrik von Wehrden	N/A	Current Dean of Faculty of Sustainability	Referred from other interviewees
Guido Caniglia, Harald Heinrichs, Joern Fischer.	N/A		In order: Referred from other interviewees, advice regarding ASU case; Referred from other interviewees; Publication used in analysis (Abson et al., 2017)

5.2.3 DOCUMENT ANALYSIS

There were 30 primary documents included in the hermeneutic unit in Atlas. A table of documentation collected, and interview transcripts and summaries used in the analysis can be found in *Appendix 2*. This section focussed on the research design and empirics selected for analysis. The next section shows the results of the analytical tool application and a systematic overview of the findings per category⁴.

5.3 QUALITATIVE EVALUATION: LEUPHANA'S ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

This section begins with an overview of LU's organisational design for sustainability before entering into a detailed overview of data per category (see *Figure 3, Chapter 4*) demonstrating the associations and links made in the analysis of LU's organisational transformation, and a proposed transformation signature for LU, comprising of action strategies formed of tested associations.

5.3.1 ORGANISATIONAL DESIGN FOR SUSTAINABILITY

This section presents the organisational design characterising how LU has embedded sustainability. Its recent sustainability reporting shows how it developed structurally. To better understand the organisational design and structure regarding the governance and responsibility for sustainability at LU, a hand-drawn organigram was produced, with up-to-date information of LU's composition. Relevant information was overlaid as stakeholders were located in the organisation, from the documentation available via the website, and from meetings within the Faculty of Sustainability. In *Appendix 3* - an overlay of *Figures 2 and 3* based on the hand-drawn original, is presented for transparency, zoomed out to display researcher annotations. This chart was filled in incrementally based on findings from the interviews, formal meetings, and informal conversations.

LU has the structure of a small-medium-sized public research university. This structure originated from the prior two organisations, the university of applied sciences - a more vocational, professional-based HEI - and the Lüneburg university *Pädagogische Hochschule* (college of education) - a unique structure in Germany since its establishment in 1946 as a foundation under public law (LU, 2018b). Correspondingly, the faculty composition comprises the core sciences, social sciences, arts and professional schooling. LU's governance structure with units, faculties, services, and representative bodies is presented in *Figure 2*. As seen in *Figure 3* there are four main faculties: the *Fakultät Bildung* (Education Faculty), *Fakultät Kulturwissenschaften* (Faculty of Cultural Sciences in 2015, more recently renamed the Faculty of Humanities and Social Sciences), *Fakultät Nachhaltigkeit* (Faculty of Sustainability), and *Fakultät Wirtschaftswissenschaften* (Faculty of Economics). Information was drawn from the Leuphana University website, where an organigram from 2015 was provided; updates were made whilst the field work was in progress; the map was updated from the one officially presented in the link from 2015 to suit recent developments. The snapshot of LU was taken in Spring 2016. Updates in the website, and the publication of a new sustainability report in August 2016, were considered worth including due to their relevance. On the updated website, there was

⁴ Also included are analysis outputs from Atlas – the qualitative data analysis software used in this research – which demonstrates the empirical and conceptual relationships, links and associations that emerged in the data.

also information on the student parliament (STUPA), and all the initiatives, student councils and organisations present at each faculty. However, this part of the website was still in development at the time of writing, updated between 26.10-13.12.2016. LU's sustainability reporting of 2011, 2013 and 2015, indicates how it measures and monitors its own progress. These reports helped provide the background information required on the governance of LU as an organisation for sustainability. The reports were translated and interpreted with the help of a student research assistant, Frederieke Sonnenberg. In the Sustainability Report of 2015/2016 highly relevant information was found regarding the content of the interviews, whereupon the evolution of LU's sustainability reporting, governance and responsibility was discussed. The sustainability strategy of LU can be summarised in terms of the following themes:

○ Effective aspects of a sustainable university in the social context, as self-allocated by LU: 1) life-world college; 2) operational optimisation; 3) campus development; 4) Leuphana as a (unified) societal actor; 5) teaching and training; 6) disciplinary, inter- and trans-disciplinary grounded research (LU; Brüggem, 2013).

○ Building blocks towards Climate Neutrality: Based on the Sustainability Report published in 2014, the year Climate Neutrality of LU was officially certified: 1) Energy: energy efficiency, renewable energy, innovative technology; 2) Campus development: campus structuration, building centralisation, reduction of energy consumption; 3) Transportation: projects and measures to reduce the climatically impactful traffic.

○ Fields of Action of Sustainable Leuphana: *Bildung* (Education), *Forschung* (Research), *Gesellschaft* (Society), *Campus-betrieb* (Campus Operations). These represent a new working structure for the sustainability performance improvement and reporting process at LU. The sustainability governance and responsibility structure of LU from 2016/2017 onwards is shown in *Figure 1*.

Figure 1: Sustainability Governance and Responsibility structure 2016-17; original in German: Verantwortung nachhal. Adapted from LU; Brüggem (2015).

Figure 2: LU Governance Organigram: The university *entwicklung* (development service centres), management/research/educational development, the representative bodies, board of trustees, president's office, and university council.

Organigrams of LU's governance and faculty structures are presented in *Figure 2* and *3* respectively, according to the LU official organigram of 2015, and consolidated descriptions of system units, updated between April and December of 2016.

Figure 3: LU's Faculty Structure: faculties of education, humanities & social sciences (Kultur), sustainability, and business/economics; Central Institutions, Research Centres, and Overarching Faculty Facilities.

5.3.2 APPLICATION OF THE DIAGNOSTIC TOOL

This section helps to answer what competencies, qualities and patterns were unearthed when the diagnostic tool is applied to LU. The aim of the application is to substantiate the cascade of actions, experiences, and underlying strategies characterising Leuphana's organisational transformation from the late 1990's to 2017. Groundedness⁵ in the data and conceptual density between codes are presented in Figure 4. In this Atlas output table, *SER 5.1 Sustainability competence training for transformation* is the most grounded in the data with 17 links in the internal evidence and a density of 2, followed jointly by *SES 2.1 Triple bottom line: intrinsic change agency* with 12 quotes and density of 2, and *SER 5.4 Ideal-typical transdisciplinary research praxis*, 12 quotes, and finally, joint third most-grounded in the data with 11 links, *SES 3.1 Transformative agency: sub-optimal practice challenge*, and *SES 5.3a Integrated sustainability praxis across functions*, with a conceptual density of 2 and 1 respectively.

Name	Grounded	Density
1.1 Psycho-social wellbeing~	4	0
1.2 Pro-sustainability behaviour~	9	0
1.3 Organisational cultural health~	8	2
1.4 Organisational lobbying competence~	4	1
1.5 Organisational positive behaviour~	4	1
1.6 Organisational action research~	6	0
2.1 Triple Bottom Line: Intrinsic change agency~	12	2
2.2 Collaborate to Innovate: extrinsic change-agency~	4	0
2.3 Purposeful-adaptive evolution~	4	0
2.4 Organisational-societal learning~	3	1
2.5 Organisational extroversion & openness~	2	0
3.1 Transformative agency: sub-optimal practice challenge~	11	2
3.1.1 Effective intrapreneurship~	3	1
3.2a Internal governance for sustainability~	7	2
3.2b External implementation of governance for sustainabili...	4	0
3.3 Environmental literacy competences~	6	2
3.4 University-driven asset-based community development~	4	0
4.1 Strategic trajectory, liaison and learning~	5	2
4.2a Internal Evaluation of Environmental Social Governanc...	5	3
4.2b Accountable Disclosure of Environmental Social Gover...	4	2
4.3 Externality Recognition~	4	0
4.4 University Social Responsibility Assumption~	5	0
5.1 Sustainability Competence Training for Transformation~	17	2
5.2 Intergenerational and socio-ecological ethics~	2	0
5.3a Integrated sustainability praxis across functions~	11	1
5.3b Integrated sustainability praxis external impact~	4	0
5.4 Ideal-typical Transdisciplinary Research Praxis~	12	0
5.5 Sustainability research demonstration, knowledge enter...	4	0
5.6 Minimisation of negative health, socio-economic and en...	1	0
5.7 Research and education generates societal impact and ...	9	1
5.8 Sustainability reporting standards and instruments impl...	5	1

Figure 4: Atlas Generated Code Table. All codes are shown with values of groundedness - number of quotations which a code is assigned to; and conceptual density - the number of other codes a code is associated with through the data.

⁵ See Section 4.2.3.2, Chapter 4, for more information regarding the meaning of the terms, groundedness, density and weightedness.

Legend for Figure 4, outlining abbreviations used, and colour codes assigned to each of the perspectives throughout this chapter

- **Pink** = BSP: Behavioral Science & Psychology
- **Orange** = OCM: Organisational Change Management
- **Green** = SES: Socio-Ecological Systems
- **Purple** = CGS: Corporate Governance for Sustainability
- **Blue** = SER: Sustainability in Education & Research

Equation for weighting categories of analysis

$$W = \frac{Gr_c}{N_q} \times \left(100 + \frac{De}{10} \right)$$

Out of all, despite being assigned with half as many quotes as the lower leaders, *CGS 4.2a Internal evaluation of environmental social governance* has the most conceptual density, being associated with 3 other codes through the internal evidence. It is also significant in the analysis that such high level of density, although only slightly affecting the output weight value, ‘W’, indicates that that *CGS 4.2a* is corroborated by its systemic connectedness.

We now move to the description of the data per code, categorised according to the three scales of organisational activity ranging from personal, group, unit, to the whole organisation: micro-, meso- and macro-levels. The total number of coded data bits taken into analysis at LU, N_q was taken as constant at **179**.

5.3.2.1 OVERVIEW OF DATA PER CATEGORY AT LU & HOLISTIC DESCRIPTION AT SCALE

5.3.2.1.1 Micro-level Diagnosis: Individuals & Groups

The Micro-level concerns the personal and professional development of the actors concerned with transformation towards sustainability in the university.

Perspective	Weight per Perspective	Category	Groundedness	Density	Weight per Category
BSP	7.26	1.1	4.00	0.00	2.23
		1.2	9.00	0.00	5.03
OCM	6.72	2.1	12.00	2.00	6.72
SES	7.84	3.1	11.00	2.00	6.16
		3.1.1	3.00	1.00	1.68

CGS	2.80	4.1	5.00	2.00	2.80
SER	9.52	5.1	17.00	2.00	9.52

Table 1: Results of weighting exercise per category in the rightmost columns, and per perspective in the left two columns at the Micro-level. These correspond to Charts 1 and 2 respectively.

Chart 1: Weights per rubric at the Micro-level.

Chart 2: Averaged weights per perspective, micro-level: evaluation according to each of the five theoretical perspectives at the macro-level taking the average of all rubric weights per perspective to show relative performance at this scale

Summary Description of Micro-level Diagnosis⁶

There is a strong presence of attributes from the sustainability in education and research perspective, and a fairly balanced strength of attribution from the socio-ecological systems and behavioural science and change management perspectives. Standing out by far is the category for *SER 5.1 Sustainability Competence Training for Transformation*, weighted the highest across all scales and perspectives ($W=9.52$). This is LU's strongest asset. This is followed by the assets *OCM 2.1 Triple bottom line: intrinsic change-agency* ($W=6.72$) and *SES 3.1 Transformative change-agency* ($W=6.16$)._{..}

According to the analysis of the data at the micro-level, overviewed per category in the next section, information was considered essential to empower actors of LU in its transformation. This represents the moral judgement of individuals towards social sustainability. Internal accounting efforts are comprehensive, being organised by responsible actors (at the time of field work the Environmental Coordinator) with support from leadership, who are also willing to adopt accountability and responsibility for sustainability efforts. Nonetheless, organisational alignment struggles against faculty divisions produced by the fusion of the two prior institutions – three interviewee's accounts support this. Responsiveness slowed 2014-2016 to LU intrapreneurs until 2016's sustainability report shed light on renewed efforts, corresponding with the volition of some actors to adopt a new challenge after important goals were met in 2014. Organisational transformation has therefore progressed through moments of discontinuous change (2005, 2016). Sustainability faculty and students perform roles of emergent change and sensemaking, with a history of employing successful communications and action strategies, persuading management to allocate resources, therefore raising sustainability on the learning agenda. The independent unit of professional education⁷ offers sustainability-related courses, and sustainability competencies and curricula designed and applied by LU Faculty of Sustainability researchers (Wiek et al., 2011) define LU's best asset. At the micro-scale, the Sustainability in Research and Education lens dominates, being a symptom of the heavy grounding of category *SER 5.1* in the data.

Multiple definitions of sustainable development are held by stakeholders, with intergenerational justice being a significant concept. However, it is unclear whether this is representative. Based on campus observations and conversational accounts, some students seem to have cognitive fatigue of seeing and hearing about sustainability too much, whereas administrative staff need to be included in the academic missions too.

⁶ For a detailed, comprehensive deep dive into data per category at the micro-level, see the following section, *Detailed Overview of Data per Micro-level Category*, otherwise, move to the next diagnostic summary at the meso-level.

⁷ See **Figure 3**, under 'Central Institutions'.

Detailed Overview of Data per Micro-level category

The micro-level concerns how individuals and pairs(dyads) work on sustainability transformation.

BSP 1.1

BSP 1.1 Psycho-social wellbeing

- Engendering positive psychological and social resources overcame negative reactions, ensuring psycho-social wellbeing at an individual level.

W= 2.23: Gr. 4, De. 0.

Direct observations on site produced the impression of an energetic social atmosphere at LU, brimming with activity, where interactions in the physical space are inculcated by the campus design and proximity of different departments in one location. From informal conversations and interactions with students, academic and administrative staff, the consensus is one of accomplishment. Little specific evidence was found in the interviews supporting psycho-social wellbeing, yet several documents referred to the need to ‘move people’. The following quote illustrates how LU might engender positive psychological and social wellbeing, from an anonymous interviewee report about the unreachability of sustainability:

“Yet we realize that sustainability in general is not primary when the act decision time arrives. On the contrary it is just put after. This paper explains that this is due to the fact that human beings cannot hardly develop relevant moving emotions - neither positive nor negative - for sustainability. Hence we can succeed in reaching sustainability only if we find a goal that really moves people - that at the same time produces sustainability” (Anonymous 2, 2016).

Secondly, the emphasis on the understanding of human action and social order if a light indication in Adomßent et al. (2007). Training on ergonomics at the work place and for assistance of addicts are also referenced (LU; Brüggem, 2015). Actors are aware more work is needed and a significant amount of capacity-building was planned until 2017, including a risk assessment on stress and mental health in the whole university, management training on occupational health and safety, and an action day on health.

BSP 1.2

BSP 1.2 Positive pro-sustainability behaviour

- Positive reactions to sustainability are broadly exhibited in attitudes towards it, subjective social norms for it, and perceived behavioural control towards it.

W= 5.03: Gr. 9, De. 0.

The evidence points towards pro-sustainability behavioural traits and reactions being fairly strongly present at LU. Beatrice John emphasised the importance of empowering people with information for transformation at the individual level, which identifies the need for change inherent in most pro-sustainability efforts. Whereas the interview with Philip Bernert illustrated pro-sustainability behaviour in the student body: *“Students are open to most initiatives...”* And in a separate quote: *“The students are a strong and notable influence on everyday life in Lüneburg. 10% of the city population are students. Students of environmental sciences have a strong influence on campus affairs”* (Bernert, 2016). Lars Poppel describes the administrative staff perspective on LU’s sustainability change efforts at the internal audit office: *“I think they understand that you can’t tell people that you have to do it, but why you should do it. You have to take the people with you...In former times, it wasn’t like this and in former times it was important to have something on the sheets. Now, they really want it. Think about the last three or five years, there were many changes in the mind of colleagues... for example*

Irmhild Brüggem [he refers indirectly to her role as environmental – now sustainability – coordinator, facilitating and liaising across various faculties and departments over the years]. *“And several other people who did events like with the bike to work or all the people who are responsible for the healthy things like Hochschulsport”*. The Sustainable University project review document, from 2004-2007, also highlighted the importance that *“the university affects the ways its members make use of energy and resources”* (Pöppel, 2016).

OCM 2.1

OCM 2.1 Triple Bottom Line: Intrinsic change agency

W= 6.72: Gr. 12, De. 2.

- Triple-bottom-line accounting framework employed by individuals: attempt made to measure/gauge organisational complement to people, planet and profit with the goal of creating shared value.

A high level of groundedness and fair amount of density across categories in the evidence indicates that triple bottom line accounting practices are intrinsically present to a strong extent at LU. Change agents clearly work to measure the university's complements to people, planet and profit responsibilities. There were multiple references to EMAS training and diversity in the documentation and sustainability reporting by Irmhild Brüggem, who also extensively described the university's development of its own sustainability reporting practices using an integrated approach across the portfolio aspects of research, education, society, management and organisation. With respect to organisational alignment to these practices, an anonymous interviewee mentioned the mission of LU *“was to make sustainability become in-house; whilst everything else not in-house would have disappeared”*. Whereas another anonymous academic described the beginning and improvement of LU's reporting: *“From a PhD thesis that looked at the Global Reporting Initiative, they developed the concept of sustainability reporting for universities. LU was one of the first to use EMAS”*... *“that was also part by the way of the Sustainability University project to come up with an idea of what a sustainability reporting could look like in contrast of what we had before...”* (Anonymous 1, 2016). So, we can see how the measurement and gauging of triple-bottom line accounting practices took place here through the lens of sustainability reporting and standards. Finally, the review of three years of LU's sustainability reporting, 2011, 2013, and 2015, further cements the presence of OCM 2.1. Daniel Lang, former dean of the faculty of Sustainability corroborated this, stating that LU has *“a long tradition in sustainability management in campus development. I think we're now in the fifteenth year, but you probably know that better than I do, of EMAS. We have a continuous sustainability reporting on campus. And I think it really is a fantastic case where you have sustainability in the mission of the university as one of the three guiding ideas...”* (Lang, 2016).

SES 3.1.1

SES 3.1.1 Effective intrapreneurship

W= 1.68: Gr. 3, De. 1.

Data-informed sub-category

- Intrapreneurship from the bottom-up acts as a driver for organisational transformation to sustainability: intrapreneurs, in teams of professors and students challenge sub-optimal practices, and overcome silo-based power systems.

Interesting practices were witnessed describes how LU students and staff banded together to overcome silo-based organisation by challenging power systems. This, at the time, appeared quite specific to LU, despite the lack of a broad-based indication of the extent to which

intrapreneurship is present. However, isolated evidence emerged from an anonymous interviewee who had very deep historical and scientific knowledge regarding LU's sustainability journey. In summary, the faculties had previously been acting as silos. Barriers were power and leadership. In 2007, the new President required some convincing as to the value of implementing sustainability by the staff and students that had been gunning for the transformation to that date. He soon became a staunch advocate and there was a massive reorganisation across the university to suit this vision. Numerous translated accounts of student initiatives cited in the 2015 sustainability report also support this positive trajectory driven by intrapreneurs.

SES 3.1

SES 3.1 Transformative agency: sub-optimal practice challenge

- Intrapreneurs identified in small groups within the organisation that challenge sub-optimal practices through linking strategies, opportunity contexts & innovation

W= 6.16: Gr. 11, De. 2.

Alongside effective intrapreneurship from lower hierarchs of the organisation, *SES 3.1.1*, evidence suggested a significant presence of the trait of transformative agency. 11 groundings in the data, with many interviews giving similar unprompted accounts of the success of student initiatives in the context of transformation. Enno van der Linde, a final year student himself, recounted that enabled students and their supportive community formed a group of social intrapreneurs. *"There were also lots of student projects working from the bottom-up"* according to Brüggen. Fabienne Gralla also observed the strength of the bottom-up at LU, where students request trans-disciplinary study projects, and everyone having *"a stake in the transformation"*. Bernert rounded this off by specifically identifying the crux of the transformative change agency within LU as *"Leading professors"* who *"form groups of students that are innovative and pioneering"*. He mentioned Maik Adomßent and Gerd Michelsen both later corroborated as going beyond their traditional professorial mandates to lead and facilitate transformative change-agency. He specifically referred to Michelsen as *"le Grand Seigneur or 'The Major agent' that changed the face of the university, not to forget the team of students and administrators he assembled"*. This indeed fits the description of transformative agency found elsewhere (e.g. Westley et al. (2013)).

CGS 4.1

CGS 4.1 Strategic trajectory, liaison and learning

- 1) Actors play the roles of brokers, bricoleurs, connectors, by liaising and facilitating; 2) Resulting in: sustainability being boiled down to the organisational context; 3) Therefore: it becomes relevant, understood and important for influential and interested stakeholders. Further resources are allocated and sustainability raised higher on organisational learning agenda.

W= 2.80: Gr. 5, De. 3.

We can see evidence for actors playing a facilitating role in their implementation of communications strategies at LU in the academic documentation and the interviews. Michelsen for example clearly helped spur along the strategic trajectory to raise sustainability on the agenda. This is backed-up in LU research by Franz-Balsen and Heinrichs (2007) who describe their experiments on campus and emphasise the importance of: *"sustainability communication at universities"* where *"Sustainability communication wants to initiate change, but it is also dependent on structural change. The question of bottom-up or top-down processes is located here"*. They cross-reference to other practical work by entrepreneurial professors involved in

the LU transformation from the beginning with student groups: e.g. the transferability of approaches at LU's Institute of Environmental and Sustainability Communication (Adomßent et al., 2007). Their strategic trajectory, action and communications strategies affected the positioning of sustainability in the organisational learning agenda. In 2016, one period of transformation had passed, with actors settling into the new way of things.

SER 5.1

SER 5.1 Sustainability Competence Training for Transformation

W= 9.52: Gr. 17, De. 2.

- 1) Programs are identifiable in educational curricula and in offered professional training courses where some or all of the five key sustainability competencies are present;
- 2) Students and staff, more generally are trained and taught in sustainability competencies for the purpose of transformation.

Substantial and diverse evidence indicates to a very strong extent that *SER 5.1* is present at LU. It was the most grounded code in the data. LU has innovated its own approach to sustainability competence training for students and staff. Efforts include a sustainability minor installed within the Leuphana Semester, mandatory for all students to take, that outlines and introduces competences. With staff it logically concentrated at the Sustainability faculty, coordinator, audit offices and professional school. The academic community are very aware of the need to pass on sustainability competencies, as Beatrice John citing Robert Gibson's quote (2006) showed: "*Messy, urgent, contested problems across scales, threaten wellbeing and require specific competences to resolve*". Whereas, Van der Linde's student account points to the uniqueness and appeal of LU's sustainability education, as a place where students can go "*to improve their thinking, their critical thinking, their sustainable behaviour, their health, and then move on to companies and work for them and... to change the world by applying the tools we've learnt at Leuphana*". Gralla further emphasised the need to "*prepare students to know that there is a pathway*" for learning about sustainability. Alongside this verbal evidence, sustainability competencies are broadly referred to in the sustainability reporting and the Leuphana Sustainability Science Initiative as *Competence-building in Sustainability*.

5.3.2.1.2 Meso-level Diagnosis: Intra-organisational Scale – Groups & Units

The Meso-level concerns the behaviours, qualities and competencies of the groups, teams and units working on organisational transformation towards sustainability in the university.

Perspective	Weight per Perspective	Category	Groundedness	Density	Weight
BSP	8.97	1.3	8.00	2.00	4.48
		1.4	4.00	1.00	2.24
		1.5	4.00	1.00	2.24
OCM	4.47	2.2	4.00	0.00	2.23
		2.3	4.00	0.00	2.23
SES	7.29	3.2a	7.00	2.00	3.92
		3.3	6.00	2.00	3.36
CGS	5.04	4.2a	5.00	3.00	2.80
		4.3	4.00	0.00	2.23

SER	9.51	5.2	2.00	0.00	1.12
		5.3a	11.00	1.00	6.15
		5.5	4.00	0.00	2.23

Table 2: Results of weighting exercise per category in the rightmost columns, and per perspective in the left two columns at the Meso-level. These correspond to Charts 3 and 4 respectively.

Summary Description of Meso-level Diagnosis⁸

At the meso-level, the socio-ecological systems lens is the most distinct, which corresponds to the good internal governance for sustainability and systemic environmental literacy shown at LU. The category of *SER 5.3a Integrated sustainability*

⁸ For a detailed, comprehensive deep dive into data per category at the meso-level, see the following section, *Detailed Overview of Data per Meso-level Category*, otherwise, move to the next diagnostic summary at the macro-level.

praxis is the most pronounced, with a weight of 6.15, followed by *BSP 1.3 Organisational cultural health* ($W=4.48$), and *SES 3.2a Internal governance for sustainability* ($W=3.92$).

Despite strong presence of categories for transformation for sustainability inside LU, persuasive communications strategies are still needed to “lead the people by the hand” (Pöppel, 2016), to maintain the morale and trajectory of LU students and staff. Appropriate physical facilities for transformation are positively supported by the Climate Neutrality certification of LU in 2014, as well as the high level of energy efficiency, innovative technology application and study-spaces. There are plenty of open areas to convene on campus. Furthermore, LU is ubiquitously obliged to engage with surrounding community, through its research, education and outreach. Gralla specifically mentioned that “the university has an external moral mission to connect”, and that it is “no ivory tower”, and that the sustainability of LU and its external “societal engagement” was “a trans-disciplinary project” (Gralla, 2016). This pivots around the research and praxis of sustainability witnessed at the Institute for Ethics and Transdisciplinary research (IETSR), whose researchers provided the point of focus for initiatives, liaison and external research partnerships; this project being hosted by IETSR staff is one example of that. Figure 5 shows an image of a researcher cluster map of IETSR. Communications strategies used by sustainability managers also consisted of engaging academic staff (see Figure). Capacities for self-awareness and self-diagnosis are facilitated through the teaching and training of sustainability competences; these may lead to more balanced decision-making and critical thinking, and possibly practices of transparency. This indicates a moral ‘backbone’ through free and open debate. Yet, there is not consensus on this as several stakeholders interviewed shared doubts as to whether sustainability had been used more as a marketing tool.

Figure 5: Research cluster of staff supporting this case study at the Institute for Ethics and Transdisciplinary research (IETSR) in the Faculty of Sustainability, including Daniel Lang, Fabienne Gralla, Beatrice John and Guido Caniglia (Own Source). Their behaviour and work is part of the analysis as many took part in LU’s sustainability transformation too.

In response to a competitive regional market of higher education with larger institutes, LU had to be more purposeful, adaptive and anticipatory in its change management (as the data for OCM 2.3 suggest) to find its niche. EMAS certification, sustainability assessment, and a whole-institutional approach are identifiable, yet there was asynchrony at the start of the planned change process (Anonymous 1, 2016). Actors are not too aware of power, agency and interests, and those out of the sustainability bubble do not seem to inquire further (Bernert, 2016). With respect to the presence of learning between organisational actors on environmental awareness, the establishment and success of the Leuphana Semester for all students, staff and professional training indicates strong performance, yet evidence is not as explicit on awareness of feedbacks and impacts of their actions, motivations and knowledge. They are generally aware and act on their human-environmental interactions. Knowledge, applied and pure, is strong; being reflected in the well-developed faculty structure of social and natural science sustainability.

Sustainability reporting and standardisation has made significant progress, with even a move towards integrated reporting. The environmental coordinator was part of a government working group for sustainable development, and with collective internal efforts, operationalised reputable frameworks to LU's context with their own 'Sustainability Codex'. The 2013 Sustainability Report of LU corresponds to the key performance indicators presented in the GRI's third framework. LU scored an A in GRI's grading system for coverage of their indicators across environmental, societal, and governance dimensions (LU; Brüggem, 2013). Climate neutrality was achieved in 2014. Yet, it is unclear if full recognition of externalities took place - (3rd party funding for research was observed as a sensitive issue) - the social-side lacks up to 2015's sustainability report, within which indeed there is a larger society section. Nevertheless, externality consideration seems to increase in recent years. The ideal-typical transdisciplinary research process was developed and experimented with by and within the LU sustainability research community, using LU as a campus laboratory (Lang et al., 2012). Sustainability research is quite visible in social and physical spheres, with knowledge applied on campus.

Detailed Overview of data per Meso-level category

The Meso-level concerns the groups, teams and units working on sustainability transformation in the university.

BSP 1.3

BSP 1.3 Organisational cultural health

**W= 4.48: Gr. 8,
De. 3.**

- Organisational behaviour exhibits these traits: rules and regulations are present and consensually agreed regarding ethics, there is a culture conducive to moral judgement and extrinsic societal orientation, as well as ethical organisational norms.

Organisational behavioural aspects of cultural health are present to a fair extent at LU, being grounded 8 times, with three links to other categories. Rules and regulations conducive to cultural health were identified in the interviews. Several selected quotes exemplify the

cultural aspects of sustainability on campus and in the city of Lüneburg, including Bernert, who notes that *“students are a strong and notable influence on everyday life in Lüneburg. 10% of the city population are students. Students of environmental sciences have a strong influence on campus affairs”*. Whilst Brügger’s description indicates the execution of moral judgement in the management of attitudes towards sustainability in campus through caution and empathy; *“It’s more difficult for administration staff when they have to change their behaviour for some things. Then they are coming with the complaints. Also, when you try to do it very carefully and explain to them, it’s difficult. It always also takes time... You have these different groups, they’re everywhere. But there I see that it also changes because the academic staff they’re coming here and they’re also finding the sustainable campus, the Leuphana semester. It’s normal for them, it’s not new. For transformation, you need this time”*. Popper highlights the awareness of the risk involved in rules and regulation in the context of administrative staff, which can be interpreted alongside Brügger’s account; *“I think they understand that you can’t tell people that you have to do it, but why you should do it. You have to take the people with you”*. The identification of the trans/inter-disciplinary Leverage Points for Sustainability Transformation project is significant for a healthy organisational culture exhibiting innovative socially-linked projects. In 2016, they critique the majority of approaches as *“paying little attention to human actors and their social and political behaviour, or institutional dynamics. A common feature of such framings is that they often imply that sustainability problems can be resolved without consideration of the structures, values and goals that underpin complex problems at deeper levels”* (Abson et al., 2017)⁹.

BSP 1.4

BSP 1.4 Organisational lobbying competence

W= 2.24: Gr. 4, De. 1.

■ Organisational behaviour exhibits that: there is access and appropriation¹⁰ of physical resources, persuasive communications strategies, and effective engagement of an assortment of middle management.

Positive and negative aspects emerged from the evidence under this category, specifically for the effective engagement of middle management as Popper recounts: *“I think for the ordinary people, the normal workers, it’s too much science. If you read the first two sentences [of the definition of sustainability], there are several words that I had to look at what they mean. The definition should be shorter and easier. (A: Do you think it’s not understood by most?) Not by most, but by several people and there are many people who stop reading if they don’t understand”*. This is corroborated by Brügger’s statement that it was *“more difficult for administrative staff to adapt to the changes”* as reorganisation was largely initiated from the academic staff, jargon might have been an obstacle. Whereas Van der Linde backs-up the appropriation of physical space by characterising LU as a *“place where students can go to improve their critical thinking, sustainable behaviour and learning”*. Overall, appropriated physical facilities, tailored communications strategies, and the engagement of middle management has been present at LU, however the evidence does not suggest strength or inclusivity of administrative staff across the organisation’s diverse actors.

⁹ This paper was obtained from correspondence with one of the authors and members of the project, Chris Ives, established whilst on site in 2016. The website illustrates how it has moved on since the field work: <https://leveragepoints.org/>

¹⁰ Not meant in the sense of there being ‘appropriate’ resources already, but that they are actively ‘appropriated’ hence justifying the use of the term ‘lobbying’.

BSP 1.5

BSP 1.5 Organisational positive behaviour**W= 2.24: Gr. 4, De. 1.**

- Positive organisational behaviour is exhibited that demonstrates: capacities for self-awareness and self-diagnosis which are facilitated; competences for balanced decision-making and critical-thinking; practices of transparency (whistle-blower support) and ethical debate.

Despite indication of the presence of BSP 1.5 to a fairly weak extent according to the evidence, there is a demonstration of organisational positive behaviour early in the chronology of LU's transformation: *"the university affects the ways its members make use of energy and resources"* as stated in the white paper for the sustainable university project from 2004-2007. This report demonstrates a very early awareness and capacity for self-diagnosis ten years before international recognition was gained by LU, whilst its recommendations pointed to more emphasis on staff motivation, and behavioural change, and, interesting in light of the highlighted role of administrative staff, that responsibilities are *"divided between service, research and teaching. Concepts suitable to generate a change in user behaviour therefore need to consider user as well as organisational specifics"*. Furthermore, Fabienne Gralla's account highlights actions that are implemented at LU to positively reinforce the path to sustainability: *"Networks. Transdisciplinarity. Actors from outside academia. These are all inherent"*.

OCM 2.2

OCM 2.2 Collaborate to Innovate: extrinsic leadership agency**W= 2.23: Gr. 2, De. 0.**

- Identify evidence in leadership of visioning, organisational alignment, strategic collaboration, innovation, towards ends of partnership and good governance in wider society, with an extrinsic engagement with external task environment

Support for the presence of OCM 2.2 in the evidence is weakly incident but nonetheless noticeable and significant as an LU asset worth pursuing. There have been many projects where change-agents act as leaders, collaborating to innovate, whilst engaging with the external task environment, for example as a host and midwife to many entrepreneurial projects, including the OECD-funded Innovation Incubator. According to Jens Schmidt's account, project development in collaboration with 'Tchibo'¹¹ a sustainability-orientated coffee firm, projects for refugee employment, and many more student project-based start-ups form the basis of a collaborative, innovation atmosphere. Brüggem cites the Innovation Incubator alongside *"thousands of projects on every level. We have all this in projects seminars where the students have to find some practical partners and reach out all at once"*. The people and processes behind this organisational development is explained in detail by an anonymous sustainability scientist in recounting the uniqueness of LU, its leverage points, and how a collaboration emerged from looking at *"important fields of action... projects and interventions"*. And in the extrinsic context how they looked at the outcomes of these *"tiny little"* to *"invite also other universities or institutions of higher education to take these things up if they like and try to implement them in their own institution."*

¹¹ Tchibo websites accessed to corroborate, November 2018: <https://www.tchibo.com/>
<https://www.tchibo-nachhaltigkeit.de/>

OCM 2.3

OCM 2.3 Purposeful-adaptive evolution

W= 2.23: Gr. 4, De. 0.

- Evolutionary and teleological organisational change management employed, driven purposefully and adaptively by change-agents and leadership in response to external circumstances, situational variables, and the human environment.

OCM 2.3 is somewhat present at LU. Daniel Lang led to the conclusion that LU has undergone a traumatic reorganisation process for greater sustainability. However, this does not appear to fit into the dialectical (clashing ideology or conflict), natural life-cycle progression of Adrianna Kezar (2001). Although there are certainly elements identifiable pointing towards cultural and social cognition-based change modes, LU's change management is characterised more by evolutionary and purposeful-adaptive (teleological) change. It had to find its own niche by defining its own role for universities in the 21st century - as a purposeful-adaptive response to the external stimulus - to compete with much larger regional universities with more established legacies, and to survive as an independent institution. Tensions between departments were managed by conscious individuals centrally, as Brügger exemplifies in her role and articulation: *"Other faculties didn't think the sustainability transformation was good. There were lots of quarrels... It took ten years for this transition to unfold."* Her account moreover points towards the purpose and change leadership critical to overcoming these tensions. The change management process was also as Philip Bernert showed how the Faculty of Sustainability was essential to this, strongly embracing the change management towards sustainability based on its *"strong role within the university"*. Anonymous interviews further corroborated that LU's r/evolution as an institution was driven by the future survival of either previous institute in the regional higher education market; indeed, there were many deep-reaching cuts resulting from the German and Saxony federal government's policies without full consent of universities to cut back on finance and academic staff.

SES 3.2a

SES 3.2a Internal governance for sustainability

W= 3.92: Gr. 7, De. 2.

- Organisation takes internal responsibility that natural resources and ecosystem services are managed and governed correctly by individuals and social groups practicing leadership, institutional entrepreneurship and socio-technical innovation.

SES 3.2a is present to good extent at LU. Support for this comes from several accounts of internal governance for sustainability. For example, from Bernert and the specific insider account from Brügger, which were not only back-up in the documentation, but also in the act LU reaching Climate Neutrality in 2014, without emissions trading. EMAS certification history and the quality and learning history in sustainability reporting provides further evidence of systems of governance for sustainability within LU evolving steadily and delivering effective management of natural resource by networks of actors leading in an innovative and entrepreneurial approach to accounting and governing sustainability. The following quotes are further examples of these qualities being shown in the data:

Beatrice John: *"I think with our large base of environmental scientists and sustainability scientists among the students... we also have strong bases in the student committees and ... student initiatives that deal with sustainability"*.

Sustainability Report 2015: *"to demonstrate respect for nature and society, sustainability considerations should be an integral part of planning, construction, renovation, and operation of buildings on campus"*.

Abson et al's report (2017), and the paper by IU academics Albrecht, Burandt, and Schaltegger (2007), on organisational learning, support that the intended governance for sustainability at LU has flourished into action, as shown in *Figure 5*.

SES 3.3

SES 3.3 Environmental literacy competences

W= 3.36: Gr. 6, De. 2

- Skills and competences for environmental literacy are exhibited by organisational actors according to Scholz's three postulates: P3: Awareness of multi-level interference in organisations and institutions of power & agency; P6: Learning between actors, environmental self-awareness, and motivations & knowledge concerning impacts, feedbacks; P7: Planning and analysis of sustainable human-environmental interactions, substantiation of material and social environment, and matrix formation.

Environmental literacy competencies at LU are fairly present at LU, having been developed through logics, as the projects on competence building in sustainability and the development and internal knowledge propagation stemming from the Leuphana Science Initiative Sustainability Research has supported (Schaltegger, 2009). Multi-scalar awareness of power and agency, and the material and social environment, present themselves in many of the meetings with LU researchers and staff. It was specifically the expertise and communication from the Centre of Sustainability Management that bolstered the observation of environmental literacy competences at LU, as this quote from Schaltegger, its Head, shows: *"Leuphana Universität Lüneburg doesn't only aim at promoting the individual scientific disciplines engaged in sustainability research. In particular, it aims at deepening the understanding for the long-term interrelationships between the ecosphere and the anthroposphere, between nature and society"* Schaltegger (2009). President Spoun's words in the 2009 article 'Research and Reinvention' lends support to this: *"To equip future generations with the necessary 'tools' with which to support sustainable development, it is first necessary to sensitise students to the ecological, social and economic challenges of sustainability through the imparting of basic knowledge (so-called 'mainstreaming'). However, 'specialised sustainability generalists' are also necessary for unerring situational analyses and the development of sustainable solutions"*, which demonstrates presence in LU education. Further development of this asset remains given the proportionally average number of groundings in data.

CGS 4.2a

CGS 4.2a Internal Evaluation of Environmental Social Governance

W= 2.8: Gr. 5, De. 3.

- ESG issues, material to the organisation and its stakeholders are measured, managed and monitored internally by integrating sustainability strategy into governance, management and administrative structures:
 - 1) Responsible actors measure, manage, and monitor sustainability performance with material ESG metrics;
 - 2) ESG issues are prioritised according to stakeholder's interests and influence.¹²

The practice of internal evaluation of ESG issues and materiality at LU is present to the extent that it is interconnected to other categories (e.g. *SES 3.2a*, *OCM 2.1*). With respect to accounting for sustainability, Lang's interview identified Schaltegger as a trigger for sustainability management in university organisation, research and education, further asserting *"a continuous sustainability reporting on campus"*. One anonymous sustainability scientist and the Chronological

Evolution of the ‘Science Initiative Sustainability Research’¹³ strengthen the account of this capacity at LU, along with their sustainability reporting (see *Section 5.3.1*), coupled with active organisational learning. Brüggén elaborates on the development and enhancement of reporting efforts: *“The internal process behind reporting is the interesting part... it makes the report’s authenticity of information legitimate”. “So, the full sixth report [in reference to the 2015 report analysed in this hermeneutic unit] should be different. There have been stakeholder dialogues taking place every two years, providing input for the reports and contributing to a culture of sustainability”. The fact that these dialogues have taken place alongside the written reports, and the other evidence retrieved, corroborates that LU is relatively good in this area compared to other universities, as ESG issue materiality accords to stakeholder’s interests and influence. Irmhild Brüggén was crucial to the development of this asset.*

CGS 4.3

CGS 4.3 Externality Recognition & Internalisation

W= 2.23: Gr. 4, De. 0.

- Pursue and make progress in: 1) convergence between private costs & social costs, compensation to ‘victims’; 2) quantitative reduction in the physical volume of throughput, setting a maximum aggregate limit of discharge/wasted resources.

Whilst the internalising of environmental externalities can be seen to a fair extent in LU’s overall campus implementation of renewable energy, as the Climate Neutrality 2014 certification supports, a focus on social externalities have come later. This fact was provided in the Chronological Evolution of LU document, which shows the recognition of actions taken by LU by third-parties, as one of the first European universities to receive EMAS validation, which was followed up in subsequent revalidations according to EMAS II and EMAS III standards. It should be said however that the evidence does not support a strong presence of the practice of externality recognition and internalisation. Yet it is clear that LU is aware of and taking actions towards developing this asset further, as shown in LU’s strategic plan to 2030, set in motion by the Innovation Incubator Project. Start-ups and projects at LU in 2014-2017 focussing on refugee integration support social externality recognition, which Fabien Gralla corroborated in her interview.

SER 5.2

SER 5.2 Intergenerational and socio-ecological ethics

W= 1.12: Gr. 2, De. 0.

- Ethics are identifiable in the norms and values of individuals and groups of: 1) intergenerational moral norm of ecological sustainability; a safe operating space for all of humanity; 2) intragenerational ethical development projects (e.g. resolving poverty and inequality, more resource distribution)

From the experience of evaluating this category, an organisational discourse on socio-ecological ethics was hard to isolate from limited experiential accounts. Therefore, the presence of this practice is relatively weak. However, the presence of intergenerational morals and ethical development projects shows some internal stakeholders conceive sustainability in terms of intergenerational justice. Beatrice John, amongst many other informal conversations about definitions and values of sustainability, exemplified a work ethic present in the Faculty of Sustainability where two-thirds of her work is dedicated to education for sustainability. This is her set of values, further shown by her mentioning her frustration regarding German politics on

¹³ This timeline of episodes in the sustainability research development at LU covered 1996-2010, and was part of a package of documents shared with the researcher by Irmhild Brüggén as a result of our meetings and correspondence.

energy and food policies, as well as intergenerational injustice and lack of appropriate behaviour to reduce consumption. Additionally, Schaltegger (2009) articulates LU's sustainability ethic in terms of its "social embeddedness" contributing to "the establishment of an innovative civil society worth living in, in the 21st Century". Brüggén said LU is to be on 'a right track' in this regard, however there are things that can still be improved (2016), whereas the anonymous senior sustainability scientist, and Pöpper, both mentioned the barrier of academia still being hierarchical and disciplinary in the most part even at LU (Anonymous 2, 2016; Pöpper, 2016).

SER 5.3a

SER 5.3a Integrated sustainability praxis across functions

W= 6.15: Gr. 11, De. 1.

■ Sustainability practices are embedded in the universities portfolio activities of Research, Education, Operations, Governance, Communications & partnership (REOGC), through the disclosure and creation of spaces for praxis and action in collective open inquiry.

There are a lot of evidentiary accounts that LU has integrated sustainability praxis into REOGC portfolios, we can therefore say this property is present to a strong extent at LU, being a key element of success in the transformation for sustainability. The sustainability faculty and its partners, leaders, and advocate are working hard to keep the rate of improvement up. It's a work in progress as the 2015 Sustainability report denotes: "sustainability considerations should be an integral part of planning, construction, renovation, and operation of buildings on campus", "to align the organization's core mission with sustainable development, facilities, research, and education should be linked ... across the portfolio aspects of research, education, society, management and organisation". There were many other coded quotes from interviews and documents that support the strong present of this practice, however the following quotes from Daniel Lang and the anonymous senior sustainability scientist respectively suffice to demonstrate part of this evidence for sustainability practices being embedded across REOGC functions:

"And I think it really is a fantastic case where you have sustainability in the mission of the university as one of the three guiding ideas. That is kind of translated in all the university actions." (Lang, 2016)

"The decade of education of sustainable development and now the global action program (GAP) that's following up, they have on the prominent, how is it called? One of the five ... priority areas of the GAP is this whole institutional approach. So it's a topic that is of course applied..." (Anonymous 1, 2016).

"Also coming up with some kind of interdisciplinary sustainability related education project so that we tackle all the core dimensions that we see or understand as interesting or that's important for a sustainable university. If you look at it with a holistic approach that we like to follow, that's not only the teaching and learning but also the research of course. It's the administration if you like and it's also the outreach, the cooperation with the region, with the city, and the people, non-academics surrounding." (Anonymous 1, 2016).

SER 5.5

SER 5.5 Sustainability research demonstration, knowledge enterprise

W= 2.23: Gr. 4, De. 0.

Data-informed category

■ Demonstration of sustainability-related research on campus, representing substantiated knowledge enterprise; Increasing visibility to university community: Communicating how to do sustainability, demonstrating fulfilled intent on prior goals/commitments; Using interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility

The sustainability research demonstration category, SER 5.5, consisting of visibility efforts for

the university community, and the implementation of interdisciplinary resources – e.g. engaging the campus community in ESD – is present to limited extent according to the data. Visibility and demonstrative capacity of sustainability research on campus, as a means to educate and engage the LU community has been realised by institutes within the Faculty of Sustainability. LU Science Initiative Sustainability Research ensures this. An extension of responsibility for this engagement can be seen based on these selected quotes: firstly, from the 2015 LU Sustainability Report which provides evidence for the UNESCO-chair Higher Education for Sustainable Development being held by Gerd Michelson (a key change-agent in the transformation identified in other categories of analysis): “UNESCO Chair Prof. Dr. med. Michelson holds the UNESCO Chair Higher Education for Sustainable Development. UNESCO chairs contribute to UNESCO’s goals through international cooperation, intercultural dialogue and interdisciplinary teaching and research”. Secondly, the final report on the Lüneburg Innovation Incubator in 2015 - *Lessons learned from the Lüneburg Innovation Incubator*, which explicitly mentions the *EnERgioN* (Renewable Energies in the Northern Region) project. This shows how LU actors used their sustainability research expertise for environmental management and stakeholder engagement, whilst communicating how to do sustainability through the lens of renewable energy transitions. *EnERgioN* investigated and fulfilled intent on the “sustainability umbrella concept” in LU regarding “how to store power that is generated from renewable energy sources”, with a “focus was on legal and economic issues and consumer behaviour in energy consumption, where there was existing expertise at Leuphana”.

NB: Concept of “knowledge enterprise” - and “complex-adaptive knowledge enterprise” from Crow and Dabars (2015a), undergirds the conceptualisation of codes OCM 2.3, 2.5, SER 5.5.

5.3.2.1.3 Macro-level Diagnosis: Extra-organisational Scale – Institution & Environment

The Macro-level concerns the whole organisation’s behaviour, learning process, and overall transformation towards sustainability, and how it interacts with its surrounding environment (as well as how it is affected by its environment in turn).

Perspective	Weight per Perspective	Category	Groundedness	Density	Weight per Category
BSP	3.35	1.6	6.00	0.00	3.35
OCM	2.80	2.4	3.00	1.00	1.68
		2.5	2.00	0.00	1.12
SES	4.47	3.2b	4.00	0.00	2.23
		3.4	4.00	0.00	2.23
CGS	5.04	4.2b	4.00	2.00	2.24
		4.4	5.00	0.00	2.79
SER	17.35	5.3b	4.00	0.00	2.23
		5.4	12.00	0.00	6.70
		5.6	1.00	0.00	0.56
		5.7	9.00	1.00	5.03
		5.8	5.00	1.00	2.80

Table 3: Results of weighting exercise per category in the rightmost columns, and per perspective in the left two columns at the Macro-level. These correspond to Charts 5 and 6 respectively.

Chart 5: *Weights per rubric at the macro-level.*

Chart 6: *Averaged weights across rubrics per perspective, macro-level: evaluation according to each of the five theoretical perspectives at the macro-level taking the average of all rubric weights per perspective to show relative performance at this scale.*

Summary Description of Macro-level Diagnosis¹⁴

At the macro-level, the behavioural and sustainability in education and research perspectives stand out, followed by the corporate governance for sustainability lens. The category *SER 5.4 Ideal-typical Transdisciplinary Research Praxis* dominates at this level (**W**=6.7), followed by *SER 5.7* for external impact of research and education. This is partly due to the presence of inter-disciplinary schools and institutes that perform transdisciplinary research praxis, coproducing solution-oriented knowledge into wider society (see *Figure 3*). Relatedly, there is also a Commissioner for trans and interdisciplinarity in the Presidential Committee Appointees (see *Figure 2*); LU programs for partnership with Lower Saxony and the City of Lüneburg (yet more for the former). Furthermore, action research is implemented at the Faculty for Sustainability, transcending boundaries since 2009, however cooperation has been held back by older divisions before the fusion of the previous two university organisations.

Core engagement in business and civil sectors is also pursued. For example, with the ‘leverage points for sustainability transformation project and research cluster’, the VW Stiftung-ASU-Lower Saxony partnership’ through the Centre for Global Sustainability and Cultural Transformation (CGSC), and the Innovation Incubator. *Figure 6* demonstrates a poster in the Sustainability Faculty for CGSC as a precursor to the emergence of the exemplar of leverage points at LU. Correspondingly, based on the chronology of significant events provided by Brüggem, it seems that LU’s social and environmental responses to its external task environment have been agile and sincere during the studied period (2006-2015). Yet there has been some level of controversy over the finance and legislation of such a partnership, particularly at the state level, although this was negligible in proportion to positive accounts of partnership impacts.

Figure 6: Evidence of collaboration between LU, ASU, Lower Saxony Ministry for Science and Culture and the VW Stiftung (Own Source).

Whereas financial allocation, supplier selection for new buildings, and funding arrangements could have been more transparent according to some conversations with

¹⁴ For a comprehensive deep dive into data per category at the macro-level, see the following section, *Detailed Overview of Data per Macro-level Category*, otherwise, move to the overall analysis outputs, *Section 5.3.3*.

LU actors (mostly anecdotal), the leadership are aware of this and show intention to improve, as financial numbers are posted for sustainability purposes in the recent report of 2015. Strong evidence also supports the observation that students, educators, researchers, and practitioners formed partnerships with local stakeholders, to find innovative solutions to drive societal transformation. Notable in this regard, the opportunity presented by the new President's arrival in 2006 to embed principles and practices of sustainability in LU, assisted the successful implementation of Leuphana's science initiative for social and environmental change.

Further evidence for the sheer volume of student/teacher/community projects (public-private partnerships) supports the strength of knowledge co-creation for sustainability (LU; Brüggem, 2015). Although hundreds of different projects were mentioned by Jens Schmidt in his archive, the projects *Local Living Economies*, *Phos4Sustain*, *Energiewende*, *LÜNESCO*, and *DialogN* act as exemplars also stated by Van der Linde (2016).

A strong presence of the development of knowledge of good governance, management of natural resources and ecosystem services for other organisations is demonstrated, through academic and innovative functions of the Faculty of Sustainability, business school, company development and entrepreneurship, and professional and graduate schools (Schmidt, 2016). Adopting responsibility for being an engaged political actor undertaking collaborative governance in society at large, LU is taking strides in the right direction. Indeed, its definition and vision of its social responsibility obligation was largely top-down, however institutional governance innovations from the meso-level diagnosis also show internal governance of sustainability when coupled with sustainability reporting. Multiple means of reduction of negative environmental impact are pursued. There is a consistent track record of meeting goals such as climate neutrality, reporting, recycling and renewable energy application, and significant environmental management performance and innovation, as the plaque in front of the central administrative building in the Scharnhorststraße campus demonstrates in Figure 7.

Figure 7: Environmental management and Innovation recognition outside the central administrative building (Own Source).

At the time of this inquiry, it was uncertain whether Lüneburgers are conscious that the research and education the university does have positive societal impact. Some indifference was identifiable, only those with personal associations with LU amongst the citizenry seem to be aware. EMAS and GRI were used, and IIRC (integrated reporting) principles sought. Progress is communicated transparently on the website, as well as signing membership for the ISCN-GULF¹⁵ (International Sustainable Campus Network-Global University Leaders Forum) Sustainable Campus Charter. Lastly, a specific sustainability and environmental communications institute has been deployed. Likelihood of improvement is high as long as a pro-active approach is used to outreach and equity in external partnerships. Student awareness and coherence of initiatives for bottom-up governance experienced shows recent progress in generating external public awareness.

Detailed Overview of data per Macro-level category

The Macro-level concerns the whole organisation's transformation towards sustainability and how this is nested within its environment.

BSP 1.6

BSP 1.6 Organisation Development: 3rd Person Action Research Inquiry

W= 3.35: Gr. 6 De. 0.

■ Evidence of: jointly organised transdisciplinary processes, community reach-out programs, boundary work, participatory and/or action research, behavioural interventions, 3rd person action research practice

The practice of organisational development is present to a fair extent at LU. Evidence of co-organised transdisciplinary programs was found in four interviewee accounts and the OECD report on the Innovation Incubator, that recounts LU teams in the project building absorptive capacity among local SME's, strengthening of networks and knowledge transfer (Kempton & Hofer, 2015). Gralla referred to the importance of networks, working in transdisciplinary ways with actors from outside academia, and a long-term process of organisational development outlining LU's pathway:

"It's like the idea to work in a transdisciplinary way and to include networks or start networks and work with partners or actors from outside academia... At Leuphana for example, you can't say that there is just one person that is very motivated... it was always inherent; it was always there somehow. It started with Cultural Studies, and the Cultural Studies program had nothing to do with sustainability and it had a small deeper study program of Environmental and Cultural Studies. And from this... we came to Environmental Science, and from Environmental Science we came to Sustainability Science, so there is a whole process that started years, years before... So, it's maybe 15 years, or 20 years."

Van der Linde describes the top-down and bottom-up approach of students and professors working together under the leadership referring to a matrix-like organisation of Leuphana in a community of inquiry: *"most of the professors, they are not those kind of persons who are locked up in their rooms all the time and then holds a lecture and then that's it. You can build a relationship with them... Every few professors, at the sustainability department, Von Webrden, Daniel Lang, who are quite young. And they are driven ... it's one bubble. They have taken the role of communicating this... flattened hierarchy. And you have this president, and students at the bottom - it goes in both directions A: Top-down, bottom-up. E: Exactly."*

15 At the time of publication, the ISCN-GULF Charter is located here: <https://international-sustainable-campus-network.org/charter-guidelines/>

OCM 2.4

OCM 2.4 Organisational-societal learning

W=1.68: Gr. 3, De. 1.

- The organisation learns from and anticipates issues mature on the societal agenda, that is approached and internalised by adopting a civic-orientation towards the external task environment

Historically speaking, looking at the LU Chronological Evolution document, management and leadership can be said to have learnt from their task environment, with respect to the fusion of the two institutes and putting sustainability at the core of their practices. However, evidence of anticipation of mature issues on the societal agenda was hard to find. The view expressed by core interviewees Gralla and John that LU actors wanted to “let the dust settle” in the period 2014 onwards justifies civic orientation internally as change was traumatic in response to external pressures in years past. Expertise can be observed as present for ESG issues being internalised through the adoption of a civic orientation towards the external task environment, pioneering new standards of excellence in research, education and practice. Prime examples are LU sustainability scientist’s work using their own campus at the Centre for Sustainability Management and the Institute of Environmental and Sustainability Communication (Albrecht et al., 2007; Franz-Balsen & Heinrichs, 2007).

OCM 2.5

OCM 2.5 Organisational extroversion & openness

W= 1.12: Gr. 2, De. 0.

- Adopts extroverted role with open boundaries: a porous organisational ‘membrane’:
 - 1) Reacting quickly to changes in the external environment;
 - 2) Focussed on wider world with respect to societal wellbeing & ecological carrying capacity

The extent of the presence of OCM 2.5 does not abound from the data collected, with a couple of isolated incidences. Albeit, we do see LU’s extroverted positioning grounded specifically in the OECD’s evaluation of the Innovation Incubator, it being: “*central to Leuphana’s efforts to establish itself as a major player in a nascent regional innovation system... in an economically-lagging region with the emergence of new innovation players in various industry sectors mainly related to digital media, health, and sustainable energy*”. The two-way exchange across LU’s boundaries also evidenced: “Incubator projects were successful in building “sticky knowledge” by combining of place-specific experience and tacit knowledge from local businesses with knowledge produced in the University and its research networks. In this, some of the Incubator projects – for example... in digital media – heavily built upon knowledge inflow from outside the region.” (Kempton & Hofer, 2015).

SES 3.2b

SES 3.2b External implementation of governance for sustainability

W= 2.23: Gr. 4, De. 0.

- The organisation takes responsibility that knowledge of good governance and management of natural resources and ecosystem services is developed and implemented extrinsically, practicing leadership, entrepreneurship and socio-technical innovation for other organisations & societal actors

Anonymous expert meetings with sustainability scientists at LU, as well as references to international research groups, supports the view that at the group-level knowledge of governance and management of ecosystem services has been applied and shared externally.

We can therefore state that *SES 3.2b* is present to a fair extent. Examples of how this is evidenced can be shown by, firstly, an anonymous senior sustainability scientist: *“I’m part of many... sustainability related projects and networks like the Copernicus Alliance... I’m member of a steering committee for the Japanese government and UNESCO. That’s about fostering sustainability science worldwide. There is an ESD network with people from Mexico, India, Germany, and South Africa and so forth and so forth. Countless associations but also non-formal contacts...”*

And secondly, referring to socio-technical innovation, entrepreneurship and leadership driving this knowledge into implementation extrinsically in the OECD report on the Innovation Incubator: *“The activities implemented as part of the Incubator can be grouped in several activity areas: the so-called Competence Tandems, which are a dozen internationally-staffed research co-operations; research and development projects, focused on short-term applications of research results; innovation and transfer networks; visiting professors; scholarships for master and doctoral students; and a wide range of practical projects for students.”* (Kempton & Hofer, 2015).

SES 3.4

SES 3.4 University-driven asset-based community development¹⁶

W= 2.23: Gr. 4, De. 0.

Data-informed category

■ Students, educators, researchers, & practitioners lead by forming partnerships with civic actors to find innovative solutions to drive societal transformation. Teams of staff and students go out into the community to:

- 1) understand community problems;
- 2) identify the spaces for sustainability to come in to solve community problems;
- 3) resolve problems in innovative ways via interventions driving societal transformation

Asset-based community development being driven by LU is present to a certain extent. Most interviewees refer to young professors and professors with student teams that pressured for innovation and leveraged positive change towards sustainability outcomes. Examples of research teams working for short-term applications are seen in Kempton and Hofer (2015), yet limited evidence was found for the three step ABCD process, aside from the joint Master’s program with ASU. In the 2015 Sustainability Report, the President characterises LU as a community of sustainability in dialogue with the outside world: *“A microcosm of a partly heterogeneous community that has committed itself to the goal of sustainability is Leuphana. Our common endeavour is to develop ideas, practices and technologies, in research, teaching and university life, which bring us closer to the goal of a sustainable society. To this end, we are also in close dialogue with people outside the university context who contribute their valuable experience to science....”* The extent to which his words may translate into actions supporting the presence of *SES 3.4* is subject to interpretation. Indeed, further claims are made in substantiated reporting like the sustainability report of 2013: *“[LU] sensitizes its students and employees to the challenges of sustainable development, stimulates formal and informal learning processes and enables them to acquire design competencies. The university promotes internal and external knowledge transfer, which promotes the process of sustainable development and transdisciplinary exchange.”*

¹⁶ ASU Data-informed category based on post field work stakeholder interview (Cloutier, 2016). This affected the concept used to describe LU in retrospect.

CGS 4.2b

CGS 4.2b Accountable Disclosure of Environmental Social Governance**W= 2.24: Gr. 4, De. 2.**

- 3) After materiality analysis (1&2 in 4a), the whole organisation's sustainability performance is collated and made presentable in a comprehensive, high-quality sustainability or integrated report. Internal evaluation of ESG issues (4.2a) are communicated externally to relevant stakeholders

There is substantive support for the presence of the developing process of ESG accountable disclosure at LU to external stakeholders. This is cemented by LU's now Sustainability Coordinator, Irmhild Brüggén, being part of a government working group on sustainability assessment and reporting tools for HEIs, the *Nachhaltigkeitskodex*. The learning trajectory of LU in this regard is clear. The format of Sustainability reporting moved towards integrated reporting through the reporting years of 2011-15, and in the organisational structures and governance required for quality sustainability reporting (see section 5.3.1). Van der Linde stated that they are *"forced to do a sustainability report, to keep up with competitors, to disclose performance, policy, education and research"*, which certainly testifies to the extrinsic drivers in the region to account for sustainability. Whereas Lang corroborates the LU learning trajectory for CGS 4.2b mentioning *"a continuous sustainability reporting on campus"*. Finally, the Chronological Evolution provided by Brüggén provides substantive evidence of LU's sustainability reporting *"according to the G3 Guidelines from the Global Reporting Initiative (GRI)"*.

CGS 4.4

CGS 4.4 University Social Responsibility Assumption**W= 2.79: Gr. 5, De. 0.**

- 1) accept the moral obligation of the university defined by its own political economy, accepting social duties, and participating in deigned social cooperation;
- 2) collaborative governance is undertaken through partnership with external societal actors (NGO's, business, citizen groups)

The extent to which LU assumes social responsibility in collaborative governance with wider societal groups is quite well evidenced but somewhat isolated given the lack of density across categories. Some interviewees stressed the people would be better *'lead by the hand'*, referring to the rather top-down approach employed leveraging reorganisation and transformative change by leadership over the group level. There are several good examples of LU's assumption of social responsibility and collaborative governance with LU-Tchibo's projects for refugee employment being cited by Schmidt, the recognition of the *"challenge with including peoples with different cultures"* and countries into the LU community by Gralla. The latter is further corroborated by efforts observed during the peak of the refugee crisis in 2016 for Leuphana to contribute towards the integration and education of Syrian refugees into its community. Given how fresh this societal issue was at the time, LU's swift and substantiated response must be noted. Furthermore, the Innovation Incubator report make specific mention of Competence Tandems serving to attract international students and scientists, including a list of scholarships and innovation and transfer networks. Finally, specific reference to corroborated assumption of LU's obligation to society is made in President Spoun's opening statement to the 2015 Sustainability Report.

SER 5.3b

SER 5.3b Integrated sustainability praxis external impact

- University community actions increase likelihood of sustainable lifestyles externally by fulfilling its REOGC functions, ensuring that sustainability practices are embedded

W= 2.23: Gr. 4, De. 0.

Four documentary sources provide evidence that LU community actions use an integrated approach to sustainability praxis across REOGC portfolios, and that this has an impact externally. Across sources, the Innovation Incubator repeatedly is demonstrated as a practical example of “public interventions” and “innovation-led regional development” (Kempton & Hofer, 2015; LU; Brüggen, 2015). Specifically, Ute Stoltenberg’s work is highlighted in her coordination of the Lifeworld University project, the earlier LU project Sustainable University - identified as a starting point for many initiatives across categories in this analysis – and her focus on (Local) Agenda 21, regional sustainable development and the role of education in this context (Barth, Godemann, Rieckmann, & Stoltenberg, 2007). She was identified as a key stakeholder, referred by many interviewees as someone to talk to, emphasising her place in the LU sustainability praxis network. The evidence sampled however does cast a somewhat isolated claim to the presence of *SER 5.3b* throughout LU.

SER 5.4

SER 5.4 Ideal-typical Transdisciplinary Research Praxis

- Three phase ideal–typical transdisciplinary research.

Phase A: Complex problems are collaboratively framed in interdisciplinary teams;

Phase B: solution-orientated transferrable knowledge is co-produced based on framing process;

Phase C: (Re-)integration and application of co-produced knowledge in scientific and societal practice

W= 6.7: Gr. 12, De. 1.

Ideal-transdisciplinary research praxis is present to a strong extent at LU, being a strong characteristic of LU’s research and education missions, being heavily grounded in interview and documentary evidence (Adomßent et al., 2007; Lang et al., 2012). We can see this manifested as part of the ‘Lüneburg Approach’: *“establishing an intermediate level of collaboration between sustainability activists within universities and in higher education policy and administration”*, and evidence shows this was not just an intellectual endeavour. Academic research was implemented using LU as a base for co-production, in part pioneered by LU researchers, who brought it elsewhere in their academic and practitioner communities. Beatrice John’s role in the transdisciplinary research lab with Daniel Lang highlights: *“Teaching in transdisciplinary sustainability research projects. Research-based projects, learning and leading complimentary studies programme...operated at a municipal or regional scale”*. These appear to have a uniquely ‘glocal’ outreach with respect to her roles and activities, which was retrospectively corroborated given the later discovery of the GCSO network. An expanded quote from John is justified here to show the extent to which *SER 5.4*:

“We are implementing a sustainability science master’s program which is non-consecutive... meaning that it is not for environmental scientists but for everybody. I think this is a point where you need to combine also different professors and different institutes. Where the teaching comes together and then also the exchange is better. These things definitely come along and other... smaller things when you talk about networks... the networks that we have now with ASU for example or the NEPS network. It is also creating a network

of universities with a similar mind-set and especially also the people within. Because most of our research projects, most of the institutions, they are depending on personal relationships between researchers.” (John, 2016)

An additional example of how transdisciplinary research praxis is evidenced comes from the anonymous senior sustainability scientists’ account: *“with regard to the scientific ideal that we should be able to really work together... produce something that is more valuable or more usable like one of these groups would have a solution when they work on their own. So transdisciplinary research leads to a better knowledge in that way... epistemologically better knowledge but then it comes to this legitimization effect. That you produce something together and these non-academics of course take up this knowledge more easily because they coproduced it.” (Anonymous 1, 2016)*

SER 5.6

SER 5.6 Minimisation of negative health, socio-economic and environmental effects

W=0.56: Gr. 1, De. 0.

- Minimisation of negative environmental, economic, societal, and health effects as a result of the university’s activities, and the flow of resources across its boundaries (related to maintaining throughput).

Despite the limited extent to which it is present according to its weightedness, the minimisation of various negative effects is evinced indirectly from the instance of sustainability reporting coordination clear from Brüggens’ accounts. Additionally, from direct observations, organic catering is very present at LU, with the campus organic food market being a good example. Air pollution concerns were not seen. LU creates jobs in the locality and makes more effort in outreach than the citizens make in ‘in-reach’. The attainment of Climate Neutrality without carbon offsetting in 2014 is a big indicator too that LU has actively minimised negative environmental effects.

SER 5.7

SER 5.7 Research and education generates societal impact and public awareness

W= 5.03: Gr. 9, De.1.

- a) ‘Walking the talk’: enhance research and education function to generate societal processes of change towards desired quality-of-life;
- b) ‘Talk the walk’: a significant level of public consciousness is detectable that the research and education the university does has positive societal impact

Despite the good extent to which LU’s research and education functions appear to have a clear impact on society, there is somewhat limited evidence of a significant level of public awareness that this is the case. In-reach from the public – at the time of observation - appears weaker than the outreach from the university. Evidence of societal impact is strong and broadly found on the academic level and in teaching. Strong reflexive learning iterations are practiced by and within the Sustainability faculty. LU and the city council have been coupled, and the Innovation Incubator made waves. However, there were some doubts were present in anonymous interviewing regarding the motivations behind this, regarding whether they *“want to create the reputation of being a societally innovative university in order to attract students”* (Anonymous 2, 2016). Yet, this appears to be a minor issue as evidence abounds for the means justifying the ends, as long as the impact is made. The researcher’s radio presenter host, Kirsten Rinke, was very positive, and was observed to be an active member of the Leuphana community herself. When asked about the impression of LU research and education on the city she said *“a lot of students are working in restaurants and bars, they have jobs*

and this is quite good. This is very good as well. (A: They contribute to the local economy.) I'm so happy that everybody that I know is positive. The average of Lüneburgers is positive. Cross-case reference was made to a joint project with ASU in Kosovo and Albania, reciprocally mentioned by Braden Kay of ASU who worked there, who stated LU was the European basis with many international partners. This is a strong third-party, external source. LU also received several awards for Research Projects within the UNESCO Decade ESD (nine Project Awards in total since 2006) as seen in 2016 from *Chronological Evolution* (LU, 2010). Combined with the earlier account in the *Sustainable University* Project 2004-07, we can see the intent to translate their research and education into external impact is substantiated (an indication of action rather than intent to act).

SER 5.8

SER 5.8 Sustainability reporting standards and instruments implemented

W= 2.8: Gr. 5 De. 1

- Global, regional & national sustainability standards, instruments & principles are implemented in measurement and reporting process. Communicate progress made.

There is a fair amount of evidence for the presence of implementation of global, regional or national sustainability standards, certifications and instruments at LU. This is supported by the interconnected information on sustainability reporting and ESG evaluation sourced in the LU chronological evolution document. EMAS Standards have been used for 16 years. GRI is applied since 2009. IIRC principles of integrated reporting were used from 2014 onwards. Sustainability management processes at LU support its application from 2016. Interviewee accounts support this. Finally, the following quote from John serves to evince the substance behind the fairly developed presence of *SER 5.8*: “Well, we have this entire energy initiative. With solar panel, climate neutral etc. We are EMAS certified” (John, 2016).

5.3.3 ANALYSIS OUTPUTS

5.3.3.1 SCALAR PERFORMANCE COMPARISON

Charts 1, 3 and 5, presented sequentially (from left, downwards), allow a direct visual comparison of LU's sustainability transformation performance at the micro-, meso-, and macro-levels. Alongside each other, we can see that LU shows a strong aptitude at the micro-level, in particular with respect to sustainability competence training, pro-sustainability behaviour, triple-bottom-line and transformative agency, all over $W=5$. However, at the meso and macro-levels, there are not as many rubrics with $W \geq 5$, except for integrated sustainability praxis, transdisciplinary research praxis and - a shade over - impact and

awareness of LU's research and education in the public. This suggests a bottom-up aptitude in its organisational transformation towards sustainability.

5.3.3.2 SUBSTANTIATING ASSOCIATIONS & LINKS USING NETWORK SIGNIFICANCE

Table 4 below presents the output of the conceptual associations produced when internal evidence linked more than one category or code. When more than three quotes were shared between codes, the relationship was tested (using the network map function in Atlas.ti) to establish the pathway or action strategy that LU ostensibly took. Associations, as expected before the case work began, are cross-scalar *as well as* cross perspective. Meso-level criteria, such as *OCM 1.5 Organisational positive behaviour* are interestingly linked to micro-level ones like *SER 5.1 Sustainability competence training for transformation*. Whereas *OCM 2.1 Triple Bottom Line: Intrinsic change-agency* appears to have contributed to *SER 5.3a Integrated sustainability praxis across functions*. Given the density of the links and overlaps with the data, this suggests that a series of steps may have been taken along a pathway of organisational transformation, indicating a distinct action strategy. The substantiation of denser associations and links (for example more than three clear links between codes) allowed for the potential causality ('is cause of') to emerge in these relationships.

Network Maps Synopsis

In order to validate the associations made in the analysis, many network diagrams were used as a tool in Atlas.ti. The network map function allows for an isolation of individual links and data bits in an otherwise highly complex field of interdependence that is the output of the qualitative data coding. As such, associations were substantiated, re-evaluated, and re-apportioned; in other words, some links were cut or added depending on their re-assessed validity. Not all network diagrams are included in this report for reasons of brevity. Some examples of network maps relevant for showing how the relationship between certain categories and the internal evidence were tested are shown in Appendix 2. In particular, these demonstrate interviews with associated documentary corroboration and certain action strategies. 19 maps in total were used in this hermeneutic unit. The maps shown in Appendix 2 were mapped onto the diagnostic tool template to produce the action strategies and unique transformation signature. The next section demonstrates and describes the outputs of this procedure.

5.3.3.3 LU TRANSFORMATION SIGNATURE AND ITS ACTION STRATEGIES

Based on the proximity and overlap of codes and categories of analysis, LU's performance can be visually depicted using the diagnostic tool. Categories were mapped against each other and tallied according to groundedness and density respectively. Any code with $Gr \geq 10$ and $De > 2$ was included for assessment for the validity of and substance of the data underlying co-occurring codes, based on the procedure described in the previous *Section 5.3.3.2*. *Table 4* represents the tabulated form of the elemental connections included as significant in the action strategies. Arranged semantically and according to scale level, this series of associations was charted onto the tool's template producing the action strategies that holistically describe LU's unique transformation signature. Certain elements are shown as visually larger or more highlighted based on their weightedness value (see *section 4.3.2*).

Source	Link Type	Link Scale	Link Lens	Target
1.3 Organisational cultural health	is cause of	Meso-Macro	BSP-SER	5.7 Research and education generates societal impact and public awareness
1.3 Organisational cultural health	is cause of	Meso-Micro	BSP-SES	3.1 Transformative agency: sub-optimal practice challenge
1.5 Organisational positive behaviour	is associated with	Meso-Micro	BSP-SER	5.1 Sustainability Competence Training for Transformation
2.1 Triple Bottom Line: Intrinsic change agency	is cause of	Micro-Meso	OCM-USR	4.2a Internal Evaluation of Environmental Social Governance
2.1 Triple Bottom Line: Intrinsic change agency	is cause of	Micro-Meso	OCM-SER	5.3a Integrated sustainability praxis across functions
2.4 Organisational-societal learning	is associated with	Macro-Micro	OCM-USR	4.1 Strategic trajectory, liaison and learning
3.1.1 Effective intrapreneurship	is a property of	Micro-Micro	SES-SES	3.1 Transformative agency: sub-optimal practice challenge
3.2a Internal governance for sustainability	is associated with	Meso-Micro	SES-USR	4.1 Strategic trajectory, liaison and learning
3.2a Internal governance for sustainability	is associated with	Meso-Meso	SES-USR	4.2a Internal Evaluation of Environmental Social Governance
3.3 Environmental literacy competences	is associated with	Meso-Micro	SES-SER	5.1 Sustainability Competence Training for Transformation
3.3 Environmental literacy competences	is associated with	Meso-Meso	SES-BSP	1.4 Organisational lobbying competence
4.2b Accountable Disclosure of Environmental Social Governance	is associated with	Macro-Macro	USR-SER	5.8 Sustainability reporting standards and instruments implemented

Table 4: Associations made from linking data, produced from the Atlas analysis tool 'List of Code-Code Links' with comments. Three distinct strategic chains of categories connected by the internal evidence are shown in **black**, **dark orange**, and **turquoise**. The column 'Link Type' shows the type of association in Atlas. Whether dialogical (two-way interaction observed between actions, strategies or episodes), or unidirectional (one episode, action or pattern of behaviour clearly affecting another), these are reflected by two-way or one-way arrows in the transformation signature.

Figure 4: *Leuphana University Transformation Signature consisting of three action strategies.*

The visualisation is designed to allow a holistic view, with rubrics shown proportionally according to groundedness (as in Charts 1-6); conceptual density/type of association is represented by arrow design. LU's signature is weighted more towards the micro-level, than the meso-level, with the SER lens heavily dominating, followed by the CGS and SES lenses, respectively.

LU Action strategy A ‘Sustainability competences and environmental literacy’

is defined by the association of *SER 5.1 Sustainability competence training for transformation*, *OCM 1.5 Organisational positive behaviour*, *SES 3.3 Environmental literacy competences*, and *OCM 1.4 Organisational lobbying competences*, shown in Figure 4 in **turquoise**. It connects the micro-level to the meso-level, and can be characterised by the implementation of sustainability competencies at individual-dyad level in Leuphana (*SER 5.1*). The sustainability minor within LU’s ‘Leuphana Semester’ outlines and introduces their own approach to sustainability competence training for students and staff, which are also referred to in the sustainability reporting and the Leuphana Sustainability Science Initiative as Competence-building in Sustainability (Schaltegger, 2009). Continuing, this action strategy links sustainability competencies with environmental literacy in the socio-ecological systems theme (*SES 3.1*), as well as positive behaviour (*BSP 1.5*) and lobbying (*BSP 1.4*) in behavioural science and psychology. Qualities of environmental literacy (*SES 3.3*) such as, multi-scalar awareness of power and agency, and the material and social environment, also presented themselves in many of the meetings with LU researchers and staff.

LU Action Strategy B ‘Environmental evaluation and governance’

shows the associations between *OCM 2.1 Triple Bottom Line: Intrinsic change agency*, *SES 4.1 Strategic trajectory, liaison and learning*, *SES 3.2a Internal governance for sustainability*, *CGS 4.2a & 4.2b Evaluation of ESG*, *SER 5.3a Integrated sustainability praxis*, and *SER 5.4 ideal-typical transdisciplinary research praxis*, shown in **orange**. It appeared rooted in the strong ability of actors at LU to manage and account for their triple-bottom-line (*OCM 2.1*), with change agents measuring the university’s complements to people, planet and profit responsibilities. Multiple references to EMAS training and diversity in the documentation and sustainability reporting was linked to two higher steps, integrated sustainability praxis (*SER 5.3a*), and a cluster of evaluation and disclosure of environmental social governance (**ESG**) at the meso and macro levels (*CGS 4.2a & 4.2b*). These linked further into the use of interdisciplinary resources and sustainability standards (*SER 5.8*) (e.g. the Global Reporting Initiative), at a macro-level, and back across into internal governance for sustainability (*SES 3.2a*), strategic trajectory at the micro-level (*CGS 4.1*), and ideal-transdisciplinary research praxis (*SER 5.4*), at the meso-level.

LU Action Strategy C ‘Sustainability research and education, and intrapreneurial outreach’

in **black**, demonstrates the relationship between *OCM 1.3 Organisational cultural health*, *SES 3.1 Transformative agency: sub-optimal practice challenge*, *SES 3.1.1 Effective intrapreneurship*, and *SER 5.7 Research and education generates societal impact and public awareness*. It demonstrates an even more significant scalar range, with an interesting rubric that has some significance for external triggers (*SER 5.7*). It seems to originate at the micro-level of transformative agency, and effective intrapreneurship (*SES 3.1-3.1.1*), supported by internal evidence like the Innovation Incubator project, and Lars Pöppel’s account of leading university staff by the hand. These qualities were interrelated with the quality of organisational cultural health (*BSP 1.3*), supported by evidence of the Faculty of Sustainability staff and LU’s student organisations, which, in turn, was seen to affect the appearance of research and education that generated societal impact and public awareness (*SER 5.7*). A joint project with ASU in Kosovo and Albania exemplified this, with LU as the European basis of projects maximising

societal impact and public awareness, with many international partners. They received several awards for such research projects within the UNESCO DESD (nine Project Awards in total since 2006) based on LU's chronological evolution (LU, 2010).

The LU transformation signature consists of three action strategies, shown in Figure 8 as **dark orange** (A), **black** (B) and **turquoise** (C) outlines.

Transformation signature LU: Summary

The transformation signature of LU is characterised by these three action strategies, showing that sustainability competences and environmental literacy, environmental evaluation and governance, as well as sustainability research and education, and intrapreneurial outreach, all played an important role in LU's transformation.

The next section moves on to interpret the meaning of the most significant aspects of the data analysis from the intelligence gathered.

5.4 DISCUSSION

Based on the analysis in the previous section, this section discusses the accounts, interpretations and corroborating evidence for the competencies, qualities and patterns unearthed at LU using the diagnostic tool. These organisational assets are shown by the highest-weighted rubrics, and form part of LU's sustainability transformation pathway, in turn composed by distinct action strategies which actors employed. These strategies might each represent one coherent transformation pathway. This level of insight and detail has been achieved through applying the diagnostic tool. Now that the first research question has been answered in detail, showing the assets – competencies, qualities or patterns – discerned using the tool, and that the signature pathway organisational transformation for sustainability has been presented and described in Section 5.3.3.3, this section zooms in to discuss the deeper structure and characteristics of the pathway of transformation. During the final stages of analysis, it was hard to separate the roles of the actors from the process and structure of the transformation pathway. The discussion has therefore been structured according to the three scales explored in the diagnosis. The micro-, meso-, and macro-level sections each discuss the evidence produced in the analysis in different yet inter-related ways, for example, by looking at the patterns created by the action strategies in the context of the bigger picture, and interpreting defining roles of the actors who have navigated pathways of transformation to sustainability at LU.

5.4.1 MICRO-LEVEL: ROLES & AGENCY IN THE TRANSFORMATION PATHWAY

This section in particular helps to paint a meaningful picture of the roles of specific actors in the pathway of organisational transformation for sustainability.

General Account of community identity & moral orientation

Generally, based on the conversations held with people at LU, the moral imperative for intergenerational justice is significant part of the community identity – at least with those randomly selected. Integrating accounts from the documentation and interviews, it is interesting to note that LU is conceived by many thinkers and practitioners as a *Universität als Möglichkeitsraum* – translated approximately as 'University as possibility's

space'. This was seen in the specific steps in LU's action strategy C '*Sustainability research and education, and intrapreneurial outreach*'. Thus, a second transformative quality, made clear through the researcher participating in the cultural scene at LU, is their language of possibility towards innovation and sustainability on campus, with teams of students and staff collaborating to innovate for intrinsic change-agency, combined with external engagement efforts.

Channelling Inquiry & Action

Some key roles for the actors interviewed in this case seems to have been to channel inquiry and action into deeper systemic change towards sustainability (in particular the UN chairs of HESD). Indeed, the anonymous interviewees' values and historical experiences seemed to cut to the core of the problem of unsustainability at universities (Kempton & Hofer, 2015) which also unseated several preconceived assumptions (Anonymous 1, 2016; Anonymous 2, 2016). For example, using Donella Meadows' leverage points framework for places to intervene in systems, their language approaches deeper design and intent traits, like recognising goals, prevailing mindsets and paradigms of the system which actors are members in. The fact that LU has active members of its community who think like this can be interpreted as a strong and encouraging inclination towards authentic sustainability praxis across REOGC portfolios. This is backed up by the strong weighting of *SER 5.3a*. Despite being sustainability scientists, they implement constructive critique on the failures of their own field and institution to increase the chances of contributing to more sustainable development trajectories as a community.

Student Participation

Student-based intrapreneurship sets the scene for possible further capacity building on campus, coupled with staff support from the Faculty of Sustainability, by welcoming external modes of governance for sustainability¹⁷. 34 student organisations are cited in the 2015 LU Sustainability report, based on 2016 data. If still active, this represents a strong and diverse bottom-up engagement from the student body on a diversity of issues. This corresponds with *SES 3.1 Transformative agency, sub-optimal practice challenge*, and *SES 3.1.1 Effective intrapreneurship*. With an umbrella organisation to support them, *Dachverband der StudierendenInitiativen*¹⁸ (DSI) also shows that Leuphana is making authentic strides to encourage student praxis and participation, and that this has fared them well at higher levels in terms of external impact and public awareness, as at least 10% of Leuphana's population are students.

Leadership Role

Evidence, from two anonymous interviewees and a research assistant¹⁹, assigned to translate key findings of the sustainability reports of 2011-2015, gave rise to the

¹⁷ Like the Green office Movement for example, which actually recently took place in a recent collaboration between rootAbility and one of the actors involved in this case study in 2017/18, related to the UNESCO HESD chair at LU.

¹⁸ Umbrella organisation for Student Initiatives.

¹⁹ The inputs and analysis provided by Frederieke Sonnenberg, part of the ICIS-GO PhD co-research team and student at Maastricht University, were invaluable to the generation of knowledge and insight for this report.

conclusion that sustainability has been used by leadership as a tool to promote and position LU as pioneer of sustainable Universities. Strong in applying for prizes and awards, LU's commitment may be intrinsic to some extent but a big part is simply good marketing. They found a niche to promote themselves. Whether this is a 'good or bad' thing is irrelevant next to the substantive success in improved sustainability performance and outreach; an innovation by any means. The analysis suggests that the usage of sustainability as a guiding principle and practice, for reputational purposes allowed LU faculty to score crucial research funds and for administration and middle management to assign resources from financial allocation for further internal initiatives under the sustainability banner. The question arose in one anonymous interview as to whether "*they just want an innovative approach [to university conduct] to attract students?*", which pertains to increasing traditional metrics of university success. The mere fact that key internal stakeholders have their doubts about the degree of adoption of societal responsibility and sustainability, regardless of external reputational success, is encouraging, deserving inclusionary and appreciative attention by the leadership at LU.

Call for Therapeutic Transformation

The reference to traumatic reorganisation up to 2014 appears to have led to an attitude amongst stakeholders of letting the dust settle; this means the transformation could have slowed, and initiatives have been less intense to allow for a sufficient adjustment period for the changes to gain traction. This is especially conscientious given the reference to the division between academic communities from the fusion of the two prior Universities – evinced by the presence of *BSP 1.2 Positive pro-sustainability behaviour* and *BSP 1.3 Organisational cultural*. We can therefore conclude that transformational intent and action cannot be constantly in 'fifth gear' otherwise the system 'burns out'-stakeholders saw a risk of change and sustainability fatigue in the LU population demonstrating empathy, conscientiousness and appreciation. Operational optimisation, communications strategies, organisational learning, internal knowledge transfer, and finally the wellbeing, creativity, innovativeness and passion of its citizens characterises the role of LU actors in the transformation.

5.4.2 MESO-LEVEL: IDIOSYNCRASIES, GROUP AND FACULTY EXPERIENCE OF THE TRANSFORMATION PATHWAY

This section presents certain unique, context-specific characteristics of LU's pathway of organisational transformation. After retrospection on empirical findings, research journals, the results themselves, and impressions and methods of the campus community, the following idiosyncrasies are subsequently included in the discussion. These distinct cultural, and socio-organisational aspects appear to more tangibly and meaningfully depict LU's transformative performance. They can also be described as cross-organisational initiatives; intellectual, social, and material outcomes of the sustainability transformation studied.

5.4.2.1 THE FACULTY OF SUSTAINABILITY

"From revolution to evolution" is the Faculty of Sustainability's unwritten motto (John, 2016), typifying a characterisation of LU as a 'matrix' organisation versus the silo-based organisation characterised by faculty power centres and intractable disciplinary divides.

This is shown by the presence of *SES 3.3*, *BSP 1.6*, and specifically *SES 3.1.1*, the asset of overcoming silo-based power systems. Through the formal and informal efforts of the faculty that kick-started LU's transformation, initiatives coalesced in high-level leadership support, and implementation marked by an array of achievements. For example, the then environmental coordinator put into action representative internal reporters from each faculty to herself, as well as several other service centres and sub-units, with explicit legitimacy, resources and decision-making allocated to perform these roles. Her position is then structured so that she reports and is accountable directly to the President's office (represented by the formalised governance for sustainability structure of 2016/17 in *Figure 1*). This forms a cohesive network for dialogical communication within and throughout LU that works against the usual decentralisation of faculties and disciplines seen in more traditional models. That lead to a dissolution of the characteristics and practices of a silo-based organisation in favour of a matrix organisation: the inter-faculty, inter and trans-disciplinary collaboration with the public research university driven by shared vision and mission (see *Section 5.1.3*).

The traumatic reorganisation experienced at LU required some time to settle into the new state-of-the-art. Since Leuphana obtained the certification of Climate Neutrality in 2014, stakeholders in the transformation searched for the next big goal, whilst the dust settled after the institutional redesign, leaving some fatigued and confused, for example between the two groups of professors resulting from the prior two institutes' fusion. Since 2015, as the dust settled, renewed focus has graduated to the macro-level, with societal engagement coming under a new strategic plan focus to 2030 by university decision-makers (Anonymous 1, 2016; Brüggem, 2016; Gralla, 2016; Lang, 2016). This arguably was set in motion by the success of the Innovation Incubator (Kempton & Hofer, 2015), in turn determined largely by the initiatives, strategies, pragmatic action research programmes and structural reconceptualisation triggered by the Faculty of Sustainability's culture of transdisciplinarity and the education and training of sustainability competences in real-time.

The performance of the Faculty of Sustainability in LU's overall transformation illustrates its pivotal role as an in-house source of knowledge and organisational innovation, having overcome traditional disciplinary divides and silo-based power systems.

5.4.2.2 THE LU SUSTAINABILITY SCIENCE RESEARCH INITIATIVE

The Leuphana Sustainability Science Initiative was identified as significant in evolution of LU, characterised by the realisation of an array of projects, such as the Agenda 21 and Sustainable University projects. Its presence across categories supports the view that actors consciously navigated a pathway for organisational transformation towards sustainability. Key assets in this exemplar were integrating sustainability praxis across REOGC portfolios (*SER 3.2a*), whilst outcomes of research and education in sustainability (*SER 5.7*) generate impact and awareness in its societal surroundings.

Figure 5: Leuphana's Sustainability Science Research Initiative, highlighting transdisciplinarity for international sustainable development at the confluence of natural and social sustainability science perspectives, adopted from Schaltegger (2009).

The LU Sustainability Science Initiative's application (see Figure 5) led to LU's unique approach to *Sustainability Competence Training (SER 5.1)*, its strongest asset from this analysis. Other institutional evaluations highlight these in the Innovation Incubator Competence Tandems. These appear associated with *design* competencies (*'Gestaltungskompetenz'*), key competencies required for forward-looking and autonomous participation in shaping an international sustainable development, and ensuring an organisation has the capacity to meet 21st century demands and challenges. Barth et al. outlined how the "*development of key competencies is based both on cognitive and non-cognitive dispositions and asks for multiple contexts. Through combining formal and informal learning settings within higher education – as part of a new learning culture – a variety of contexts can be given and competence development can be enhanced... Particular attention is given to interdisciplinarity and students' self-responsibility*" (2007, p. 416).

5.4.3.3 THE LEVERAGE POINTS PROJECT RESEARCH CLUSTER

The Leverage Points Project research cluster is critical in its articulation of the dissonance between rhetorical sustainability and realised outcomes that might better evaluate or navigate sustainability transformations, as the following quote shows:

“Despite substantial focus on sustainability issues in both science and politics, humanity remains on largely unsustainable development trajectories. Partly, this is due to the failure of sustainability science to engage with the root causes of unsustainability.”

Figure 6: Leverage points for sustainability transformation. Abson et al. (2017), based on Meadows (1999). For further information, see <https://leveragepoints.org/>.

Re-connecting people to nature, re-structuring institutions, and re-thinking how knowledge is created and used in pursuit of sustainability, the leverage points cluster acts as a boundary object for transformative, action-oriented sustainability science. Its use adds a deeper perspective, looking at core and potentially overlooked assets and success factors. Action researchers were also assigned to assist the project team's own understanding of itself (Freeth, 2016), which helps us to isolate how positive aspects of organisational behaviour and self-diagnosis reflected in the analysis can trigger meso-level properties of organisational transformation for sustainability. The outcomes of the Leverage Points project could be applied elsewhere at universities that correspond to the same cultural and institutional characteristics seen in Lüneburg.

5.4.3 MACRO-LEVEL: STRUCTURE & CHARACTERISTICS OF LU'S ORGANISATIONAL TRANSFORMATION PATHWAY

An innovative, as well as a pragmatic approach to sustainability characterises LU's pathway of transformation, having been somewhat anticipatory in its organisational change management since 2005. As social and environmental responsibility became more important for the private sector to account for and embed, so too was the pressure put on universities to 'walk the talk', to create positive societal impact, and to reduce negative social and environmental impacts for the community they served. LU's new vision therefore became making itself a humanistic, sustainable and entrepreneurial university in 2006, that would encourage innovation, external partnership with civil society and the private sectors for the public good, and not shy away from risk-taking

central to the experimental approach in its own culture to achieve the mission.

Based on the analysis, external stimulus seemed to trigger intrinsic efforts which characterise LU's pathway of transformation towards sustainability. LU followed a unique pathway, with interlinkages between significant rubrics at the meso and macro-level across perspectives. At the macro-level, LU's organisational transformation can be framed as a 'response' to the institutional transformation of the Higher Education sector in Germany as a result of unification from the 90's to the 00's, which also opened up competition in Lower Saxony, driving LU's own restructuring (Wolter, 2004). This intense competition amongst universities in the region drove LU to carve out its own niche orientated around sustainability and innovation. It was LU's concerted development of intrinsic competencies of systemic change that have notably defined its trajectory, as shown by its unique transformation signature.

Concrete examples of organisational-scale transformative action include the OECD Innovation Incubator, and the fusion of the two prior universities. If it were not for the OECD Innovation Incubator's local and regional evidentiary impact, the documentary accounts would lead us to conclude that LU language on sustainability and public administration can mostly be seen as '3rd mission' speak of knowledge and technology transfer. Entering into partnerships with large external entities to ease the prevalent obstacle of funding independent research projects, as well as the consistency and quality of the social capital held by decision makers internally, bears the risk of future lock-in scenarios and mission drift. Providing a safe operating space with university-based incubators for startups, and generating re-investment revenue into social and environmental entrepreneurs with smart foundations should help insure against LU student and staff start-ups losing autonomy, dissolving under investor demands into business models that override the development of intrinsic competencies. The ratification of the Paris Climate agreement for Germany has also had some implications for the sustainability specifications of all new buildings; as LU commissioned and built the new campus centre in 2016/17, it therefore had to be built to be climate neutral in line with its own goals, independent from fossil fuel heating.

By dint of the rather difficult merger of the two prior institutions present in Lüneburg before President Spoun's tenure, the American institutional model – the shift to the bachelors and masters system, and liberal arts and science-style colleges – was looked to for inspiration about how best to undertake the structural changes in the governance and organisation. This included the best-case example of Wolfgang Hermann at Technical University Munich before him, and other pioneering examples for how to overcome institutional architecture barriers at the federal state level. The new fused LU adopted a Board of Trustees (*Stiftungsrat*) and a Senate, to improve its governance and independence which allowed for adaptive decision-making. Funding obstacles in the public sphere due to the climate of austerity since the global financial crisis in 2007/08 were overcome too via the creation of private fund-raising entities; a successful example of this was in cooperation with the state of Lower-Saxony, LU allocated finance for the management of the influential and impactful EU-sponsored regional development *Innovations Inkubator* project. Overcoming macro-societal barriers took a leaner, agile approach that anticipated instead of reacting to issues prominent and growing on the

public consciousness. It appears this was the approach employed by the leadership at LU. This research indicates the recommendation to comprehensively evaluate the source and nature of external partnerships, particularly when larger sums of money are involved, or scopes of association. An autonomy in the intrinsic capability of LU's actors to guide their own sustainability transformation ought to be demarcated and ring-fenced. Research and student community capacity building could be a good investment due to the underlying tensions that the merger caused to internal faculty relations.

In terms of how LU is regarded externally, added insights from the research assistant's analysis and translation of the Rinke transcripts and sustainability reporting provided two views of the Lüneburg people's perceptions of the university. One, that LU is 'really embedded in society and the community', that unless you know someone in the academic community, as a citizen you are not inclined to take an active interest or be affiliated with the university. This also creates the impression that the Lüneburgers seem to ask 'what do researchers really do for me?' The second, more critical interpretation is that perceived impact is 'not really translated from the ivory tower', that the people of Lüneburg do not seem to care whether documents the university produces are in English for example. This seems to exemplify the need for a continued drive for external community engagement that creates non-prescriptive space for the voices and needs of Lüneburgers; it must be said however that this does not take away from LU's already identified societal impact drive in this evaluation

5.5 CONCLUSION

Over the last 15 years LU has navigated its own signature pathway of organisational transformation towards sustainability. LU leadership challenged the regional academic status quo, prevailing through bureaucratic civil law, intellectual and financial stagnation, to resolve an "inward-looking ivory tower culture" (Alison Abbott et al., 2014). Newer, smaller, public research universities like LU faced an uphill struggle against this. LU has been actively engaging those surrounding the university in order to work towards a sustainable society. Sustainability is seen in the campus discourse as a 'big word', which deserves authentic dialogue. President Spoun's opening statement to LU's sustainability report of 2015 for a collective human endeavour. However, there are also more critical accounts which challenge the very mindset of sustainable development itself: *"Sustainable development is an oxymoron: there is no form of development within the bounds of our cultural paradigm that can be truly sustainable"* (Anonymous 2, 2016).

The findings suggest a signature 'Leuphanisation' approach to organisational transformation, which takes the presence of dynamic leadership, coupled with the transformative change-agency of entrepreneurial Professors and teams of student change-agents at the mid-level that realised and advocated sustainability, using LU to chisel out a potentially new model for the German university. This corresponds with the research by Romanelli and Tushman (1994), confirming that chief executive officer succession was a driver of organisational transformation, and that "small changes in strategies, structures, and power distributions did not accumulate to produce fundamental transformations" (p.1).

APPENDICES: CHAPTER 5

APPENDIX 1: LIST OF THE 30 PRIMARY DOCUMENTS USED IN THE ANALYSIS

Coded Documentation, 19: Research notations denote some document names to protect identity of actors

- P19: Key_competencies_in_sustainability_a_ref.pdf
- P20: Konzeptwerkstätten - DE Org Struc S.pdf
- P21: Lessons_learned_from_the_Lueneburg_Innovation_Incubator__OECD_2015.pdf
- P22: Guerra_Nachhaltigkeit_Irrwege_Licht.pdf
- P23: Organigramm Luneburg.pdf
- P24: Leuphana_Nachhaltigkeitsbericht 2015.pdf
- P25: Nachhaltigkeitsbericht_2011.pdf
- P26: Nachhaltigkeitsbericht_2013.pdf
- P27: Abson_et_al_accepted_Leverage_points_for_sustianability_transformation.pdf
- P28: Meadows 1999 Leverage Points Paper The Sustainability Institute.pdf
- P29: Chronological_Evolution.pdf
- P30: Fischer, Jenssen et al 2015 - Getting an empirical hold.pdf
- P31: Key competencies_Barth, Godemann, Rieckmann, Stoltenberg.pdf
- P32: Leuphana Sustainability Sciences 2009_Schaltegger.pdf
- P33: Organizational learning_Albrecht, Burandt, Schaltegger.pdf
- P34: Research and Reinvention 2009_Spoun.pdf
- P35: SU_Leuphana_overview.pdf
- P36: Sustainability communication on campus_Franz-Balsen, Heinrichs.pdf
- P37: Transferability of approaches_Adomssent, Godemann, Michelsen.pdf

Interviews, 11: Both Summaries and Raw Transcripts of some actors' interviews were used in the analysis

- P 1: Interview Summary BJ 03.05.docx
- P 2: Interview Summary DL 03.05.docx
- P 3: Interview Summary EvL 27.04.docx
- P 4: Interview Summary FB 26.04.docx
- P 5: Interview Summary IB 28.04.docx
- P 6: Interview Summary [Anonymous 1] 04.05.docx
- P 7: Interview Summary JS 02.05.docx
- P 8: Interview Summary LP 27.04.docx
- P 9: Interview Summary [Anonymous 2] 03.05.docx
- P10: Interview Summary PB 02.05.docx
- P11: Transcript Interview BJ.docx
- P12: Transcript Interview DL.docx
- P13: Transcript Interview EvL.docx
- P14: Transcript Interview FG.docx
- P15: Transcript Interview IB.docx
- P16: Transcript Interview LP.docx
- P17: Transcript Interview [Anonymous 2].docx
- P18: Transcript Interview Rinke.docx

APPENDIX 2: EXAMPLES OF ATLAS NETWORK MAPS USED IN THE ANALYSIS TO SUBSTANTIATE AND VALIDATE ASSOCIATIONS IN THE DATA

Map 3 (below): Atlas generated association diagram of categories forming action strategy B, shown in **orange** in Figure 4.

Map 2 (below): Atlas generated association diagram of categories forming LU action strategy A, shown in **turquoise** in Figure 4.

Map 4 (below): Atlas generated from association diagram based on shared internal evidence between categories for action strategy C, shown in **black** in Figure 4.

Map 1: Conceptual grounding of SER5.7, OCM2.1, with associations to other rubrics and primary documents (one source per box).

Map 5 (below): A series of empirical and experience-based accounts provide heavy linkages surrounding conceptually dense codes, and corroborated by the interview with Daniel Lang. This map shows causal links between micro-level properties like OCM2.1 Triple Bottom Line: Intrinsic change-agency, and its effects at higher levels such as SER5.3a Integrated sustainability praxis and the sister categories CGS4.2a&b evaluation of ESG at meso and macro-levels.

Map 6: Network Diagram of Criteria OCM1.3 and SER5.6, Association in coded information in the primary documents/interviews. The resulting empirical link demonstrates a possible causal association between OCM1.3 organisational positive behaviour and SER5.6 research and education that generates societal impact with public awareness.

APPENDIX 3: ORGANISATIONAL MAPPING

LEGEND: *Leuphana Universität Lüneburg Organigramme; Spring 2016. Digitised. Original hand-drawn on site. The formal structure presented in Figures 1 & 2 (smaller text boxes in burgundy and grey central), are shown centrally, annotations made onto the original chart based on the relationships, systems, units and eventually individuals targetted and their account are shown surrounding it. This was primarily an internal sensemaking procedure for the researcher to explore and understand the horizontal and vertical distribution of responsibility and governance for sustainability throughout the organisation, as well as the key actors.*

CHAPTER 6. CASE-STUDY TWO:

ARIZONA STATE UNIVERSITY

PROMISE AND TRACTION WITH THE NEW AMERICAN UNIVERSITY PROTOTYPE:
FLIPPING ACADEMIA ON ITS HEAD & CREATING SPACES FOR PRAXIS

*“We’re becoming more and more like
translators, facilitators, interpreters
between and within disciplines.”*

...

*“At the centre of every single
sustainability issue is a human
being.”*

Scott Cloutier (2016)

SUMMARY

Arizona State University (ASU), founded in 1885, is a large public research university (PRU), with a total student enrolment in 2018 surpassing 100,000, with around 4,500 academic staff, mostly in Tempe and Phoenix, USA. Early in the 2000s, social, environmental, cultural, and political drivers in Arizona State, triggered a major departure from traditional models typified by leading US PRUs (e.g. Ivy League, Gold Standard, Land Grant universities). The comprehensive reconceptualisation of ASU into the New American University prototype, was initiated by Michael Crow in 2002, who as President, led the transformation of ASU into “an egalitarian institution committed to academic excellence, inclusiveness to a broad demographic and maximum societal impact” (President’s Office, 2015). This unfolded in an experimental approach to institutional innovation, grounded in Katz & Kahn’s (1978) integration of open systems theory and the biological metaphor of “the interaction between an organism and its environment” (Crow & Dabars, 2015a, p. 63). There are dozens of notable examples of interdisciplinary research institutes, initiatives and transdisciplinary configurations which denote ASU’s transformative approach to sustainability. Three in particular show its idiosyncrasies. Firstly, the Consortium for Science Policy and Outcomes (CSPO), which was reconstituted in 2004 from the previous Columbia-based initiative “Through an NSF -funded project, on decision-making under uncertainty for climate change” (Crow & Dabars, 2015a, p. 285). Secondly, the Complex Adaptive Systems Initiative (CASI), which is a “collaborative effort to address ... challenges in health, sustainability and national security” (Crow & Dabars, 2015a, p. 279). Thirdly, the Julie Ann Wrigley Global Institute of Sustainability (GIOS), where this research was hosted, and includes ASU’s School of Sustainability (SOS), and the Global Consortium of Sustainability Outcomes (GCSO). GIOS is the primary vehicle by which the university establishes and pursues a comprehensive set of goals on sustainability education, research and practice, along with department of University Sustainability Practices. GCSO was established in 2015 as a federation of universities and research institutes that collaborate to develop, test, teach and transfer potential solutions to worldwide sustainability problems. They aim to reduce, eliminate, or deflect a sustainability problem by applying research-based practical solutions, termed as sustainability outcomes (Tromp, Boone, Dirks, & Melnick, 2015).

6.1 INTRODUCTION TO ARIZONA STATE UNIVERSITY

In this chapter the second organisational case-study research will be presented. The field research took place in the United States of America, in the conurbation of Phoenix and Tempe, in the state of Arizona, at Arizona State University (ASU)¹, during the period July-August 2016. The specific research questions I aim to answer in this chapter are:

¹ *Abbreviations: ASU: Arizona State University; BSP: Behavioural Science and Psychology; CASI: Complex Adaptive Systems Initiative; CGS: Corporate Governance for Sustainability; CSPO: Centre for Science Policy Outcomes; ESG: Environmental Social Governance; GCSO: Global Consortium for Sustainability Outcomes; GIOS: (Julie Ann Wrigley) Global Institute of Sustainability; OCM: Organisational Change Management; PRU: Public Research University; SES: Socio-Ecological Systems; SER: Sustainability in education and research; SOS: School of Sustainability; USP: University Sustainability Practices;*

- What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to ASU?
- What is ASU's signature pathway of organisational development/transformation for sustainability?
- What is the role of specific actors and groups (for example, intrapreneurs, change-agents, and the sustainability department) in the pathway of organisational transformation for sustainability?

6.1.1 CONTEXT & EVOLUTION

Image 1: Image of ASU's main administrative centre, located directly opposite the Julie Ann Wrigley Global Institute of Sustainability. The proximity of the sustainability centre to the Office of the President and the leadership of ASU is notable.

Arizona State University (ASU) is mainly based in Tempe and Phoenix, USA, situated near the south-western 'frontier' of the country, Arizona borders California to the east, Nevada to the north-west, Utah to the north, and New Mexico to the west. As a result, the observer of the global Higher Education market will note its regional competitors, ranked in the top 50 US News Best National universities: California Institute of Technology, University of Southern California, and the San Diego and LA branches of the University of California (Pannoni, 2015). These were high performers against which ASU had to compete, and subsequently find its niche. Established in 1885 (a relatively young university according to the US 'Gold Standard'), ASU's President since 2002 is Michael Crow, who migrated over from Columbia, New York, bringing with him his administrative team and whichever academics shared the vision of what universities needed to become in the 21st century, later conceptualised as the 'New American University'. Crow and William Dabars – a critical historian with considerable expertise on the design and socio-historical trajectories of modern universities – published "The New American University" in 2015. In it they extensively examine the emergence of a new model for public research universities that: *"through institutional innovation ... realise unique and differentiated identities, which maximize their potential to generate the ideas, products,*

and processes that impact quality of life, standard of living, and national economic competitiveness” (President’s Office, 2015).

The role of the leadership in ASU’s pathway is very clear to discern: “Crow has led the transformation of ASU into an egalitarian institution committed to academic excellence, inclusiveness to a broad demographic and maximum societal impact.” (Crow & Dabars, 2015a; President’s Office, 2015). ASU has also won a number of awards and recognition for its innovative and pragmatic approach to higher education governance including ‘Most Innovative 2016’, No. 1 in the US for innovation according to US News and World Report (ASU, 2016b). Crow relates this as significant in his opening statement to the Annual Report 2016, because of the lower ranking of the traditionally leading US PRUs, and also because the rankings were made by academic leadership peers “who address the same challenges we do” (ASU, 2016b). ASU’s numbers also represent steady progress against the usual performance indicators of PRUs, as *Figure 1* shows with core faculty data: notable is the 40% increase in minority tenured and tenure track faculty since 2006. Secondly, core student data shows a 64% increase in the number of degrees awarded from 2005-2015, along with 39% of the population coming from an ethnic minority in 2015, and an overall increase of 156% in the number of degrees awarded to minority students since 2005 – see *Figure 2* (ASU, 2016b). *Figure 3* shows core performance data in the areas of finance, graduate recruitment, alumni networking and research. For example, in the period 2005-2015, research expenditures increased by more than 150% to \$450 million, surpassing notable peers including Princeton and Caltech. Notable, also is the €207 million in new gifts and commitments in the fiscal year of 2015, and the €38 million in scholarship support provided to more than 8000 ASU students (ASU, 2016b).

6.1.2 VISION, MISSION, VALUES

The ethos of the New American University is exhibited by the ASU Charter:

“ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; advancing research and discovery of public value; assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves.”

Faculty

Top 10

in the nation for Nobel-winning faculty economists; tie with New York University, Stanford

40%
increase in minority tenured and tenure-track faculty since 2005

3,391

total faculty members (fall 2015)

38

National Endowment for the Humanities members

10

National Academy of Engineering members

1

Resident astronaut

66

American Association for the Advancement of Science fellows

13

National Academy of Sciences members

6

Pulitzer Prize winners

Figure 1 (right): Core Faculty data across a number of indices, including American Association for the Advancement of Science (AAAS) fellows, National Endowment for the Humanities members, and Pulitzer Prize winners (ASU, 2016b).

Students

The 2015 freshman class was the most academically distinguished and diverse in ASU's history, with:

3.4

Average high school GPA

1126

Average SAT/ACT score

39%

Minority students

#3 all-time

Most Academic All-American athletes in Pac-12

21,020

Number of degrees awarded (2014-2015)

156%

Increase in number of degrees to minority students since 2005

Degrees awarded in the Arizona university system

Figure 2 (left): Student data across a number of indices including graduation rates, degrees awarded, and proportion of top performing faculty (ASU, 2016b).

Four-year graduation rates

Six-year graduation rates

Support

100K+

Individual, corporate and foundation donors

\$207 million

New gifts and commitments in fiscal year 2015

\$38 million

Amount of scholarship support provided

41%

Increase over previous year

8,000+

ASU students received scholarship support

Alumni

#1

ASU Alumni Association named Top Networking Association by Phoenix Business Journal

146

Groups in ASUAA chapter network worldwide

400,000+

Alumni Association members worldwide

100+

Students receiving ASUAA Medallion Scholarships

Figure 3 (right): ASU Core performance data according to donors, scholarship and alumni association members globally (ASU, 2016b).

Research

11th

in the U.S. for NASA funding in fiscal year 2015

30th

for National Science Foundation funding

ASU total research expenditures in millions of dollars*

ASU presents itself as a stand-alone institution that has departed from traditional models and broken-down disciplinary walls of American PRUs, becoming a 'comprehensive knowledge enterprise' rather than an 'ossified bureaucracy'. This enterprise is complex and adaptive by nature, and symbiotic and reflexive in its relationship to the communities it serves. This has not least been accomplished by the tracking, maximisation and substantiation of its societal impact, but also seems to have been the *modus operandi* for ASU's transformation since Dr Crow's arrival in 2002. A mutual redesign was implemented, whose conception was identified in Crow's White Paper of 2004, *One University in Many Places: Transitional Design to Twenty-first Century Excellence: the President's Response to the University Provost's Recommendations Regarding the University Design Team Report* (Crow, 2004).

In 2004, a University Design Team (UDT), chaired by the former provost Milton Glick, and responded to by the new president, debated and confirmed the reconceptualisation of ASU as the New American University, with sustainability principles and practices to be designed and hardwired into its core structures. ASU frames itself as the New American University Prototype, which sets out on a major departure – by producing a model of differentiation, rather than of replication – from traditional models of organising PRUs in the USA. These models are not only hundreds of years old, and out of sync with current 21st century challenges, but highly regarded and replicated worldwide (Crow, 2004). All of this was rooted and guided by the eight design principles² of the New American University Prototype. ASU integrated these in innovative ways to demonstrate its excellence, access and impact. They now appear to form the cultural binding of shared values, vision and mission for ASU:

1. Leverage Its Place: ASU embraces its cultural, socioeconomic and physical setting.
2. Transform Society: ASU catalyses social change by being connected to social needs.
3. Value Entrepreneurship: ASU uses its knowledge and encourages innovation.
4. Conduct Use-Inspired Research: ASU research has purpose and impact.
5. Enable Student Success: ASU is committed to the success of each unique student.
6. Fuse Intellectual Disciplines: ASU creates knowledge by transcending academic disciplines.
7. Be Socially Embedded: ASU connects with communities through mutually beneficial partnerships.
8. Engage Globally: ASU engages with people and issues locally, nationally and internationally.

The eight design principles were therefore used for the purpose of navigation, with sustainability as the means for integration across the institution's structure, with an

² They are referred to interchangeably as principles, imperatives, and aspirations since 2002.

earlier study of ASU supporting this visionary intent: “*Sustainability will serve as a conduit to more productive knowledge creation and more meaningful instruction*” (Cummings, 2010; p.118, citing James Buizer). They occur clearly in the language of ASU. These principles are peppered throughout campus and university literature and now represent ASU’s guiding ethos that defines its organisational identity, being clearly identifiable and taken up by its members. Furthermore, they are reflected in the organisational structure of transdisciplinary colleges and schools (*configurations*) that complement and amplify the research and teaching missions of pre-existing disciplines, departments and faculties.

ASU Mission and Goals for the period 2016-2020 describe that its capacity to make practical its aspirations over the past decade – combining access to higher education for the lower family bracket of academically qualified students – have not diminished:

- Establish ASU as the global centre for interdisciplinary research, discovery and development by 2020
- Demonstrate American leadership in academic excellence and accessibility
- Establish national standing in academic quality and impact of colleges and schools in every field
- Enhance our local impact and social embeddedness

A characteristically pragmatic approach to sustainability and PRU organisation further defines the ASU mission: “*Sustainability will require the reconceptualisation and reorganisation of our ossified knowledge enterprises*” (Crow & Dabars, 2015a). According to Crow’s vision, societal concerns are high on the agenda, as Top Right newspaper’s account of his efforts state, his concerns include “*broader indicators of society’s health: declining educational attainment, shrinking wages, [and] environmental degradation*” and insists that universities should be judged by these efforts (Saletan, 2011).

After this section’s description of the characteristics of ASU as a university, its recent history, institutional structure and governance, the next section focusses on the research design for this case study.

6.2 METHODS OF THE ASU INQUIRY

6.2.1 ORGANISATIONAL MAPPING

ASU’s organisational structure was mapped in order to locate the most significant persons associated with embedding sustainability, and to gain knowledge about the distribution of governance and responsibility for sustainability horizontally and vertically across of the organisational architecture. Key actors were identified through referral (for example from initial contact points) and literature research whose insights were considered valuable due to their own structural embeddedness and place in the system. After attempting to map ASU’s organisational structure in order to arrive at the most visible persons associated with embedding sustainability, no clear organigramme for ASU was found. As a result, mapping exercises instead focussed on the sustainability governance and structure surrounding GIOS/SOS, and the Office for Knowledge Enterprise Development (**OKED**); see *Figures 10 and 11* which depict the superposition of inter and trans-disciplinary schools and departments over the previous disciplinary, siloed structure of the university.

6.2.2 SEMI-STRUCTURED INTERVIEWS

14 semi-structured Interviews, a half-dozen formal meetings, and a couple of dozen informal meetings were held; this process unfolded alongside and was informed by the organisational mapping exercise, which helped to produce a clearer picture of ASU's organisational design for sustainability (see *Section 6.3.1*). A broad distribution was sought of significant actors vertically and horizontally throughout the structure, as well referrals and recommendations from initial contacts (Braden Kay, Candice Carr Kelman). These yielded unexpected explanations of the historical development of ASU, and allowed, by emergent targeted questions, much insight into the chronological evolution of ASU's sustainability transformation. The targeted interview strategy, which contributed to the unstructured portion of the interviews and conversations held, was informed by the background analysis of how journalistic articles and Higher Education observers see ASU. In particular the following question from the Nature article of 2014, *Research Rethink*, later determined the formation of targeted interview questions: "Beyond metrics, there are also questions about how profound the organizational changes at ASU really are, and whether they represent a major departure in higher education" (Fischman, 2014). The reflection of this question resulted in the new focus on how to substantiate the New American University model's promise and traction, and therefore to what extent an organisational transformation has taken place. Based on this reasoning, I formulated the below targeted questions, that were intended for President Crow. These were then considered valuable to be used on members of senior leadership and change-makers, including Dean Chris Boone, Executive Director of GIOS Rob Melnick, Director of GCSO Jenny Nixon-Carter, another Senior Advisor to Crow, Wellington Duke Reiter, and Chief innovation Advisor to the President Derrick Anderson.

Targeted questions and talking points³:

- What are the (substantiated and) realised outcomes of ASU's transformation towards sustainability?
- How has it tracked the objective of the maximisation of societal impact?
- Does 'all' ASU's achievements represent a major departure from the traditional public research model.
- What have been the biggest challenges along the way? And therefore, the most profound lessons for the President himself?

The interviewees, their roles and responses can be found in *Table 1* below. The structured questionnaire framework can be found in *Chapter 4*. This was used on site in combination with referrals from interviews and conversations to determine interview targets.

Interviewee Targeting Key
Not interested or open: difficult to commit
Of interest: Contacted or No response
Meeting: Interview Pending
Interview Confirmed
Interviewed

³ I submitted the questions in an online form to the Office of the President, which forwarded my inquiry onto advisors of his, confirming meetings with his Policy Analyst, Kyle Whitman, and Chief Innovation Advisor, Derrick Anderson.

Contact	Date	Role; Place in ASU	Stake, Comms, Actions; Ideas
Candice Carr Kelman	10.08.2016	Assistant Director, School of Sustainability	Knowledge on GIOS/SOS set-up & intro meeting
Braden Kay	23.08.2016	Senior Sustainability Scientist, Wrigley Institute; bradenrkay@gmail.com	Host & lots of meetings and discussion. Invaluable to this case study.
Mick Dalrymple*	10.08.2016	Director University Sustainability Practices; Michael.Dalrymple@asu.edu	Via Candice & Arnim; Could introduce to Alanna Brenner; Telephone interview
Rob Melnick**	20.08.2016	Executive Director & COO Wrigley Institute	Scale up. Connector to other institutes. GCSO. Aim for three short meetings throughout the case. Focus on GCSO: supra-institutional network for transformative change to overcome the funding and metric barrier
Chris Boone*	24.08.2016	Director/ Dean, School of Sustainability 2014-present	
Lauren Kuby*	23.08.2016	City of Tempe Council member; Manager of Events and Community Engagement & Senior Grant Proposal Writer/Editor GIOS; Lauren_Kuby@tempe.gov	An absolute legend and a force to be reckoned with; Informal meeting and a subsequent interview
Auriane Koster	29.08.2016	PhD from SOS, Sustainability Consultant, President of GIOS Alumni	Student community perspective. PhD defended at GIOS
Alex Slaymaker	01.09.2016	Enterprising Grad Student from SOS	
Wellington 'Duke' Reiter*	31.08.2016	Senior Advisor to Crow; Senior Sustainability Scientist, Wrigley Institute; Institutional Design, Mapping and Evaluation Expert, wellington.reiter@asu.edu	
Jenny Nixon Carter*	31.08.2016	Director, Global Consortium for Sustainability Outcomes; Jenny.Carter@asu.edu	Kim Grout recommended I speak to her: has travelled to HK with Arnim for GCSO work
Derrick Anderson	02.09.2016	Special Advisor to the President on Innovation; Professor of Public Policy & Organisational Theory; derrick.anderson@asu.edu	On formal request to interview Crow (using targeted questions) was redirected to DA. 2 meetings, one recorded and two follow-up Skype calls
Arnim Wiek		Senior Sustainability Scientist, Wrigley Institute Associate Professor	Close to case study and PhD research, more of an advisory role than interviewee. Several meetings held
Scott Cloutier		Action researcher on urban-ASU relations	Two skype conversations about action research after the field work. Research note data influenced Code 3.4 inductively
Michael Bernstein		Post-Doc, School of Sustainability; michael.j.bernstein@asu.edu	Informal meeting, notes taken, no formal interview
Kimberly Grout		Concierge for Sustainability Scientists & Scholars, Wrigley Institute; Kimberly.Grout.1@asu.edu ; 480-727-0957	Met in person, keep informed and updated (overview-only) during stay. Was essential to the case as she actively hosted and referred me onto many others, helping me partake in life there.
Katja Brundiers		Community-University Liaison/ PhD Student; katja.brundiers@asu.edu ; 480-965-1304	Via Candice & Arnim. Informal meeting, notes

Kyle Whitman	09.08.2016	PhD Candidate/ Policy Analyst President's Office kjwhitma@asu.edu	Conversational interview, formal meeting, not recorded. Shared many essential documents useful in the analysis.
Corey Hawkey		ASU Sustainability Coordinator	Will introduce to Alanna Brenner
Chuck Redman *		Director/ Dean, School of Sustainability 2007-2010	
Sander van der Leeuw*		Director/ Dean, School of Sustainability 2010-14	
Manfred Laubichler		Distinguished Sustainability Scientist, GIOS; Global Classroom, ASU<-->LU; manfred.laubichler@asu.edu	
George Basile		CSR Expert, Dell- GIOS	Linked-in message, no reply
Bruno Sarda		Director of Professional Master's Program	
Jacqueline Smith		President's Office, Executive Director, Office of University Initiatives (Think and Do tank)	
Rob Delaney		SOS Alumni/ Carbon Roots International	
Natalie Fleming		SOS Alumni/ San Francisco Company	
John 'Marty' Anderies		Professor, Senior Sustainability Scientist at GIOS/SOS	Unfortunately, I did not have a conversation with him. I am sure his insights would have been excellent as Braden recommended.
Jonathan Fink		Vice President, Research and Strategic Partnerships (RSP), Portland State University; jon.fink@pdx.edu	Get referral from another senior person
David Manual-Navarete		Senior Sustainability Scientist, GIOS; Assistant Professor, SOS	Via Michael Bernstein

Table 1: Organisational sustainability stakeholders identified. Targets, interviewees, their roles, and notes on communications, actions, stakes and responses are included.

6.2.3 DOCUMENT ANALYSIS

There were 44 primary documents included in the hermeneutic unit in Atlas, not including interview transcripts or summaries. A table of documentation collected, and interview transcripts and summaries used in the analysis can be found in *Appendix 2*. This section focussed on the research design and empirics selected for analysis. The next section shows the results of the analytical tool application and a systematic overview of the findings per category.

6.3 QUALITATIVE EVALUATION: ASU'S ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

This section presents the qualitative evaluation of ASU's organisational transformation for sustainability. First, it surveys ASU's organisational design, then it presents a detailed overview of data per category and code (see *Figure 3, Chapter 4*), demonstrates significance of the interconnectivity in the data, then introduces a unique transformation signature for ASU, comprising of action strategies formed of tested associations.

6.3.1 ORGANISATIONAL DESIGN FOR SUSTAINABILITY

To illustrate ASU's organisational design for embedding sustainability, we may begin with its governance structure. A major body of accountability and which ASU must report progress and policy to is the Arizona Board of Regents (ABOR), a 12-member board created under the Arizona Constitution as the governing body for the State of Arizona's public university system, which includes Arizona State University, Northern Arizona University and the University of Arizona. Michael Crow is the Administrative Director and Chair of this group. According to Whitman (2016), ASU is an institution that celebrates role multiplicity (Ashforth & Johnson, 2001). Everyone, faculty and administrative staff seems to have (at least) two positions. There is also a Board of Directors for Sustainability at ASU, and internal 'Town Hall' meetings at various colleges and schools. GIOS holds these in order to bring their community of sustainability scientists, researchers, students and other interested stakeholders in sustainability efforts together across campus. Several years of ABOR Strategic Enterprise Reports and other presentations from the President's Office were shared by Kyle Whitman. Whereas, previous PhD research on the institutional transformation as well as consultancy work was obtained from Braden Kay and an anonymous source. The rest of the documentation are white papers, policy papers and articles by Crow and colleagues that appear to track and establish the path for 'his' vision of the redesign of ASU as an organisation. These helped establish a 'sequence' of sorts and allowed for deeper conceptual and empirical associations to emerge.

As mentioned in the methods section, mapping ASU's structure was difficult without an organisational chart; it later transpired that no models or charts were posted because ASU is never static so the organisational structure changes often, as Whitman articulated (2016), with Anderson's account corroborating (D. Anderson, 2016). Therefore, only certain aspects have been mapped, such as GIOS and SOS, as well OKED (Exhibit 1) from the documentation available via the website, and from the knowledge gained with initial hosts within GIOS. Organisational design and structure artefacts from this investigation are therefore presented in section 5.4.1 (Exemplars) as outputs of this evaluation, which somewhat attest to the structural fluidity and capacity to 'pivot' of ASU leadership and management. In the analysis, this is shown by the incidence of *OCM 2.4 Purposeful-adaptive evolution* and *SES 3.1.2 Transformative Leadership* at ASU. Background analysis of ASU showed how it appears to present its sustainability performance according to the following indicators, which are interpreted in relation to different aspects of organisational sustainability (environmental, social, economic, governance):

- Student economic diversity
- Student ethnic diversity
- Student success
- Degree production and persistence
- Faculty excellence
- Faculty and staff ethnic diversity
- Research growth
- Entrepreneurship & economic development
- Partnerships and collaboration
- Health
- Energy
- Social Service
- HE & Workforce preparation
- Civic & Municipal
- Global Partnerships.

ASU appears to hold itself to account according to the above metrics. In addition, governance and reporting documentation all use explicit and concise language on organisational transformation. New organisational units were superimposed over old ones to promote inter- and trans-disciplinary research and teaching in practice, whilst not undermining disciplinary activities.

6.3.2 APPLICATION OF THE DIAGNOSTIC TOOL

This case-study aimed to synthesise less the subjective success of ASU's sustainability performance for comparative purposes (as there are many types of assessment framework), but rather the *'how'* of ASU's organisational transformation to sustainability. There have been many similar studies of ASU that have sought to derive best practices for application elsewhere. It did not make sense to reinvent the wheel, but to try to put an evaluative lens on how to navigate sustainability transformation pathways at universities from the perspectives and experiences unearthed.

The aim of the application of the framework is to diagnose and substantiate the cascade of actions, experiences, and underlying strategies characterising what happened in ASU, spanning the early 2000's to the 2017. The codes' groundedness in the data and conceptual density are presented below in Figure 3. In this Atlas generated output table, we can see that *SES 3.2a, Internal Governance for Sustainability*, with 20 groundings, and a weight of 8.9 is most significant, followed by *SER 5.7, Research and Education Generates Societal Impact and Public Awareness*, with 14 groundings, and *SER 5.5, Sustainability research demonstration, knowledge enterprise and visibility*, and *OCM 2.3 Purposeful-Adaptive evolution*, both with 13. Out of these *SER 5.7* has the most conceptual density, being associated with two other codes through the internal evidence.

Figure 4: *Atlas Generated Code Table.* All codes are shown with values of groundedness - number of quotations which a code is assigned to; and conceptual density - the number of other codes a code is associated with through the data.

Legend for Figure 4, outlining abbreviations used, and colour codes assigned to each of the perspectives throughout this chapter

- Pink** = BSP: Behavioral Science & Psychology
- Orange** = OCM: Organisational Change Management
- Green** = SES: Socio-Ecological Systems
- Purple** = CGS: Corporate Governance for Sustainability
- Blue** = SER: Sustainability in Education & Research

Equation for weighting categories of analysis⁴:

$$W = \frac{Gr_c}{N_q} \times \left(100 + \frac{De}{10} \right)$$

We now move to the description of the data per code, categorised according to the micro, meso and macro level at which they operate. The total number of coded databits taken into analysis at ASU, was taken as constant at **225**.

⁴ See Section 4.2.3.2, Chapter 4, for more information regarding the meaning of the terms, groundedness, density and weightedness.

6.3.2.1 OVERVIEW OF THE DATA PER CATEGORY AT ASU & HOLISTIC DESCRIPTION AT SCALE

6.3.2.1.1 Micro-level Diagnosis: Individuals & Groups

The Micro-level concerns the personal and professional development of the actors concerned with transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 2)	Aggregate Weight per Perspective	Category	Groundedness	Density	Weight* (chart 1)
BSP	1.33	2.67	1.1	4.00	0.00	1.78
			1.2	2.00	0.00	0.89
OCM	4.00	4.00	2.1	9.00	0.00	4.00
SES	3.56	10.68	3.1	10.00	1.00	4.45
			3.1.1	4.00	0.00	1.78
			3.1.2	10.00	0.00	4.44
CGS	2.67	2.67	4.1	6.00	0.00	2.67
SER	2.22	2.22	5.1	5.00	0.00	2.22

Table 2: Weights per rubric at micro-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective, are shown in the left two columns. *Charts 1 and 2.

Chart 1: Weights per Rubric at the Micro-level.

Chart 2: Average weight across rubrics per perspective, micro-level: evaluation according to each of the five theoretical perspectives at the micro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Micro-level Diagnosis⁵

Most remarkable from the micro-level diagnosis, is the significant extent to which the categories for *SES 3.1 Transformative agency*, and *SES 3.1.2 Transformative leadership* are present. These are weighted highest at the individual level. Change management and socio-ecological systems lenses stand out the most at the scale of individual and group actors. Other notable categories that are significantly present at ASU include *OCM 2.1 Triple bottom-line: intrinsic change-agency*. Cross-scalar interactions in this analysis have shown that the ASU redesign process required individual-level *effective transformative leadership* (*SES 3.1.2*) in order to drive the purposeful-adaptive evolution (*OCM 2.3*) that ASU then followed. What cemented this view was the discovery of an internal organisational design process at the office of the President. In the interview with Whitman, he showed his early drafts of this concentric ring evolution of university design models over time (ASU, 2012) – see *Figure 5* below. To focus on Robert Melnick, out of the many individuals represented in this work, is to shine a light on the leadership and vision of those designing and steering the ship from the inside; further, it gives us a unique perspective on the management of ASU’s sustainability research and education missions. The planet-side of *OCM 2.1* is well supported by Melnick in his description of the most recent iteration of GIOS: “*GIOS 4.0 was built upon the assumption that sustainability problems, for the most part are very common around the world, most cities have the same problem*” (Melnick, 2016). Indeed, as Gibson supports, sustainability (assessment, evaluation, progress management) consists of the balance of trade-off rules in complex systems (R. B. Gibson, 2006). One of these trade-offs applied at ASU appears to have been the asset development of *SES 3.1.2* from the top-down, of transformative change-agency, and the engagement of middle management at the expense of the bottom-up component of *SES 3.1.1 Effective intrapreneurship*, as we see from its relatively low weighting (1.78 compared to 4.44 for *SES 3.1.2*).

⁵ For a detailed, comprehensive deep dive into data per category at the micro-level, see the following section, *Detailed Overview of Data per Micro-level Category*, otherwise, move to the next diagnostic summary at the meso-level.

There is ‘weak link’ below the middle academic level, ostensibly alluding to student engagement; however, these student stakeholders are well aware that work needs to be done, due to their trained organisational sustainability competences: “I’m very critical of ASU and GIOS but that’s because they trained us to be that way right, but we’re also doing a lot. [ABS: Sustainability competences?] Exactly, but I mean ASU, I came to ASU because we’re one of the leaders in the world, and so we’re definitely innovative in that sense but there’s definitely room to improve” (Slaymaker, 2016).

Figure 5: Graphical examples of how Whitman and the President’s Policy Analysis team researched the historical trajectory of university institutional models, placing ASU’s ‘New American Model’ as a new wave in the transition from bureaucratic agency to a ‘complex-adaptive’ knowledge enterprise (President’s Office, 2012).

Detailed Overview of Data per Micro-level Category

The micro-level concerns how individuals and pairs(dyads) work on sustainability transformation.

BSP 1.1

BSP 1.1 Psycho-social wellbeing

- Engendering positive psychological and social resources overcame negative reactions, ensuring psycho-social wellbeing at an individual level.

W= 1.78: Gr. 4, De. 0.

Based on the evidence collected, it cannot be stated that *BSP 1.1 Psycho-social wellbeing* is present to a significant extent, given its low weight. However, key documents and interviews do make oblique references to ASU's concern for human wellbeing within its halls. In Crow's White Paper of 2004, we see that improving the human condition, and a focus on the individual is part of the 2nd and 5th design principles of ASU which aimed "to foster teaching, research and public service that: (2) Underscores the role of ASU as a preeminent catalyst for societal change to transform society, improve the human condition, foster sustained social advancement and economic growth, and promote responsible planetary stewardship; (5) Focuses on outcome-determined excellence ('a focus on the individual')" (Crow, 2004). These references are further corroborated by Cumming's analysis of the same design principles (2010), an anonymous account of ASU's focus on human wellbeing and holism by a Sustainability Scientist at GIOS (Anonymous 3, 2016), and by Alex Slaymaker's referral to the Living Lab mentality and applied learning for students, specifically graduate students, where they are allowed room to experiment, fail and really learn-by-doing (Slaymaker, 2016).

BSP 1.2

BSP 1.2 Positive pro-sustainability behaviour

- Positive reactions to sustainability are broadly exhibited in attitudes towards it, subjective social norms for it, and perceived behavioural control towards it.

W= 0.89: Gr. 2, De. 0.

Positive, pro-sustainability behaviour was not so present according to the evidence at ASU. Attitudinal orientation and social norms were limited but notable in ASU's evaluation. Based on notes taken from the meeting with Whitman (2016), in 2012/13, "Crow's protégée" Bridget Burns designed a network to encourage disruptive innovation, called the 'University Innovation Association' with others from ASU's peers. Burns worked on how to reward behaviours that focussed on societal impact. For example, testing intervention strategies for potential dropouts, which provides support for how conscious ASU individuals and leadership were and how they tried to encourage pro-sustainability behaviour. Additionally, Dalrymple emphasised the guideline for ASU staff: "Personal, practice, influence and create behavioural change. People are measured by this in their performance reviews", which indicates how individual's performance are reviewed against shared social norms (Dalrymple, 2016).

OCM 2.1

OCM 2.1 Triple Bottom Line: Intrinsic change agency

- Triple-bottom-line accounting framework employed by individuals: attempt made to measure/gauge organisational complement to people, planet and profit with the goal of creating shared value.

W= 4: Gr. 9, De. 0.

The category OCM 2.1 *Triple Bottom Line: Intrinsic change-agency*, is present to a good extent at ASU with a relatively high weight of 4 across six different interviews. Auriane Koster, emphasised the importance of hierarchy and grass-roots involvement aside from the guiding compass of the leadership, highlighting a demarcated individual responsibility for TBL accounting, however normative, she said: *“Crow isn’t the one going out picking the oranges to make the marmalade, he’s not supposed to... each person on this campus should be doing their part, and if you want to make this a fully sustainable campus, then that should be a requirement. You come to ASU, then you have to sign a pledge that you are going to do everything you can to be sustainable yourself”* (Koster, 2016). Moreover, an anonymous Sustainability Scientist recounted projects that support TBL accounting by referring me onto project leaders in sustainable engineering and built environment at the Polytechnic Institute. Whereas, Braden Kay evinced further projects he was involved with, including ‘Reinventing Phoenix’, a sustainability urban planning project, which, he said, *“got the largest grant at SOS for comprehensive sustainability planning and resilience”* (Kay, 2016). Yet, later in that interview, with respect to the pathway of transformation undertaken by ASU, a contradictory element emerged concerning ASU’s ubiquity as an economic powerhouse, which diminishes a holistic focus on the ‘people’ and ‘planet’ aspects: *“Crow’s ASU is working on [making ASU] a ubiquitous entity and an economic powerhouse, to becoming bigger and more impactful... It cannot be seen at the moment from the educational perspective if they are getting this right. The development side seems to override the environmental responsibility and responsible decision-making”* (Kay, 2016). Dean of SOS, Chris Boone (2016), exemplified the Executive Education Program for sustainability leadership run by GIOS’s Walton Sustainability Solutions Initiative, which provides evidence for the intrinsic change-agency aspect inculcated in graduate and executive education. Whereas, Lauren Kuby, City of Tempe Council member, and Community Engagement and Sustainability Scientist at GIOS, remarks on the shared intent at ASU for TBL: *“People want more social justice and socio-economic outcomes from ASU. Crow is all about this, and the impacts of the ‘boundary organisation’ in his work. What he has done is of course remarkable, however, there is a taint of micro-management in his leadership style”*, her account further highlights the difficulty of allowing for intrinsic change-agency in the top-down redesign process at ASU (Kuby, 2016).

SES 3.1.1

SES 3.1.1 Effective intrapreneurship

W= 1.78: Gr. 4, De. 0.

Data-informed sub-category (LU)

- Intrapreneurship from the bottom-up acts as a driver for organisational transformation to sustainability: intrapreneurs, in teams of professors and students challenge sub-optimal practices and overcome silo-based power systems.

SES 3.1.1 Effective intrapreneurship is not present to a good extent, being outweighed by its sister categories, *SES 3.1* and *SES 3.1.2*. This analysis is supported by sometimes critical accounts from Kuby, Koster and others, which ascribes too much strength to the top-down component at ASU. In particular Koster’s normative vision of how each person needs to be doing their part to be fully sustainable and how “you need all these levels of information and education”, when asked if this was actually the case at ASU, she responded thoughtfully “Not fully, not holistically within the university, I don’t think so” (Koster, 2016). However, there was a willingness to streamline bureaucracy, despite the limitation of the traditional/conventional academic structure according to an anonymous Senior Sustainability Scientist (Anonymous 4, 2016). Whereas, at ASU in 2006, *“students faculty, and*

staff knowingly or unknowingly adopt a traditional, much-rewarded service mentality” rather than “an approach of empowering communities” according to Fern’s social embeddedness plan for ASU (Fern Tiger Associates, 2006). Since Fern’s analysis took place in 2006, much seems to have improved with the emergence of supportive centres for change-agency like Change-Maker Central, but, as we see in other indicators, this should be viewed against that the bottom-up and horizontal distribution of ownership somewhat lacking. As Slaymaker said: “I think every department needs to prioritise sustainability... I mean GIOS is a great thing, but we also need something like GIOS in every department on campus. In every school on campus, because they need to have ownership in it, and right now it’s just like people don’t even know what happens in Wrigley Hall or in GIOS” (Slaymaker, 2016). Indeed, intrapreneurship in the context of sustainability is also about distributed ownership and demarcated autonomy. In the cadre of Professors supporting intrapreneurs in teams for example⁶ Carr-Kelman remarks that Professors “don’t have the bandwidth for change-making.” Whereas “Younger faculty, generally have a better understanding of both the academic game and the real-world, real-time challenges” (Carr-Kelman, 2016).

SES 3.1.2

SES 3.1.2 Effective transformative leadership

W= 4.44: Gr. 10, De. 0.

Data-informed sub-category (ASU)

■ ASU Data-informed sub-category based on singularity observed

Intrapreneurship from the top-down: leadership exhibits intrapreneurial characteristics, redesigning the organisation from the top-down, to challenge sub-optimal practices and policies at the regional and national level. Stewardship by the leadership to re-design of colleges, schools, units and departments to improve interconnection and transdisciplinary research and education. An ‘organisational revolutionary’, who fights to change the system from within at the level of institutional innovation and design.

SES 3.1.2 *Effective transformative leadership*⁷ was heavily evinced by numerous documents and interviews and is therefore present to a strong extent at ASU, being one of its strongest assets. Cummings explains the desirability of transformative leadership in Higher Education: “Given the lack of a clear definition of successful leadership, college presidential effectiveness is often tied to entrepreneurial action, risk-taking and the ability to make transformational change. Entrepreneurial approaches to higher education, if perceived as successful, receive high praise” (Cummings, 2010). In our meeting, Kyle Whitman, showed early drafts of the concentric ring evolution of university design models, which demonstrated the platform upon which ASU’s President led the transformation (see **Figure 5**). This, and other analyses he shared, showed how the Office for the President had been clearly engaged in the redesign process at an institutional scale. Indeed, from Crow’s work, *A New Model for the American Research University*, this redesign process is framed as part of the New American university prototype: “The model... embodies a reconceptualization of the American research university as a complex and adaptive comprehensive knowledge enterprise committed to discovery, creativity, and innovation, accessible to the demographically broadest possible student body, socioeconomically as well as intellectually, and directly responsive to the needs of the nation and society more broadly” (Crow & Dabars, 2015b). Further accounts from external interviews of Crow show how the President challenged the status-quo as somewhat of an organisational revolutionary; in the interview by Top Right magazine, he related to the question “How do you get people to rethink old systems and habits? In academia, we become entrenched in obsolete organizational models and social constructs... We need to move away from these historic models and design our knowledge enterprises to solve the problems that confront us”⁸ by Saletan, the interviewer’s

6 As was very much prevalent at in Leuphana.

7 Later in the HKUST evaluation reconceptualised inductively as Transformative Leadership

own analysis: “Crow wants to reconnect higher education to the real world... he has pushed scholars to think like public servants and work like entrepreneurs” (Saletan, 2011). In addition to Crow’s own work, and previous interviews undertaken of him directly, diverse interview accounts support the role of the Office of the President in the creation of the new model in real time, including, firstly the reference to his ‘firm’ leadership by an anonymous Sustainability Scientist at GIOS (Anonymous 3, 2016). Secondly, in response to my question who were the most significant change-agents in the transformation at ASU, Carr-Kelman said “Number 1 is of course President Crow”, she further elaborates that Julie Ann Wrigley believed in Crow’s approach and was one of its primary stakeholders. She heard he was using this “fusion of disciplines”, “breaking down disciplinary walls” and this “was always part of the plan” (Carr-Kelman, 2016). Finally, Slaymaker gave a positive, yet nuanced account of the President’s transformative form of leadership resembling intrapreneurial vigour: “Dr Crow came in, as I’m sure you’ve already heard, he fired a lot of people, and totally reorganised the whole university. When you do that, you don’t make only friends, you make a lot of enemies that are going to resist the change that’s coming. It wasn’t a participatory stakeholder engagement process by any means. ABS: it makes me think really that had a participatory stakeholder engagement process been employed, that it would have been too incremental AS: Yeah!” (Slaymaker, 2016). As can be deduced, had he taken a softer approach, a more incremental, developmental path would have been traced that may not have amounted to organisational transformation.

SES 3.1

SES 3.1 Transformative agency: sub-optimal practice challenge

W= 4.45: Gr. 10, De. 1.

■ Intrapreneurs identified in small groups within the organisation that challenge sub-optimal practices through linking strategies, opportunity contexts & innovation

The category *SES 3.1 Transformative agency*, characterised by the broad presence of intrapreneurs in groups (whether bottom-up or top-down, respectively represented by the sub-categories *SES 3.1.1* and *3.1.2*) is grounded by ten quotes, and was the most significant at the micro-level. Several accounts pointed towards specific projects that housed the development of the competency of transformative agency. An example is The SEED spot, a non-profit incubator supporting social entrepreneurs, and was studied by two ASU sustainability scientists, Brundiers and Wiek, who found it transferrable from the ETH-Zürich context to ASU (Brundiers & Wiek, 2011). Crow remarks his interview by Saletan (2011): “We ask people to justify the status quo and say to them, if you design something new, we will move to it the resources the new design merits” which indicates a welcoming of intrapreneurial practice from the top. The potential of the newest generation of sustainability scientists and practitioners as change-agents is further outlined by Carr-Kelman (2016) in her statement about Professors not having the “bandwidth” for change-making, as “Younger faculty, generally have a better understanding of both the academic game and the real-world, real-time challenges”. Whereas Derrick Anderson, Innovation Advisor to Crow, demonstrates how faculty contribute to the enterprise via “nested faculty organisation structures”. “We have these ‘mega’ faculty members; these highly productive celebrity faculty members”. However, after a prod for a broader picture of engagement in ASU he mentioned that “there are other types of people who contribute meaningfully to this complex knowledge enterprise” alongside the ‘celebrity Professors’ (D. Anderson, 2016). In discussion with Kuby, the notion emerged that when some of intrapreneurs break out the glass ceiling, outside of ASU, gelling with administrators, with the political powers that be, they adopt more the role of social entrepreneurs, who are less embedded and subject to inertia that the institute creates through its culture. Kuby identified Arnim Wiek as one of the most significant change-agents in the sustainability transformation at ASU, by characterising him

as an intrapreneur who has broken the glass ceiling in this description: *“That’s probably like Arnim: He’s on the sustainability commission, he’s crucial in getting this sustainability manager position before the city.”*⁸ In addition, evidence shows how GIOS is actually run like a start-up; as an institute it tries to challenge sub-optimal practices and transcend its place whilst scaling impact. Melnick applied the 1.0-4.0 approach to GIOS’s development and evolution to get their hands around GIOS as a start-up (Tromp, Boone, Dirks, & Melnick, 2015). This observation shows a unique ASU/GIOS application of the lean-start-up approach to knowledge enterprise for sustainability outcomes. After the end of the inventory of projects in 2015, they did not find the evidence of impact they set for. “We don’t have the evidentiary impact we thought we did.” Melnick “found that depressing”, in addition there was some pressure for evidentiary impact from Crow who asked for them to ‘hit the reset button’ (Melnick, 2016). The lack of evidence, at the time, that ASU enables and impacts sustainability outcomes at the global scale required was identified as a driver for the creation of GCSO. Finally, as a graduate of GIOS herself, Slaymaker was attracted by the innovative reputation: *“I came to ASU because we’re one of the leaders in the world, and so we’re definitely innovative in that sense but there’s definitely room to improve”* (Slaymaker, 2016). Despite the work that still needs to be done, by one account inside GIOS, Directors show a willingness to streamline bureaucracy, which also enables transformative agency (Anonymous 3, 2016).

CGS 4.1

CGS 4.1 Strategic trajectory, liaison and learning

W= 2.67: Gr. 6, De. 0.

- 1) Actors play the roles of brokers, bricoleurs, connectors, by liaising and facilitating;
- 2) Resulting in: sustainability being boiled down to the organisational context;
- 3) Therefore: it becomes relevant, understood and important for influential and interested stakeholders. Further resources are allocated and sustainability raised higher on organisational learning agenda.

Category *CGS 4.1*, consisting of actor’s communications and action strategies working in strategic trajectory, liaison and learning about institutional dynamics, is present to a fair extent in ASU. Although there was no conceptual density from associations across codes, six sources bolster its presence in documentary and interview accounts. As many categories have outlined, Crow’s White Paper, which introduced the strategic implementation of the eight design principles, was a significant catalyst for strategic trajectory led by individuals and groups later on in ASU. In Appendix B-2 of the paper, the Provost’s recommendations are systematically responded to by the President, outlining actions to be implemented in successive UDT recommendations; one of these in specific shows how actors at ASU were obliged to play the roles of brokers, liaising and facilitating an Extended Education into the “mission and administrative structure” by “extending programs and services beyond the boundaries of the four campuses”. This seems in retrospect to have actually been translated into ASU’s “primary mission ... essential to implementing ‘ASU as a force, not just a place’” (Crow, 2004, p. 30), connecting furthermore to the 1st and 7th design principles – ‘Leverage our Place’ and ‘Be Socially Embedded’

In Cumming’s analysis of ASU, he refers to ‘sustainability initiative strategies’ employed in higher education, in particular the “critical leverage point” of transformation and the organisational learning associated with systemic restructuring due to the sustainability

⁸ Very interestingly, this position of Tempe Sustainability Manager was filled by another key stakeholder, not to be mentioned by name, because of the sensitivity of some ASU sustainability champions’ mission scaling. They were crucial to the intelligence gathered.

strategies reviewed (Cummings, 2010). The two document sources do not however provide substantive indications of strategic trajectory, liaison and learning for sustainability unless they are seen in the context of Kuby's reference (2016) to key actors breaking through glass-ceilings, and her identification of "trans-academic interface management", and "good communication with faculty and staff" being essential to the success of the Sustainability Connect⁹ platform, a marketplace for trading sustainability projects in the ASU community. Further evidence is found with Slaymaker's references to the distribution of sustainability intelligence throughout ASU. Specifically, her reference to the "change in leadership" at University Sustainability Practices as a result of ASU missing the Zero-Waste Goal in 2015 indicates an "exciting" development representing the new team "making tonnes of gains" and "room to grow" to "gauge students, and mobilise different stakeholders in different departments" (Slaymaker, 2016). So accordingly, we can see a positive strategic trajectory driven by the team at USP since Dalrymple took up the reins in 2016. The development of this department's contribution to sustainability strategy, liaison and learning is also evinced by the intelligence gained from the online ASU sites and by slides shared by Dalrymple himself (2016). See Figure 6 below.

SER 5.1

SER 5.1 Sustainability Competence Training for Transformation

W= 2.22: Gr. 5, De. 0.

1) Programs are identifiable in educational curricula and in offered professional training courses where some or all of the five key sustainability competencies are present;

2) Students and staff, more generally are trained and taught in sustainability competencies for the purpose of transformation.

The property of training sustainability competences such as systems thinking, anticipation, normative thinking, was fairly present at ASU with 5 instances in the data. These were sources consisting of learning outcomes, whose listed elements directly pertain to the implementation of sustainability competences, summarised here for brevity as: "*Problem-driven, Systemic Complexity, Dynamics, Long-term Perspective, Inter-/Transdisciplinarity, Anticipation, Goal-orientation, Action-orientation, Stakeholder Collaboration, Contributions to Real-world Solutions*" (Van der Leeuw & Boone, 2012). These are seen in an early draft of a revised curriculum for SOS in around 2011 by former GIOS director Van Der Leeuw and current SOS Dean Boone. This was shared by an anonymous source whose identity shall be protected. Further accounts of inculcated sustainability competences at ASU are found in Crow and Dabars' article presenting the New American University Model's objective to produce "*students who are adaptive master-learners, empowered to integrate a broad array of interrelated disciplines and negotiate over their lifetimes the changing workforce demands and shifts in the knowledge economy driven by continual innovation*" (Crow & Dabars, 2015b). More support is found in the research, development and implementation of sustainability competences at ASU by Wiek and his GIOS network of colleagues (Wiek et al., 2011). Finally interview accounts from Carr-Kelman and an anonymous GIOS sustainability scientist provide us with direct reference to individual experiences. Firstly, via the reference to sustainability in education and research as outcomes, with GIOS/SOS's primary goal of creating "top notch sustainability degrees and integration with other programs"; secondly, with respect to the co-creation of transformation knowledge needing to specifically "build these competences over the course of a program" (Anonymous 4, 2016; Carr-Kelman, 2016).

⁹ 'Creating ASU-community collaborations that educate students and contribute to sustainability solutions.' See: <https://sustainabilityconnect.asu.edu/>, accessed November 2018.

6.3.2.1.2 Meso-level Diagnosis: Intra-organisational Scale - Groups & Units

The Meso-level concerns the behaviours, qualities and competencies of the groups, teams and units working on organisational transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 4)	Aggregate Weight per Perspective	Rubric	Gr _c	De	Weight*
BSP	2.01	8.02	1.3	1,00	0,00	0,44
			1.4	2,00	0,00	0,89
			1.5	7,00	1,00	3,11
			1.6	8,00	2,00	3,56
OCM	4.01	8.02	2.2	5,00	2,00	2,23
			2.3	13,00	1,00	5,78
SES	5.12	10.23	3.2	v	1,00	8,90
			3.3	3,00	0,00	1,33
CGS	1.78	3.56	4.2	6,00	1,00	2,67
			4.3	2,00	0,00	0,89
SER	3.42	10.25	5.2	3,00	0,00	1,33
			5.3	7,00	3,00	3,12
			5.5	13,00	0,00	5,78

Table 3: Weights per rubric at the meso-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns. *Charts 3 and 4.

Chart 3: Weights per category at the meso-level. Detailed descriptions per rubric given below.

Chart 4: Average weight across rubrics per perspective, meso-level: evaluation according to each of the five theoretical perspectives at the meso-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Meso-level Diagnosis¹⁰

At the scale of the organisation's relationship with itself internally, *SES 3.2a Internal governance for sustainability* is the most weighted category at the meso-level, and at ASU overall, at a W-value of 8.9. This is intuitively logical given the numerous instances of good governance and organisational design for sustainability at ASU, including the development and distribution of responsibility for sustainability research, education and praxis, throughout ASU's complex structure via actors at the Global Institute of Sustainability (GIOS), University Sustainability Practices, and its sister departments in the life sciences, engineering, medicine and business (see *Figures 10 and 11* and the GIOS exemplar in *Section 6.4.2*). *OCM 2.3a Purposeful-adaptive evolution* also stands out, followed by *SER 5.5 Sustainability Research Demonstration*. As with the micro-level, organisational change management (OCM) and socio-ecological systems (SES) lenses are most pronounced, except SES is strongest at a W-value of 5.12.

Organisational experimentalism (*BSP 1.6.1*) is another notable quality (W=3.56); well documented in the evidence, it was associated with integrated sustainability praxis across portfolios (*SER 5.3a*) in the analysis. We can see this in particular from Cummings who quotes Bonny Bentzin, former Director of University of Sustainability Practices at GIOS. She was succeeded by Mick Dalrymple after the failure to meet the target set for Carbon Neutrality 2014-2015. She refers to the presence of solar panels on campus as a result of student 'push' (Cummings, 2010, p.101). With respect to highlighting these 'pushes', the interview with Carr-Kelman gave rise to the conclusion (found in many other documentary and interviewee sources) that The Temozón Retreat (Clark et al., 2004) appears to have been an important leverage point: bringing together academics, founders, and funders. organisational experimentalism is also found to be linked to the qualities for university assets-based community management (*SES 3.4*) that arose from the discussion with Scott Cloutier, by way of leadership agency (*OCM 2.3*) and

¹⁰ For a comprehensive deep dive into data per category at the meso-level, see the following section, *Detailed Overview of Data per Meso-level Category*, otherwise, move to the next diagnostic summary at the macro-level.

integrated sustainability praxis across functions (*SER 5.3a*), where evidence was found for visioning, organisational alignment, strategic collaboration and innovation.

A lot of activity at the group-level can be explained by the adoption of a purposeful-adaptive evolutionary approach to change management within the ASU organisational ecology (*OCM 2.3, W=5.78*) that has enabled it to transform the way it sees itself in the world. This property is the second-most highly weighted at this scale, revealed by the redesign and reconceptualisation of ASU as a complex-adaptive knowledge enterprise as part of the New American University Prototype. The first trace of *OCM 2.3* is found in the Arizona Board of Regents (ABOR) Changing Directions Initiative, where the administration of ASU led to the formation of the University Design Team (UDT), which was “*charted to explore bold and innovative thinking about how the university should prepare for its new and expanded mission... of ASU conceived as a prototype New American University. As specified in the president’s concept paper ‘Changing Directions’*” (Crow, 2004, p.7). President Crow had barely been in ASU a year before this took place, and evidentiary accounts point to this episode being the spark for the ensuing organisational transformation from 2004. Despite the planned start of the transformation in 2002 according to Crow’s planned redesign process, “weak and uneven relationships between and among ASU campuses” needed resolution to ensure effective planning and graduate ASU from a regional to a national university (Crow, 2004). The Fern Tiger Associates Social Embeddedness commissioned study (2006) may well have been a direct reaction to resolve this.

There was a fair extent of the internal evaluation of environmental social governance

Figure 6: Example of Internal Governance for Sustainability and Internal Evaluation of material Environmental Social Governance issues at ASU: Coded Slide; We see that the whole structure of Sustainability practices is managed across ASU With GIOS managing education, research, outreach and solutions (therein defined as ‘Social & Governance’), whilst USP and Facilities Development and Management focus on the physical campus environment and evaluation (University Sustainability Practices & Dalrymple, 2016).

(‘ESG’), *CGS 4.2a* (related to the macro-level category for sustainability reporting, *SER 5.8*). The purchasing policy used by ASU improved the overall STARS (Sustainability Tracking, Assessment & Rating System) scores as well as ASU’s top AASHE (Association for the Advancement of Sustainability in Higher Education) standard ranking. ASU uses a “Green Purchasing” policy to ensure business practices support sustainability efforts, which results in the purchase of environmentally friendly non-volatile organic compound products. For example, it requires cleaning products for campus use are Green Seal- or EcoLogo-certified. The university’s Green Purchasing policy also behoves ASU vendors to demonstrate environmentally responsible practices and production methods such as the minimization of waste products and use of post-consumer recycled materials.

Detailed Overview of Data per Meso-level Category

The Meso-level concerns the groups, teams and units working on sustainability transformation in the university.

BSP 1.3

BSP 1.3 Organisational cultural health

W= 0.44: Gr. 1, De. 0.

- Organisational behaviour exhibits these traits: rules and regulations are present and consensually agreed regarding ethics, there is a culture conducive to moral judgement and extrinsic societal orientation, as well as ethical organisational norms.

Given the lack of evidence found, *BSP 1.3 Organisational cultural health* cannot be said to be present to a significant extent at ASU. One supportive incident for this property was found in the interview with Robert Melnick, whose demeanour, when describing how they did not find the evidence of impact they set out for in the evolution of GIOS from 2.0 to 3.0, indicated moral sensibility and judgement regarding extrinsic societal orientation. He thought it “depressing” that at the time he related to of 2015, no evidence could be found that ASU enables and impacts sustainability outcomes, at “the global scale required” (Melnick, 2016). Although there is only one instance here, observations and conversations at GIOS and elsewhere at ASU supports a certain indirect presence of this quality.

BSP 1.4

BSP 1.4 Organisational lobbying competence

W= 0.89: Gr. 2, De. 0.

- Organisational behaviour exhibits that: there is access and appropriation¹¹ of physical resources, persuasive communications strategies, and effective engagement of an assortment of middle management.

BSP 1.4, the Organisational lobbying competence is also not that present at ASU according to the evidence. There are however, a couple of supportive incidences of the appropriation of physical resources, persuasion and engagement of middle management, but this is limited to Duke ‘Wellington’ Reiter’s account, which indicates “aspirations that exceed our reach” as “an example of the university using its own assets as part of the experimental work that we do here” (Reiter, 2016), and Crow’s Top Right interview evincing how resources are allocated to actors seeking to “design something new” (Saletan, 2011).

¹¹ Not meant in the sense of there being ‘appropriate’ resources already, but that they are actively ‘appropriated’ hence justifying the use of the term ‘lobbying’.

BSP 1.5

BSP 1.5 Organisational positive behaviour

W= 3.11: Gr. 7, De. 1.

- Positive organisational behaviour is exhibited that demonstrates: capacities for self-awareness and self-diagnosis which are facilitated; competences for balanced decision-making and critical-thinking; practices of transparency (whistle-blower support) and ethical debate.

The diagnostic criteria of capacities for self-awareness and self-diagnosis at the organisational and group levels are clearly evident from the intelligence gathered on ASU; therefore, the category *BSP 1.5* is present to a significant, but not major, extent. The intent and development of the assets for *organisational positive behaviour* is found in recent evidence of ASU's success in its own institutional redesign, specifically alluding to "internal flexibility" and being able to "better serve the needs of its many diverse constituencies", which demonstrates competences for balanced decision-making in the redesign, critical thinking and ethical debate at the leadership level. Self-diagnosis for the sake of ASU's success and sustainability is demonstrated in much of the language of *One University in Many Places*, dedicating a whole section to their own self-knowing, "*Arizona State University: who are we?*" (Crow, 2004). Fern Tiger Associates' analysis backs this up in their summary of the path to social embeddedness, success and sustainability requiring the prerequisite intrinsic qualities of: "A thoughtfully-crafted mission statement", as now seen with the ASU Charter for example, "*faculty buy-in; criteria which attract and energize like-minded faculty, staff, and students; a true commitment to ongoing engagement with the community (not just public relations)*" (Fern Tiger Associates, 2006). Cummings research furthermore provided theoretical support for the guided transformation that took place at ASU requiring a certain level of self-awareness within the institution: "*the opportunity for leadership and the possibilities for change have more to do with how one sees oneself within an institution and in relation to others there than the position one holds*" (Cummings, 2010). However, there were no incidences of practices of transparency or of whistle-blower support, either due to the welcoming of critique from students taught at ASU, or because of the lack of appropriate sampling.

BSP 1.6.1

BSP 1.6.1 Organisational Experimentalism through Pragmatic Idealism

Data-informed sub-category (ASU, HKUST)

W= 3.56: Gr. 8, De. 2.

- Reference to living laboratories or test beds, where actors relate to the use of their university campus as a community of inquiry/practice that uses its own social and material surroundings to experiment; adoptive of living lab approach or having the campus objective with socio-behavioural & inclusive experimentation

The property of socio-behavioural self-experimentation, or the willingness of ASU actors to use their own campus as a testbed is present to a fairly good extent in the language and accounts sampled at ASU. This connects to the associated criteria of pragmatic-idealism and communities of inquiry which are well evident in previous studies, direct ASU investigations, and several interview accounts. We begin with Fern Tiger Associates' observations early in the transformation in 2004 of the need to engage the ASU academic community in reflection of their own roles and approaches, which may be "*perceived by communities as treating them as living laboratories*" (2006). This provides a somewhat wary view of the misconceptions and pitfalls of the living-lab making participants feel like 'lab-rats'. The past case-study of ASU by Cummings,

Turning Higher Education Green from the Inside-out, refers again to the former USP Director, Bentzin, who indeed “went on to stress the importance of using the campus as a living laboratory. Using students to provide “real world” research on sustainability problems and questions within the university offered a “double-win” (Cummings, 2010). There are further references from Brundiers and Wiek, two sustainability scientists at ASU focussing on education in their 2013 paper “Do we teach what we preach?: *Expanding on Biggs’ systematic perspective means also to include the campus as a living laboratory for sustainability as well as the academic sustainability science community*” (Brundiers & Wiek, 2013). Moreover, Reiter directly confirmed the test-bed approach to ASU’s environmental sustainability and urban greening efforts that he oversaw: “Have they been transformative yet in the field? Not yet. They’re on their way, but immediately we have produced waste tier, we’ve generated power from all these sources, we have metrics by which that can be understood. [ABS: And this is all like a test-bed? A living laboratory?] Yes...” (Reiter, 2016). Finally, Slaymaker corroborates how the experimentalist approach connected with her time at ASU “while I was on campus I really engaged in the Living Lab type of mentality” (Slaymaker, 2016). Our interview took place around the time she graduated from the GIOS Master in Sustainable Solutions, she also referred to her co-founding of Zero-Waste Partners whilst at ASU.

OCM 2.2

OCM 2.2 Collaborate to Innovate: extrinsic leadership agency

- Identify evidence in leadership of visioning, organisational alignment, strategic collaboration, innovation, towards ends of partnership and good governance in wider society, with an extrinsic engagement with external task environment

W= 2.23: Gr.5, De. 2.

There are five instances for OCM 2.2 *Collaborate to Innovate: extrinsic leadership agency*, proving the fair extent to which OCM 2.2 is present at ASU. However, the accounts are solely concentrated in Crow’s White Paper of 2004, a book chapter arising from the Glion Colloquium in Montreux, Switzerland, in June 2009, presenting the New American University Prototype, and Carr-Kelman’s account. Evidence of visioning, organisational alignment, and innovation is shown by Crow’s bold critique of “the traditional disciplinary organization of universities” not being the “the optimal way” to “address the social, economic, and technological challenges that face us”; he goes on: “...if we are to advance knowledge in the face of its rapidly changing nature, and come to terms with the explosion of new knowledge that characterizes the academy in recent decades, a new and more fluid organization is urgently required”, and therefore outlining how “the design of ASU must accommodate the establishment of interdisciplinary research centres construed across the university” (Crow, 2004). The direct evidence for this is undeniable in the actual fulfilment of this vision with the Office for Knowledge Enterprise Development’s array of interdisciplinary centres and transdisciplinary configurations (see Figure 9). The Glion Colloquium chapter expanded on this six years later, introducing the matrix of *Scale in breadth of functionality* of a research university along the x-axis, and the y-axis depicting the institution’s *conception of itself* as “and evolving entrepreneurial entity”, which the Office of the President used to delineate the evolutionary trajectory of the ASU experiment; as Crow goes on further to say: “If the institution is a comprehensive knowledge enterprise such as the New American University, it will be committed to the traditional missions of teaching, research and public service, but in addition will advance innovation and entrepreneurship” (Crow, 2010). This substantiates the criteria for innovation as a part of extrinsic leadership agency. Lastly, Carr-Kelman’s account showed the importance of Temozón Retreat as an important leverage point bringing together academics, founders and funders around the inquiry

on how to make ASU sustainable; the answer, clear in the report, and corroborated by Carr-Kelman, was to orient ASU around sustainability, whilst also securing funding and a Times Higher Education ranking (Clark et al., 2004)(Carr-Kelman, 2016).

OCM 2.3

OCM 2.3 Purposeful-adaptive evolution

W= 5.78: Gr. 13, De. 1.

■ Evolutionary and teleological organisational change management employed, driven purposefully and adaptively by change-agents and leadership in response to external circumstances, situational variables, and the human environment.

OCM 2.3 *Purposeful-adaptive evolution* is present to a strong extent at ASU, based on its joint-second highest weight at the meso-level (5.78), also being associated with the lower weighted macro-level asset OCM 2.4 *Organisational-societal learning*. In the Office of the President's presentation, 'Agency to Enterprise', evolutionary and purposeful-adaptive qualities are seen as being employed by the leadership over time, as progress along the 'evolutionary trajectory' of the New American University is reported on: "*As an enterprise, the university is embedded in a competitive arena, producing knowledge capital, including goods and services, and, most importantly, human capital*" going on to list associated elements of change management as: "*perpetual innovation, edge of newness, deep competitiveness, ecologies of innovation*" (ASU, 2012). Further evidence of ASU's purposeful-adaptive evolution towards becoming a comprehensive 'knowledge enterprise' was demonstrated in the meeting with Whitman, Policy Advisor to Crow, where he showed me a series of charts and maps that charted ASU's trajectory – this is digitally presented in ASU (2012), depicted by Figure 5. Whitman went on to explain that at ASU "*We don't want to formalise the institutional structure*" which is itself an impediment to the design and experimentation with the living lab of the New American University (Whitman, 2016). Exactly because of the complex and *adaptive* nature of ASU's change management, no static form was identified describing ASU's organisational morphology; hence no organigramme was found. Further evidence of the purposeful-adaptive evolution is found in Melnick's formulation of the 1.0-4.0 approach to GIOS's development at the institute-level (2016). These accounts connects to numerous quotes from Crow's (2004) call to the urgent requirement for "a new and more fluid organization", adding the evidentiary elements of this type of change management being led in response to "external pressures of enrolment and demographic change". Accordingly, the above approach to change management is given further direct credence by Anderson's description of the evolving organisational morphology at ASU: Anderson: "*But we also have these really complex nested faculty organisation structures... we have these really smart organisational models that help us achieve these outcomes without having to dramatically increase the number of faculty we invest in... So I tend to, as an organisation theorist I tend to look at these sorts of metrics as outcomes and how they change over time*" (D. Anderson, 2016). Whereas Cummings' 2010 investigation pulled up the need for "institutional change" identified, and pathway of purposeful-adaptation implemented by Crow and other leaders and change-agents. He went to cite Crow: "*New faculty recruits invariably arrive with unquestioned assumptions shaped by their socialization in the traditional academy. While we do not pretend that we will ultimately overturn all previously held convictions m we do hope to build 'genetic variation' within the institution as a function of our eight design aspirations*" (Cummings, 2010).

SES 3.2a

SES 3.2a Internal governance for sustainability

- Organisation takes internal responsibility that natural resources and ecosystem services are managed and governed correctly by individuals and social groups practicing leadership, institutional entrepreneurship and socio-technical innovation.

W= 8.9: Gr. 20, De. 1.

With the highest W-value (8.9) out of all categories, *SES 3.2a Internal governance for sustainability*, is by a significant extent the most strongly present at ASU. This is mainly due to the various tenets of social-ecological governance evinced from many diverse and grounded sources, which demonstrate the extent to which ASU has taken internal responsibility that natural resources and ecosystem services are governed correctly, over the course of the organisational transformation it has navigated from 2003. Although, frankly, this is certainly more of an imperative asset to develop and implement when you are situated in a desert, whose climate is not ideally hospitable for a city to thrive, let alone a university; so, there are climatic drivers for this, ASU's strongest asset identified by this analysis.

Documentary evidence and five interviewees' accounts substantiated and corroborated presence of *SES 3.2a*, which is further shown to be associated with the micro-level category of *SES3.1 Transformative agency*. Because of the density and frequency of instances, I focus on some highlights as a description of all 20 data bits would swamp this section. We can start with the 2010 Glion Colloquium chapter, where we see evidence of the criteria for *SES 3.2a* of leadership, entrepreneurship and innovation in Crow's articulation of the matrix of institutional scale and self-conception (see OCM 2.2): "*At the upper end are entrepreneurial institutions, those willing to adapt, innovate and take risks in rethinking their identities and roles. On a chart the New American University would thus appear in the curve in the upper-right quadrant reserved for leading-edge institutions designed to accommodate innovation, rapid decision-making and entrepreneurial behaviour*" (Crow, 2010). There are more references to promoting "responsible planetary stewardship" as part of the "design process of the university", in addition to the fostering of creativity and the generation and dissemination of new knowledge "as widely as possible, serving students, the local community, and the larger national and global communities" in *One University Many Places* (Crow, 2004). Connecting specifically to the practice of leadership, institutional entrepreneurship and innovation, Cummings observes how presidential effectiveness "*is often tied to entrepreneurial action, risk-taking and the ability to make transformational change...*" and that Crow specifically "*noted that the domination of nature has been one of the most conspicuous objectives of Western science since the Enlightenment and asked the question, 'To what extent would scientific research change if we were more concerned with conserving and enhancing as opposed to consuming?' This requires a shift in scientific culture and the ability to break down barriers, work across disciplines, and address global challenges*" (Cummings, 2010).

References to 'SEED Sustainability' and ASU 'SEEDspot' (a non-profit incubator supporting social entrepreneurs) exhibits that ASU's sustainability governance structure performs well and supports social and environmental entrepreneurial ecosystem in the region. In addition, the reference to the deliberative design of ASU's organisational processes as marking *Wave 5: Launching the next wave in higher education*, shows the clear intent to depart from traditional modes of governance, presenting clearly trajectory of institutional evolution of university design taken by ASU in its governance (ASU, 2016c). Several interview accounts are also useful under-girders for this asset. In response to my questions regarding sustainability performance management at ASU, Braden Kay said

that “they are headed in the right direction. They are creating more entrepreneurs and increasing their online reach. It’s an advancement on the technical side as well as the transformational side”, as well as noting how ASU is moving in the direction of an internal communications strategy for sustainability (Kay, 2016). In our interview, Melnick also referred to outcomes-oriented science policy at ASU, which is hosted at the transdisciplinary configuration of CSPO (Centre for Science, Policy and Outcomes under Daniel Sarewitz). Discussion concerned the roots of ‘outcome-oriented science policy, and therefore CSPO’s roots, also found in Crow and Dabars (2015a, p. 285), specifically: “through an NSF-funded project, on decision-making under uncertainty for climate change, CSPO, collaborating with colleagues at the University of Colorado, developed a conceptual and practical framework for improving the societal value of information through reconciling the supply of and demand for information. These endeavours began to contribute to a new intellectual infrastructure for an outcomes-oriented science policy.” One final quote from my interview with Reiter truly exemplifies how ASU is driving and properly managing internal governance for sustainability in connection to its asset for experimenting on itself:

“The word testbed comes to mind. [he pulls something up on a slideshow] Here is me at the direction of the university trying to make us into a testbed. This is one of our campuses. There’s the campus. There’s the airport that was adjacent to it. What should we do with it? Let’s identify [reading from slides and notes to explain content] a use that we can draw up there, leverage in several things, so how could we be the nexus of water, food and energy systems, and make that campus a full-scale test-bed... I’ll lay in on a couple things, these are big issues. So, when you use the word test-bed, we have a legacy of innovation here, growing crops in the desert, how do you engineer water from the native Americans to others. But the future in water, energy and food is going to be very different. We’re going to create water out of supplies that provide drinking water, different kinds of energy, we’re going to grow food differently. Can a campus be a full-scale testbed for that using our principles - [ABS: the eight design principles of the New American University?] - Yes.” (Reiter, 2016)

SES 3.3

SES 3.3 Environmental literacy competences

■ Skills and competences for environmental literacy are exhibited by organisational actors: P3: Awareness of multi-level interference in organisations and institutions of power & agency;

W= 1.33: Gr. 3, De. 0.

P6: Learning between actors, environmental self-awareness, and motivations & knowledge concerning impacts, feedbacks;

P7: Planning and analysis of sustainable human-environmental interactions, substantiation of material and social environment, and matrix formation.

Little evidence was found in the data sample that skills and competences for environmental literacy are present to a significant extent across ASU. Yet two interviewees, Slaymaker and Reiter, and a paper on education by two sustainability scientists at ASU (Brundiers & Wiek, 2013) , seem to indicate it takes place at ASU in other ways. Koster’s account in particular illustrates the possible under-developed status of the asset for environmental literacy being holistically spread throughout ASU: “You come to ASU, then you have to sign a pledge that you are going to do everything you can to be sustainable yourself. I think you need to engage leadership, you need people to be doing it, you need educators to be informing the people on how to do it as well, you need all these different levels of education and information. [ABS: And is that the case?] [thinks] Not fully, not holistically within the university, I don’t think so” (Koster, 2016). However, in our interview, Reiter did extensively demonstrate that the analysis of environmental conditions and awareness of

impacts and feedbacks occurs in the array of projects he manages with his team at ASU. It is certainly the case this happens in focussed clusters like at GIOS/SOS, but an awareness of multi-level interference or power and agency (postulate 3) was lacking in the evidence as well as a systemic distribution of environmental literacy. Perhaps this is due to the sheer size and complexity of ASU, and the lag-time in instilling these qualities throughout ASU actors.

CGS 4.2a

CGS 4.2a Internal Evaluation of Environmental Social Governance

W = 2.67: Gr. 6, De. 1.

■ ESG issues, material to the organisation and its stakeholders are measured, managed and monitored internally by integrating sustainability strategy into governance, management and administrative structures:

- 1) Responsible actors measure, manage, and monitor sustainability performance with material ESG metrics;
- 2) ESG issues are prioritised according to stakeholder's interests and influence. *3rd step continued in CGS 4.2b.*

A good degree of evidence for *CGS 4.2a* Internal evaluation of ESG at ASU, showing the fair extent to which it is present. This is grounded in six sources, with Dalrymple's sustainability operations and practices source providing a large proportion of focussed evidence. It was also associated with *SER 5.8* sustainability reporting standards and instruments being implemented. Systems of accountability are in place to ensure ESG issues material to ASU are evaluated. The presentation Dalrymple shared with the researcher on *Sustainability Operations and Practices* presents key environmental impact trends taking a baseline of 2007 in comparison with 2015, such as the reduction of CO₂ emissions by 17% despite the addition of 33% more campus room and a 34% increase in the campus population. Another positive trend is the total emissions per student decrease by 40% whilst experiencing a 37% increase in student numbers over the same period. A university wide governance structure is also presented as being a core part of the services provided by University Sustainability Practices (USP) as "ASU's internal sustainability consultant resource" (see meso-level description, *Figure 6*) (University Sustainability Practices & Dalrymple, 2016). Dean Boone corroborates the asset of ESG issues being measured and managed by integrating sustainability strategy and governance by referring to the recognition and attainment represented by ASU's AASHE and STARS credentials: "*They have also used other tools such as AASHE and STARS, for which they have full-time staff dedicated to. President Crow is very serious about attaining top rankings in AASHE, and STARS. This has been attained in both last year and this year for each sustainability performance rating instrument*" (Boone, 2016). More references are given by Carr-Kelman's reflection on ASU's sustainability performance: "*Walking the talk is an incredibly massive undertaking. AASHE, STARS reporting is reflected in the University Sustainability Practices website sustainability reporting. AISHE and STARS criteria are skewed towards smaller schools. We want AASHE STARS Gold/Platinum standard – a lot of what we're doing is to do with managing unit-level resources*" (Carr-Kelman, 2016). Anderson's account stressed the importance of creating "*systems of accountability so it is the case in the context of organisations that people respect what expect you will inspect*" (D. Anderson, 2016). Slaymaker responded, when asked her opinion of ASU's sustainability reporting, that missing the Zero Waste goal was not factored in, despite the positive signs from Dalrymple's new leadership at USP: "*there's a change in leadership now that is really exciting... And so they're on the right track with that which is great. Carbon neutrality I think they're also on the right track*" (Slaymaker, 2016).

CGS 4.3

CGS 4.3 Externality Recognition & Internalisation

W= 0.89: Gr. 2, De. 0.

- Pursue and make progress in:
 - 1) convergence between private costs & social costs, compensation to 'victims';
 - 2) quantitative reduction in the physical volume of throughput, setting a maximum aggregate limit of discharge/wasted resources.

The category *CGS 4.3 Externality recognition and internalisation* was difficult to identify, given the limited returns on evidence, this result shows a weak extent to which it is present (although this may be due to lack of sufficient coverage and sampling). The only two codes were located in Kay's account, referring to the attempt at a quantitative reduction in the volume of throughput in terms of "*an aggressive policy on renewable energy application*" representing "*an advancement on the technical side as well as the transformational side*". Additionally, in our interview, he related that towards the end of his PhD, and beginning of a Post-doctoral project, he was part of 'Reinventing Phoenix', a sustainability urban planning project. They got the largest grant at SOS for comprehensive sustainability planning and resilience. This showed that "*GIOS has impact outside the walls of ASU*", and that this effort to reduce ASU's throughput was incorporated into research and education praxis (Kay, 2016).

SER 5.2

SER 5.2 Intergenerational and socio-ecological ethics

W= 1.33: Gr. 3, De. 0.

- Ethics are identifiable in the norms and values of individuals and groups of:
 - 1) intergenerational moral norm of ecological sustainability; a safe operating space for all of humanity;
 - 2) intragenerational ethical development projects (e.g. resolving poverty and inequality, more resource distribution)

Although *SER 5.2* does not appear that present at ASU, given the low weighting, there are clear indications that the moral and ethical orientation towards ecological sustainability, and intragenerational development projects in the leadership, design and populace of ASU researched. A good example is its mission to be inclusive of the lower socio-economic quadrant in students it admits. References were found in the Kay Interview, and Crow's interview by Saletan (2011) shows an ecological ethical consideration in its reference to the transdisciplinary configuration of the Biodesign Institute: "*Sometimes new organizational constructs have the potential to produce new transdisciplinary fields of study. In the case of our Biodesign Institute, for example, we said: Academic disciplines are meaningless. Nature has already outlined for us a framework from which innumerable adaptations have occurred in species over the past several billion years. Why don't we take that as a fundamental model and create a platform to understand this process, build from it, and engineer through bio-inspired architecture?*"

SER 5.3a

SER 5.3a Integrated sustainability praxis across functions

W= 3.12: Gr. 7, De. 3.

- Sustainability practices are embedded in the universities portfolio activities of Research, Education, Operations, Governance, Communications & partnership (**REOGC**), through the disclosure and creation of spaces for praxis and action in collective open inquiry.

The fair extent to which *SER 5.3a Integrated sustainability praxis* is present across the functions of research, education, operations, governance and communications is clearly evident. It is also the most conceptually dense category, being associated through the internal evidence with three others: *OCM 2.2 Collaborate to Innovate: extrinsic change-agency*, *SES 3.4 University-driven asset-based community development*, *SER 5.3b Integrated sustainability praxis external impact* - See **Table 4** on category associations made. This is mainly due to the multiple overlapping codings of the Eight Design Principles as put forward in Crow's White Paper. These have been interpreted as an integrated shared vision and mission to the ASU community about the direction of its transformational journey and how to get there, covering diverse but interconnected aspects of sustainability in research and education, as well as its praxis intrinsic to the university and its surrounding community. Particular key words, phrases, and the language identifiable in other documentary and interview sources actually indicate how holistic the effects of the design imperatives have been, by inculcating spaces for praxis, action and collective inquiry towards the articulated vision to be achieved: *"ASU as a preeminent catalyst for societal change to transform society, improve the human condition, foster sustained social advancement and economic growth, and promote responsible planetary stewardship"; "outcome-determined excellence"; "knowledge through interdisciplinary scholarship"; "assumes major responsibility for the economic, social and cultural vitality of the region"* (Crow, 2004). The Temozón report and summit, FTA's commissioned investigation in 2006, and Cumming's study of 2010 all provide further support and context to the process of integrating sustainability into ASU practices. FTA's report in particular illustrates what was required for ASU to *"become truly embedded"* was *"an all-encompassing process integrating five broad areas of activity: teaching and learning; community capacity-building; social development; economic development and investment; and research and discovery"* (Fern Tiger Associates, 2006). Further observations, regarding the extent to which sustainability is embedded in education and research, as well as the implementation and attainment of ASU's operational sustainability goals, were further supported in Carr-Kelman's, and Reiter's interviews.

SER 5.5

SER 5.5 Sustainability research demonstration, knowledge enterprise

W= 5.78: Gr. 13, De. 0.

Data-informed category

■ Demonstration of sustainability-related research on campus, representing substantiated knowledge enterprise; Increasing visibility to university community: Communicating how to do sustainability, demonstrating fulfilled intent on prior goals/commitments; Using interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility

The intelligence collected points towards *SER 5.5* being strongly present, representing ASU's highly developed asset for sustainability research demonstration linked to its knowledge enterprise. It is joint-second highest weighted with *OCM 2.3* at the meso-level. Significant evidence was found in ASU President and historian's book *"Designing the New American University"* in their own insider case study of ASU *"An institution undergoing transformation must identify new partners, press its case to investors, seize unexpected opportunities, remain responsive to changing conditions, deploy its resources in ways that empower its many component parts, and prepare to advance in novel and unexpected ways"* (Crow & Dabars, 2015a, p. 255). This build on Cummings' remarks that *"New institutions are needed to provide the interdisciplinary and solution-driven framework that sustainability requires. ASU's Global Institute of Sustainability was designed to fill this need"* (Cummings, 2010). The 2014 ASU Strategic Enterprise Report also states that *"the products of a knowledge enterprise are people, ideas and solutions"* (ASU, 2014). This was corroborated by the usage of the same phrase by Melnick in our interview. Additionally, we can see the substantial investments

of €700 million allocated to demonstrating sustainability on campus in an anonymous ASU sustainability scientist's statement which also referenced the substantiation of ASU's knowledge enterprise. Crow's interview by Top Right journalist, Saletan (2011), also showed how ASU was embedded sustainability across portfolios, and how this seemed to be inextricably connected to the design and philosophy of the New American University's complex-adaptive knowledge enterprise rooted in pragmatic idealism. Aside from documentary evidence, Anderson, Dalrymple, Slaymaker and Kuby also lent further support to the presence of this quality. Highlighting these accounts of sustainability praxis, an anonymous GIOS Senior Sustainability Scientist mentioned the practical example of the "Sustainability Connect" platform as a 'marketplace' for trading sustainability projects. Additional references were made in the same interview to how this source's role was in acquiring sustainability projects from the external community, where requirements were that partners worked on sustainability problems and that interdisciplinary teams of students were assembled. The *Decision Center for a Desert City* was another prominent example given by this source, proving the strong motivation and action at ASU to demonstrate sustainability and visibility to the community (Anonymous 4, 2016). More incisive description of the research, practice, education hiring and organising structure at ASU was bolstered by this source, as the view of integrated sustainability praxis at ASU emerged. To this source research consisted of "*conceptualising, theorising, synthesis*" to "*develop teaching-learning necessary for SOS*"; secondly, practice was about "*organisational structure*" and "*Developing the infrastructure*" and "*providing the physical resources*"; thirdly education was about "*practicing teaching with students*" and also "*doing the projects yourself*". This seemed to connect also to how this source described the "trans-academic interface management" at ASU, with the essential success factor of "good communication with faculty and staff" (Anonymous 4, 2016).

6.3.2.1.3 Macro-level Diagnosis: Extra-organisational Scale - Institution & Environment

The Macro-level concerns the whole organisation's behaviour, learning process, and overall transformation towards sustainability, and how it interacts with its surrounding environment (as well as how it is affected by its environment in turn).

Perspective	Average Weight per Perspective* (chart 6)	Aggregate Weight per Perspective	Rubric	Gr _c	De	Weight per Category* (chart 5)
BSP	2.67	2.67	1.6	6,00	1,00	2,67
OCM	2.89	5.78	2.4	6,00	1,00	2,67
			2.5	7,00	0,00	3,11
SES	2.45	4.90	3.2	5,00	0,00	2,22
			3.4	6,00	2,00	2,67
CGS	2.22	4.44	4.2	5,00	0,00	2,22
			4.4	5,00	0,00	2,22
SER	4.01	20.12	5.3	10,00	2,00	4,45
			5.4	10,00	1,00	4,45
			5.6	3,00	0,00	1,33
			5.7	14,00	2,00	6,23
			5.8	8,00	1,00	3,56

Table 4: *Weights per rubric at the meso-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns. *Charts 3 and 4.*

Chart 5: *Weights per rubric at the macro-level. Detailed descriptions per rubric given below.*

Chart 6: Average weight across rubrics per perspective, macro-level: evaluation according to each of the five theoretical perspectives at the macro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Macro-level Diagnosis¹²

At the macro-level of ASU's relationship with its surroundings, we see that *SER 5.7 Research & Education Generates Societal Impact & Public Aware* is the most weighted ($W=6.23$), followed by *SER 5.3b Integrated Sustainability Praxis External* and *SER 5.4 Ideal-typical Transdisciplinary Research Praxis*. Unlike the micro and meso-levels, Sustainability of Education and Research is the most pronounced perspective, followed by change management.

The accounts analysed start from before the redesign and reconceptualisation of ASU: the prior state of the university organisational structure, which acted as the baseline from which the drive to redesign the university took hold. Based on the analysis of multiple sources, the top-down redesign drive Crow had was also present before ASU, rooted in his experiences of higher education elsewhere. The lesser significance of category *SES 3.2b* with respect to *SES 3.2a* suggests a lag-time before ASU's pathway of transformation to sustainability gained traction. This can be interpreted by, firstly, insufficient reciprocal external engagement from other organisations and societal actors, explained by the drop in resources for higher education in the mid-to-late 2000s, and commensurate with ASU's not so forgiving political and institutional environment that did not exactly welcome transformative approaches to sustainability performance at the state and federal levels; secondly, that Crow's vision to transform ASU towards the New American University Prototype with the University Design Team took some convincing and consultation within the community itself. There is some evidence to support this interpretation, especially regarding the departure of staff who had strong feelings against this vision, and the colloquial expression on campus that 'if you stand still long enough, Crow will slap a solar panel on your head'. Furthermore, Melnick and Carter's accounts in *SER5.3b* show further evidence of

¹² For a comprehensive deep dive into data per category at the macro-level, see the following section, *Detailed Overview of Data per Macro-level Category*, otherwise, move to the overall analysis outputs, Section 6.3.3.

impact from ASU's (sustainability) education and research, which indicate how this interior-exterior lag-time might have passed. ASU's efforts, through GIOS-SOS, and University Sustainability Practices, and Duke Reiter's Testbed experimentation for example, are showing early evidentiary indications of impact that only recently Melnick lamented the lack of. This does not mean he was wrong, simply that the evidence was not yet entirely visible, and that patience and persistence were needed along the current pathway of transformation.

Early in its transformation, in 2005, ASU received the STARS gold rating for the first time. Whether or not this represents their capacity for effective self-diagnosis is another question. Self-assessment and self-diagnosis seem to be distinguished by the ability to account for one's own bias. In 2016, ASU Purchasing was named No. 1 in 2016 Sustainable Campus Index: *"For the second consecutive year, [AASHE] ranks Arizona State University Purchasing as the top performer in its Sustainable Campus Index. The ranking demonstrates ASU's continued commitment to sustainability."* *"To receive the top ranking for a second consecutive year is a tremendous honor. I am extremely proud that my procurement team continues to exemplify ASU's commitment to sustainability,"* said Nichol Luoma, associate vice president for University Business Services, and Chief Sustainability Operations Officer. In Duke Reiter's interview, we discussed how to view USP. If you see ASU as a system with a primarily academic function, and then the office for knowledge enterprise development as a representation of the new American University model, we can look at Mick Dalrymple's University Sustainability Practices (USP) as the in-house sustainability consultancy of ASU, ensuring it delivers on what it aspires to do in sustainability within itself and the region it explicitly serves.

Undergirding the strength of *SER 5.7* in this diagnosis, Cummings' ASU investigation (2010) identified a cultural lever associated with Pasteur's quadrant and the fourth design aspiration of 'leveraging our place', also part of Jim Buizer's vision of the future of the university as an agent of change in wider society. Buizer, as science policy advisor to Crow, seemed to help make tangible the case for pragmatic idealism in higher education's sustainability mission. The origin of the fourth design imperative, 'use-inspired research', is also grounded by Anderson's interview, Crow's White Paper, and the Temozón Report. The 2004 *Retreat on Institutions of Sustainable Research and Education* in Temozón of leading global academics, researchers, and professionals provided key impetus to the ensuing reconceptualisation of ASU. Relatedly, the interview with Rob Melnick linked the fourth design imperative to 'outcomes-oriented science policy'. Subsequent intellectual and social infrastructure was notably developed around this at ASU; specifically, CSPO, the Consortium for Science, Policy and Outcomes.

Detailed Overview of Data per Macro-level Category

The Macro-level concerns the whole organisation's transformation towards sustainability and how this is nested within its environment.

BSP 1.6

BSP 1.6 Organisation Development: 3rd Person Action Research Inquiry

■ Evidence of: jointly organised transdisciplinary processes, community reach-out programs, boundary work, participatory and/or action research, behavioural interventions, 3rd person action research practice

W= 2.67: Gr. 6 De. 1.

The property of *BSP 1.6 Organisation development*, or 3rd person action research inquiry at the organisational-level taking place over time, is present at ASU to a fair extent. Evidence was retrieved supporting how jointly-organised transdisciplinary processes, reach-out programs, and iterative behaviour and interventions have been undertaken as part of ASU's overall transformation. This was based on an initial self-diagnosis of ASU's organisation in 2004 by Crow and the UDT, where it was concluded that *"The current organization of the university lacks clear definition of campus identities, and perpetuates unnecessary duplication of programs and resources. The structure of the university does not encourage interdisciplinary collaboration of programs construed across the campuses. The present design discourages the emergence of capable enterprise-building units"* (Crow, 2004). It is clear from the data across categories that ASU has since taken substantial action to remediate this situation by performing action learning towards establishing a community of inquiry and practice within and around ASU, consisting of inter and trans-disciplinary collaboration amongst diverse actors, pragmatic research of and within ASU itself, and the engagement of an external community regarding sustainability problems and behavioural change. Six accounts support this, ranging from the *Research Rethink* case of ASU in *Nature*, Carr-Kelman, Jennifer Nixon-Carter (Co-Director of GCSO), Slaymaker and an anonymous GIOS Senior Sustainability Scientist. To illustrate, the *Nature* article specifically refers to the early internal inquiry and research about ASU by ASU actors that took place in the transformation trajectory: *"In 2010, Brevis and some colleagues surveyed all 54 tenured faculty in the school [of Human Evolution and Social Change] to find out who they collaborated with. The strongest partnerships, they learned, were still between traditional sub-disciplines such as archaeology and physical anthropology. Many non-anthropologists in the school often had stronger ties to anthropology than they did to one another. So diversity within the school had not led to fragmentation, the researchers concluded, and all the disciplines were contributing to anthropological research. For example, a team of researchers ... is developing computer models that show how population size, economic behaviour and vegetation change in the region have affected the sustainability of natural resources, and how those resources are likely to fare in the future"* (Fischman, 2014). Direct reference is also given by Carr-Kelman of action researchers in practice at GIOS, specifically the sustainability scientist, Scott Cloutier, who I later interviewed. She emphasised what he does with his community-based research as that he "starts with them. Asking them what they want." Which was certainly engaged scholarship (Carr-Kelman, 2016). Moreover, indicating transdisciplinary global outreach for sustainability outcomes, Nixon-Carter describes how *"GCSO will also be a vehicle by which we can scale a lot of this work and knowledge that we've generated within the university, so that we'll have a larger more global impact, and create the necessary collaboration that we need to do that"* (Nixon-Carter, 2016).

OCM 2.4

**OCM 2.4
Organisational-societal
learning**

- The organisation learns from and anticipates issues mature on the societal agenda, that is approached and internalised by adopting a civic-orientation towards the external task environment

W= 2.67: Gr. 6, De. 1.

The dynamic property, *OCM 2.4 Organisational-societal learning* is also present to a fair extent, grounded in the documentary evidence of Cummings, *One University Many Places*, the Crow Top Right interview, and the *Public Administration Review* and *Issues in Science and Technology* papers, again authored by Crow. There is, however, a definitive lack of verbal accounts corroborating these documentary sources; yet despite no interview codings, the returned information traces a learning trajectory across the years 2004, 2009, 2011, 2015, and 2016 which allows a certain longitudinal perspective on ASU's learning and anticipation of issues coming to fruition and maturity on the societal agenda in the region, and other categories also support their civic orientation to these ends over time. Key highlights can be shown. Firstly, in *Issues in Science and Technology* Crow writes of the New American University Model "that ... embodies a reconceptualization of the American research university.... The at-the-time controversial aspiration for 'inclusivity rather than exclusivity' is a key element in ASU's orientation towards its external task environment, and evidence certainly supports how ASU anticipated this need in the State of Arizona to be "accessible to the demographically broadest possible student body, socioeconomically as well as intellectually, and directly responsive to the needs of the nation and society more broadly" (Crow & Dabars, 2015b). In 2011, a second-hand external account assesses Crow's intent "to reconnect higher education to the real world... That means "use-inspired" teaching and research focused on local and global outcomes. More students admitted and educated. More graduates who are socially and economically productive" (Saletan, 2011). Furthermore, in *Public Administration and the Imperative for Social Progress*, Crow writes that "As an enterprise of social advancement, public administration predates formal inquiry into important topics such as organization, authority, and control that characterize the field in recent decades." *A new model is needed for connecting knowledge to social progress, and this is squarely an issue of public administration. At ASU, I lead a team of institutional designers in developing a new prototype for a knowledge-intensive social enterprise... Our academic community has approached this challenge from the perspective of design within a democracy... We decided that the university would be measured and deemed successful based on inclusion and the success of our students*" (Crow, 2016). This account is indeed backed-up by the quantitative evidence retrieved (see Figures 1-3, section 6.1.2, and particularly Figure 13, 6.4.3).

OCM 2.5

**OCM 2.5 Organisational
extroversion &
openness**

- Adopts extroverted role with open boundaries: a porous organisational 'membrane':
 - 1) Reacting quickly to changes in the external environment;
 - 2) Focussed on wider world with respect to societal wellbeing & ecological carrying capacity

W= 3.11: Gr. 7, De. 0.

The evidence collected regarding ASU's organisational stance demonstrates its propensity for openness as an organisation, playing an extroverted role, reacting quickly connected to its perceived place in the wider world to be a force for social transformation and ecological wellbeing. The researched history of ASU's policy,

redesign and outreach efforts do support the presence of the category OCM 2.5 *Organisational extroversion and openness*, however, the evidence is mostly documentary. In 2004, the UDT and Crow stress the importance of focussing on the needs of the wider State, as *“Arizona’s demand for higher education will continue to increase. In 2001-2002 the number of high school graduates in Arizona totaled 46,774. That number in 2017 is projected to be 72,697—a 55.4 percent increase”*; they continue: *“Arizona has fewer college graduates, lower per capita income, and a greater percentage of the population living below the poverty line than the national average... The burgeoning enrollment of ASU parallels the unprecedented growth of metropolitan Phoenix and the state of Arizona... Consistent with increasing statewide demand for higher education, enrollment levels at ASU are projected to increase dramatically in the decades ahead”* (Crow, 2004). This demonstration of proactive extroverted focus towards social and economic conditions was clearly identified and actions were taken relatively quickly to adapt towards the resolution of the external task environment (e.g. the inclusivity rather than the exclusivity discourse). In addition, Cummings refers in 2009 to “outcome-driven science” being *“granted equal accord with fundamental research in the effort to solve-real-world problems”*, quoting Crow (Cummings, 2010). More recently, in the ASU GSV 2016, we can see tangible examples of its openness and extroversion in the form of its partnering *“with leading venture capitalists and investment advisors to source, fund, pilot and credential higher education technology companies”* as part of the ‘ASU Draper GSV Accelerator’ a joint venture specialising in education and learning technologies (ASU, 2016c). Finally, in the one conversational account backing up this category, Melnick relates to a framework for enhancing academia’s societal value in and of the Centre for Science and Policy Outcomes (CSPO) as one of ASU’s transdisciplinary configurations (Melnick, 2016).

SES 3.2b

SES 3.2b External implementation of governance for sustainability

W= 2.22: Gr. 5, De. 0.

■ The organisation takes responsibility that knowledge of good governance and management of natural resources and ecosystem services is developed and implemented extrinsically, practicing leadership, entrepreneurship and socio-technical innovation for other organisations & societal actors

Whereas the meso-level category of the rubric for governance for sustainability is strongly evident at ASU (SES 3.2a), the macro-level category, SES 3.2b *External implementation of governance for sustainability* is only present to a fair-to-low extent, with a weight-value a quarter of that for SES 3.2a. Five evidentiary lines support how ASU as an organisation takes responsibility that knowledge and good governance is extrinsically implemented, yet the criteria for management of natural resources and ecosystem services lacks. One is rooted in the Agency to Enterprise presentation by Crow which demonstrates how ASU is *“an enterprise... embedded in a competitive arena, producing knowledge capital... and human capital”*, where this new form of “academic enterprise” embodies *“the spirit of creative risk-taking through which knowledge is brought to scale to spur social development and economic competitiveness”*; this framing lacks a specific reference to the governance of ecosystems and natural resources externally to ASU (2012). The ASU Strategic Enterprise Plan of 2014 is similarly framed, although it does specifically focus on “increasing philanthropy and affinity”, and in particular “going beyond philanthropy” its major reference is to the products of knowledge enterprise being people, ideas and solutions” (ASU, 2014). This further links to Melnick and Crow’s later verbal accounts about knowledge enterprise outcomes being “people, ideas and ‘gizmos’”; Melnick moreover went on to say, with regards to the efforts at CSPO, that *“these endeavours began to contribute to a new intellectual infrastructure for an outcomes-oriented science policy. Scaling education through online technology, MOOCs, and leveraging existing networks and tapping into others. Adapting*

the solution through the lens of the collaboration” (Melnick, 2016). Again, no specific reference to ecological governance, but a meta-level shift to outcomes-oriented science policy scaling education, and access to it, could form the platform within which such knowledge is implemented with external organisations and societal actors.

SES 3.4

SES 3.4 University-driven asset-based community development

W= 2.67: Gr. 6, De. 2.

Data-informed category; based on post-field-work stakeholder interview (Cloutier, 2016).

■ Students, educators, researchers, & practitioners lead by forming partnerships with civic actors to find innovative solutions to drive societal transformation. Teams of staff and students go out into the community to:

- 1) understand community problems;
- 2) identify the spaces for sustainability to come in to solve community problems;
- 3) resolve problems in innovative ways via interventions driving societal transformation

SES 3.4 University-driven asset-based community development is present at a fair-to-good extent at ASU. The category was rooted in the interview with Cloutier and other accounts. There are six instances in the internal evidence and it is also linked twice in conceptual density to the micro-level categories from the BSP and SER perspectives *5.3a Integrated sustainability praxis*, and *2.2 Collaborate to innovate: extrinsic change agency* (see *Map 1 in Appendix 2*). That students, educators and researchers form teams with practitioners to find innovative solutions to drive societal transformation is fairly well supported by the internal evidence. There are six instances, and it is also linked twice in conceptual density to other categories. The Temozón retreat was the first instance found that showed a real convening of educators, researchers and practitioners (yet lacking on the student-representation front) to come up with innovative sustainability solutions to the clear challenges to research and education in a systemic manner. The influence of this summit was profound, for example providing the platform for future strategic and moral partnerships, like the one between Julie Ann Wrigley, Crow and the sponsorship of GIOS. FTA’s extensive investigation presents the formulation and recommendation of a highly detailed and specific social embeddedness plan for ASU according to its needs (Fern Tiger Associates, 2006). FTA’s first goal for ASU’s social embeddedness plan was to “*foster a university-wide culture that embraces responsibility for contributing to positive social change in the community and in the research, teaching, and service practices of ASU*” including the relevant sub-goals to: “*create a community-based forum to engage students, faculty, staff, local residents, and community leaders in ongoing dialogues...*”; and: “*integrate community knowledge into university-driven and university-wide research and use research to advance community goals*” (Fern Tiger Associates, 2006, p. 34). Did ASU bring the plan recommended by FTA into fruition? Did ASU measure its own transformation and that of the community according to the FTA plan? And if so, how? These are questions that could not be clearly answered based on the evidence retrieved. We will return to this point in the discussion. The 2016 ASU GSV Presentation, and Carr-Kelman’s account also helped ground this category’s presence at and around ASU.

CGS 4.2b

CGS 4.2b Accountable Disclosure of Environmental Social Governance

W= 2.22: Gr. 5, De. 0

- 3) After materiality analysis (1&2 in 4a), the whole organisation's sustainability performance is collated and made presentable in a comprehensive, high-quality sustainability or integrated report. Internal evaluation of ESG issues (4.2a) are communicated externally to relevant stakeholders

Connected to *CGS 4.2a Internal evaluation of ESG issues*, the macro-level quality, *CGS 4.2b Accountable disclosure of ESG* by responsible bodies at ASU represents to what extent actors at ASU collate and communicate externally the whole organisation's sustainability performance after materiality analysis in steps 1 and 2 in *CGS 4.2a*. This behaviour is present to a fair extent with respect to ASU's external disclosure. It is clear from the resources made available by Dalrymple that ASU USP deals with the collation of the whole organisation's sustainability performance, yet it was hard to track down one sustainability/integrated report for ASU. The Sustainability Operations and Practice presentation refers to the AASHE STARS Task Force set up at USP, that discloses procedure for new efforts, challenges and opportunities to be reported, as well as submission to the respective sustainability standards (University Sustainability Practices & Dalrymple, 2016). Also, the fact that Dalrymple shared this with me, an external researcher shows that internal ESG evaluation is communicated to relevant stakeholders. In our interview, Boone confirmed that ASU parties do "track their societal engagement", which is an important aspect of ESG, referring to a system of indicators developed for societal impact measurement in connection to the ASU *Indicators of Engagement* project, as well as the *Carnegie Community Engagement Survey*¹³. Boone went on to corroborate the actors responsible for ESG disclosure at USP: "They have also used other tools such as AASHE and STARS, for which they have full-time staff dedicated to. President Crow is very serious about attaining top rankings in AASHE, and STARS. This has been attained in both last year and this year for each sustainability performance rating instrument" (2016). Carr-Kelman observed that Environment, efficiency and education are the strong points of ASU's sustainability embeddedness, also mentioning the challenge of scale being "almost always a blessing and a curse with sustainability issues. For example, translating substantiated zero-waste goals and implementation to all the actors on and around campus" (2016). Some contradictory accounts did emerge with respect to an underdeveloped understanding at ASU of the social-side of sustainability and CSR being reflected by "not scoring too highly" on the STARS assessment ratings. Yet Crow's ambition to 'win at everything' in sustainability performance efforts, and Reiter's (2016) testament to USP more clearly supports the ongoing efforts to walk the talk at ASU's USP under Dalrymple "who is making sure that we are doing what we aspire to do".

13 Campus Compact 'A STRATEGY FOR DEEPENING CIVIC AND COMMUNITY ENGAGEMENT IN HIGHER EDUCATION' See <http://compact.org/indicators-of-engagement-project-categories-page/>; <http://compact.org/resource-posts/campus-compactaacc-campus-engagement-survey/3520/>. Accessed December 2018.

CGS 4.4

CGS 4.4 University Social Responsibility Assumption**W= 2.22: Gr. 5, De. 0.**

- 1) accept the moral obligation of the university defined by its own political economy, accepting social duties, and participating in deigned social cooperation;
- 2) collaborative governance is undertaken through partnership with external societal actors (NGO's, business, citizen groups)

The property *CGS 4.4 University social responsibility assumption*, where the moral obligation of ASU is accepted by internal actors for societal impact and collaborative governance is present to a fair extent as well. Evidence supporting this analysis is found in Crow's White Paper, the ASU GSV presentation's referral to the ASU Draper accelerator, Crow and Dabars' *Issues in Science and Technology* article, as well as Anderson's account which supports the claim that ASU actors evaluate their social impact (D. Anderson, 2016; ASU, 2016c; Crow, 2004; Crow & Dabars, 2015b). Cross-referenced evidence also support this in the form of Boone's reference to the Campus Compact and AACC Campus Engagement Survey, as well as to how ASU actor's track societal engagement (Boone, 2016). Key quotes from this body of evidence illustrate how ASU has assumed its moral obligation to participate in collaborative governance and accept social duties and partake in social cooperation: *"The transformation of ASU from a territorial teachers college to a major research institution parallels the transformation of metropolitan Phoenix from a frontier settlement to a dynamic and emerging global city"* (Crow, 2004).

"We ask people to justify their operations according to social impact maximisation, and that happens - the thing about this is that this happens for everybody, so you can be Piano Professor or you can be an economist or geographer or a management theorist, we still sort have obligation to think about these things. Now, it's really easy to be a social maximising entity as an individual at a university because universities can't help but make the world a better place - even when they're not trying, they're still making the world a better place. And so part of the challenge here is helping faculty members think about what they're doing in that context. Now, it's true that there are a lot of research programs that have, at universities throughout the world that have niche prospects for advancing some sort of social agenda. And we get ahead of that by designing research programs and research enterprises around the Pasteur's Quadrant of problems" [See ASU Design Aspiration 4 on Use-Inspired Research] (D. Anderson, 2016).

SER 5.3b

SER 5.3b Integrated sustainability praxis external impact**W= 4.45: Gr. 10, De. 2.**

- University community actions increase likelihood of sustainable lifestyles externally by fulfilling its REOGC functions, ensuring that sustainability practices are embedded.

Targeted question one generates data for this code: 1) What are the substantiated and/or realised outcomes of ASU's transformation towards sustainability

The category *SER 5.3b Integrated sustainability praxis* across portfolio areas increasing likelihood of sustainable lifestyles externally was present to a very good extent at ASU. Integrated sustainability praxis having an external impact is clear from the evidence in the GIOS Town Hall meetings of 2015, where a collective inquiry into the extent to which ASU (specifically GIOS) had an impact with its sustainability outcomes, and the birth of the fourth iteration of GIOS (GCSO) took place (Tromp et al., 2015). When I inquired with the targeted question based on initial observations of this inquiry and discourse at GIOS, I got highly detailed and elaborate responses, specifically from Reiter, which seems to be the

best quality answer proving the good extent to which *SER 5.3b* is present. The following responses are sampled from the extensive body of evidence that supports the likelihood of ASU's sustainability praxis driving more sustainable lifestyles externally:

"The biggest realised outcomes of GIOS/SOS (ASU-level too) are by far the students, through the impact of what they do and the solutions they bring about. This is also the biggest indicator of success"; Boone's claim that the best evidence of external impact are the graduates themselves and what and where they undertake their trained sustainability practice externally (2016).

Nixon-Carter continued: *"Internally, I think the easiest one is the number of students who have moved through our programs, and that is kind of the baseline function of a university is that educational competent. And when you think of students as individual agents of change, that impact is exponential in the sense that each of these students are getting the knowledge and skills that they need and then they're going out into the community and creating transformation in their local and broader community. And I think that is one of the greatest legacies of SOS. In terms of ASU in the larger sense, I think that many of programs that have been created and generated from ASU and from GIOS in terms of the sustainability consortium having a big impact on supply chains and businesses and corporations... [ABS: Best practices?] Yes, and best practices, other organisations that are having impacts in the larger community. Like the Decision Centre for a Desert City... Certainly GCSO is at the beginning of having an impact, but we can see the direction that we want that to take. In terms of, I think my interest has always been in the transfer of knowledge outside the walls of the university into the broader world."* Nixon-Carter's account corroborates Boone's without prompting (2016).

Melnick stated that they had learned that the best evidence or qualification of impact was actually on the Education side: *"We educate someone [with] skills, knowledge and competences [then they went out] and worked with organisation X and did something impactful"*. This connects with the others' account of on students as outcomes having impact in the outside world. Then he extended this line of evidence by articulating GIOS 4.0 and sustainability outcomes at a global city-implementation level: *"How do you do GIOS 4.0? Well, GIOS 4.0 was built upon the assumption that sustainability problems, for the most part are very common around the world, most cities have the same problems - yeah, the demographics are different, the temperature's different, the economics are different - but cities have very very similar kinds of problems, and so do agricultural areas, have very very similar types of problems. So, if you find a potential solution in Phoenix that fits say other deserts or desert cities, we shouldn't just keep it here, we should do everything we can to push it out to other places. Well, how do you do that: You got to get it from here to the implementation agents"* (Melnick, 2016).

Reiter referred to tangible physical and project-based examples such as initiatives in water and solar energy and an algal plantation that generates water from air percolation as *"a legacy of innovation... growing crops in the desert, how do you engineer water from the native Americans to others. But the future in water, energy and food is going to be very different. We're going to create water out of supplies that provide drinking water, different kinds of energy, we're going to grow food differently. Can a campus be a full-scale test-bed for that using our principles - Yes"*. Developing these assets at ASU and its campus surroundings was part of their strategy of attaining a *"full-scale test-bed research park, not just so many laboratories with work going on inside but how do you make the work observable by others. So, full-scale prototyping, that would be the hallmark of this place"*. A systemic view is also shown when he mentioned the external "non-ASU community" as *"a not inconsequential community... how they are behaving differently, how are they doing things differently..."* being appreciated by students: *"They care a lot about that stuff. In the community, I think it would be harder to measure, but that won't surprise you. So, I do a lot of work with that, I'm on my way to Mesa to work on a project. I've done a lot of work with downtown Phoenix to build a whole campus there... I was just in a meeting about how, with the city of Tempe, and the leadership there, how we can help Tempe*

to become - to use the language of the day - a Smart city" (Reiter, 2016).

SER 5.4

SER 5.4 Ideal-typical Transdisciplinary

Research Praxis

W= 4.45: Gr. 10, De. 1.

■ Three phase ideal–typical transdisciplinary research.

Phase A: Complex problems are collaboratively framed in interdisciplinary teams;

Phase B: solution-orientated transferrable knowledge is co-produced based on framing process;

Phase C: (Re-)integration and application of co-produced knowledge in scientific and societal practice

The category *SER 5.4 Ideal-typical transdisciplinary research praxis* was found to be present to a very good extent at ASU. The strength and diversity of the body of evidence speaks to this. The first incidence – as with a majority of other categories of analysis for ASU's overall organisational transformation for sustainability – was found in *One University Many Places* with the conception of the sixth design imperative, "Intellectual Fusion: Interdisciplinary/ multidisciplinary/ transdisciplinary/postdisciplinary", "*It is no longer sufficient to neatly categorize knowledge into disciplinary-based academic departments... Accordingly, the New American University encourages teaching and research that is interdisciplinary, multidisciplinary, transdisciplinary, and post-disciplinary, leading, where appropriate to a convergence of disciplines, an approach that might more accurately be described as intellectual fusion*". Other explanations of ASU's redesign trajectory occurring throughout the paper. For example: "*The design and implementation of new colleges and schools and the rethinking and redesign of existing colleges and schools provides opportunities to break out from the confines of traditional disciplinary organization, and to actually build the kind of interdisciplinary programs needed to institutionalize and implement intellectual fusion*". Along with the explanation of the fourth design imperative, "Pasteur's Principle: Use-Inspired Research" we can see how Phases A and B of *SER 5.4*, the collaborative framing of complex problems in interdisciplinary teams, and coproduction of solution-oriented knowledge, was programmed early into the transformation of ASU's organisation: "*we must integrate the advancement of knowledge with the transformation of society. If academic research is to be a force for societal transformation—if we are to improve the human condition—we must consider the social implications of our research, and harness our knowledge for maximum societal benefit. This is an approach to scholarship that could be termed use-inspired, and will increasingly guide the ASU research enterprise*"; here, Crow's vision further corresponds with Phases C, aligning scientific praxis with societal praxis (Crow, 2004).

Elsewhere, the convening cluster of scientists and practitioners at the Temozón retreat supported the redesign of ASU for transdisciplinary research: "*A sustainability research agenda was presented...with applications areas— use-inspired/ solution-driven cuts at solving problems— and sustainability science areas—fundamental/core questions/themes*" (W. C. Clark et al., 2004). Numerous interview-based, conversational and observational accounts support the presence of all three Phases being undertaken at ASU, including Koster, Anderson, Melnick and an anonymous sustainability scientist. There are many transdisciplinary configurations at ASU that are outcomes of the transformation, which also lend direct and tangible credence to this claim; see *Figure 9 on the structure of the Office for Knowledge Enterprise Development in 5.4.1*. One example which also came up in Melnick's interview was the Centre for Science, Policy and Outcomes, a Columbia-based initiative of 1997, reconstituted in 2004 as a transdisciplinary configuration at ASU. A final example of the evidence can be seen in the account from an anonymous Senior Sustainability Scientist self-described function being the

acquisition of sustainability projects from the external community, where requirements were that partners worked on sustainability problems and interdisciplinary teams of students were assembled. The same person also cited the Decision Center for a Desert City and the project on Transformational Solutions for Urban Water Sustainability Transitions, which both exemplify Ideal-typical transdisciplinary research praxis at and around ASU (Anonymous 4, 2016).

SER 5.6

SER 5.6 Minimisation of negative health, socio-economic and environmental effects

W=1.33: Gr. 3, De. 0.

- Minimisation of negative environmental, economic, societal, and health effects as a result of the university's activities, and the flow of resources across its boundaries (related to maintaining throughput).

Less evidence was found that supported the presence of *SER 5.6 Minimisation of negative health, socio-economic, and environmental effects* caused by the flow of resources through ASU's organisational economy. However, some evidence is still notable and does not detract from ASU's efforts in other similar categories like *CGS 4.2a*. One example of from the three instances returned comes from Cortese, who was also chairman of *Second Nature* and contributed on the 2013 Strategic Assessment of the GIOS and ASU's Sustainability Strategy. In his review of Crow and Dabars' book, *Designing the New American University*, he seems to speak to his prior knowledge from his leading the strategic insider assessment two years earlier: "*Designing offers a model of integration and synthesis oriented toward addressing society's biggest challenges. Its three pillars are reorienting scholarship and teaching; educating the aware and engaged citizenry needed to address the hurdles society faces; and assuming responsibility for local economic, social, and environmental well-being. In the case of ASU, this means the Greater Phoenix area (home to the main campus) and the three satellite campuses that serve the university and its 80,000 students*" (Cortese, 2016).

SER 5.7

SER 5.7 Research and education generates societal impact and public awareness

W= 6.23: Gr. 14, De.2.

- a) 'Walking the talk': enhance research and education function to generate societal processes of change towards desired quality-of-life;
- b) 'Talk the walk': a significant level of public consciousness is detectable that the research and education the university does has positive societal impact

Aside from *SES 3.2a*, this category had the strongest presence at ASU as indicated by the significance, diversity and depth of the body of evidence. The property *SER 5.7* of research and education at ASU generating societal impact, coupled with some level of public awareness that it contributes this way had 14 incidences and two links to other categories, *SER 5.3b* and *SER 5.4* being ways in which *SER 5.7* occurs. In Crow's 2004 White Paper, ASU's commitment to walking the talk and talking the walk is clear with respect to its missions to build "*strong and deep linkages to the community*", the "*Distribution of programs throughout the community*" and "*to position ASU as one of the premier public metropolitan research universities of the twenty-first century... committed to teaching, discovery, and service to the community (university as social enterprise)*" (Crow, 2004). This is line with Cumming's later analysis that "*Crow asserts that outcome-driven science should be granted equal accord with fundamental research in the effort to solve real-world problems*" (Cumming, 2010). Further evidence was found in the accounts of Dean Boone, Candice Carr-Kelman, Derrick Anderson, Jenny Nixon-Carter and Mick Dalrymple.

Dean Boone's account related to examples of exemplary practices that included any or all of the following characteristics: innovative, sustained, sustainable, replicable, transforming, institutionalized, accepted, widespread, in practice, publicized/ acknowledged/ recognized, significant, deliberate, planned, intentional, and unique or special (Boone, 2016). Dalrymple mentioned that the impact of sustainability is "not just internal to ASU. There's a ripple" and when we couple this with what Reiter has been doing since our 2016 interview, the image emerges of a reciprocal relationship between the Arizonan public communities that surround ASU and its research and education missions for sustainability. A review of Reiter's recent activities is warranted to illustrate this, including complex multi-stakeholder projects *"which serve to unite the interests of the university and the surrounding metro region"*, such as *"working with the Global Institute for Sustainability (GIOS) to assemble an Urban Diagnostics Laboratory which unites a variety of research capabilities at ASU to produce a unique 'city signature' for other arid regions"* and *"working with city officials (Scottsdale) and the deans of multiple colleges at ASU to launch a \$75M Desert Discovery Center within the McDowell Sonoran Preserve, the largest urban preserve (30K acres) in the nation"* (Reiter, 2019). Out of all the other accounts - a lot of which are cross-referenced with other categories providing the linkages in the action strategies identified at ASU - it is this researcher's view that Nixon-Carter provides the most illustrative and extensive account of the evolution of GIOS, the reasoning and mission of GCSO, and the culture and mindset of impactful, sustainability solution-oriented research creating awareness outside of ASU. For this reason I quote her at length here: *"In terms of ASU in the larger sense, I think that many of programs that have been created and generated from ASU and from GIOS in terms of the sustainability consortium are having a big impact on supply chains and businesses and corporations... GCSO will also be a vehicle by which we can scale a lot of this work and knowledge that we've generated within the university, so that we'll have a larger more global impact, and create the necessary collaboration that we need to do that... one of our challenges, it's getting people to think in this solution space, to think about how does their work actually have impact, and how do we transfer that knowledge. So, this knowledge transference is something that's very important, but also creating this culture around solutions and getting people to think and understand what that means in terms of their work. So, for example, all elements of sustainability research are important, but they have their best value when they linked I think, in the sense of when you have a technology innovation around air quality monitoring, or around air pollution improvement or something of that nature, you really don't have an impact when it's not linked to monitoring or a way to assess its impact in that you can demonstrate that it actually does improve air quality, and then actually translating that into a policy. So, there's multiple steps I think in the development of solutions, in getting people to understand those linkages and collaborate in that space, it's very critical I think if universities are going to perform the important function that they can perform. Rob probably spoke to the fact that sustainability challenges are growing exponentially, but the solutions aren't being developed aren't being developed at the same pace to address these challenges [ABS: it's a better way of saying what I tried to say earlier] Haha, I mean universities are uniquely positioned to close that gap because we have the knowledge, we have the 'Brain trust', we have the resources, we just need to be operating in that space, and that's the space GCSO wants to work in. ASU can't do it alone, and we don't want to do it alone, but we have the resources to support that, so we're looking to create a network with these other institutions that are also operating very successfully in sustainability, and also have the capability and resources, we just need to link those up"* (Nixon-Carter, 2016).

SER 5.8

SER 5.8 Sustainability reporting standards and instruments implemented

- Global, regional & national sustainability standards, instruments & principles are implemented in measurement and reporting process. Communicate progress made.

W= 3.56: Gr. 8 De. 1

The category *SER 5.8 Sustainability reporting standards and instruments implemented* is present to a good extent at ASU, grounded eight times in the data and linked to *CGS 4.2a Internal evaluation*

of ESG. Despite some accounts highlighting weaker areas in the STARS ratings performance for example and the tools being proportionally weighted towards their application in larger schools. The recent history of sustainability reporting and the implementation of national sustainability tools like AASHE STARS are supported by Dalrymple's account and his presentation disclosure on ASU sustainability operations and practice (Dalrymple, 2016; University Sustainability Practices & Dalrymple, 2016). The "full-time staff dedicated to" sustainability reporting, standards, and instruments is also supported by Boone who mentioned their usage of "other tools such as AASHE and STARS" (Boone, 2016). In the 2015 revision of ASU's Achievements 2002-2014, recognition for sustainability efforts lists "AASHE — For 2015, ASU is one of 79 institutions to receive the AASHE STARS Gold rating. The Sustainability Tracking, Assessment and Rating System (STARS) provides a transparent self-assessment framework to allow colleges and universities to gauge progress towards sustainability; 697 institutions have registered to use the STARS Reporting Tool" (ASU, 2015). In guest post *Towards a Sustainable University* Cortese also cites ASU's sustainability performance and instrument implementation¹⁴: "The campus was one of the first in the country to commit to achieving carbon neutral operations, and it has the largest on-site solar-powered electricity generation among US institutions of higher education. Because of such advances it received a "Gold" rating in the Sustainability Tracking, Assessment & Reporting System which measures progress in seventeen areas ranging from education, research, operations, and investment for seven hundred institutions" (Cortese, 2016). Furthermore, notable ASU GIOS sustainability researchers were directly observed to contribute to improving sustainability reporting and standards at ASU in their teaching, research and practice activities. Bruno Sarda, an ex-sustainability Executive at Dell, made donations and used to pay interns on projects to do with sustainability reporting. He now helps to coordinate the Executive Professional Master's Program that Dalrymple also attended before his leadership of USP. Some evidence goes against ASU's strength in the social responsibility standards though, as seen in Kuby's account that alludes to the underdeveloped asset "to understand the social-side, which is perhaps the reason why they do not score too highly on the STARS assessment ratings" (Kuby, 2016). However, Carr-Kelman's account seems to explain this apparent contradiction as she mentioned that "Walking the talk is an incredibly massive undertaking", including saying that AASHE STARS reporting is reflected in the USP, yet that AISHE and STARS criteria are skewed towards smaller schools. "We want AASHE STARS Gold/Platinum standard – "a lot of what we're doing is to with managing unit-level resources". "ASU is known for Sustainability!" "It needs staff-level engagement" (Carr-Kelman, 2016). Finally the reference to the AISHE STARS and Carnegie Foundation projects is made by another ASU sustainability scientist, corroborating Boone's reference to the Carnegie and Community Engagement projects (Anonymous 4, 2016).

14 Evidence online: <https://stars.aashe.org/institutions/arizona-state-university-az/report/2014-02-28/>. Accessed December 2018.

6.3.3 ANALYSIS OUTPUTS

6.3.3.1 SUBSTANTIATING ASSOCIATIONS & LINKS USING NETWORK SIGNIFICANCE

Table 4 presents the output of the conceptual associations produced when internal evidence linked more than one category or code. When more than three quotes were shared between codes, the relationship was tested to establish the pathway or action strategy that ASU ostensibly took. Associations, as expected before the case work began, are cross-scalar *as well as* cross-perspective. Meso-level categories, such as *OCM 2.2 Collaborate to Innovate* are interestingly linked to macro-level ones like *SER 3.4 Asset-based community development* and is a part of the process for, *SER 5.3a, integrated sustainability praxis REOGC* (research, education, operations, governance, community). Given the density of the links and overlap with the data, this suggests that a series of steps may have been taken along a pathway of organisational transformation, indicating a distinct action strategy. The substantiation of denser associations and links (for example more than three clear links between codes) allowed for the potential causality ('is cause of') to emerge in these relationships.

Network Maps Synopsis

Many network diagrams were also used as a tool in Atlas, to substantiate, re-evaluate, apportion, and validate links and associations made in the data. Not all network diagrams are included in this report due to scope and length. Some examples of maps relevant to testing certain categories' relationship with the internal evidence, particular interviews with associated documentary corroboration, and for each action strategy are included in Appendix 2. These cover what we considered to be the most notable, interesting, and significant accounts. 11 maps in total were used in this hermeneutic unit. The maps shown in Appendix 2 were mapped onto the diagnostic tool template to produce the action strategies and unique transformation signature. The next section demonstrates and describes the outputs of this procedure. An example, *Map 1*, in Appendix 2, depicts the highest weighted and most interconnected categories of the 33 analysed, tracing out ASU's pathway.

6.3.3.2 SCALAR PERFORMANCE COMPARISON

Charts 1, 3 and 5, from left to right, above, and to the left here, allow are a visual comparison of ASU's sustainability transformation performance at the micro-, meso-, and macro-levels. Alongside each other, we can see that ASU's most pronounced assets appear at the meso-level, when it comes to internal organisational sustainability governance (W=8.9), purposeful-adaptive change management, and sustainability research demonstration, both at W≈6. It also shows a strong aptitude at the macro-level with respect to impact and awareness of its research and education in the community, at over W=6. However, at the micro-level, there are not as many highly weighted rubrics with W≥5. All this suggests an organisational design and change management aptitude in transformation towards sustainability, with the need to further develop bottom-up, intrinsic competencies and capacity.

Table 5 (below): Associations made from linking data, produced from the Atlas analysis tool 'List of Code-Code Links' with comments. Two distinct strategic chains of categories connected by the internal evidence are shown in **purple** and **blue grey**. The column 'Link Type' shows the type of association in Atlas. Whether dialogical (two-way interaction observed between actions, strategies or episodes), or unidirectional (one episode, action or pattern of behaviour clearly affecting another), these are reflected by two-way or one-way arrows in the transformation signature.

Source	Link Type	Scale	Lens	Target
1.5 Organisational positive behaviour	is part of	Meso-Macro	BSP-BSP	1.6.1 Organisational experimentalism
1.6.1 Organisational experimentalism	is associated with	Macro-Macro	BSP-BSP	1.6 Organisational action research
2.2 Collaborate to Innovate: extrinsic change-agency	is associated with	Meso-Macro	OCM-SES	3.4 University-driven asset-based community development
2.2 Collaborate to Innovate: extrinsic change-agency	is part of	Meso-Meso	OCM-SER	5.3a Integrated sustainability praxis across functions
2.4 Organisational-societal learning	is associated with	Macro-Meso	OCM-OCM	2.3 Purposeful-adaptive evolution
3.1 Transformative agency: sub-optimal practice challenge	is cause of	Micro-Meso	SES-SES	3.2a Internal governance for sustainability
3.4 University-driven asset-based community development	is part of	Macro-Meso	SES-SER	5.3a Integrated sustainability praxis across functions
5.3a Integrated sustainability praxis across functions	is property of	Meso-Macro	SER-SER	5.3b Integrated sustainability praxis external impact
3.1.2 Effective Transformative Leadership	is property of	Meso-Micro	SES-SES	3.1 Transformative agency: sub-optimal practice challenge

Source	Link Type	Scale	Lens	Target
5.4 Ideal-typical Transdisciplinary Research Praxis	is cause of	Meso-Macro	SER-SER	5.7 Research and education generates societal impact and public awareness 5.3b Integrated sustainability praxis external impact
5.7 Research and education generates societal impact and public awareness	is part of	Macro-Macro	SER-SER	
5.5 Sustainability research demonstration, knowledge enterprise	is associated with	Macro-Meso	SER-OCM	2.3 Purposeful-adaptive evolution
5.5 Sustainability research demonstration, knowledge enterprise	is associated with	Macro-Micro	SER-SES	3.1 Transformative agency; sub-optimal practice challenge

6.3.3.3 ASU TRANSFORMATION SIGNATURE & ITS ACTION STRATEGIES

ASU's performance is visually depicted using the diagnostic tool, using the proximity and overlap of categories of analysis. Using Atlas.ti, categories were mapped against each other according to groundedness and density respectively. Any code scoring higher than 10 in number of co-occurring codes are included as significant in the action strategy. This was substantiated by re-evaluating internal evidence undergirding links using the network map function in Atlas. The connections tracing out action strategies are shown in Table 5. Further criteria of inclusion into the action strategies include: **Gr**≥10; **De**>2. Arranged semantically and according to scale level, the associations were charted onto the ID-tool template producing the action strategies that holistically form ASU's unique 'transformation' signature. Certain elements are shown as larger or more highlighted based on their weightedness value (see Section 6.3.2).

ASU Action strategy A 'Agency, leadership, reflexive governance and organisational learning in the region' in **purple** depicts transformative agency (*SES 3.1*), affected by effective transformative leadership (*SES 3.1.2*), and the challenging of sub-optimal practices linked to internal governance for sustainability (*SES 3.2a*). This aspect is in turn interestingly linked to the rubric for sustainability research demonstration (*SER 5.5*), as the deliberative top-down redesign of ASU's organisational processes by Crow and his policy office shows. They researched the historical trajectory of university institutional models, grounding ASU's New American University Prototype as a new iteration in the shift from agency to enterprise (President's Office, 2012). Thus, we see the link with the purposeful-adaptive evolution of ASU (*OCM 2.3*). Furthermore, this links into ASU's sustainability governance structure for sustainability (*SES 3.2a*) which has evolved into quite a functional system when we consider the size, scale and scope of its activities as a comprehensive knowledge enterprise. *SER 5.5* is cross associated with ASU's ability to learn about itself and its societal surroundings (*OCM 2.4*). The effective governance and demonstration of sustainability in the organisation substantiates ASU's role in the Phoenix-Tempe-Mesa region's transformation towards sustainability, and acts as a clear indication of their departure from traditional modes of governance.

ASU Action strategy B ‘Transdisciplinary sustainability research and education, praxis and organisational experimentalism’ in **blue-grey** occurs mostly at the meso- and macro-levels. Notable is the incidence of transdisciplinary research praxis (SER 5.4). Several interviews with staff members reference ASU education and research generating societal impact and public awareness (SER 5.7), including the Dean of SOS and the Joint Directors of GCSO. Evidence shows the presence of the rubric cluster of integrated sustainability praxis (SER 5.3a), depicting a knock-on of integrating sustainability across portfolio functions being effectively implemented in the region (SER 5.3b) through ASU’s various spin-off communities; for example, the SkySong Center (President’s Office, 2012), and trans-institutional networks such as GCSO. SER 5.3b is interestingly connected to ASU’s ability to run test-beds, and campus labs, shown by the rubric organisational experimentalism (BSP 1.6.1), in close connection with organisational development and action research at the macro-level (BSP 1.6), partially orientated by positive organisational behaviour (BSP 1.5). Further links across into leadership agency for response to extrinsic drivers, (OCM 2.2), and university-driven community development (SES 3.4) show significant internal processes connected to external impulses ASU makes for the public good.

Transformation Signature ASU: Summary

The transformation signature of ASU is characterised by two action strategies, showing that agency, leadership, reflexive governance and organisational learning in the region (A), as well as transdisciplinary sustainability research and education, praxis and organisational experimentalism (B) played an important role in ASU’s transformation. The next section, the discussion, expands on the meaning of the data analysis from the intelligence gathered.

At ASU, the transformation signature includes two action strategies, shown in **purple** (A) and **blue-grey** (B) in **Figure 7** on the following page:

Figure 7: Arizona State University Transformation Signature, consisting of two distinct action strategies. The visualisation is designed to allow a holistic view, with rubrics shown proportionally according to groundedness (as in Charts 1-6); conceptual density/type of association is represented by arrow design. ASU's signature is weighted more towards the meso-level, then the macro-level, with the SER lens dominating, followed by the SES and OCM lenses, respectively.

6.4 DISCUSSION

Rooted in the previous analysis, this section discusses the accounts, interpretations and corroborating evidence for the competencies, qualities and patterns unearthed at ASU using the diagnostic tool. These organisational assets, illustrated by the highest-weighted rubrics, form part of ASU's overall sustainability transformation pathway. This is, in turn, composed of distinct action strategies, which actors in ASU employed to navigate the transformation pathways observed. In fact, each action strategy could also be interpreted as its own coherent pathway. This level of insight and detail has been achieved through applying the diagnostic tool. Now that the first research question has been answered in detail, showing the assets – competencies, qualities or patterns – discerned using the tool, and that the signature of organisational transformation for sustainability has been presented and described in *Section 6.3.3.3*, this section zooms out to discuss its meaning, structure and characteristics. During the final stages of the analysis, it was hard to separate the actor's roles from the process and structure of the transformation pathway. The discussion has therefore been structured according to the three scales followed in the diagnosis. The micro-, meso-, and macro-level sections each discuss the evidence produced in the analysis in different yet inter-related ways, for example, by looking at the patterns created by the action strategies in the context of the bigger picture, and interpreting defining roles of the actors who have navigated pathways of transformation to sustainability at ASU.

6.4.1 MICRO-LEVEL: ROLES & AGENCY IN THE TRANSFORMATION PATHWAY

This section helps to paint a meaningful picture of certain types of actor and the roles they play in the transformation pathway by highlighting emerging themes which could be reproduced under certain conditions elsewhere.

General Account of Community Identity: the ASU Design Aspirations

From the studied experience of ASU actors, one of most significant facets of community identity we noted are the eight design aspirations which occur throughout the time period studied (2002-2016). Crow's White Paper - the first reference found in this investigation to the design principles -appeared to guide the creation of a new American University identity, community, and culture: they acted as the compass with which ASU navigated its transformation from 2004 onwards and appears to punctuate the equilibrium of the traditional American institutional model, rehabilitating its design flaws as set out by Cummings (2010) and others. The design aspirations, after first being presented in 2003, were subsequently referred to as 'principles' and 'imperatives', in Cummings' ASU case study of 2010, other governance documents, and in conversations with stakeholders. These principles are also visible on campus and are part of the language and culture of ASU according to the present study. Representing a systemic change initiative, the language, actions, and organisational perspectives they have since encapsulated, are coded with a number of categories from the diagnostic tool: *BSP 1.1 Psycho-social wellbeing*; *OCM 2.3 Purposeful-Adaptive evolution*; *OCM 2.4 Organisational-societal learning*; *SES 3.2a Internal Governance for Sustainability*; *CGS 4.4 University Social Responsibility Assumption*; *SER 5.3a Integrated sustainability praxis*; *SER 5.4 Ideal-typical Trans-disciplinary research praxis*; finally, *SER 5.6 Minimise negative health, socio-economic and environmental effects*. This confirms the *ex-ante* observation that despite not being explicitly 'about' sustainability, the design imperatives can be interpreted in

various shades of sustainability, including psychological, organisational change, socio-ecological systems, governance, and social responsibility aspects.

Figure 8: The Eight Design Aspirations of the New American University. Displayed visibly across ASU campuses.

'Our Graduates are our Sustainability Outcomes'

Another defining role appears with the identification of students as the outcomes of ASU's sustainability transformation. Nixon-Carter, Boone, and Melnick all indicated that students are *the biggest* outcomes of ASU's transformation. This reveals how developing and employing trans-disciplinary scientific and societal praxis (*SER 5.4*) in academic institutes led to ASU's research and education generating societal impact, raising public awareness (*SER 5.7*) via students coming into contact with them once they graduate, becoming active in communities and other organisations. This pattern is also why *SER 5.4* is depicted as cross-scalar in *Figure 4*: it is both a macro-level property in terms of the relationship between ASU and its external environment, as well as a meso-level one with respect to the organisational quality of transdisciplinary configuration and praxis in the campus academic and student community.

In spite of this, claims that SOS has low accessibility seem to contradict the design aspiration of inclusivity of the broad socio-economic diversity of students from the region into ASU as a whole; to be clear, Koster positively illustrated the challenge of applying the principle of inclusivity across the institution whilst avoiding too much exclusivity from the increasing success of the GIOS-SOS education (Koster, 2016). Albeit, this very critique, as Slaymaker indicated, represents the roles students play as sustainability leaders and change-agents once they start implementing the critical and systems thinking they were taught to use on their own university. Continuing this line of thinking, in terms of intrapreneurship (3.1.1) and transformative leadership (3.1.2), significant assets of ASU transformation signature can be further implemented in an extension of actors' current roles, utilising the overarching knowledge enterprise development of transdisciplinary configurations and interdisciplinary networks.

Sustainability Liaison Officers

As we saw in the early interviews at GIOS/SOS, institute managers and leaders played

a key role as ‘liaison’ points across organisational units, mediating contributions of different schools towards sustainability early in the GIOS journey. They appreciated the various standpoints and histories of respective faculties’ sustainability initiatives and diversified as ambassadors throughout the colleges and the schools to approach their needs first, and to address what and how they would potentially tackle sustainability from their point of view. This type of role emerged from the interviews with Carr-Kelman and Slaymaker. Comparing this role with the strength of top-down redesign at ASU, we begin to see why certain actors recommended greater bottom-up student engagement; it also makes logical sense as these student ‘liaison officers’¹⁵ could help to rebalance the perception of ‘too much top-down’ and reduce friction from certain schools as Carr-Kelman illustrated. Under these circumstances building on a ‘student-driven-staff-supported’ mission, as seen at Changemaker Central, for example, may well have great potential to help tap into the vast and diverse student body’s ideas on sustainability solutions at ASU.

Transformative Leadership, Philanthropy, and Top-down Redesign

President Crow’s role as a transformative leader clearly had a strong effect on the driving momentum along pathway towards sustainability. This role plays out across scales as seen with the respective rubric of *SES 3.1.2 transformative leadership* in Figure 4. For example, our analysis shows how Crow’s leadership operates across ASU via the organisational unit of the President’s Office. A notable example of the effects of Crow’s leadership can be seen in the engaged philanthropy of initial supporters who became inspired by ASU’s research, education and organisation, such as Julie Ann Wrigley, present at the Temozón summit where Crow ostensibly discussed his vision. Such was her belief and willingness, that she invested heavily in the ASU sustainability enterprise to the sum of \$25 million, which was a significant drive that “*would move the university from a modest and traditional environmental approach under Redman to the opening of the ground-breaking Sustainability Institute*” (Cummings, 2010, p. 109).

Crow selected his grounds for transformation from a short list of other universities, choosing ASU it seems as fertile ground for the redesign process. As there has been entrepreneurial behaviour identified in the student and staff community at ASU, it is also seen with Crow in the context of the constraining institutional architecture of traditional American higher education. He selected ASU with respect to its surrounding community and State as in dire need of positive change and set in motion the participative experiment that eventually became the prototype of the New American University. Therefore, the transformative agency of institutional entrepreneurship helped ASU overcome constraining institutional (and arguably, also, political and economic) infrastructure.

6.4.2 MESO-LEVEL: IDIOSYNCRASIES, GROUP AND FACULTY EXPERIENCE OF THE TRANSFORMATION PATHWAY

This section presents exemplars, defined as unique, context-specific components of ASU’s pathway of organisational transformation. After retrospection on empirical findings, research notes and journals, the results, campus and community impressions,

¹⁵ This term was not used at ASU – I considered this term was the most fitting way to describe this type of role based on the literature research of corporate governance, finance and CSR.

and methods, these exemplars emerged. These are useful to examine idiosyncratic cultural, and socio-organisational aspects of ASU, which more tangibly and meaningfully depict transformative performance. They also represent selected cross-organisational initiatives which are intellectual, social, and material outcomes of the sustainability transformation studied.

6.4.2.1 ASU'S OFFICE FOR KNOWLEDGE ENTERPRISE DEVELOPMENT (OKED)

The Office for Knowledge Enterprise Development is a tangible organisational innovation that allows this differentiated major departure from traditional PRUs. Artefact 1 presents how the ASU experiment has embodied this concept of knowledge enterprise in practice, with specialised, yet university-wide, interdisciplinary research institutes and initiatives and transdisciplinary configurations, set up with the objectives to, as stated in 2016: *“enable scientists and scholars to collaborate freely across disciplines; connect with clinical, government and corporate partners; and provide the teams and infrastructure to win significant funding opportunities”* (ASU, 2016a). The configurations, institutes and initiatives aim to resolve complex global challenges that emerge from, for example, population growth, urbanization, globalization, and technological advancements. They draw disciplinary insights, techniques, and approaches from science, social science and the humanities, stating that researchers create innovative and sustainable solutions to these problems (ASU, 2016a).

As stated on the website in 2019, ASU Knowledge Enterprise Development focusses on *“solutions-focused, interdisciplinary research; an entrepreneurial approach that is embedded in every school and department; and a commitment to transform positive way”*, is ‘transdisciplinary’, ‘use-inspired’ and ‘agile’. It is driven by a specialised leadership team, headed by Sethuraman Panchanathan, Executive Vice President, ASU KED, and Chief Research and Innovation Officer, and holds a series of ‘KED-Talks’, one of which includes Duke Reiter describing his current work that our interview provided an early indication of (ASU, 2019). This appears to manifest the aspiration to scale ASU’s impact in the region using testbeds. Use-inspired research via Knowledge Enterprise Development also proliferates across disciplines, with examples including ‘QESST’, the National Science Foundation Engineering Research Center for Quantum Energy and Sustainable Solar Technologies, and GCSO.

6.4.2.2 GIOS: A SUSTAINABILITY RESEARCH INSTITUTE RUN LIKE A START-UP

As Cummings stated in 2010, *“New institutions are needed to provide the interdisciplinary and solution-driven framework that sustainability requires. ASU’s Global Institute of Sustainability was designed to fill this need”* (Cummings, 2010, p. 72). GIOS, which includes SOS, is the primary vehicle by which the university establishes and pursues a comprehensive set of goals on sustainability education, research, and practice. They practice an inverted model regarding their respective organisational structures - see *Figures 10 and 11*.

Figure 9: Depiction of ASU's Office for Knowledge Enterprise Development. Own design, not ASU-produced. Based on 2018 updated information found at: <https://research.asu.edu/about-us>.

Figure 10: ASU Innovation: Inverted Academic Unit-Institute Model

Figure 11: How GIOS/SOS share ownership of disciplinary strands of sustainability with other schools to reduce tensions.

Trans-academic interface management was a term used by one anonymous ASU sustainability scientist to refer to the three steps of research education and practice specific to ASU's sustainability research demonstration and knowledge enterprise (*SER 5.5*). Further discussion with Carr-Kelman allowed a better understanding of the innovative organisation of academic and research missions at GIOS/SOS as examples of the broader ASU organisational design for sustainability. In a traditional academic unit and institute structure, the academic unit is hierarchically above the institute, whereas at ASU this was 'flipped on its head' to produce the Institute (GIOS) over the academic unit (SOS) – see *Figures 10 and 11*. This is further bolstered by the Institute having a direct reporting line to the President. Melnick corroborated this, mentioning Crow's push to hit the reset button on GIOS in order to provide evidence that GIOS enables and impacts sustainability outcomes globally.

The knowledge enterprise and transdisciplinary configuration of GIOS extends further into the Walton Sustainability Solutions Initiatives Service, which in 2016, initially seemed like a spin-off executive education, sustainability consulting and leadership training branch of ASU. In 2006, the renowned American philanthropists Rob and Melani Walton joined ASU's sustainability education efforts and research on the ASU Sustainability Board. In 2012 they 'cemented their investment' to accelerate sustainability efforts with a €27.5 million, powering Walton Sustainability Solutions Initiatives. In 2018, the Walton's increase investments to €31.8 million, with the result that Walton Sustainability Solutions Service becomes a permanent sustainability consultancy establishment connected to GIOS and ASU, as an evolution of the initial Initiatives programs also housed as a unit within ASU Knowledge Enterprise Development (ASU, 2018). The structured series of images taken on site in *Figure 12* shows how GIOS developed iteratively, as Melnick explained in the 2015 Townhall meeting and our interview (Capaldi, 2009; Melnick, 2016; Tromp et al., 2015).

The School of the Sustainability (SOS) – established in 2004 – can also be seen as the university college-level enterprise engaging units throughout the university (ASU, 2015). SOS was the first in the entire USA to grant sustainability degrees in 2006, now offering a wide variety spanning the natural and social sciences, from bachelor's to post-graduate and PhD-level. This seems to put into perspective the pivotal role GIOS and SOS played in the ASU transformation, as well as the properties of its trajectory that are still left to play out via GCSO and the fourth iteration of GIOS as a sustainability knowledge enterprise.

6.4.2.3 THE GLOBAL CONSORTIUM FOR SUSTAINABILITY OUTCOMES: LEVERAGING IMPACT GLOBALLY

The Global Consortium for Sustainability Outcomes (GCSO) is the representation and scaling of GIOS®4.0, a knowledge innovation that increases collaboration between pioneering universities to share and apply each other's sustainability solutions. GCSO was barely common knowledge to the ASU community, very fresh at the time of the field work, and was not formally recognised until October 2016. GCSO is an outcome of the observed iterative design of GIOS (see *Figure 12*), beyond GIOS®3.0. Additionally, it is a long-term realisation of goals made at the Temozón forum in 2004,

as the report states: “*Boundary-spanning organisations will play a critical role in the fusion of the knowledge modes; the advancement of knowledge in sustainability; and the creation, transfer and application of knowledge for sustainable development*” p.20 (W. C. Clark et al., 2004). The association between GIOS®4.0 and GCSO, including the corroboration of Boone, Reiter, Carter and Melnick’s accounts, allowed the association between categories *SER 5.3b*, *SER 5.7*, and *SES 3.2a*, which trace out definitive steps in both action strategies making up ASU’s transformation signature.

Fundamentally, GCSO is a federation of universities and research institutes that collaborate to develop, test, teach and transfer potential solutions to worldwide sustainability problems. They define a sustainability outcome as where “*a sustainability problem was reduced, eliminated or deflected by applying a research-based practical solution*” (Melnick, 2016; Tromp et al., 2015). The supposed reduction or deflection could still be fluid and resurgent; hence, a variable requiring systemic coordination and entrepreneurial behaviour at scale. Relevant parts of their value proposition as at August 8th 2016, when its Directors and Founders admitted it still needed validating and refining, are, for example: visibility for international leadership in sustainability science and solutions; purposeful, global connections in sustainability science; enhanced collective competitiveness for funding; positive branding from association with leading institutions; contributions to the public good; connected brainpower to design scalable solutions to global issues of sustainability. Additionally, they aspire to translate this into implementable actions, including: identifying champions at each institution, determining highest priority members, and validating and refining the value proposition.

ASU, and other cases in this PhD project, were selected in 2014/2015 according to specific criteria for sustainability in institutional governance, policy, strategy and design, *before* the network even existed¹⁶. This builds the case for action-oriented research of the network of institutes for global impact with mutually *co-created*, sustainability outcomes, which represent the holistic function of the whole network. As its founder states, sustainability solutions are not being produced quickly enough in order to keep up with the pace that sustainability problems arise globally. GCSO was therefore created to transcend the institutional design boundaries that restrain individual universities, and is considered a positive example of how sustainability research institutes can circumnavigate constraints via transformative design.

6.4.3 MACRO-LEVEL: STRUCTURE & CHARACTERISTICS OF ASU’S ORGANISATIONAL TRANSFORMATION PATHWAY

Throughout the analysis, the concept of ASU as a ‘complex-adaptive knowledge enterprise’ stands out in its governance and organisational design; in practice ASU’s specific ‘knowledge enterprise’ approach links specialised, university-wide, interdisciplinary research institutes, initiatives, and transdisciplinary configurations, to make a ‘complex-adaptive’ organisational system. Under these conditions, such configurations – inter and/or transdisciplinary - develop solutions to complex global challenges, ranging from population growth, urbanisation, automation, to

¹⁶ All three case studies are currently member institutions of GCSO. This was unknown until the ASU field work, July 2016.

space exploration, across diverse disciplines (ASU, 2016a). Hence, complex-adaptive knowledge enterprise embodies the design and philosophy of the New American University Prototype (Crow & Dabars, 2015a). It also undergirds the conceptualisation of codes *OCM 2.3*, *OCM 2.5*, *SER 5.5*: the means by which the New American University ‘model of differentiation’ transformed how it conceived itself, and thus impacted on its external environment in the region.

The critique of how the scientific community organises and embeds itself in society can be seen as a major argument driving ASU’s transformation. The analysis highlights this with how Crow and team convened the global sustainability science and higher education leadership community in Temozón in 2004. As Rotmans argued in the outcome report, *“In order to address the under-addressed social component ... we must confront cultural and institutional issues... a social conscience needs to be injected into the scientific community”* (W. C. Clark et al., 2004, p.3).

Figure 12 below shows a timeline of key landmarks in the institute and school’s development are marked in four iterations. The images taken depict plaques along one flank of walls on the 2nd floor of the Wrigley building, where the School of Sustainability (SOS) and the GIOS (GIOS) are located.

In the interview with *Rob Melnick* he explained the evidentiary, ‘undeniable causality’, and linearity of the graduation from 1.0-2.0, however as shown in the analysis earlier, demonstration of evidence of impact was more complex. GCSO became GIOS’s answer to pressure from the President to hit the reset button regarding scaling of the 3.0 model. This led to the establishment of GCSO, planned as a hub for global sustainability outcomes.

Figure 12: The Maturation of GIOS®/ Evolution of ASU's Commitment to Sustainability

Related to the characteristics ASU's leadership instilled into its redesign process, three research challenges were identified there to address issues related to scale, current limits in economic theories which have no capacity to value beyond multiple generations, and the need to establish "excellence" in sustainability science. A notable emphasis was placed on the need for transition towards *"an exploratory approach... that is more socially relevant"*. This analysis validates this by revisiting what ASU has actually achieved throughout the course of its organisational transformation against the backdrop of another major external shock; this being the increased cuts to state Higher Education funding by almost 50% in Arizona over the period 2002-2012, driving the leadership change and subsequent reconceptualisation from 2002 onwards (ASU, 2013). A summary of successful deliverables was issued by the Office of the President in 2015: firstly, they succeeded to greatly expand the number of graduates; secondly, they increased numbers of graduates of lower income families; thirdly, they shared every innovative tool developed, and lastly they actually lowered the cost of producing a graduate (ASU, 2015). This is remarkable given the major external challenges ASU faced. Higher education state funding cuts hit Arizona State the worst in the USA.

These barriers, and others, such as institutional isomorphism¹⁷ and fliopietism¹⁸, were treated like challenges to innovate around with the New American University Prototype. These broad system-level issues in the public administration of research universities identified by Crow and his team are generally avoided or ignored at other PRUs; however, in spite of its impediments and reputation, ASU has shown success through the actions of its students and staff, serving the communities to fulfil their mandate to generate public good and societal impact. Their implemented solution, according to Melnick, is that after 2008, *"we moved aggressively to become more cost-efficient and seek strategic partnerships"*. Both Crow and Melnick mirror the same account, also ASU's argument to the State: *"You fund us for the wrong thing". "It shouldn't be our enrolment but what we produce. We produce three things: people, ideas, gizmos or devices"*.

In our interview, Dean Boone developed the image of ASU breaking through barriers, yet still being somewhat constrained by them. Articulating the challenges faced in the sustainability transformation, he used an analogy, confirmed as a good fit by Melnick and Slaymaker, of the state of play: *"Everything is tied up on the ship, and it is almost ready to set off, but the ropes have not been cut yet"* (Boone, 2016). This adds meaning to the perspective on GIOS and SOS's leadership, its preparedness, awareness, and perseverance. This means in practice that the New American University is still battling with the bureaucracy of the traditional university institutional model and system, at a scale larger than itself. Incentivisation in the promotion and tenure of faculty was seen as the biggest obstacle. This needs to be overcome involving a 'club of academics', leveraging the 'faculty as a guild', 'who are willing to be measured beyond the traditional research and educational measures' (Boone, 2016).

17 From the Greek; equal-shaped. Implying a bimorphic 'copy-paste' approach to organisational design.

18 Latin root, meaning the excessive or irrational glorification of tradition.

Figure 13: Fiscal support for HE per \$1000 personal income (ASU, 2013).

A clear demonstration of the substantial decline in funding in Arizona from a marked drop after the Global Financial Crisis of 2007-08. However, ASU has more than doubled the amount of federal money it attracts for research *despite* a significant reduction by almost 50% of fiscal state funding to higher education in the period 2007-2013.

Arriving at a culture of change is hard. In the past, the command from the top-down was sometimes seen as not aligning with the actual reward structure that needs to reinforce it, as noted by Redman in Cummings (2010). The consultancy, ‘Second Nature’s, analysis of the internal sustainability strategy at ASU-GIOS in 2013, highlighted the influence of funding institutions and professional communities, and the predominance of disciplinary divisions as barriers. This adds the common theme of tenure-track incentivisation that interviewees gave. Together with Boone’s ‘tied-up ship’ analogy, we can interpret this policy-driven incentivisation as the ‘ropes that hold back the ship’ of professors, who may want their performance, practice, research and teaching to be evaluated according to sustainability-linked criteria. In its attempt to resolve this, ASU seems to have proven early critics wrong by flipping the traditional academic model on its head.

Redman worked to pull faculty together and, with Wiek and team, helped create new future and problem-oriented thinking in the teaching of sustainability competences that went beyond the traditional descriptive-analytical agenda. Tensions identified by Cummings arose from the disappointment of the leadership over the bifurcation of GIOS and SOS¹⁹. We can see a more recent example of leadership tension at GIOS in the drive for ‘evidentiary impact’ which seems to have resulted in the Global Consortium for Sustainability Outcomes (at the time of analysis, promising, at

¹⁹ This tension, in more recent development, appears to have played out in another top-down redesign of the GIOS-SOS set up under the Global Futures programme. It is as yet still unclear what kind of evidentiary impact Crow would have liked to have seen from GIOS-SOS in order for this move to have been avoided.

the time of thesis publication, strangely absent). To summarise the endeavours of the sustainability academics and change-agents at GIOS and elsewhere in ASU leadership is to say that they were “constantly balancing constituencies”; this balance is shown as an important method for actors in good boundary organisations (Guston, 2001). It is always a challenge, as a leader, to determine whether or not to interfere in this balance. This research recommends treading carefully, like a gardener nurturing the budding plants, rather than overcutting and rearranging, which, any gardener will tell you, is not so good for one’s garden.

To round off the discussion, the culture at ASU has shifted to make research and education more interdisciplinary. Results underscore how hard it is for large universities, which employ thousands of researchers, to alter their fundamental character by uprooting entrenched academic disciplines (Fischman, 2014). Yet ASU has appeared to shift the needle. In the past at ASU, there was somewhat of a critique of the overly academic perspective of social embeddedness, as well as the dangers of treating the local community like lab-rats, where data flows are too one-way: *“Documents are not regularly disseminated to the community in which the study took place”* (Fern Tiger Associates, 2006). FTA concluded at the time that *“ASU has determined that a plan for a comprehensive, long-term evaluation needs to be designed at the onset which assesses and analyses related programs and activities, whilst also measuring the transformation of the University and community”* (Fern Tiger Associates, 2006, p. 16). FTA’s recommendation for a long-term evaluation was ostensibly followed, as references to the Carnegie and Community Engagement projects show, yet a systematic measurement ASU’s own transformation could not be found. Fern’s recommendations from 2006 seem to still apply to the current situation: repeat and expand upon them to support, leverage and train into others in the clear competences of assets-based community development and action research evinced by key actors like Cloutier and Wiek.

Mike Searle, ASU Provost and Executive Vice President, praises the capacity of the ASU community: *“we’re capable of accomplishing things that most simply avoid, or that they don’t address.... We can do this through student accomplishment, research, service and embedded connection to community”* (ASU News, 2015). This quality can be viewed through the lens of positive organisational psychology: to persist in allowing the student’s successes as graduates in their careers, and the skills they bring employers, to speak for themselves. Traditionally, this more qualitative definition of success would correspond to student retention, attraction, graduation, and employability rates. It follows that the more sufficiently incentivised tenure-track faculty there are - according to renewed metrics built on sustainability principles in higher education policy - the more effective transdisciplinary or transformational research and teaching is done. This responds to the call by ASU leadership early on in its transformation, reiterating the core principles of inclusivity and rights to higher education for less-privileged inhabitants of Arizona, something which ASU has achieved in practice: *“There is tremendous need in Arizona. There are many more thousands of students graduating from high school, capable of going to college, that aren’t going to college. And we need to get them going to universities, to ASU...because those students in turn will drive the... economic, social and cultural life of the state of Arizona”* (ASU News, 2015).

6.5 CONCLUSION

We can conclude the ASU case study by noting some seemingly inconsistent interpretations of the university's signature approach to sustainability transformation; these interpretations seem to be at odds with each other, yet taken in tandem, help us to understand the importance of balancing the top-down with the bottom-up in navigating organisational transformation for sustainability. Explicitly, at ASU, was it necessary for the transformation observed that Crow 'made enemies', or should a more participatory and incremental approach have been followed? If the latter had been the approach, might it not have been too incremental to achieve the change desired? Once we observe the radical pace, scale, and depth of transformation attained at ASU, the former seems to be the case. Although, the necessity to assertively drive transformation could be debated: whilst it appears to be warranted given the extent of organisational change of ASU's actors over time, and the subsequent emergence of intrinsic competencies for systemic change in their culture, anonymous accounts advised a therapeutic approach to transformation. For ASU's remarkable journey to continue, the meaning and purpose behind the transformation must not be lost. Indeed, it is essential for the leadership to remember and reflect on the roles and agency of those involved in the sustainability transformation thus far: *"Practicality and prioritisation may prevent people lifting the rug up to look and examine deeper; they might be conscious, but activism is not comfortable or convenient"...* *"Sustainability has such a moral undercurrent that reflection is essential"* (Anonymous 4, 2016). Overall, this 2016 case-study depicts ASU as an enterprising yet intrinsically differentiated change-agent in wider society; it has been guided by the social, environmental, cultural and political drivers of Arizona, and is a major departure from the traditional model of public research university. This is corroborated by the analysis of a targeted group of ASU stakeholders in its transformation, as well as a swathe of independent, policy, governance, and strategy documents. The findings suggest that effective redesign from the top-down, allowing for intrapreneurial behaviour, is driven by intellectual transformation and academic reorganisation articulated by leaders such as Crow and Capaldi (2009). This allows us to characterise ASU's journey as an organisational transformation for sustainability over the last 15 years. ASU's 'design aspiration' values, visible across campus, seem to have allowed for a shift in culture, building a pro-sustainability knowledge enterprising school spirit. Having inquired into what the core values were to achieve their objectives, Crow's office, in parallel to other academic, administrative and student change-agents created a sense of ownership that weaved sustainability principles and practices into campus life. Although this was most observed at SOS/GIOS, its satellites and linked schools and colleges, it may still lack elsewhere across ASU by some accounts.

The culture experienced by this research can be characterised as egalitarian, pragmatist and entrepreneurial, however the sample size is not large enough to say this is the case for the whole institution. Yet, many interviewees are senior enough, or at a more central administrative level to have sufficient overview; their accounts seem to support the interpretation that the ASU-wide culture is one that sees itself as a test-bed, a self-reflexive social and organisational experiment through which to achieve the eight design aspirations. Indeed, one real achieved impact has been the reduction of social inequality through increasing access to higher education of students from lower socio-economic quartiles in Arizona. This study has shown that this was no

accidental process, and indeed was most likely an outcome of external engagement, and the tenacity of the major departure articulated early on by the UDT and Crow. Their planned redesign attracted key external support, setting up smart research revenue foundations able to independently generate funds against the backdrop of drying up government support. According to internal communication between ASU stakeholders, this vision spurred program development that enabled sustainability to be incorporated into the curriculum ahead of its time, which in turn lead ASU into a complete transformation of society's traditional view of a university. Currently, ASU change-agents - including notable alumni interviewed - still appreciate and create opportunities to explain the New American University model to external actors, as well as ASU's learning trajectory, and the types of innovation that 21st century higher education needs to tackle global sustainability challenges. In this dialogical manner, drumming up and leveraging political and industrial support from the outside-in, by translating the value of sustainability to those not previously inclined to it allowed more traction for sustainability transformation from the inside-out. The strongest assets of ASU's signature approach made tangible include transformative leadership, internal governance for sustainability, purposeful-adaptive evolution, organisational experimentalism, positive behaviour, and sustainability research demonstration, teaching its own community how to communicate with others using one of many liaison points in its knowledge enterprise development. Fundamentally, the findings show ASU has tried and succeeded to 'flip academia on its head'. We can therefore say that the New American university prototype show signs of promise and traction for an uncertain and crisis-ridden future, having undertaken a signature approach of organisational transformation for sustainability. Yet, in dynamic, complex-adaptive organisations such as ASU, change appears as relentless²⁰.

Addendum to ASU: July 2018-December 2019

Expectations of top-down leadership are continuously so high that units struggle to live up to them over longer periods, leading to transformative exhaustion. This can be seen as one end of a spectrum, whereby transformative change occurs so constantly that organisational units simply cannot keep pace with the transformative leadership - on its own not a negative thing, but as observed at LU, sometimes it helps to allow the dust to settle a bit between periods of transformation characterised as we have seen by rapid bursts of discontinuous change and punctuated equilibrium.

One anonymous source allowed a post-script observation concerning the recent major structural changes experienced by GIOS/SOS whereby much that was seen on site in 2016 has now given way to a new system marked by a Global Futures transdisciplinary structure. The President of ASU is clearly a visionary and educational architect, as well as a transformative leader, yet his high expectations create a hard-drive from the top-down, which has been characterised as a prolonged pattern of behaviour during his leadership. This can be connected with advice from another anonymous source who recommended that transformations towards sustainability have to be (not without great difficulty and poise) navigated therapeutically to avoid slipping into an aggressive mode of change that overlooks and fails to appreciate the assets already present before changes are driven through.

²⁰ *The diagnosis herein is relevant to the period researched, and no doubt future changes will occur, and likely already have.*

APPENDICES: CHAPTER 6

APPENDIX 1: LIST OF THE 44 PRIMARY DOCUMENTS CODED IN THE ANALYSIS, NOT INCLUDING INTERVIEWS. MANY ARE SENSITIVE AND THEREFORE NO FULL REFERENCES ARE GIVEN TO PROTECT ANONYMITY OF SOURCES

P 31	Crow 2007 None Dare Call it Hubris.pdf
P 32	Crow 2010 Organising Teaching & Research Address SD.pdf
P 33	Crow Solve for X with U FINAL 020312_0.pdf
P 34	Crow White Paper One University 2004.pdf
P 35	New American University Reader 072611.pdf
P 36	sustainability ops and practice 20160614 MD.pdf
P 37	ASU_Achievements_Revised_121115.pdf
P 38	asu_innovation_2015_yearinreview_web.pdf
P 39	Campbell 2013 Rebranding an HEI using Corp Practices ASU.pdf
P 40	Capaldi 2009 Intellectual Transformation & Savings Through Academic Reorganisation.pdf
P 41	Prospectus.pdf
P 42	Temozon_Report_052104.pdf
P 43	Arizona_State_University Tiger Fern.pdf
P 44	BK Intelligence.docx
P 45	CummingsDissertation-Finished II.doc
P 46	DRAFT Curriculum revision (5).pdf
P 47	Names and intelligence from BK.docx
P 48	SEEDspot DECK- Version 9.pdf
P 49	Agency to Enterprise 2012.pdf
P 50	ASU Community Changemaker 2014.pdf
P 51	ASU Strategic Enterprise Report to ABOR 2013.pdf
P 52	ASU Strategic Enterprise Report to ABOR 2014.pdf
P 53	ASU Strategic Enterprise Report to ABOR 2015.pdf
P 54	ASU_GSV_FINAL_Brande_041516.pdf
P 55	Is College Worth It 2015.pdf
P 56	Issues in Science and Technology.pdf
P 57	Wave_5_of_American_Higher_Education_Evolution_051716_Final_UMT.pdf
P 58	Brundiers & Wiek 2010- Educating Students in Real-world Sustainability Research- Vision and Implementation.pdf
P 59	Do_We_Teach_What_We_Preach_An_Internatio.pdf
P 60	GIOS-TownHall-April-2-2015.pdf
P 61	GIOS-TownHall-November-15-2015.pdf
P 62	2012cla_badge_winner.png
P 63	Arizona's big bet research rethink Fischman 2014.pdf
P 64	ASU & Knewton Adaptive Learning Data-driven teaching 2016.pdf
P 65	Cortese 2016 Guest Post Towards a Sustainable University.docx
P 66	Michael Crow, President, Arizona State University Top Right 30.06.16.docx
P 67	nature_magazine_the_arizona_experiment.pdf
P 68	Personalizing HE Bold ASU 2016.docx

Map 2: Links made between SER 5.7 Research & Education Generates Societal Impact & Public Awareness with SER 5.4 Ideal-Typical Transdisciplinary Research Praxis.

Map 3: An example of the category association and internal evidence justifying this between SES 3.1 Transformative agency, sub-optimal practice challenge, and SES 3.2a Internal Governance for Sustainability. Mentions the SEEDspot, a non-profit incubator for sustainability solutions.

Map 4: Associations made in aspects of organisational behaviour with linked interview quotes and documents. Organisational Experimentalism is associated with BSP1.6 Organisational Action Research, whilst OCM1.5 Organisational Positive Behaviour was found to be a property of BSP1.6.1 Organisational Experimentalism.

CHAPTER 7. CASE-STUDY THREE: HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY EAST MEETS WEST: PROMETHEUS UNBOUND?

“The development of the field is so new and so it’s still being sculpted. Universities are really not good at that, they are structurally set up to make sustainability education, and embedding it, difficult! Even a research professor who is keenly interested is in difficulty”

David Mole.

“We view rankings as useful tools to learn from rather than as goals.”

President’s Report, HKUST, 2016.

SUMMARY

Hong Kong University of Science and Technology (**HKUST**¹) was established in 1992, with approximately 15,500 students, and 650 academic staff in autumn 2018. It boasts a scenic campus with excellent facilities for leading-edge knowledge creation in science and technology. Demonstrably, it is committed to interdisciplinarity, the wellbeing of its students and staff, and has made considerable progress to embed sustainability into its core and supporting processes. HKUST's recent long-term vision on sustainability has been implemented through a 5-year plan, the HKUST 2020 Sustainability Challenge, although efforts to embed it into the organisation can be traced back to a formative and ambitious group of academics who formed the Environmental Sustainability Steering Committee (ESSCOM), and composed the pivotal and influential program, HKUST's Green Campus Initiative: A Sustainability Strategy, in the mid 2000's. Examples of its efforts to implement sustainability practices include a counselling and mindfulness centre for students, ambitious reforms in education for sustainability, and progress along physical sustainability goals, such as zero-waste and CO2 emissions reductions. Notable is the 2016 strategic programme implemented by senior leadership, assigning specific portfolio responsibility to themselves in the process. This resulted in the formation and management of five cross-faculty clusters due to "a demanding consultative process involving all 20 of the University's departments and divisions together with senior research management" (HKUST, 2016a; Lim, Mak, Hui, Course, & Forestier, 2016). These clusters appear to act as transdisciplinary research and education focal points for the HKUST community. HKUST is part of a network of eight University Grants Committee (UGC) funded universities working together in the Hong Kong Sustainable Campus Consortium (HKSCC). HKSCC promotes regional cooperation, solutions sharing and agreements so that all member universities, as well as Hong Kong as a whole, can make progress towards mutual goals like reducing greenhouse gas emissions, plastic pollution and improving solid waste management (HKSCC, 2017). HKUST's sustainability mission is also reflected in its own organisational design, demonstrated by the Division of Environment and Sustainability (ENVR) and the HKUST Sustainability Unit nested within it. HKUST applies an experimental approach to its own campus by running entrepreneurial programs and visibly demonstrating its sustainability research, for example, by kick-starting the Sustainable Campus Leadership Program. HKUST as a cradle for its student's futures indeed appears to provide "a unique opportunity to demonstrate real-world lessons in real-world conditions" (HKUST, 2014b).

7.1 INTRODUCTION TO HONG-KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

In this chapter the third organisational case-study will be presented. The field research took place in the Special Administrative Region of Hong Kong (**HKSAR**), in the

1 *Abbreviations: BSP: Behavioural Science and Psychology; CGS: Corporate Governance for Sustainability; ENVR: Division of Environment; ESSCOM: Environmental Sustainability Steering Committee; ESG: Environmental Social Governance; ExCo: Sustainable Operations Executive Committee; HKSAR: Hong Kong Special Administrative Region; HKSCC: Hong Kong Sustainable Campus Consortium; HKUST: Hong Kong University of Science and Technology; ID: Interpretative-Diagnostic; OCM: Organisational Change Management; PRU: Public Research University; SES: Socio-Ecological Systems; SER: Sustainability in education and research; UGC: University Grants Committee.*

Clear Water Bay area of mainland Hong Kong, at Hong Kong University of Science and Technology (**HKUST**), during the period October-November 2016. The specific research questions I aim to answer in this chapter are:

- What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to HKUST?
- What is HKUST's signature pathway of organisational development/transformation for sustainability?
- What is the role of specific actors and groups (for example, intrapreneurs, change-agents, and the sustainability department) in the pathway of organisational transformation for sustainability?

7.1.1 CONTEXT & EVOLUTION

To set the scene before diving into HKUST's sustainability journey, one ought to first look at the context of public administration in the Asia-Pacific region (East and South-East Asia). It is an interesting time for Hong Kong and the region, given two notable anniversaries in 2017. These reflect and a part of a shift in the geo-political centre of gravity to the East, with the People's Republic of China (**PRC**) taking up the reins of a new Asian century. The first anniversary, the 20th of Hong Kong's handover to the Chinese as a former British colony in 1997, was predicated by what the national Chinese narrative, perhaps not without reason, refers to as the 'Century of Humiliation' of the Chinese by the West, where "in the space of a little over a century, China suffered a long list of political, military, and cultural indignities" (Kaufman, 2011). The second milestone is the 50th anniversary of the establishment of the Association of South-East Asian Nations ASEAN.

ASEAN forms an economic, social, and political alliance of countries spreading from Myanmar, Malaysia, Cambodia, Indonesia and Singapore, up to, but not currently including Hong Kong. Whereas Hong Kong is a special administrative region of the PRC, it operates, famously under the modus operandi of 'one country, two systems'. This work shall not go into the current debate, or controversy surrounding the reality of this system with respect to universal human rights or political freedom for the Hong Kong citizen, or indeed, international student or academic staff².

However, introducing Hong Kong's place in the world is still warranted here. As it leverages its place, it seeks to reach out to its regional partners. The ASEAN Socio-Cultural Community Blueprint 2025 set out a vision for a 'Dynamic ASEAN', advocating the promotion of an innovative approach to higher education to promote more interpersonal interaction and "mobility within and outside ASEAN" leading to "the free flow of ideas, knowledge, expertise and skills to inject dynamism within the region". It is envisaged that this will ultimately "strengthen regional and global cooperation in enhancing the quality and competitiveness of higher education

2 *The democracy protests of 2014, and 2019, including recent globally-followed developments provides some context for Hong Kong-PRC relations, as well as critique regarding the erosion of civil liberties' effect on the capacity of universities to navigate transformation to sustainability - see Kuo and agencies (2019). An addendum of 2020 is not made due to the risks of this research being subsequently misinterpreted.*

institutions” across ASEAN. All these initiatives suggest that momentum is building (McDermott, 2017).

The initial objectives of ASEAN, optimistic and bold, more recently geared towards creating an economic community of association, tariff-free trade and resource-sharing that aspires to rival the European Union. In September 2017, ASEAN partners’ economics ministers met in Manila on a number of issues. Problems identified include a hindrance of trade due to piecemeal and very different national regulations within the region-cum-bloc, the difficulty of incentivising investments from other ASEAN countries, and free movement of people across borders for migration and business. Governments add restrictions and fail to support or call each other out for obvious infringements of social and environmental justice. The Economist’s analysis states that the “best hope for regional integration” will likely be found in the Regional Comprehensive Economic Partnership (RCEP), “a tariff-slashing free-trade pact” driven forward by China (Espresso, 2017). Under the auspices of this network therefore, Hong Kong and its universities sees itself as benefitting and contributing knowledge innovation and sustainability expertise to the region as a hub. It appears that it seeks to enhance its positioning in competition with Singapore and other aspiring ‘capitals’ of the new bloc. If Brussels is the capital of the EU, then the Pearl River Delta³ looks prepared to be such for the Asia-Pacific. Indeed, China’s dominance may persist, as the economist notes: “ASEAN will try to project a united front but ultimately it is the big countries at that table, like China and India that will determine its success” (Espresso, 2017).

The relevance of ASEAN to HKUST increases. It is the second largest trading partner of Hong Kong next to China. Hong Kong actively seeking to complete a free trade agreement with ASEAN in 2017, which was successful (Yong, 2017). With the healthy competition of Hong Kong and Singapore as regional hubs in a developing region, environmental and sustainability concerns are also on the agenda, in particular in China - whose investments in higher education match renewables and clean technology - with the recently announced Chinese Belt and Road Initiative. This is the largest infrastructure development project in modern history, and will see the construction of a network by land and sea that connects China with South-East Asia by sea, and then to Asia and Europe by land. As Singapore and Hong Kong are in similar geographical contexts, being islands surrounded by larger countries who operate as hubs, they are also both members in the Asian Infrastructure Investment Bank – intended to fund the Belt and Road Initiative - that could be seen as directly competing with older western international organisations, such as the IMF and World Bank. HKUST has also positioned itself in global alliances such as the Association of Pacific Rim Universities (APRU), and the Association of East Asian Research Universities (AEARU) (Chan, 2015).

Universities in the East Asia region have notably begun to look to HKUST as a model for institutional advancement, creating institutions “without the layers of bureaucracy

³ *A mega-city, and one of the most densely populated conurbations in the world, comprising of nine cities, including Shenzhen, Guangzhou and Hong Kong (see: <https://www.webuildvalue.com/en/reportage/pearl-river-delta-infrastructure-for-china-megacity.html>)*

widely associated with Chinese higher education”, delegating “considerable power to faculty members” (Jaschik, 2011). The South University of Science and Technology of China for example, looked to HKUST as a model thanks to its ability since 1992 to rapidly become a player in the global higher education scene. This seems to be a common driver, with the tenure track system, the shift from the British-European three-year degrees to the American four-year model, and the commitment to giving graduates more general and less specialised education, as well as a recruitment drive for leading north American faculty at HKUST and its peer group. President Chan⁴, in an interview in 2011, identified the HKUST’s possible niche as being both global and Chinese in nature, representing a shift eastwards as they seek to build links in the Pearl River Delta with businesses and universities, but also creating opportunities for intercultural exchange for students and staff from Europe, North America, Hong-Kongers and Mainlanders (Jaschik, 2011).

The Impact of China’s Economic rise in the global higher education scene, further illustrates HKUST’s unique position, and its enabling capacity to create new interdisciplinary courses for students. Two decades ago, China realised that they were lagging behind somewhat in research, education development. Accordingly, they have invested heavily in higher education. HKUST demonstrates the edge of this movement, positioning itself as a social and economic driver within Hong Kong and the region, and its academic and intellectual autonomy that follows from that. This represents several layers of governance working together at the Chinese government level, the Hong Kong local government level, and HKUST itself. The HKSCC can be added at the local Hong Kong level as a layer of sustainability governance which acts somewhat as a ‘buffer’ that exists between eight Hong Kong universities and regional and national governance. HKUST forms part of a larger shift eastwards of leadership and emergence in Higher Education. It capitalises on this opportunity in its culture of experimentation, innovation and entrepreneurship in science and technology research.

The laws of Hong Kong, chapter 1141, interestingly provide a legislative incentivisation for change-agency, stating that the objects of a university should be to “assist in the economic and social development of Hong Kong” (HKUST Annual Report 2013/14, page 3). In 2013, President Chan was interviewed on this matter by Korea Joong Ang Daily, explaining that in the late 80’s Hong Kong was “plunged into real economic crisis”, and that it was within “such a context HKUST was created, as called for by the HK government to take the crisis in its stride through the development of knowledge-based industries”. Now the Hong Kong government still delivers 60% of HKUST’s funding (H.-G. Lee, 2013). So, unlike universities in Europe and North America, who have suffered a decrease in funding under austerity policies, the Hong Kong government maintains good levels of investment in knowledge creation and discovery.

⁴ At the time of the field work, analysis and the majority of the preparation of this chapter, Tony Chan was President of HKUST. Chan announced his early resignation in June 2017, with effect from September 2018. In January 2018, Chan’s transfer of power to Dr. Wei Shyy as the acting president was announced; Dr. Wei Shyy played a part in this study in his referral of David Mole for interview. On 31st August 2018, Chan formally left his position as President. Therefore, the substance of this report still refers to President Chan, however, the reader is reminded to consider Tony Chan as former President in the reading of this report, which is intended for current HKUST President Shyy.

HKUST was designed in a time of economic crisis to help drive positive social and economic change. It could therefore be said that transformational change was designed into it from its establishment, providing a mandate to be transformational in its regional setting. We will revisit this in the discussion and conclusion of this report.

7.1.2 VISION, MISSION, VALUES

President Chan, when interviewed by a Dutch newspaper in 2011, extolled knowledge as “the greatest good for each country (Boomsma, 2011). At almost 20 years old, HKUST was generating international recognition for its successes, securing a place amongst the top universities in the world. The message from its President, that ostensibly holds true, is that HKUST as one community has not rested on its laurels. In the annual report (AR) of 2015-16, HKUST’s core values and mission statement stand out boldly:

- Excellence, integrity, and academic freedom
- Global vision and local commitment
- Can-do spirit
- Inclusiveness, diversity, respect
- ‘1-HKUST’: a term the President and senior leadership have described as representing the unison and togetherness of the campus culture (HKUST, 2016a).

“While we view rankings as useful tools to learn from rather than as goals, HKUST’s position at No.1 in Greater China and No.2 in the world in QS’s Top 50 Under 50 2015 serves as an indication of the excellence of the University’s holistic student experience. HKUST’s No. 14 ranking in the Emerging/Trend Global Employability University Ranking 2015, an international survey of employers, illustrates its beneficial and productive impact on our graduates.” President’s Report (HKUST, 2016a).

HKUST’s recent long-term vision on sustainability has been implemented through a five-year plan called the HKUST 2020 Sustainability Challenge. Based on 2017-18 information, administrative and academic responsibility for the attainment of the challenge’s ambitious goals is divided equally between the five executive and vice-presidential members of the board of HKUST. In the area of sustainability education, leadership responsibility is held by the EVPP (Executive Vice-President & Provost, Professor Wei Shyy). For operations, the Vice-President for Administration and Business, Mark Hodgson, is responsible. The President himself is responsible for the HKUST community aspect. The VPRG (Vice-President Research and Graduate Studies, Professor Joseph Hun Wei Lee) is responsible for the fourth point in the challenge, the demonstration of sustainability-related research on campus. Relative to its age, HKUST has had significant success, coming top of the Asian university rankings, as well as in its visible implementation efforts. In the field research, the latter was particularly apparent. The direct observation of the HKUST library exhibition

visibly depicted the new strategic programme of senior leadership at HKUST's 25th Anniversary, titled 'Transforming Lives', and presented much like a small walk-around gallery of initiatives and visions. This is where five cross-faculty clusters were observed, exhibited in the library and elsewhere on campus, resulting from the internal consultation process amongst all 20 HKUST schools in the run-up to the anniversary (see Figure 1).

Figure 1: HKUST Annual Report 2015/16, 5 cross-faculty inter-disciplinary clusters. 1) Data Science 2) Sustainability 3) Design Thinking & Entrepreneurship 4) Autonomous System & Robotics 5) Public Policy.

The five strategic areas can be interpreted as trans-disciplinary research and education focal points for the HKUST community, which appear broad, pragmatic, ecologically and socially responsible, and innovative. With respect to HKUST's mission, whilst the President's report in the 2015-16 AR shows awareness of the dangers of viewing rankings as goals in themselves, Chan nonetheless demonstrates how these rankings demonstrate HKUST's fulfilment of its mission. In HKUST's Sustainability Report of 2013-14, President Chan put a specific emphasis on environmental sustainability as part of HKUST's mission: *"We recognise the important role and responsibilities of the HE sector to provide appropriate responses to the challenges of climate change and sustainable development through our core missions of research, teaching and knowledge exchange"* (HKUST Sustainability Unit, 2014). After this Section's description of the characteristics of HKUST as a university, its regional context, drivers, and its own identity, the next section describes the modes of analysis and evaluation.

7.2 METHODS OF THE HKUST INQUIRY

7.2.1 ORGANISATIONAL MAPPING

HKUST's organisational structure was mapped in order to locate the most significant persons associated with embedding sustainability, and to gain knowledge about the distribution of governance and responsibility for sustainability horizontally and vertically across the organisation. Key actors were identified through referral (for example from initial contact points) and literature research, whose insights were considered valuable due to their own structural embeddedness and place in systemic change initiatives for sustainability. The list of significant stakeholders and targeted group of interviewees, and more detailed organisational charts - in addition to what is already presented in Section 6.3.1 - can be found in the Appendices for this chapter.

7.2.2 SEMI-STRUCTURED INTERVIEWS

12 semi-structured interviews, several formal meetings (i.e. with prescriptive agendas and e-mail correspondence), and around a dozen informal ones (i.e. emergent, on the spot, conversational) were undertaken; this progressed in conjunction to an open and systemic organisational mapping exercise (see *Section 6.3.1*), which identified the most significant actors. Broad distribution was sought throughout the structure vertically and horizontally, in conjunction with referrals from initial contacts (e.g. Robert Gibson, Davis Bookhart). These yielded unexpected insights into HKUST's character, history, and its transformational journey. As with ASU, targeted interview questions were formulated on site, intended for the President; thereafter these were valuable in the interviews with members of senior leadership and change-makers. For example, a referral was obtained from the HKUST sustainability unit to interview the Vice President for Administration and Business, one of the 'G5' in the leadership team of HKUST. At the time of the field work, the 'G5' were: Mark Hodgson, Vice-President for Administration and Business; Eden Y Woon, Vice-President for Institutional Advancement; Tony F Chan, President; Joseph Hun-Wei Lee, Vice-President for Research and Graduate Studies; Wei Shyy, Executive Vice-President and Provost.

Targeted questions and talking points:

- What have been the indicators of performance success?
- What are the realised outcomes of HKUST's organisational transformation?
- [How have you substantiated the outcomes?]
- How have you tracked the maximisation of your societal impact?
- What were/are the most pressing 'environmental' conditions that either drove/enabled or hindered progress?

Contact	Role; Place in HKUST	Stake, Comms, Actions; Ideas
Robert Gibson	Adjunct Professor	Entry Point: Contacted in late August via Rob Melnick's referral/introduction and Jenny Carter of ASU GCSO/GIOS.
David S. Mole	Senior Advisor to Provost; ESSCOM	Chiefly works on UST's Sustainability Education Strategy
Jimmy Fung	Head of Division of Environment; Professor Dep't of Mathematics; Director, Institute for the Environment	Part of the representation with DB to the GCSO. Inaugural meeting at ASU took place during HKUST field work. Insight on environmental policy arena of HK->
Loretta Luk	Program Manager (Sustainability); ESSCOM	Host. Set-up physical work-space, meetings, referrals and introductions to informants/interviewees: PF, GP, SY, YL, SL. Essential to field work
Mark Hodgson	VPAB (Vice-President Administration & Business)	Key change-agent in leadership team: operational sustainability intelligence goldmine
Gerald R. Patchell	Professor, School of Humanities & Social Science, ESSCOM	Historical perspective of the strategic trajectory of sustainability praxis at HKUST. Access to the Key report by ESSCOM 'Sustainable UST 2.8'

Yvonne Li	Team Head, International engagement & affairs HKUST	Communications, Alumni Relations, Development & Advancement, Global Engagement. Worked on key GLION report in analysis for Tony Chan
Paul Forster	Senior Lecturer, Division of Environment; ESSCOM	Social impacts of technology, Sustainable business, Business and environment
Samuel C T Yau	Professor, Acting Director of Health, Safety and Environment (HSEO), ESSCOM	
Simon Law	Associate Director, Technology Transfer Centre	
Davis Bookhart	Senior Manager, Sustainability Unit; Adjunct Assistant Professor; Secretary ESSCOM	Entry Point: initial correspondence and permission for field work September after research approach information debrief to RG
Denise Chow	Health, Safety & Environment Specialist	Host. Set-up physical work-space, meetings, referrals and introductions to informants/ interviewees: PF, GP, SY, YL, SL. Essential to field work
Alexis K H Lau	Professor, Director Central Facility of the Institute for the Environment, ESSCOM	
Wei Shyy	Former: EVPP (Executive Vice-President & Provost). Current President of HKUST	
Tony Chan	Former President of HKUST	Responsible for the 1-HKUST community initiative, in the university's values and mission as well as the sustainability challenge
Joseph Hun Wei Lee	VPRG (Vice-President Research & Graduate Studies)	
Mary Ho	Adjunct Assistant Professor	Teaches ESG/ Sustainability course @ Business School. Recommended informant by PF.
Erik Baark	Professor, Division of Environment + Social Sciences	Sociologist, Climate Change Governance, Innovation. Recommended informant by PF.
Jitendra V. Singh	Former Dean, School of Business & Management	Identified as potential key informant based on an HKUST website article about sustainability in business and finance research and education
Kar Yan Tam	Dean, School of Business	Advance global business knowledge, contribute to socio-economic advancement of the region. Explore, realise, and substantiate how to create a culture of entrepreneurial and innovative thinking.
Daisy Chan	Director of Public Affairs Office, ESSCOM	

Table 1: Organisational sustainability stakeholders identified. Targets, interviewees, their roles, and notes on communications, actions, stakes and responses are included.

Interviewee Targeting Key

	Not interested or open: difficult to commit
	Of interest: Contacted or No response
	Meeting: Interview Pending
	Interview Confirmed
	Interviewed

The interviewees, their roles and responses can be found in *Table 1*. The structured questionnaire framework can be found in *Chapter 4*. This was used on site in combination with referrals from interviews and conversations to determine interview targets.

7.2.3 DOCUMENT ANALYSIS

There were 39 primary documents included in the hermeneutic unit in Atlas, not including interview transcripts or summaries. A table of documentation collected, and interview transcripts and summaries used in the analysis can be found in *Appendix 2*. The next section shows the results of the analytical tool application and a systematic overview of the findings per category.

7.3 QUALITATIVE EVALUATION: HKUST'S ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

This section presents a holistic qualitative evaluation of HKUST's organisational transformation for sustainability. First, it surveys HKUST's organisational design, then it presents a detailed overview of data per category and code (see *Figure 3, Chapter 4*), demonstrates significance of the interconnectivity in the data, then introduces a unique transformation signature for ASU, comprising of action strategies formed of tested associations.

7.3.1 ORGANISATIONAL DESIGN FOR SUSTAINABILITY

The organisational design for sustainability at HKUST can be viewed by beginning from the perspective of those operating within it. This includes the various interests, titles and roles of the stakeholders in sustainability efforts uncovered in the research. Administrative staff, at the senior, mid, and entry-levels were identified, as well as academic staff, such as professors, assistant professors and PhD candidates. Student organisations active in furthering a politics of ecology and sustainability were also seen in community of HKUST. Relatedly, there were masters and bachelors-level students involved in sustainability-related initiatives and/or education. The HKUST Council consists of lay members, academic and administrative representatives, and an elected student and staff member, for example Dr Marvin K. T. Cheung, Chairman of the Task force on Sustainability Progress with the Hong Kong Sustainable Campus Consortium. Images on site indicated an individualised interdisciplinary major program. The researcher was hosted by the HKUST Sustainability Unit, with its staff including Denise Chow, Loretta Luk, and an array of Interns and 'EcoReps', managed by Davis Bookhart, Director of the Unit, Adjunct Assistant Professor and the Secretary of ESSCOM. Further nodes of interest were observed with HKUST's partnership with the wider community, business and entrepreneurship sector. For example, 'Solve for X⁵: in search of moonshot thinkers in the HK community', which encourages the generation of radical innovation and technological breakthroughs for solving huge problems, aiming to increase visibility and connections within the community. HKUST has supported this community since 2014 and has integrated its efforts into the Interdisciplinary Programs Office, who worked to create the interdisciplinary major programme.

Through investigating HKUST's organisational design for strategic sustainability improvement, lines of implementation were uncovered alongside specific persons of interest. These included the then Executive Vice-President and Provost, Wei Shyy, and the portfolio of sustainability in education, for which the Special Advisor to the

5 *A strikingly similar 'Solve for X' call was observed at Case Study Two.*

Provost, David Mole, was appointed for the development of an ambitious sustainability education strategy for 2020. The Vice-President for Administration and Business (VPAB), Mark Hodgson was of interest for operational intelligence on HKUST, whereas President Chan oversaw the '1-HKUST' community approach. Particular interest was focussed on way sustainability-related research was visibly demonstrated on campus, linked to the Vice-President for Research and Graduate Studies, Joseph Hun Wei Lee. Relatedly, the Division of Environment Head, Jimmy Fung, imparted a great deal of insight and intelligence. A final point of focus was put on the portfolio area of Knowledge Transfer, headed by the Associate Vice-President Enboa Wu. Also of interest was anyone knowledgeable and engaged with the five cross-faculty clusters, resulting from the internal consultation process amongst all 20 HKUST schools in the run-up to the 25th anniversary. Robert Gibson, the point of first contact by referral from Rob Melnick of ASU, shared the work request and materials onto three others who were later interviewed: Jimmy Fung, Davis Bookhart, and David Stewart Mole, incidentally also forming the old Environmental Sustainability Steering Committee (ESSCOM). David Mole, for instance has been in HK since 1989. He was secretary of ESSCOM, and also held the position of Associate Vice-President for Academic Affairs from 2005, retiring from this post in 2014. The then Dean of HKUST Business School, Professor Kar Yan Tam was of interest due to the Principles of Responsible Management Education (PRME) report identified. However, before the Dean was Prof. Jitendra V. Singh, who committed the school to the PRME and renewed that commitment. There is reference to this in the report "Sharing Information on Progress Report (June '13- June '15)"⁶.

HKUST has the structure of a medium-sized public research university. HKUST follows the core governance structure - like most contemporary top universities in China - of a Humboldtian public research university with a twist: its council and senate debate how interdisciplinarity can be designed into the university, and administrative power is divided amongst the President and Vice-Presidents presiding over the academic mission (the Provost), administration and business, research and graduate studies, and institutional advancement. Notably, at the 25th anniversary library exhibition, six strategic themes were visually represented in panels. These were, firstly 'Building Capacity, Developing Talents'; second, 'Engaging Society, Nourishing Culture'; third, 'Enhancing Communication Technology'; fourth, 'Innovating Materials'; fifth, 'Solving Medical Mysteries'; and, finally 'Sustaining Environment, Renewing Energy'. Although not all these themes directly implicate sustainability, several infer environmental and social themes, such as the second and sixth themes.

In HKUST's Sustainability Report of 2013-14, certain design aspects and norms of HKUST's organisation towards sustainability can be seen. In their definition of sustainability, they state that "*Creating a sustainable campus is more of a process than a destination*" and that "*Sustainability is the glue that binds our community together*" (HKUST, 2014b). Their definition of sustainability includes temporal, spatial, social and individual aspects, and like both other cases investigated has a humanistic value-set, but also refers to holistic systems and infers an understanding of the universal constant

⁶ Prof Singh was targeted for interview until it was seen that he was no longer Dean, despite listing on the website.

of change and throughput. It is presented according to the following four principles which are relevant linguistic lenses through which the HKUST community understands its own sustainability efforts. As will be seen later, these are idiosyncratic to HKUST and percolate through the action strategies of the transformation researched:

“1. Sustainability revolves around humans – we recognize that health and happiness are at the core of a sustainable community, and that our actions to protect air, water, and natural resources are necessary to protect our well-being.

2. Sustainability recognizes the larger system – all things are interconnected and work together; seeing how a change to one thing influences another is essential for understanding the impact of our decisions.

3. Sustainability focuses on the elimination of wastes – there is no value or benefit when wasting energy, water, natural resources, money, time, or human capital.

4. Sustainability focuses on the future – change is inevitable, happens quickly, and is often unpredictable. It is essential to make thoughtful decisions today that will make us more likely to succeed in the future.”

These four principles illuminate HKUST’s conceptual framework for addressing the multiple dimensions of their campus sustainability. HKUST Sustainability Unit and the HKUST leadership recently proposed an expansion of these initiatives using a learning lab approach (see asset OCM 1.6.1 below). They initiated a ‘Sustainable Campus Leadership Program’ in order to facilitate such new ideas in campus experimentation (HKUST, 2014b). Further observations found a corporate sustainability style of reporting in the Office of the Vice-President for Institutional Advancement (see Figure 2), with moves toward having an integrated sustainability (Environmental Social Governance issues) and annual reporting after 2016. Sustainability is also mentioned as a key prong in the strategic development of HKUST by key figures in leadership and advisory roles at the executive level (Hodgson, 2016; Mole, 2016).

To better understand the organisational design and structure for the governance and responsibility of sustainability at HKUST, a hand-drawn organigram was produced, with up-to-date information of HKUST’s composition. Pertinent information was overlaid as relevant stakeholders were situated in the organisation, from the documentation available via the website, and from meetings within HKUST Sustainability Unit. The organigram is shown in Figure 3 and was verified by Loretta Luk, Programme Manager at HKUST Sustainability Unit, for its validity, who has both studied and worked at HKUST since 1998.

Figure 2: HKUST Office of the Vice-President for Institutional Advancement structure, with the sub-group of Public Affairs office annual reporting efforts from 2001, and samples from 2014-15, 2015-16. *Top:* VPIA responsibilities and sub-units, *left-central:* Public affairs office and annual reporting; *bottom-central, right:* summaries of sustainability-related information found in the two annual reports of 2014/15 and 2015/16. The Current Vice-President is Professor Sabrina Lin, effective November 2017. Adapted from: (HKUST, 2015a, 2016a, 2017, 2019b).

Figure 3: Organisational Map, HKUST: Original hand-written superimposed on HKUST official website Organigramme. ENVR & Sustainability Unit in Green. Note the horizontal structure across four schools to alleviate tension and incentivise joint appointments and interdisciplinary work. HKUST 'S' Unit; 'S' = Sustainability.

7.3.2 APPLICATION OF THE ANALYTICAL FRAMEWORK

The aim of the application of the tool is to attempt to diagnose and substantiate the cascade of actions, experiences, and underlying strategies characterising what happened in HKUST, spanning the early 2000's to the 2017. The codes' groundedness in the data and conceptual density are presented below in *Figure 4*. The qualitative data analysis software Atlas.ti-generated output table shows that *BSP 1.6.1 organisational experimentalism* is the most weighted, with 15 links in the internal evidence and a density of 5, making it a highly significant quality of the HKUST culture. This is followed jointly by *SER 5.5 sustainability research demonstration, knowledge enterprise*, and *SES 3.2a internal governance for sustainability*. Taking weights into account, *SER 3.1.2 effective transformative leadership* is the third most significant category, with a groundedness of 14 and density of 2.

Name	Grounded	Density
1.1 Psycho-social wellbeing~	6	1
1.2 Pro-sustainability behaviour~	8	1
1.3 Organisational cultural health~	2	0
1.4 Organisational lobbying competence~	4	1
1.5 Organisational positive behaviour~	8	2
1.6 Organisational action research~	2	0
1.55 Organisational experimentalism~	15	5
2.1 Triple Bottom Line: Intrinsic change agency~	3	0
2.2 Collaborate to Innovate: extrinsic change-agency~	9	0
2.3 Purposeful-adaptive evolution~	7	2
2.4 Organisational-societal learning~	6	0
2.5 Organisational extroversion & openness~	4	0
3.1 Transformative agency: sub-optimal practice challenge~	5	2
3.1.1 Effective intrapreneurship~	8	4
3.1.2 Effective transformative leadership~	14	2
3.2a Internal governance for sustainability~	15	1
3.2b External implementation of governance for sustainabili...	4	0
3.3 Environmental literacy competences~	4	0
3.4 University-driven asset-based community development~	2	0
4.1 Strategic trajectory, liaison and learning~	13	2
4.2a Internal Evaluation of Environmental Social Governanc...	10	2
4.2b Accountable Disclosure of Environmental Social Gover...	2	0
4.3 Externality Recognition & Internalisation~	10	2
4.4 University Social Responsibility Assumption~	2	0
5.1 Sustainability Competence Training for Transformation~	10	3
5.2 Intergenerational and socio-ecological ethics~	4	0
5.3a Integrated sustainability praxis across functions~	10	0
5.3b Integrated sustainability praxis external impact~	2	0
5.4 Ideal-typical Transdisciplinary Research Praxis~	9	0
5.5 Sustainability research demonstration, knowledge enter...	15	4
5.6 Minimisation of negative health, socio-economic and en...	3	1
5.7 Research and education generates societal impact and ...	12	1
5.8 Sustainability reporting standards and instruments impl...	3	0

Figure 4: Atlas Generated Code Table. All codes are shown with values of groundedness - number of quotations which a code is assigned to; and conceptual density - the number of other codes a code is associated with through the data⁷.

⁷ See Section 4.2.3.2, Chapter 4, for more information regarding groundedness, density and weightedness.

Equation for weighting categories of analysis:

$$W = \frac{Gr_c}{N_q} \times \left(100 + \frac{De}{10} \right)$$

We now move to the description of the data (quotes, documents, diagrams, exhibits and other types of evidence) per code, categorised according to the micro, meso and macro level at which they operate. The total number of coded data bits taken into analysis at HKUST, was taken as constant at **231**.

Legend for Figure 4, outlining abbreviations used, and colour codes assigned to each of the perspectives throughout this chapter

Pink = BSP: Behavioral Science & Psychology

Orange = OCM: Organisational Change Management

Green = SES: Socio-Ecological Systems

Purple = CGS: Corporate Governance for Sustainability

Blue = SER: Sustainability in Education & Research

7.3.2.1 OVERVIEW OF THE DATA PER CATEGORY AT HKUST & HOLISTIC DESCRIPTION AT SCALE

7.3.2.1.1 Micro-level Diagnosis: Individuals & Groups

The Micro-level concerns the personal and professional development of the actors concerned with transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 2)	Aggregate Weight per Perspective	Rubric	Groundedness	Density	Weight* (chart 1)
BSP	3.04	6.07	1.1	6.00	1.00	2.60
			1.2	8.00	1.00	3.47
OCM	1.30	1.30	2.1	3.00	0.00	1.30
SES	3.93	11.78	3.1	5.00	2.00	2.17
			3.1.1	8.00	4.00	3.48
			3.1.2	14.00	2.00	6.07
CGS	5.64	5.64	4.1	13.00	2.00	5.64
SER	4.34	4.34	5.1	10.00	3.00	4.34

Table 1: *Weights per rubric at micro-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective, are shown in the left two columns. *Charts 1 and 2.*

Chart 1: Weights per Rubric at the Micro-level.

Chart 2: Average weight across rubrics per perspective, micro-level: evaluation according to each of the five theoretical perspectives at the micro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Micro-level Diagnosis⁸

The micro-level of HKUST exhibits attributes strongly associated with the socio-ecological systems perspective, particularly *transformative change-agency* and its sub-categories. *SES 3.1.2 Effective transformative leadership* is the highest weighted category ($W=6.07$), whereas its sister code *SES 3.1.1 Effective intrapreneurship* is somewhat less prevalent, but still significant ($W=3.48$). *CGS 4.1 Strategic trajectory, liaison and learning* is the next highest weighted ($W=5.64$), followed by *SER 5.1 Sustainability competence training for transformation* is third-highest ($W=4.34$).

At the individual level, considering individual responsibility of the leadership as part of the picture, we see a strong commitment to the community aspect of the university sustainability improvement strategy, led by President Chan. His framing of

⁸ For a detailed, comprehensive deep dive into data per category at the micro-level, see the following section, *Detailed Overview of Data per Micro-level Category*, otherwise, move to the next diagnostic summary at the meso-level.

the following aspects is pertinent to mention given the strong weight of *SES 3.1.2 Transformative leadership* at this level. The reference to “One HKUST”, which Chan appears to have spearheaded it’s a whole institutional, systemic approach, bringing all members together, with an explicit focus on wellbeing. From the individual student perspective, schools are more active, and open to collaborate with each other, so there are many opportunities to intern in the community. As such students are ‘aggressive’ for these opportunities. However, actors generally tend to “start from appreciation” with respect to change efforts towards sustainability. The individual accounts included see the need to bring the university community together as ‘one-HKUST’.

This communitarian aspect is perhaps unsurprising in an Eastern context, but still notable for its success in terms of the systems perspective’ many initiatives have been promoted, with little resistance or contention from individuals. This demonstrates evidence of the transformative leadership towards a ‘matrix’ organisation. Loretta Luk’s account is rooted in her position as sustainability program manager at HKUST Sustainability unit, and her intimate knowledge of the student body. Her account of the President’s leadership and the attainment and progress towards a ‘1-HKUST’, as well as the pro-sustainability behaviour exhibited by the students, is reliable. The implication from the accounts regarding the President, and other members of the executive team of HKUST, is that leadership is well aware of the risks of simpler transference of approaches that have worked elsewhere. This implies that institutional isomorphism ought to be avoided. Chan’s thinking echoes this caution, where it can be read that he is cautious of copying and pasting from other elite leading institutions:

“Technology transfer has become a pivotal key performance indicator for universities. Innovation and entrepreneurship have become key components of strategies adopted by many universities to achieve this mandate. Thus, most countries with any ambition in S&T want to build their own Silicon Valleys, and most research universities want to imitate Stanford and UC Berkeley. If only matters were that simple!” (Chan, 2015)

In a key conversation with Jimmy Fung, head of the Division for Environment and Sustainability, we discussed and referred to Chan’s writing about the success of HKUST, but also sustainability in particular. Fung mentioned Chan’s emphasis on innovation and entrepreneurship, not solely on sustainability. He added that the Provost (now President) Wei Shyy, is also supportive, as sustainability is one of the five strategic themes moving onwards from the 25th anniversary. These themes, he said acted as an incentive for how faculty are expected to work, *“so in fact for new faculty members, for each department new faculty hires expertise has to be in one of these five areas, and on top of that has to be joint appointment. So that is really forcing you to do interdisciplinary research”*. Improvements in the relations and coherence between schools for sustainability efforts were rendered by transformative agency and strategic trajectory. Indeed, this shows how far they have come, from being colloquially known as the ‘university of stress and tension’ to positive behaviour, and concern and intervention for psycho-social wellbeing of a more inclusive 1-HKUST community.

Figure 5: Image taken on campus of the Counseling and Wellness Center: manned with staff and student volunteers and a welcoming social space in clear view.

Detailed Overview of Data per Micro-level Category

The micro-level concerns how individuals and pairs(dyads) work on sustainability transformation.

BSP 1.1

BSP 1.1 Psycho-social wellbeing

Engendering positive psychological and social resources overcame negative reactions, ensuring psycho-social wellbeing at an individual level.

W= 2.6: Gr. 6, De. 1.

Based on the evidence retrieved, the asset *BSP 1.1 Psycho-social wellbeing* is present to a fair extent at HKUST. Some of the strongest evidence was direct and visible on campus in the form of the Counselling and Wellness Center, which “strives to assist students who are facing challenges and difficulties in life”, according to a handout brochure available at the centrally located Center near one of the main university concourses and canteens. Services include a proactive approach to mental health crisis management “in collaboration with Departments and Offices of the University”, psychological assessments and a personal counselling service.

Activities offered bolster the psychological and social wellbeing of students through activities ranging from Mental Health First Aid, a Healthy Living Festival, a Peer Counsellor Training Programme, and Self-enrichment Workshops and Trainings. The Counselling and Wellness Center also provides psychological assessments. HKUST is also unique as it houses its students and staff on campus; as Gerald Patchell recounted, “*the one thing this university has that is not present elsewhere is that it houses its students and staff on campus. This reduces their housing expenses, commuting costs, transport emissions, and allows for less stress in their lives and higher psychological wellbeing*” (Patchell, 2016). Mark Hodgson, VPAB of HKUST, remarked about the positive effects of the physical and aesthetic qualities of the campus, mentioning specifically that

with respect to *“the well-being of people, we have good open spaces, it really has a beneficial impact on people which helps in their personal well-being.”* I asked to clarify whether he meant psychologically: *“Yeah, psychological sustainability if you can call it that, so well-being is an aspect of this and we’ve certainly tried to use our location to be inspirational in this regard.... All the glass with the views out of the Bay. We’ve got fabulous outdoor space...”* (Hodgson, 2016). It was also evident from the interview with Samuel Yu, as Director of the Health, Safety and Environment Office (HSEO), that he has the main competence of wellbeing of staff and students from a risk management point of view under his remit and responsibility.

BSP 1.2

BSP 1.2 Positive pro-sustainability behaviour

■ Positive reactions to sustainability are broadly exhibited in attitudes towards it, subjective social norms for it, and perceived behavioural control towards it.

W= 3.47: Gr. 8, De. 1.

There is substantial evidence supporting a strong presence of BSP 1.2, *Positive pro-sustainability behaviour* at HKUST. According to the Annual Report (AR) of 2014-15, as part of the Sustainable Campus Leadership Program, which broadly developed hands-on green campus projects, *“students also tested behaviour theories to ascertain whether psychological nudges could shift wasteful habits toward more sustainable action”*; this exhibits one of the key criteria for this rubric, of actions and projects that demonstrate skills in individuals for the execution of behavioural change towards sustainability (HKUST, 2015a). Further references to social norms and behavioural control that *allows for* rather than *controlling towards* positive attitudes for sustainability can be seen in the 2013-14 Sustainability Report. It reports the orientation of HKUST Sustainability Unit towards supporting the sustainability transformation that, for example, facilitates *“actions and ideas that contribute to strengthening sustainable operations”*, and that it supports *“students who want to improve conditions through their hands-on actions”* (HKUST, 2014b). Also, a major recommendation from the Sustainable Operations External Advisory Group’s final report for the HKUST Sustainable Operations Executive Committee (or ExCo as it is known) in 2016 spoke to the enabling of pro-sustainability behaviour in the community: *“While renewables may not represent a large opportunity for reductions, they should remain a part of the discussion because they are part of the campus dialogue and promotion of sustainable behaviours”*. We begin to see therefore the active coupling of pro-sustainability behaviour here with the realisation of operational physical sustainability goals, like renewable energy. They go on: *“‘Sustainability’ could be a theme of engagement with the students and could be used as a means to create a more informed, active, involved and caring community”* (HKUST Sustainability Unit, 2016). HKUST has acted on this recommendation. Further references to nudging behaviour are found in the results of an internal survey on recycling conducted by the Sustainability Unit and students in 2014: *“Peer pressure or behaviour could contribute to the increased likelihood of paper recycling”* (Ho, 2014). Loretta Luk’s account in particular illustrated the awareness of stakeholders about the capacity to create positive reactions to sustainability in norms, attitudes and perceived control, and is worth quoting at length for its insight and experiential content: *“Sustainability is not just about protecting the environment. It’s how you see things. It’s how you see the resources or how you design things, how you live your life. So, if you see things having the sustainability mind-set it’s future looking, you don’t just look at the present.... And it’s also always interrelated. Many times, when we make decisions about and talk about sustainability, we don’t just see it in one perspective, we see it always interconnected to other areas, if you make this decision that also influences other aspects and so you have to really thoroughly think about it when you make a decision. So, I would see it as a mind-set. How you change people to think about it in that aspect. A: So, there’s an aspect of behavioural change to sustainability? L: Yes”* (Luk, 2016).

OCM 2.1

**OCM 2.1 Triple Bottom Line:
Intrinsic change agency****W= 1.3: Gr. 3, De. 0.**

■ Triple-bottom-line accounting framework employed by individuals: attempt made to measure/gauge organisational complement to people, planet and profit with the goal of creating shared value.

OCM 2.1, *Triple Bottom Line: Intrinsic change agency* appears to be present at HKUST to a limited extent. We can see some evidence from the ESSCOM report of 2008 'HKUST's Green Campus Initiative: A Sustainability Strategy: "Both the Facilities Management Office and the Health, Safety and Environment Office have spearheaded efforts to operate a green campus. Innovative programs in energy conservation, waste minimization, recycling, and pollution prevention have been established over the past decade" (Patchell et al., 2008). Mark Hodgson's detailed account also shows that the triple bottom line is taken care of by in-house academics working with the operations team, and that there is organisational structuring to support this collaboration:

"We take seawater and we pump it through the heat exchangers and that transfers the heat from the air con system which has collected it and dissipates it back out to sea is a continuous cycle... So, for us, this is kind of an interesting project; you don't need to modify anything in the building, you can still do behavioural stuff, but if we can get lower temperature sea water coming in that helps us a great deal... A: you have to evaluate that and the potential impact of it? M: Correct, and we've talked to our academics as well, it could be a nice opportunity for a collaboration between the operations team and the academics" (Hodgson, 2016).

SES 3.1.1

**SES 3.1.1 Effective
intrapreneurship****W= 3.48: Gr. 8, De. 4.**

■ Intrapreneurship from the bottom-up acts as a driver for organisational transformation to sustainability: intrapreneurs, in teams of professors and students challenge sub-optimal practices, and overcome silo-based power systems.

SES 3.1.1, *effective intrapreneurship* is present at HKUST to a strong extent, with supportive evidence ranging across two reports corroborated in three different interviews with Loretta Luk, Davis Bookhart, and Gerald Patchell. In HKUST's Green Campus Initiative report of 2008 we can see how steps for challenging sub-optimal practices played out in terms of "empowering residents, staff, faculty, and students to generate the innovations that will turn the campus into a living laboratory of sustainability". The report frames this as a necessity against the backdrop of international competitiveness: "To match our ambitions to be an internationally renowned institution, we must set bold goals and targets to stop climate change and create sustainable development. If we do not respond to this challenge, we will fail both in the eyes of our students and our community, and indeed fail China and the world. Moreover, we will fall behind our peers in the US and Europe who are making strides in commitment, action and innovation" (Patchell et al., 2008). Gerald Patchell, lead author of the report, and one of those interviewed, wrote several documents and articles for magazines, the purpose of which, he said, was to realise ESSCOM's intention to make HKUST a living laboratory for sustainability. Luk highlights the specific role David Mole played in the intrapreneurial initiatives: "You talked to David Mole already? A: Yes. I understand he was involved in this from a very early stage... L: Yes, I know he's been quite personally passionate. And not just academic but he tries to find out how can we make this happen, especially very important to get the sustainability challenge approved, from the previous time to get this official target in place so he's been very supportive and always in the right position to help, to push it forward, to get the right people. A: so, he's quite savvy, he knew the right people to approach at the right time? L: yes, he knows many people I think. He knows how to get it approved, what's the right way. A: he knows the academic system, its positive aspects, its negative aspects, internal political cliques, he knows the best path? L: Yes, yes, yes!" (Luk, 2016). Years later,

and linking across the categories of this analysis, HKUST's sustainability education strategy is an eventual evidentiary outcome of this intrapreneurial effort to leverage sustainability progress internally. At its core, it targets the attainment of literacy in sustainability *for all students*. This demonstrates that intrapreneurial and systemic change competencies are present at the staff level as well.

SES 3.1.2

SES 3.1.2 Effective transformative leadership

W= 6.07: Gr. 14, De. 2.

Data-informed sub-category

- Intrapreneurship from the top-down: leadership exhibits intrapreneurial characteristics, redesigning the organisation from the top-down, to challenge sub-optimal practices and policies at the regional and national level. Stewardship by the leadership to re-design of colleges, schools, units and departments to improve interconnection and transdisciplinary research and education. An 'organisational revolutionary', who fights to change the system from within at the level of institutional innovation and design.

SES 3.1.2, the category for *effective transformative leadership* is present to a very good extent at HKUST, being strongly expressed in the accounts and experiences collected. It is the most highly weighted at the micro-scale. The Xth Glion Colloquium for Global Higher Education report by President Chan and Yvonne Lee's team (International Affairs) showed clear signs of transformative vision: *"At HKUST, we are working hard in creating an enhanced entrepreneurial environment for our students and faculty. We just completed our 5th annual HK\$1M Entrepreneurship Competition. We run a "Build your own Business" seminar series. We are completing an on-campus space devoted to student entrepreneurship activities, to be run by students. And we have introduced an entrepreneurship minor for all majors. We hope to produce more Frank Wangs and DJIs!"*. Furthermore, these leaders appear to use the language of Xi Jinping's 'China Dream' to justify their focus on innovation and entrepreneurship within their own university: *"China's government realises that developing a modern and effective higher education system is essential to drive the country's economic advancement based on development of human capital, investment in research, cultivating an entrepreneurial culture, and building a new economy based on innovation rather than low-cost labour"* (Chan, 2015).

Four HKUST executive team leaders, including President Chan each adopted clear responsibility for part of HKUST's holistic sustainability transformation (see Section 7.3.1), and in so doing, appear to exhibit some characteristics of intrapreneurship from the top-down, by creating space for innovation and sustainability solution generation within the organisation they lead. Another link that validates the strength, and distribution of effective transformative leadership is found in the HKUST annual report of 2013/14, in the words of the Acting Chairman of that year Martin Y Tang: *"I commend the work of the President and his team who have pursued the strategic objectives of HKUST with diligence and foresight while ensuring that the campus remains a welcoming and lively meeting ground for all members of the HKUST community"* (HKUST, 2014a). Further reference to the transformative leadership of the 'G5', as they are colloquially known, is seen in the HKUST Sustainable Operations Implementation Plan, where there is clear evidence for direct top-down support for innovative organisational and strategic implementation. The internal report cites their approval, in 2015, of the HKUST Sustainability Action Plan (or 2020 Sustainability Challenge). The plan's focus on clear operational goals in the short term (e.g. 50% waste reduction by 2020) is seen as a direct outcome of the support of the leadership for transformative efforts in improving sustainability performance.

The interview accounts both corroborate and allow more detailed insights of how intrapreneurial behaviour can be found lower down the ranks, with HKUST itself, with

stakeholders such as Mole, Fung, Luk, and Hodgson playing a key role. David Mole's account was crucial for understanding how intrapreneurial leadership had led in part to the formation of HKUST Sustainability Unit, and the 2020 Sustainability Action Plan: *"So at any rate, at a certain point we gained the standing necessary to bring forward a strategic document. The sustainability vision for 2020, the sustainability challenge. So we're still talking about the main advocates, self-appointed steering persons, and change agents, appointed to do this"* (Mole, 2016). Jimmy Fung corroborated Chan's engaged leadership in our interview, as well as providing significant context with accounts from the Environment Secretary and HEI's in Hong Kong being somewhat reticent to adopt energy saving measures. In spite of these regional challenges thought, when asked he confirmed that *"Tony Chan is very engaged... A strong leader, he seems really supportive about these sustainability initiatives"* (Fung, 2016). In the interview with Loretta Luk, when asked who the key agents in HKUST's sustainability transformation were, she cites Mark Hodgson as being the first person who came to mind, being *"quite key... He is very supportive for sustainability. He chairs the operations committee. Every-time we have a meeting he is very passionate, get the agenda going, how can we meet these targets, he asks different department heads so what do you say? Is it doable? What's the obstacle? If it's a resources issue he can try to find out. I think it's key because without this high-level support how can the bottom up staff believe that this can happen! I think he's giving a really good pathway for the challenge"* (Luk, 2016). Lastly, directly from the horse's mouth, we can see it is not all plain sailing according to Hodgson himself, who mentioned *"pushback from the community in some initiatives"*, particularly procurement policies it seemed; *"You've got to walk the talk!!"* (Hodgson, 2016).

SES 3.1

SES 3.1 Transformative agency: sub-optimal practice challenge

Intrapreneurs identified in small groups within the organisation that challenge sub-optimal practices through linking strategies, opportunity contexts & innovation

W= 2.17: Gr. 5, De. 2.

The broader category, *SES 3.1*, depicting the *transformative agency* of actors at different levels, is present to a fair but limited extent at HKUST. Mole's account is particularly revealing of how HKUST Sustainability Unit was formed through their agency by linking opportunity context, strategy and innovation: *"The environmental sustainability steering committee. ESSCOM... in part supported and stimulated by the university Council... gave us an opportunity to moving internally. I should say that there was no opposition, it was understood quite readily that it was something the university ought to do. So, we drafted as a matter of urgency a strategic document, and tried to work it up the system for adoption by the university, but it was not straightforward... It was still the enthusiastic champions and it depended on our own resources and time, there was no real institutional momentum that we could get traction with. We weren't catalysts, we were just there! We didn't get traction, so it slowed itself down. What we did manage to do though was to work towards the formation of the sustainability office"* (Mole, 2016). Mole also related that universities are not well structured to enable the development of sustainability embedded in education, which requires broad and conceptual work into narrow and technical specialisations. Jimmy Fung's account extends transformative agency to the external level with respect to the mentioned obstacle of the lack of meters on campus by Robert Gibson (2016) hampering efforts to increase energy efficiency: *"I work with Davis, Davis works with the FMO, the facility management office... They should be working with the electric company CLP, China Lion Power... In the whole of Hong Kong, we only have two energy suppliers, one is CLP which supplies all the electricity in Kowloon and the New Territories - no choice really... But CLP they are a little bit more socially conscious, they are willing to supply smart-meters. So, we have been trying to talk with FMO, they should work really closely with CLP to see whether they can install more smart meters for us. At least we can separate into zones so that we have more idea about the energy being consumed"* (Fung, 2016).

CGS 4.1

CGS 4.1 Strategic trajectory, liaison and learning**W= 5.64: Gr. 13, De. 2.**

- 1) Actors play the roles of brokers, bricoleurs, connectors, by liaising and facilitating;
- 2) Resulting in: sustainability being boiled down to the organisational context;
- 3) Therefore: it becomes relevant, understood and important for influential and interested stakeholders. Further resources are allocated and sustainability raised higher on organisational learning agenda.

The category, *CGS 4.1., Strategic trajectory, liaison and learning* is present to a very good extent at HKUST. Change-agents' communications and action strategies have been crucial for HKUST's transformative sustainability, with. This was primarily rooted in Mole's account: *"We had been among those helping to form the Hong Kong Sustainable Campus Consortium. So, we managed to get that strategic trajectory up to senior management and they were at least two members of the senior management team who were personally supportive, and wanted to see this go. We didn't have to convince them, they were already convinced. I guess our argument was and I still think it's correct, that we were solving a problem, we weren't presenting management with a problem, we were presenting them with a solution to a problem they had, which was how to position HKUST in this growing sense that something ought to be done... And I think that that gradually has come to be understood, although it comes and goes, it comes and goes. Ebbs and flows"* (Mole, 2016).

On the International Association of Universities Higher Education and Research for Sustainable Development website, HKUST Sustainability Unit is listed⁹ *"to communicate with HKUST community about the sustainability issues, challenges and solutions, to raise awareness and promote positive actions"*. Further evidence of a longitudinal process of strategic communications and actions for sustainability was found on the HKUST HSEO webpage newsletter¹⁰, citing ESSCOM's, David Mole, Alexis Lau and Joseph Kwan advocacy for *"formulating ideas and compiling action plans to raise awareness among members of our campus community on environmental sustainability"* as well as gaining sponsorship in that year, 2009, from Hang Seng bank to reward *"students who will come up with innovative and achievable ideas about environmental sustainability"*. ESSCOM's drive in the strategic trajectory is further corroborated in the HKUST Green Campus Initiative report of 2008, which comprehensively presented an actionable sustainability strategy *"to transform the campus into a sustainability innovation system"*, *"not only making our campus sustainable, but producing research and graduates that will make society sustainable"* (Patchell et al., 2008). Moreover, Jimmy Fung's, Loretta Luk's, and Samuel Yu's interviews all assisted in the identification of the importance and coherence of the long-term process of actors working together in strategic communications and actions to operationalise sustainability for the campus community. Specifically, Fung's account refers to overcoming tensions arising from jealousy in the setting up the Department of Environment and Sustainability: *"It was specifically set up across the four structures to alleviate those tensions. It seems these tensions and the scepticism has been ameliorated over the years. Initially people were sceptical, now most faculty tend to be more active, they're more enthusiastic about that"* (Fung, 2016). Luk directly mentioned Mole's key role in the transformation: *"he's been quite personally passionate. And not just academic but he tries to find out how can we make this happen, especially very important to get the sustainability challenge approved, from the previous time to get this official target in place so he's been very supportive and always in the right position to help, to push it forward, to get the right people... He knows many people I think. He knows how to get it approved, what's the right way. A: he knows the academic system, its*

⁹ <http://www.iau-hesd.net/en/universities/1874-hong-kong-university-science-and-technology.html>, accessed 06.10.2016.

¹⁰ <http://www.ab.ust.hk/hseo/sftywise/200812/Page2.htm>, accessed 30.12.2016.

positive aspects, its negative aspects, internal political cliques, he knows the best path? L: Yes, yes, yes. A: so, he's a political change agent? L: Mhmm" (Luk, 2016).

The HKUST Sustainable Operations Implementation Plan placed a specific emphasis on 'communicating for success' as part of the achievement of the 2020 Sustainability Plan, referring to ExCo's agreement to bolstering the efforts with a communications strategy to make goals, progress, methods, and successes visible to the HKUST community, whilst highlighting actions and being inclusive with the community. They also identified HKUST Public Affairs Office to take the lead in the development of the communications strategy (HKUST Sustainability Unit, 2017b). The proposal for a Sustainability Education Network in the comprehensive sustainability education strategy also describes the need to behave in a 'community of practice' to allow liaison opportunities between faculty and senior staff. Lastly, Samuel Yu's interview highlighted the prior state of affairs of HKUST as the University of Stress and Tension, and how they were not very active in cultivating and sustaining student groups. This is how far HKUST has come as this is clearly now not the case, and strategy trajectory, liaison and learning was key to this process. His reference to HKUST Sustainability Unit is indicative of an awareness of mindset change and dialogical communications as; *"We always believed the Sustainability Unit should be visible to the whole HKUST community. We don't want people to think sustainability should be another administrative unit"* (Yu, 2016).

SER 5.1

SER 5.1 Sustainability Competence Training for Transformation

W= 4.34: Gr. 10, De. 3.

- 1) Programs are identifiable in educational curricula and in offered professional training courses where some or all of the five key sustainability competencies are present;
- 2) Students and staff, more generally are trained and taught in sustainability competencies for the purpose of transformation.

The asset *SER 5.1, Sustainability competence training for transformation* is present to a good extent at HKUST, being clearly identifiable in HKUST annual reporting, the HKUST 2020 Sustainability Challenge, various internal postings, and from the sustainability education strategy file shares. As an example of cross-faculty efforts, the Annual Report of 2015-16 discusses the "Innovating Today, Imagining Tomorrow" Mentorship Program. This *"was launched with the Hong Kong Federation of Youth Groups as part of the 25th Anniversary activities and to nurture future leaders. Over 25 faculty members from the Schools of Science, Engineering, Business and Management and Humanities and Social Science participated in the program..."* (HKUST, 2016a). Furthermore, in the Sustainability Challenge 2020 commitment, a strong focus on educational competences at a university scale is seen, it particular on 'experiential learning'. A strong indication of sustainability competence training comes from the webpage message¹¹ from the Division of Environment and Sustainability Head, Jimmy Fung, whose interview also gave insights into the competencies educators aim to develop in their students at HKUST: *"We strive to cultivate a stimulating research and academic community that endows graduates with knowledge and skills that are crucial to leading the stewardship of global environmental sustainability, and to engaging economic development challenges that arise from resource depletion, climate change, and population growth. We believe that an interdisciplinary emphasis that encompasses the biological, physical and social sciences constitutes a superb foundation to building effective solutions to these challenges."* In Fung's interview, I asked him about bottom-up initiatives and the student community at the Division of Environment and Sustainability: *"we nurture them, we give and educate them with the necessary knowledge, the curriculum based, but we are hoping that when they go out to the real world... we like them to be going to various co-operations, big companies to become either at the management in particular in the sustainability sections,*

11 <https://www.envr.ust.hk/our-division/message-from-division-head.html>, accessed 06.10.2016.

which is growing" (Fung, 2016).

Based on a series of files shared with the researcher by participants, it was possible to specifically identify how HKUST fully supports the enhanced roll-out of embedded sustainability competencies in the new education strategy, especially with regards to foundation courses that aim to inculcate an interdisciplinary introduction to sustainability in students as a platform to their future sustainability studies. This portfolio on the development of sustainability education at HKUST sets the goal that by 2020 there will be an educational framework that allows students to obtain firm grounding in sustainability concepts, as well as walk-away from their degree being capable of solving local and global sustainability problems. Further aspects of the course development outline emphasise a holistic systems approach linking disciplines and teaching across faculties and departments, as well as other organisational infrastructure to ensure the progress and scaling up courses over time, including the already implemented individualised interdisciplinary major programme for exemplary students. Finally, from the documents describing a comprehensive sustainability education strategy, basic sustainability literacy competencies, cross-disciplinary teaching and hands-on learning outside the classroom are all aspects that HKUST is at the time of publication embedding in its students for their graduate futures.

7.3.2.1.2 Meso-level Diagnosis: Intra-organisational Scale - Groups & Units

The Meso-level concerns the behaviours, qualities and competencies of the groups, teams and units working on organisational transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 4)	Aggregate Weight per Perspective	Rubric	Grc	De	Weight
BSP	2.03	6.08	1.3	2.00	0.00	0.87
			1.4	4.00	1.00	1.73
			1.5	8.00	2.00	3.47
OCM	3.47	6.94	2.2	9.00	0.00	3.90
			2.3	7.00	2.00	3.04
SES	4.12	8.23	3.2	15.00	1.00	6.50
			3.3	4.00	0.00	1.73
CGS	4.35	8.69	4.2	10.00	2.00	4.34
			4.3	10.00	2.00	4.34
SER	4.20	12.60	5.2	4.00	0.00	1.73
			5.3	10.00	0.00	4.33
			5.5	15.00	4.00	6.52

Table 2: *Weights per rubric at the meso-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns.*

**Charts 3 and 4.*

Chart 3: *Weights per category at the meso-level. Detailed descriptions per rubric given below.*

Chart 4: *Average weight across rubrics per perspective, meso-level: evaluation according to each of the five theoretical perspectives at the meso-level, taking the average of all rubric weights per perspective to show relative performance at this scale.*

Summary Description of Meso-level Diagnosis¹²

The meso-level at HKUST is characterised by a well-rounded weight distribution across the perspectives, with no one perspective standing out very significantly. We can see that BSP and CGS are the most weighted, followed by SES, OCM, and BSR, all falling in the range of **W**-value between 6 and 9. The highest weighted categories at this scale are *SES 3.2a Internal governance for sustainability* (**W**=6.50), and *SER 5.5 Sustainability research demonstration, knowledge enterprise* (**W**=6.52). *CGS 4.2a Internal ESG evaluation*, and *CGS 4.3 Externality recognition and internalisation*, are the next highest weighted, jointly at a **W**-value of 4.34.

A key aspect identified at the group and unit-level, within the organisational, and in the

¹² For a comprehensive deep dive into data per category at the meso-level, see the following section, *Detailed Overview of Data per Meso-level Category*, otherwise, move to the next diagnostic summary at the macro-level.

history of transformative efforts at HKUST, was the successful proposal which led to HKUST Sustainability Unit's inception. "HKUST: A Greener UST Initiative" was the sustainability strategy document drafted and approved by ESSCOM and supported and implemented by the leadership. Davis Bookhart was liaison and contact, providing policies and practices that were formally adopted by the University Council—one of the three bodies of university governance at HKUST including the Court and the Senate; the Sustainability Unit and the recruitment of a Sustainability Director to manage it and HKUST's sustainability portfolio was also in part created as a result of the document's impact. This was also all presented to ExCo Operations committee. Whereas the individual scale attributes contributing to this trajectory were communications and actions of intrapreneurial staff and transformative leadership, at the intra-organisational scale, the best attributes are more to do with internal governance for sustainability, demonstration of sustainability research, and organisational experimentalism.

Sustainability is a part of HKUST's strategic objectives and principles, identified in the groups interviewed (see Section 7.1.3). HKUST also exhibits transparent reporting on ESG data. The new annual report (2015-16) has a sustainability chapter, and they are dedicated to further development of sustainability and integrated reporting, which was being discussed in 2016 according to VPAB Hodgson. In 2016/17, ENVR, the Division of the Environment was renamed as the Division of the Environment and Sustainability. This reflects larger administrative changes within the division, representing purposeful-adaptive change management, administrative experimentation, and most significantly (SES 3.2a) internal governance for sustainability. The change includes assigning ENVR as lead department in coordination and development of the comprehensive sustainability education efforts, (SER 5.3a) integrated sustainability praxis across functions, and the planned emphasis and implementation of (SER 5.5) sustainability research demonstration. Stakeholders aim to place more emphasis on building "the foundation of sustainability literacy" (SES 3.3 environmental literacy competences), however they think it is "more important to have students demonstrate that they can actually apply some of these concepts and principles at the end of their academic careers". This is a very recent development, and had it not been for its significance and correspondence to other accounts and linkages across categories, the information would have been left out of the scope of this report.

Detailed Overview of Data per Meso-level Category

The Meso-level concerns the groups, teams and units working on sustainability transformation in the university.

BSP 1.3

BSP 1.3 Organisational cultural health

W= 0.87: Gr. 2, De. 0.

■ Organisational behaviour exhibits these traits: rules and regulations are present and consensually agreed regarding ethics, there is a culture conducive to moral judgement and extrinsic societal orientation, as well as ethical organisational norms.

In seeking a culture at HKUST conducive to moral judgement and extrinsic social orientation in sustainability ethics, only two exhibits were found in the evidence that support the presence of *OCM 1.3*. Firstly, in the HKUST Business School 2013-2015 report

to PRME¹³, expertise in the area of developing a sustainability culture is cited in Calvin Kwan, a general sustainability manager. Furthermore, ethical theories, organisational ethics, Eastern and Western moral philosophies, and other ethics aspects are clearly identifiable in the compulsory course “Business Ethics and the Individual”. Second, the Annual report of 2014/15 explains the University’s intrinsic philosophy: “*through the development of a set of core values in consultation with the HKUST community*”. This appears to show a consensually agreed ethical orientation, however further corroboration lacked. The report went on to describe this intrinsic core value development as a ‘call sign’ that would help HKUST “*stand out not only for academic achievements but principles and culture. It will give the University the bedrock for on-going long-term sustainability as an institution and as an influential contributor to social advancement at home and beyond*” (HKUST, 2015a).

BSP 1.4

BSP 1.4 Organisational lobbying competence

W= 1.73: Gr. 4, De. 1.

■ Organisational behaviour exhibits that: there is access and appropriation of physical resources, persuasive communications strategies, and effective engagement of an assortment of middle management.

Figure 6: HKUST’s intent and tangible effort for sustainability in communications. Based on conversations held at the Sustainability Unit regarding the relationship between sustainability, PR and communications.

Several pieces of evidence were retrieved that organisational behaviour within HKUST exhibits the appropriation of physical resources, persuasive communications strategies and engagement of middle management. However, a strong presence of *BSP 1.4 organisational lobbying competence* is not well supported. It is primarily demonstrated in the leitmotif of creating campus engagement, dedicating resources and instilling a culture conducive to high sustainability, which the HKUST ESSCOM Sustainability Strategy of 2008 establishes well (Patchell et al., 2008). Further evidence came from discussions with Davis Bookhart at the Sustainability Unit, where more subtle indications of lobbying competence for sustainability was interpreted. With the assistance of digitalised research notes from one meeting with Bookhart, a map of how HKUST has learnt to more deeply appreciate sustainability via the patient and cunning efforts of its own sustainability champions can be seen in Figure 6. The key take-away is that indirect benefits can come from image-based PR efforts, but there should be measurable outcomes and evidentiary impacts, which require properly sitting down and thinking about impact, leverage points and change agency.

13 <http://www.unprme.org/reports/PRMEReportfromHKUSTJune2013toJune2015.doc>, accessed 11.10.2016.

BSP 1.5

BSP 1.5 Organisational positive behaviour**W= 3.47: Gr. 8, De. 2.**

Positive organisational behaviour is exhibited that demonstrates: capacities for self-awareness and self-diagnosis which are facilitated; competences for balanced decision-making and critical-thinking; practices of transparency (whistle-blower support) and ethical debate.

BSP 1.5 organisational positive behaviour is present to a fair extent in HKUST. According to the perspective used by the research, the HKUST 2020 Sustainability Challenge text shows a strong indication that sustainability managers, leaders, and key stakeholders in campus sustainability efforts exhibit self-awareness and self-diagnosis. The process through which it came about also shows capacities for balanced decision-making, critical thinking, and the fact that HKUST is transparent and hosts ethical debate in the HKUST community: “HKUST strives to become a global leader in sustainability education by transforming the Clear Water Bay campus into a living laboratory for experiential learning, demonstrating cutting-edge research and sustainable operations within a vibrant and engaged community.” This vision statement is found online¹⁴, and in the Green Purchasing Policies which also aim to improve practices of transparency in tendering and procurement. Additional accounts from the master’s student and aspiring council member Hariadi Tjandri, Davis Bookhart and Jimmy Fung also support this category’s assignment to the HKUST evidence. In fact the design of the ENVR appears to have contributed to positive organisational behaviour due to its having been set up across the four main faculties as a means to alleviate tensions arising from perceived ‘jealous’ towards the Division as it grew and garnered more resources¹⁵: “Initially people were sceptical, now most faculty tend to be more active, they’re more enthusiastic about that” (Fung, 2016).

OCM 2.2

OCM 2.2 Collaborate to Innovate: extrinsic leadership agency**W= 3.90: Gr.9, De. 0.**

Identify evidence in leadership of visioning, organisational alignment, strategic collaboration, innovation, towards ends of partnership and good governance in wider society, with an extrinsic engagement with external task environment.

The asset *OCM 2.2*, which consists of attributes of extrinsic leadership agency is present to a good extent at HKUST, based on the substance and diversity of evidence retrieved. This evidence that the ‘G5’ and others at the top of HKUST utilise visioning, alignment, strategic collaboration and innovation in their engagement with the external task is well represented. Key indications can be seen in the 2013-14 AR, particularly with respect to instilling leadership competencies and collaboration across schools: “we moved steadily forward in our students’ social contribution to the community. Awareness of the needs of others, leadership skills, and service learning have been highlighted through programs such as the REDbird Award scheme, HKUST Connect, which now works together with 80 partners in the community on service projects, and a newly piloted Student Leadership Program, which has attracted over 200 students already” (HKUST, 2014a). In the following year’s report, leaders, in particular the Chairman of the University Council, Andrew Liao, creates a positive characterisation of HKUST’s journey “to embed its global profile as an innovation hub” in

¹⁴ <http://green.ust.hk/en-us/about/2020challenge>, accessed 03.11.2016.

¹⁵ Interestingly, this precise dynamic and awareness of tension was observed with the inter-faculty relationship between GIOS/SOS and other departments at the second case-study of ASU in Arizona.

his opening statement, as part of his new role in the institutional development of HKUST (HKUST, 2015a). Whilst the Sustainability Report uses language stressing the importance of cohesion and collaboration on campus: *“While the Sustainability Unit serves the HKUST community, the contributions of all community members make the difference in creating a vibrant and sustainable HKUST”* (HKUST Sustainability Unit, 2014). The leadership agency for environment and sustainability performance of HSEO and the Facilities Management Office (FMO) over time is shown in the 2008 Sustainability Strategy report. It cites numerous awards for environmental efforts garnered by HKUST, such as Gold Wastewise award, the Eco-business award and the Green Innovative Practice award: *“These awards testify to the fact that many basic programs are already in place in our campus community. These programs are mostly driven by HSEO and FMO at the organizational level with varied levels of involvement by other members of our campus community”*. Furthermore it illustrates a deeper understanding held by sustainability leaders represented in its authorship of their university’s need for coordinated interlinkage and implementation: *“We seek to achieve our environmental management goals as an outcome of stimulating the campus community to innovate and participate”* (Patchell et al., 2008). Currently, this asset seems to be helping to overcome what David Mole called “profound difficulties”, in particular the major challenges faced “in terms of sustainability education”, since “universities are not well structured to enable the development” (Mole, 2016). It appears the leadership and collaborative innovation in this area with Bookhart and others at HKUST Sustainability Unit may well be overcoming this hurdle with the implementation of the HKUST 2020 Challenge and the HKUST Sustainability Education strategy for 2020 and beyond.

OCM 2.3

OCM 2.3 Purposeful-adaptive evolution

W= 3.04: Gr. 7, De. 2.

■ Evolutionary and teleological organisational change management employed, driven purposefully and adaptively by change-agents and leadership in response to external circumstances, situational variables, and the human environment.

The property for *purposeful-adaptive evolution*, OCM 2.3, is also present to a good extent at HKUST. Its attributes describe the evolutionary mode of change management employed at HKUST according to the evidence gathered and analysed. In Chan’s Xth Glion Colloquium paper of 2015, he contextualises HKUST change management by framing in terms of its unique place with respect to *“the rapid change in the Mainland’s higher education system”*, mentioning the ‘One Country, Two Systems’ model applied to higher education in Hong Kong allowing HKUST a *“unique vantage point”*. The evidence for a purposive and adaptive change management, guided by the leadership of HKUST, is spread throughout this report. Chan continues that *“HKUST has benefited from this recent more balanced two-way flow of East and West students. On one hand, Mainland Chinese students are attracted to study at our university because of our high academic standards and global rankings, proximity to home, all-English instruction, relatively low tuition (our non-local tuition is about the same as University of California’s instate tuition), and a very safe living environment”*. Further framing change management at HKUST in terms of its response to external circumstances, he cites HKUST alongside the “increasingly global” ‘C9’ universities (China’s elite nine universities like Tsinghua and SJTU), as it also seeks strategic partners across the world, *“joining members of global alliances such as the Association of Pacific Rim Universities (APRU), The Association of East Asian Research Universities (AEARU), HKUST is a member of both.”* Lastly, Chan casts HKUST efforts as important in the development of the increasingly globally-recognised conurbation of the Pearl River Delta: *“We were amongst the first Hong Kong universities to set up an “Industry, Education and Research” (IER) base in Shenzhen more than a decade ago and now we have built a second IER building in Shenzhen”* (Chan, 2015). A

more participatory, and dialogical form of change management is indicated in the long-term by the Sustainability Strategy of ESSCOM in 2008, which broadly stresses that key to HKUST's sustainability transformation is *"empowering residents, staff, faculty, and students to generate the innovations that will turn the campus into a living laboratory of sustainability. Students leaving this culture will be excited about and capable of bringing sustainability into their communities"* (Patchell et al., 2008). Additionally, when prompted about the Global Consortium for Sustainability Outcome, which HKUST was known beforehand to be a nascent member of at the time, Jimmy Fung confirmed enthusiastically *"next week is the inaugural meeting!"* Jimmy Fung and Davis Bookhart were travelling to Arizona with the support of Tony Chan, where HKUST then presented its proposal and decided how much to fund, what the outcomes would be, learning from other institutions and what courses each institution is offering. Fung disclosed their intentions for the inaugural meeting, aiming for a comprehensive set of courses on a trial and error basis, to modify and experiment with their efforts. This adds to the quality of purposeful-adaptive evolution at HKUST in its association and proactivity in the GIOS/ASU-initiated GCSO.

SES 3.2a

SES 3.2a Internal governance for sustainability

- Organisation takes internal responsibility that natural resources and ecosystem services are managed and governed correctly by individuals and social groups practicing leadership, institutional entrepreneurship and socio-technical innovation.

W= 6.5: Gr. 15, De. 1.

Internal governance for sustainability is very strongly present at HKUST, being very close to the highest weight at this category. This is due in large part to accounts from the HKUST Sustainability Unit reports, HKUST Sustainability Policies, the HKUST Sustainable Catering Policy, and the Sustainability Strategy of 2008, which all clearly show members writing responsibility for the correct usage of natural resources into the organisation. As Andrew Liao observed in his assessment of HKUST's progress in 2015, HKUST's finding its unique *"intrinsic philosophy through the development of a set of core values in consultation with the HKUST community"* inside itself, gives it *"the bedrock for on-going long-term sustainability as an institution and as an influential contributor to social advancement at home and beyond"* (HKUST, 2015a). The role of the Division of Environment and Sustainability, and the HKUST Sustainability Unit, has been pivotal too in the management and governance of natural resources and ecosystems services. They, too, exhibit the attributes of this category, of practicing leadership, entrepreneurship and socio-technical innovation from within the institution. Looking back over the organisational transformation traced out in this research, examples of these practices are given clearly in the defining Green Campus Initiative of 2008. Firstly, of the outcomes of reductions in CO₂ and significant savings incurred due to *"several performance-driven contracts"*. They go on: *"the reductions were accomplished at the hardware and software levels. Energy-efficient appliances, such as electronic ballasts, transformers, motion detectors, and light sensors, were installed along with reprogramming the building management system to follow an energy saving utilization schedule. There is still much more to be done on the hardware and software sides to make our campus carbon neutral and to produce zero waste"*. Secondly, the example of contractor management shows how governance for sustainability actually works in practice with respect to the often-tricky issue of tendering in higher education: *"HKUST engages contractors for a variety of services, such as catering, facility work, security, plant operations, etc. A part of the appointment process includes evaluation of the contractors' environmental performance records. The required tendering process also stipulates that potential service providers submit plans on environmental compliance and sustainability practices"* (Patchell et al., 2008). Almost a decade later, and the progress of managing natural resources is seen

in the ExCo prepared HKUST Sustainability Guidelines, which cover sustainable office management, green office purchasing and guides for residents and students on campus, amongst other information, including innovative measures to install Office Sustainability Representatives throughout the organisation. The policy for Supplier management is worth quoting at length as an example of how significantly developed this asset is within HKUST:

*“Many of our office purchases have already been negotiated on behalf of the university by the **HKUST Purchasing Office (PURO)**. This office has a high standard for sustainable purchasing contracts with suppliers, and constantly strives to improve the environmental performance of HKUST by “greening” our supply chain. However, office at times make purchases independently, or have special cases for buying new products. In these cases, we recommend that offices use these occasions to remind our vendors of our commitment to environmental performance. In the case that a tender is developed, our Sustainable Purchasing policy asks that we include the following statement: ‘HKUST is committed to creating a sustainable campus setting where resources are utilized responsibly and all members of the HKUST community have the capacity to thrive within a healthy environment. The specifications detailed in this document are predicated on the expectation that the Contractor respects and supports HKUST’s commitment to creating a sustainable campus’” (HKUST, 2016b).*

Further cementing the overarching governance of sustainability at HKUST, the Sustainability Policy, formed during the field work and after, outlines specific goals: *“To support this transition, the university embraces a future vision of itself as one that operates with zero net carbon emissions, zero waste transported to landfills, a regenerative environmental setting where the physical landscape is enhanced by our active management”* (HKUST Sustainability Unit & Bookhart, 2017a). According to an early draft of the HKUST Sustainable Catering Policy of late 2016, the Sustainability Unit presents further near term objectives for management of healthy and sustainable lifestyles on campus: *“It is the intention of HKUST to create food and dining facilities and services that provide clean, healthy, environmentally responsible surroundings that reflect and demonstrate our campus sustainability vision and mission”* (HKUST Sustainability Unit & Bookhart, 2017b). Corroborating the ambitious and successful progress in sustainable procurement, Mark Hodgson described the process even more in reference to the reduction of input waste, leveraging tender specifications to be greener, in particular being wary of sometimes the lowest cost tenders not being compliant! In response to the question of to what extent this process required the support, awareness and direct engagement of senior leadership like himself, he confirmed that this was essential to effectively manage the university’s environmental impact. He also cited the important roles of the purchasing department and procurement office. He seemed to indicate an intricate level of oversight here to connect administration to academic decision-making, since these departments have “no clue whether we need a new electron microscope or not”: *“...assuming you’ve decided that’s what you want we will manage the procurement process so we are compliant with the requirements of a publicly funded body, we tender, and we’ll make sure that the tender documents are clear and we’re transparent, and we’re negotiating properly. So because we have that process, it means that we can use the purchasing office as a means to put that greener requirement into our future procurement deals”* (Hodgson, 2016). In conclusion, we can also see significant evidence of governance for sustainability of HKUST in its own evolving organisational design (see Section 7.3.1).

SES 3.3

**SES 3.3
Environmental
literacy
competences****W= 1.73: Gr. 4,
De. 0.**

- Skills and competences for environmental literacy are exhibited by organisational actors:
 - P3: Awareness of multi-level interference in organisations and institutions of power & agency;
 - P6: Learning between actors, environmental self-awareness, and motivations & knowledge concerning impacts, feedbacks;
 - P7: Planning and analysis of sustainable human-environmental interactions, substantiation of material and social environment, and matrix formation.

Evidence for strong presence of the asset, *SES 3.3, competences for environmental literacy*, was not too easy to discern at HKUST. It therefore does not appear strongly present. The incidences in the data do indicate some level of awareness of multi-level interference, learning and self-awareness of environmental impacts, knowledge concerning these impacts, and the planning of sustainable human-environmental interactions. Chan, in his paper for the Xth Glion Colloquium, appears to show his awareness of the environmental impacts of China's rapid urban development, providing an analysis of the current trends in 2015; noteworthy is his reference to the PRC's cabinet statement to boost "environmental sustainability" (Chan, 2015). In the HSEO release, *SafetyWise*¹⁶, online in 2008, learning between actors and substantiating the material and social environment is indicated: "SAO (Student Affairs Office) has launched a Green Ambassador program to identify students who are willing to help promote environmental sustainability on our campus in the Hong Kong community. The program will initially provide training on a wide scope of environmental sustainability issues". Lastly, the Sustainability Strategy of 2008 maps out the need for the research and development branch to "to integrate environmental concerns into development and transfer activities", making specific recommendations in line with developing environmental literacy competences in the material and social environment throughout HKUST (Patchell et al., 2008).

CGS 4.2a

**CGS 4.2a Internal
Evaluation of
Environmental Social
Governance****W= 4.34: Gr. 10, De. 2.**

- ESG issues, material to the organisation and its stakeholders are measured, managed and monitored internally by integrating sustainability strategy into governance, management and administrative structures:
 - 1) Responsible actors measure, manage, and monitor sustainability performance with material ESG metrics;
 - 2) ESG issues are prioritised according to stakeholder's interests and influence. *3rd step continued in CGS 4.2b.*

The *Internal evaluation of ESG*, *CGS 4.2a*, is present to a very good extent at HKUST. As an organisation, it comprehensively demonstrates its capacity for measuring, managing and monitoring ESG issues material to itself and its stakeholders. Not fewer than six different HKUST reports in this analysis demonstrated this. Firstly, the Annual Report of 2015/16 mentions management reporting, independent assurance, internal audit and control systems in place, demonstrating how good corporate governance is overseen and maintained (HKUST, 2016a). Citing the International Chamber of Commerce Business Charter for Sustainable Development, and Principles for Environmental Management, the HKUST

Green Campus Initiative indicates the need for improved environmental performance management in its Annex: *“The objective remains that the widest range of enterprises commit themselves to improving their environmental performance in accordance with these Principles, to having in place management practices to effect such improvement, to measuring their progress, and to reporting this progress as appropriate internally and externally”* (Patchell et al., 2008). In a more recent document outlining newer guidelines for improving campus sustainability, high performance building standards policies state that *“Project stage review reporting should include sustainability component to ensure that issues can be addressed early in the design process. It should provide an update on all elements of the standards and provide a forward look at how sustainability aspirations will be addressed up to the next stage review”* (HKUST Sustainability Unit, 2017a). Further recent internal reporting on sustainability policy pathways also clearly show the implementation of internal ESG evaluation. For example, the HKUST Sustainable Operations Implementation Plan, and the HKUST Sustainable Catering Policy.

HKUST has a long track-record of environmental reporting, relative to its peers this is noteworthy. It has 15-17 years of environmental reporting, from a baseline of 1999-2000. This was a significant criterion for the selection of HKUST as a case-study; they had been writing environmental sustainability reports for almost two decades, longer than most universities have been observed to do. A success determinant of this is the fact that it is the *“requirement of all public and government offices in Hong Kong to report on environmental issues”*, so regional HKSAR regulations act as an enabler here (Yu, 2016). Loretta Luk’s account of her direct work at HKUST Sustainability Unit on reporting is worth quoting at length due to its strong corroboration of this asset on the ground:

“Yes, we have the report every year, and now we have the Sustainable Campus Consortium for all the Hong Kong universities, so we share good practices and have standard metrics to see how we perform across universities. So, it has a more high-level review, so not just looking at it on our own but how to compare across other institutions. And for our own reporting we try to of course have the baseline, before we have the challenge in place with the baseline so that we can keep track of the progress and also, we have to take account of our campus with more students coming more schools more courses new buildings and Labs, how does it incorporate when we compare the figures.... they have the annual report consolidated for comparing these results, they also share their best practices perhaps about how we get sustainability incorporated into student’s whole lives, and then share figures and best practices or good programmes.” (Luk, 2016)

CGS 4.3

CGS 4.3 Externality Recognition & Internalisation

W= 4.34: Gr. 10,
De. 2.

Pursue and make progress in:

- 1) convergence between private costs & social costs, compensation to ‘victims’;
- 2) quantitative reduction in the physical volume of throughput, setting a maximum aggregate limit of discharge/wasted resources.

The asset for *externality recognition and internalisation*, CGS 4.3, is very present at HKUST, based on the evidence observed. Three interviewees (Tjandri, Hodgson and Luk) and six documentary accounts show that HKUST as an organisation increasingly internalises its social and environmental externalities, through the lenses of social costs and reducing throughput (quantitative reduction of physical resources consumed or wasted). Indicative of this body of evidence is the language used across a number of internal documents regarding HKUST’s vision of itself in the future, for example in the HKUST Business School 2013-2015 report to PRME:

“HKUST will become a global leader in sustainability education by transforming the Clear Water Bay campus into a carbon neutral, zero waste, and net-positive environmental impact living laboratory for experiential learning, demonstrating cutting-edge research and sustainable operations within a vibrant and engaged community.”

This mission statement echoes throughout the documentation and across this analysis. For example, in the AR of 2015-16, as well as in the comprehensive overview of HKUST research marking its 25th anniversary, further support for externality recognition can be seen in the reference to the 2020 Sustainability Challenge:

“HKUST is not only setting out to impact others but to live as it proposes we should all endeavour to do. The HKUST 2020 Sustainability Challenge, launched in 2015, provides the University with a clear vision for eco-friendly living by turning the campus into a vibrant showcase for zero-carbon, zero-waste and net-positive environmental impact” (Lim et al., 2016).

The mission to respond to and internalise negative environmental (and social) impacts is very evident at HKUST, with the first observed explicit commitment to remediating economic growth and expansion of China in 2008: *“The environmental crisis in China is so vast and the need for leadership is so great that we can provide a model with unprecedented potential for impact. To match our ambitions to be an internationally renowned institution, we must set bold goals and targets to stop climate change and create sustainable development”* (Patchell et al., 2008). Further tangible goal orientation is observed in the HKUST 2020 Sustainability Challenge documentation, such as a proposed 10% reduction of energy and greenhouse gases and a 50% reduction of waste by 2020 (HKUST Sustainability Unit, 2017b). The interviews help to corroborate these findings. Hariadi Tjandri a master student and aspiring student council member, for example, related to HKUST leadership role and long-term orientation without prompting: *“As a leader in education and research, HKUST is trying to be an engine for innovation, and exemplar, and a champion of diversity... They focus on longevity and environmental impact. Their vision and mission are achievable, as well as their attitudes and outreach. They do not sacrifice long-term goals of longevity and ecosystems with short term goals”* (Tjandri, 2016). There was also further corroboration by Loretta Luk and Mark Hodgson for the presence of this asset (Hodgson, 2016; Luk, 2016).

SER 5.2

SER 5.2 Intergenerational and socio-ecological ethics

W= 1.73: Gr. 4, De. 0.

■ Ethics are identifiable in the norms and values of individuals and groups of:

- 1) intergenerational moral norm of ecological sustainability; a safe operating space for all of humanity;
- 2) intragenerational ethical development projects (e.g. resolving poverty and inequality, more resource distribution)

There are four instances in the internal evidence which indicate a slight presence of intergenerational and socio-ecological ethics in HKUST members, SER 5.2. Three sources from the HKUST Sustainability Strategy 2008 document, and one from Loretta Luk. For example, the moral imperative for climate action and responsibility of higher education and research is clearly shown in 2008 by Patchell et al.: *“Nevertheless, climate change is a global emergency that places demands on the University that are of a new order of magnitude. HKUST must become part of the solution, rather than remaining part of the problem. As an institution of higher education and research, focused on science, engineering and management, our responsibilities are clear and pressing”*. Social ethics are also evinced by their report: *“As a tertiary educational institution, our mission should include educating our students about current societal values and virtues... “HKUST has*

a moral responsibility to show leadership on the environmental and climate change threats to society and it must keep pace with other institutions that are transforming themselves to meet the challenge and as a result are attracting excellent students and faculty” (2008).

SER 5.3a

SER 5.3a Integrated sustainability praxis across functions

W= 4.33: Gr. 10, De. 0.

■ Sustainability practices are embedded in the universities portfolio activities of Research, Education, Operations, Governance, Communications & partnership (**REOGC**), through the disclosure and creation of spaces for praxis and action in collective open inquiry.

SER 5.3a, integrated sustainability praxis across functions, such as research education, operations, governance and communications, is very present at HKUST. There are 10 instances in the internal evidence which evince a cross-function cross-faculty approach to embedding sustainability into action, inquiry and dialogue across the university. Again, a notable example is found in the report from the business and management school’s PRME report, referring to a key external driver that enabled progress in embedding sustainability practices, the Hong Kong Sustainable Campus Declaration:

“HKUST is committed to creating a more vibrant, inclusive, and sustainable campus to support the university’s educational goals and priorities.”

This commitment was first articulated in the Hong Kong Sustainable Campus Consortium Declaration, where the presidents of eight Hong Kong universities stated:

“We recognize the important role and responsibilities of the higher education sector to provide appropriate responses to the challenges of climate change and sustainable development through our core missions of research, teaching, and knowledge exchange.”

Next, from the 25th anniversary *Research@HKUST* report, we see the instatement of the action plan for a proactive Sustainability Network across campus, covering the operational and campus outreach aspects of the five-point REOGC portfolio: *“The action plan seeks to create a proactive Sustainability Network, reaching across education, operations, research and the campus population, and serving as a model for sustainable aspirations globally. The dynamic initiative encompasses: development of sustainability curricula; provision for the systematic reduction of waste, energy use and greenhouse gas production in daily operations; applied research that can demonstrate fresh ideas and solutions; and communication and projects to motivate campus community involvement”* (Lim et al., 2016). Three referrals to the HKUST 2020 Challenge Vision Statement are connected in association to support these initiatives, including a longer-term mission statement past the 2020 Sustainability Challenge from intelligence on the strategic development of sustainability education, as well as the 2020 Challenge website¹⁷. Next, the Sustainability Unit’s 2013-14 sustainability report mentions how a campus engagement programme was developed: *“[t]o facilitate actions and ideas that contribute to strengthening sustainable operations on campus, to involving the local and surrounding communities, and to enhancing a learning environment that embraces the vision of sustainability within academic and research pursuits”*. Similarly, there are numerous digital platforms set up to communicate with the HKUST community about sustainability. Moreover, one account from the third-party IAU HKUST Sustainability Unit also covers main portfolio aspects: *“HKUST is committed to be a leader in environmental sustainability through teaching and researches, student engagement, operations and community outreach.”*

17 <http://green.ust.hk/en-us/about/2020challenge>, accessed 03.11.2016.

SER 5.5

SER 5.5 Sustainability research demonstration, knowledge enterprise**W= 6.52: Gr. 15, De. 4.**

- Demonstration of sustainability-related research on campus, representing substantiated knowledge enterprise; Increasing visibility to university community: Communicating how to do sustainability, demonstrating fulfilled intent on prior goals/commitments; Using interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility.

Sustainability research demonstration and substantiated knowledge enterprise, SER 5.5, is the second strongest in the entire analysis, and the most highly weighted at the meso-scale. Based on the depth, diversity and cross-association of the 15 bits of internal evidence, SER 5.5 is very highly present at HKUST. Its incidence is supported by numerous data in the reporting on the HKUST 202 Sustainability Challenge vision and recommendations with respect to the effectiveness of the demonstration of research on campus. Further support comes from the PRME business school report, the Sustainability Unit report of 2013-'14, the External Advisory Report to ExCom of 2016, and the interview accounts of Jimmy Fung and Samuel Yu: "For example there is now a data visualisation of the energy saving scheme" (Fung, 2016); "We always believed the Sustainability Unit should be visible to the whole HKUST community" (Yu, 2016).

The on-campus drive for creating more visibility for sustainability features and research, demonstrating for the community, received a big push from the External Advisory Group for the operations committee, as their final report in 2016 notes: "*Community Engagement – the group recognized that most of the sustainability features of the campus are largely invisible to the campus community, and that focusing on making some of these features more visible would help with the communication of our goals and priorities...Recommendation: Identify projects that are helpful in achieving our objectives, have an obvious educational benefit, and then install them in highly visible places where they become the focus of the campus community*" (HKUST Sustainability Unit, 2016). Other HKUST initiatives have since been designed to encourage cross-disciplinary studies, and creativity rather than rote learning through the demonstration function. HKUST Sustainability's mission statement is also indicative of and commitment to the demonstration of sustainability-oriented research, for example.

In the eyes of this research, the best evidence that demonstrates actions taken, rather than intent is found in the resulting HKUST Operations ExCo Implementation Plan. Note that this is dated after the consultation of the External Advisory Group mentioned above: "*...undertaking the actions above would result in the achievement of the 2020 Sustainability Plan. However, they also agreed that the entire effort would be bolstered by a robust communications strategy that allowed the HKUST community to see the goals, the progress, the methods, and the successes. This... should include a way to highlight the actions and allow the community to become a part of the efforts... the communication of the plan would benefit greatly by the creation of a "Sustainability Corner" that would become a permanent and highly visible public display of the kinds of efforts the university has undertaken, demonstration of University-driven research.*" (HKUST Sustainability Unit, 2017b).

A last important artefact from conversations with Bookhart demonstrates the move from 'people not knowing how we operate' to turning it 'inside-out' to 'display what we are doing in real-time', increasing visibility of physical sustainability efforts. This conscious move has clearly had a positive impact in HKUST's organisational transformation for higher sustainability. A threshold, or fulcrum was envisaged, around which this turnaround could take place, from operating under a certain level of ignorance about how the organisation operates, embedding sustainability measures in policy, vision, mission and values, into the core business of the university.

7.3.2.1.3 Macro-level Diagnosis: Extra-organisational Scale - Institution & Environment

The Macro-level concerns the whole organisation's behaviour, learning process, and overall transformation towards sustainability, and how it interacts with its surrounding environment (as well as how it is affected by its environment in turn).

Perspective	Average Weight per Perspective* (chart 6)	Aggregate Weight per Perspective	Rubric	Grc	De	Weight per Category* (chart 5)
BSP	3.73	7.47	1.6	2.00	0.00	0.87
			1.6.1	15.00	5.00	6.53
OCM	2.16	4.33	2.4	6.00	0.00	2.60
			2.5	4.00	0.00	1.73
SES	1.30	2.60	3.2b	4.00	0.00	1.73
			3.4	2.00	0.00	0.87
CGS	0.87	1.73	4.2b	2.00	0.00	0.87
			4.4	2.00	0.00	0.87
SER	2.52	12.58	5.3b	2.00	0.00	0.87
			5.4	9.00	0.00	3.90
			5.6	3.00	1.00	1.30
			5.7	12.00	1.00	5.20
			5.8	3.00	0.00	1.30

Table 3 Weights per rubric at the meso-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns.

*Charts 3 and 4.

Chart 5: Weights per rubric at the macro-level. Detailed descriptions per rubric given below.

Chart 6: Average weight across rubrics per perspective, macro-level: evaluation according to each of the five theoretical perspectives at the macro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Macro-level Diagnosis¹⁸

Taking HKUST's relationship with its external surroundings into account at the macro-level, *BSP 1.6.1 Organisational experimentalism through pragmatic idealism* is the highest weighted at the macro-level and overall is the most present in the overall diagnosis of HKUST. *SER 5.7 Research & Education Generates Societal Impact & Public Aware* has the second highest weight ($W=5.20$). This is followed by *SER 5.4 Ideal-typical Transdisciplinary Research Praxis* and *OCM 2.4 Organisational-societal learning*. Notably, SER is the most weighted perspective at this scale, whereas at the meso-level the aggregate weight assigned to the perspectives was more rounded, with BSP also proving prominent.

Overviewing the evidence at this level, the language of the ESSCOM suggests an awareness, and intent to implement a strategy that sees HKUST moving on the challenge of environmental degradation and climate change. The emphasis and onus, latently, is on Asian HEI's, as representative of a region demonstrating spectacular growth, to move towards sustainability. HKUST leverages its place in the Asia-Pacific and South-East Asian regions by garnering specific resources from the government via the HKSCC with respect to these challenges, as the conversation with Loretta Luk seemed to show:

"A: so that's a key line of communication with the government then, two-way. They ask you how things are going in the higher education sector but then you are allowed to ask them to help through the HK Sustainable Campus Consortium. L: yeah" (Luk, 2016).

In terms of the external implementation of governance for sustainability, there is a large difference in weightedness with its internal sister category *SES 3.2a*. However, just because there are only four instances *SES 3.2b* does not mean that knowledge of good governance of ecosystem services and natural resources is not implemented by HKUST

¹⁸ For a comprehensive deep dive into data per category at the macro-level, see the following section, *Detailed Overview of Data per Macro-level Category*, otherwise, move to the overall analysis outputs, *Section 7.3.3*.

as an organisation, just that it was not so well represented in the accounts evaluated. This perhaps indicates a certain degree of caution with respect to HKUST's decision to influence its national and regional environment's institutional architecture. This seems understandable given the tensions in the area. More nuanced efforts emerged from the analysis. Discretion was employed by actors as part of a carefully constructed and planned communications strategy for sustainability. Indeed, the HKUST Sustainable Campus Consortium and links with local government by the ENVR and HKUST sustainability unit provide evidence that this takes place increasingly. I considered this (external and internal) communication strategy for sustainability at HKUST a very important 'missing link' after three weeks of field work. Hence the international affairs team was contacted, with help from Denise Chow, a student professional at HKUST Sustainability Unit. An interview with Yvonne Lee, Team Head of International Engagement and Public Affairs, subsequently took place which corroborated how the HKUST was seen behaving in its (complicated) relationship to the outside world. It allowed further connections to be made at the macro-scale. The purpose was to find out what direction HKUST external relations might be taking under the leadership of Eden Woon (Vice-President Institutional Advancement).

I was also interested in HKUST's international engagements and community outreach, specifically in the area of sustainability science and policy. Yvonne offered information regarding communications and positioning on sustainability, entrepreneurship and public policy; she assured me were all three were deliberately related in the HKUST context. HKUST's international positioning and communications strategy was corroborated in the *Xth Glion Colloquium Paper* by Tony Chan. Yvonne Lee's team at the department for international affairs, under the auspices of VP for Institutional Advancement, was in charge of drafting the document with Tony Chan's inputs. We can see this expressed through the correspondence with the qualities of *OCM 2.4 organisational-societal learning*, and *SES 3.1.2 transformative leadership*.

This provides a context for HKUST, at its regional administrative region level, and also at the national level, explaining how the 'One Country, Two Systems' framework of government works with respect to HKUST (Chan, 2015). We can also link this scalar situation of HKUST to its participation in the HKSCC, the network of HK universities whose values and mission work towards a better and more ecologically synchronised way-of-life. Efforts for societal impact of research (*SER 5.7*) were identifiable on further assessment of HKUST's impact cases, under point 4 at Research and Graduate Studies.

Detailed Overview of Data per Macro-level Category

The Macro-level concerns the whole organisation's transformation towards sustainability and how this is nested within its environment.

BSP 1.6

BSP 1.6 Organisation Development: 3rd Person Action Research Inquiry

- Evidence of: jointly organised transdisciplinary processes, community reach-out programs, boundary work, participatory and/or action research, behavioural interventions, 3rd person action research practice

W= 0.87: Gr. 2 De. 0.

In the search for jointly organised trans-disciplinary processes, one had to note that cultural differences might play a role in what might seem to be a western practice, as transdisciplinarity did not come up too much in the data. No direct referrals to action research practices were found, aside from referrals to Living Labs in BSP 1.6.1 In the case of HKUST, this sister code, initially interpreted at the meso-level, is here diagnosed as a proxy for action research practices of the whole organisation in relation to its surroundings at the macro-level. In the 2014-15 AR, evidence of jointly organised transdisciplinary learning and research processes was found: "In line with learning beyond the classroom, operations staff members have started to adopt roles as sustainability teachers and mentors" (HKUST, 2015a). Notably, there is also a reference to green tendering and procurement as supported by Hodgson. In the 2015-16 AR, the HKUST 2020 Sustainability Challenge is outlined and reflected upon as a 5-year plan "that seeks to develop the University's Clear Water Bay campus into a living lab for sustainable practices and experiential learning. Areas of focus encompass education, operations, on-site demonstration projects that contribute to sustainability and showcase the work of HKUST researchers, and the engagement of the HKUST community in an ideas-sharing Sustainability Network" (HKUST, 2016a).

BSP 1.6.1

BSP 1.6.1 Organisational Experimentalism through Pragmatic Idealism

- Reference to living laboratories or test beds, where actors relate to the use of their university campus as: a community of inquiry/practice that uses its own social and material surroundings to experiment. Adoptive of living lab approach or having the campus objective with socio-behavioural & inclusive experimentation

Data-informed sub-category

W= 6.53: Gr. 15, De. 5.

Manifests at Macro-level

As noted in BSP 1.6, attributes associated with BSP 1.6.1 *organisational experimentalism through pragmatic idealism* exhibit themselves strongly at the macro-level at HKUST. BSP 1.6.1 is extremely present, being the most incident and the most conceptually dense out of all the categories assigned to the data. The evidence was heavily present across and within accounts, as well as linking to other salient categories (5.5 *Sustainability research demonstration, knowledge enterprise*). As seen in the evidence for CGS 4.3 *Externality recognition and internalisation*, a long-term organisational experiment appears in the language across many key documentary sources, firstly in the HKUST Business School 2013-2015 report to PRME:

"HKUST will become a global leader in sustainability education by transforming the Clear Water Bay campus into a carbon neutral, zero waste, and net-positive environmental impact living laboratory for experiential learning, demonstrating cutting-edge research and sustainable operations within a vibrant and

engaged community.”

This same statement is seen and reflected upon in numerous different ways in public reports such as the annual reports, as well as internal reports that lay out the different aspects of the HKUST 2020 Sustainability Challenge. For example, in the HKUST sustainability guidelines for students and staff and as well as its new sustainability policies (HKUST, 2016b; HKUST Sustainability Unit & Bookhart, 2017a; Yong, 2017). Further evidence of how HKUST sees itself as an organisational-level experiment, or ‘learning laboratory’, and enacts policies and practices to further its transformation towards the 2020 vision, can be seen again in the earlier 2014-15 AR, as it reported on the period in question: *“The University continued its drive to transform the campus into a learning laboratory for sustainability education and research”* (HKUST, 2015a). HKUST’s Sustainability Unit, back in 2013-2014, already laid out its key role in the transformation into a learning laboratory: *“The goal is to support operational units as they undertake actions that improve the campus environment; faculty as they use the campus as a living laboratory for new ideas and demonstrations of research; and students who want to improve conditions through their hands-on actions”* (HKUST Sustainability Unit, 2014). The earliest reference to the learning laboratory, as framed in terms of transformational change and experimentation towards sustainability, taking a holistic view of HKUST as an organisation, is seen in the 2008 Green Campus Initiative, which laid out the strategic and moral framework for HKUST’s progression. For ESSCOM, timing was crucial. Urgency, prescient: *“In our short 3-4 year window of opportunity, we need to provide our students with a living experience, a laboratory that generates ideas and solutions for sustainable development”* (Patchell et al., 2008). The synergy between this language, and the content of the fourth Sustainability Education element of the HKUST 2020 Sustainability Challenge, is clear to see: *“The commitment of the Education Focus is to align the activities of the next five years to begin building the shape of the Vision for sustainability, stressing that the University aspires to be: A global leader in sustainability education through transforming the campus into a living laboratory for experiential learning”* (HKUST, 2015b).

OCM 2.4

OCM 2.4 Organisational- societal learning

- The organisation learns from and anticipates issues mature on the societal agenda, that is approached and internalised by adopting a civic-orientation towards the external task environment

W= 2.60: Gr. 6, De. 0.

The asset depicting HKUST’s dynamic organisational-societal learning is fairly present according to the evidence collected. Notable instances are concentrated in the Xth Glion Colloquium report by Chan (2015), and the ‘Green UST’ sustainability strategy report of 2008 (Patchell et al., 2008). In Chan’s analysis of the impact of China on the global higher education system, including the place of his own HKUST in the regional system, we see properties of civic orientation towards issues mature on the societal agenda, specifically in the areas of *“university governance, science and technology research, and entrepreneurship/innovation culture”*. Further quotes indicate how the leadership, and by proxy, HKUST, learns from and anticipates from issues mature on the societal agenda (in this case the economic rise of China and its regional and global impacts on higher education), and how it approaches these issues by adopting a civic orientation towards the external task environment. For example, a demonstration of the concerns of academics and their families: *“...for any academic with young families, environmental concerns, such as air pollution and food safety, are often additional deterrents”*; anticipating of

improving quality of higher education in developing countries enabling students from these countries to study in their home lands: *“Improving economic opportunities at home also give incentives for students to choose to study domestically, with the added advantage of building a personal network that will be useful for career advancement”*; and, converse to the effect on domestic students, the effects on international students of how East meets West at HKUST: *“Our university has been very attractive to international students as well... by gaining a study experience in China but in a Western system that they are familiar with”* (Chan, 2015). Finally, establishing the longitudinal anticipation of issues in mental health and leadership cultivation in students with respect to *“pervasive environmental degradation and climate change”* the ESSCOM group frame these global challenges *“requiring dramatic changes throughout society”* already in 2008, to academic institutions: *“The challenge is paramount in China where the fast-rising expectations of material wellbeing are matched only by the potential for thwarted aspirations.... Rarely has such an opportunity presented itself to academic institutions to lead by example and to foster the development of future leaders to meet this global need... HKUST is well placed to provide leadership through example, to cultivate leaders and to conduct research that will achieve sustainability”* (Patchell et al., 2008).

OCM 2.5

OCM 2.5 Organisational extroversion & openness

W= 1.73: Gr. 4, De. 0.

- Adopts extroverted role with open boundaries: a porous organisational ‘membrane’:
- 1) Reacting quickly to changes in the external environment;
- 2) Focussed on wider world with respect to societal wellbeing & ecological carrying capacity

OCM 2.5 *Organisational extroversion & openness* is not that present according to the evidence at HKUST. If HKUST were to be placed on the scale of introversion to extroversion, like individuals can be, it would likely be found in the middle: *ambiversion*. It reflects and experiments before conscientiously engaging with its external task environment. It is proactive using internal expertise in a less fragmented community. It is likely for this reason OCM 2.5 is not strongly evinced by the data. A balance between organisational extroversion and introversion can be seen as an asset. When combined with the appreciative inquiry on site, we see how HKUST the second criteria of OCM 2.5, being focussed on the wider world with respect to societal wellbeing and ecological carrying capacity is clearly evident, for example, with the pivotal Green Campus Initiative report: *“HKUST has a moral responsibility to show leadership on the environmental and climate change threats to society and it must keep pace with other institutions that are transforming themselves to meet the challenge....”* (Patchell et al., 2008). The language of ‘transformation’ and ‘transforming’ ‘themselves’ as organisations is notable in 2008. Two interviewees corroborate this diagnosis of HKUST as a pioneering ‘ambivert’: *“They focus on longevity and environmental impact. Their vision and mission are achievable, as well as their attitudes and outreach. They do not sacrifice long-term goals of longevity and ecosystems with short term goals”* (Tjandri, 2016). A certain degree of openness is also evinced regarding HKUST’s role in HKSCC by Luk: *“We also as one voice talk to government, for example within that consortium, we say how the government can support us in more ways, for example funding, when we have technology we want to research that helps maybe with waste reduction... the government also expects us to help them achieve the energy saving targets and reductions, as an important sector, so we also need their support.”* There is an interesting symbiosis here between the local-level network of sustainability-oriented universities in the HKSCC and the HKSAR government’s sustainability performance and goals.

SES 3.2b

SES 3.2b External implementation of governance for sustainability

W= 1.73: Gr. 4, De. 0.

- The organisation takes responsibility that knowledge of good governance and management of natural resources and ecosystem services is developed and implemented extrinsically, practicing leadership, entrepreneurship and socio-technical innovation for other organisations & societal actors

SES 3.2b, the extrinsic representation of governance for sustainability is present to limited degree with respect to HKUST's relationship with its environment. Potential targets for the knowledge implementation of good governance and management of ecosystem services and natural resources are provided by several interview accounts. Fung's critique of the industry is an insightful indicator of where HKUST sees deficits in this knowledge in its surroundings: *"Funding is not coming from companies. Industry only wants quick answers. No Hong Kong based company has a large research and development department. Property tycoons invest in HKUST"* (Fung, 2016). Further changes in tendering and procurement policies demonstrate external influence is planned on HKUST contractors: *"HKUST is committed to creating a sustainable campus setting where resources are utilized responsibly and all members of the HKUST community have the capacity to thrive within a healthy environment. The specifications detailed in this document are predicated on the expectation that the Contractor respects and supports HKUST's commitment to creating a sustainable campus"* (HKUST, 2016b). This shows progress and realisation of the intent communicated in the sustainability strategy of 2008: *"A part of the appointment process includes evaluation of the contractors' environmental performance records. The required tendering process also stipulates that potential service providers submit plans on environmental compliance and sustainability practices"* (Patchell et al., 2008). Finally, leadership see graduates themselves as a key mechanism for knowledge implementation in the long-term: - *"Five-year targets are in place for each area. These objectives range from educating graduates that have the ability and commitment to serve as sustainability problem-solvers, locally and globally"* (Lim et al., 2016).

SES 3.4

SES 3.4 University-driven asset-based community development

W= 0.87: Gr. 2, De. 0

- Students, educators, researchers, & practitioners lead by forming partnerships with civic actors to find innovative solutions to drive societal transformation. Teams of staff and students go out into the community to:
 - 1) understand community problems;
 - 2) identify the spaces for sustainability to come in to solve community problems;
 - 3) resolve problems in innovative ways via interventions driving societal transformation

Only two instances were seen for SES 3.4 university-driven asset-based community development, and it is unclear whether all three steps according to Cloutier are covered. This may well be because of the complexity of gathering evidence for a university community's ability to understand community problems, identify spaces for sustainability to contribute to these problems, and resolve these problems innovatively via interventions driving larger societal transformation. However, the evidence retrieved does indicate course-level actions which exhibits these traits. In the PRME Report, specific evidence of students, educators and practitioners partnering to innovate solutions towards societal transformation can be seen in the course, Social Entrepreneurship and Venture Philanthropy: *"In 2014, the team, with members of undergraduates and postgraduates, partnering*

with a green start-up HK Recycles won the pitch competition and a grant of HK\$250,000 to expand its recycling logistics business. The funding would be used for marketing and advertising, buying equipment and hiring more socially disadvantaged people to help collect wastes for recycling purposes. Their financial and social impact analysis estimates that by 2015, a further 7,500 people will sign up for the company's waste collecting service, thus helping alleviate the pressure on the much-debated landfills in the city". This reference demonstrates teaching knowledge for social impact and embeddedness in external organisations and the local community in student curricula. This is corroborated from other testimonies across the data regarding setting up innovative courses with student teams forming external partnerships, e.g. the "Innovating Today, Imagining Tomorrow" Mentorship Program (HKUST, 2016a).

CGS 4.2b

CGS 4.2b Accountable Disclosure of Environmental Social Governance

W= 0.87: Gr. 2, De. 0

- 3) After materiality analysis (1&2 in 4.2a), the whole organisation's sustainability performance is collated and made presentable in a comprehensive, high-quality sustainability or integrated report. Internal evaluation of ESG issues (4.2a) are communicated externally to relevant stakeholders

CGS 4.2b accountable disclosure of ESG performance in a substantive and integrated report, is also hard to discern for its presence in HKUST's relationship with the external community. Nevertheless, responsible actors mentioned continuing progress in this area. In particular from the VPAB, Mark Hodgson, who related that they were "in discussion" regarding integrating their sustainability reporting with their annual reporting. The format was indicated to be moving towards integrated reporting through the reporting years of 2012/13 onwards, with larger developments in 2016 as the documentary evidence shows. In order for organisational sustainability performance to be properly collated, sufficient communications between structures and good governance is required. Despite the inductive evidence, there were only two incidences. First, an oblique reading in the Green UST Initiative document, expressing the need and recommendation to adopt the Business Charter for Sustainable Development, PRME, in the annex of the Sustainability Strategy: *"The objective remains that the widest range of enterprises commit themselves to improving their environmental performance in accordance with these Principles, to having in place management practices to effect such improvement, to measuring their progress, and to reporting this progress as appropriate internally and externally"* (Patchell et al., 2008). Secondly, and the most significant for assessing CGS 4.2b, Luk's account was insightful: *"Yes, we have the report every year, and now we have the sustainable campus Consortium for all the Hong Kong universities, so we share good practices and have standard metrics to see how we perform across universities. So, it has a more high-level review, so not just looking at it on our own but how to compare across other institutions. And for our own reporting we try to of course have the baseline, before we have the challenge in place with the baseline so that we can keep track of the progress... Of course a university has their own reporting framework or standards but then when we come together we tried to have the standard ground for comparison"* (Luk, 2016).

CGS 4.4

CGS 4.4 University Social Responsibility Assumption

W= 0.87: Gr. 2, De. 0.

- 1) accept the moral obligation of the university defined by its own political economy, accepting social duties, and participating in deigned social cooperation;
- 2) collaborative governance is undertaken through partnership with external societal actors (NGO's, business, citizen groups)

Two references support the view that HKUST accepts its moral obligation as a university, defined by internal actors who collaborate in governance for societal impact. A moral mission and obligation is somewhat evinced by the language HKUST generically uses about its relationship with the outside world, and with itself, in the context of sustainability. The first instance this investigation had access to is from 2008: “HKUST must become part of the solution, rather than remaining part of the problem. As an institution of higher education and research, focused on science, engineering and management, our responsibilities are clear and pressing” (Patchell et al., 2008). This was substantiated in the AR of 2013-14 “we moved steadily forward in our students’ social contribution to the community. Awareness of the needs of others, leadership skills, and service learning have been highlighted through programs such as the REDbird Award scheme, HKUST Connect, which now works together with 80 partners in the community on service projects” (HKUST, 2014a). No further evidence was retrieved, therefore this research cannot conclude that CGS 4.4 university social responsibility assumption is present to a strong extent, despite the incidence of generic references that may indicate a more holistic moral orientation (as indicated in other categories of the analysis, such as BSP 1.3, especially BSP 1.5 and SER 5.2).

SER 5.3b

SER 5.3b Integrated sustainability praxis external impact

W= 0.87: Gr. 2, De. 0.

- University community actions increase likelihood of sustainable lifestyles externally by fulfilling its REOGC functions, ensuring that sustainability practices are embedded. Targeted question that generates data for this code: What are the realised outcomes of HKUST’s organisational transformation?

Based on the limited evidence available regarding the likelihood that SER 5.3a integrated sustainability praxis across functions increases sustainable lifestyles externally to HKUST, only two instances were collected regarding the presence of SER 5.3b. Firstly, in David Mole’s interview, he describes how HKUST’s process of embedded sustainability led to sharing knowledge with other institutions, in particularly forming local joint university sustainability liaison committees, directly mentioning HKSCC (Mole, 2016). The mission statement of the HKSCC backs this reference up: “We recognize the important role and responsibilities of the higher education sector to provide appropriate responses to the challenges of climate change and sustainable development through our core missions of research, teaching, and knowledge exchange” (HKSCC, 2017). Mole explained how they (ESSCOM and others) did not have to convince the management: “we weren’t presenting management with a problem, we were presenting them with a solution to a problem they had, which was how to position HKUST in this growing sense that something ought to be done” (Mole, 2016). This alludes to an increasing level of awareness of HKUST’s role in wider society being augmented in terms of its impact for sustainable lifestyles arising from its integrated sustainability praxis internally. This was somewhat corroborated in Tjandri’s interview: “HKUST wants to be a global leader in Sustainability in education, with a learning lab approach, in operations, with zero waste targets etc, with a showcase and demonstration of progress, and with the community” (Tjandri, 2016). Taking Tjandri’s ‘community’ reference in combination with another notable reference, the sustainability action plan in the Reseach@HKUST 25th Anniversary Report, this forms the second ‘hit’ for this category in the data: “The [HKUST 2020 Sustainability] action plan seeks to create a proactive Sustainability Network, reaching across education, operations, research and the campus population, and serving as a model for sustainable aspirations globally” (Lim et al., 2016).

SER 5.4

SER 5.4 Ideal-typical Transdisciplinary Research Praxis**W= 3.90: Gr. 9, De. 0.**

- Three phase ideal–typical transdisciplinary research.
- Phase A: Complex problems are collaboratively framed in inter-disciplinary teams;
- Phase B: solution-orientated transferrable knowledge is co-produced based on framing process;
- Phase C: (Re-)integration and application of co-produced knowledge in scientific and societal practice

The asset, *SER 5.4 ideal-typical transdisciplinary research praxis* is present to good extent at HKUST. The 25th anniversary research at HKUST report provides a notable overview in its presentation of HKUST research: “*Research institutes, established to generate cross-disciplinary initiatives, are another cornerstone of the University*”. Examples of these institutes include the Biotechnology Research Institute, William Mong Institute of Nanoscience and Technology, and the Institute for the Environment and Energy Institute, which “*together with various internal research support schemes from the University, this setting promotes and fosters the development of interdisciplinary as well as exploratory curiosity-driven research*” (Lim et al., 2016). Interesting references were found to ‘trimodal’ pedagogical models and interdisciplinary major programmes, in the annual report 2015-16 and other campus observations: “*As the degree program transition has taken place, tri-modal education has become a major focus, emphasizing cross-disciplinary courses, active learning and in-depth academic engagement. In tri-modal education, expanded offerings in experiential learning help to increase enthusiasm for teaching innovation*” (HKUST, 2016a). In the prior reporting year, the university supported interdisciplinary efforts and the formation of research teams in the areas of robotics and automation with a new research laboratory known as the IC Design Village, and the HKUST Robotics Institute, providing further evidence of interdisciplinary moves (HKUST, 2015a). David Mole cited structural obstacles in the way the university traditionally functions to progress being made with respect to interdisciplinary research and teaching for sustainability: “*It’s interdisciplinary. Our course includes teachers from science and engineering, Business and Social Science, and it’s also broad and conceptual, and it’s not narrow and technical at this stage. The development the field is new and so it’s still being sculpted. Universities are really not good at that, they are structurally set up to make sustainability education, embedding it, difficult! Even a research professor who is keenly interested is in difficulty*” (Mole, 2016). Finally, the conversation with Jimmy Fung seemed to confirm the most that progress was being made. In reference to the Transforming Lives 25th Anniversary themes, Fung’s comments were particularly illuminating: “*A: These themes seem to be overarching, and necessarily scientists will need to collaborate across disciplines. J: Exactly, so all these are interdisciplinary, not a single department, single discipline research at all. A: And that’s the university policy, and that means that that’s inscribed as an incentive for how faculty are expected to work from now on? J: Right, so in fact for new faculty members, for each department new faculty hires expertise has to be in one of these five areas, and on top of that has to be joint appointment. So that is really forcing you to do interdisciplinary research. A: So that’s a top-down initiative J: Right.*” (Fung, 2016). After his highly detailed overview of physical campus transformation for sustainability in his operations portfolio, Hodgson remarked on how the physical spaces provide a means to encourage interdisciplinarity too (2016). Concluding, evidence for Phases A and B, as formulated originally by Lang et al. (2012), can be seen, but Phase C, re-integration and application lacks somewhat, whether through sample limitations or the freshness of the approach at HKUST.

SER 5.6

SER 5.6 Minimisation of negative health, socio-economic and environmental effects**W=1.30: Gr. 3, De. 1.**

- Minimisation of negative environmental, economic, societal, and health effects as a result of the university's activities, and the flow of resources across its boundaries (related to maintaining throughput).

Several sources in the documentation point towards the minimisation of negative effects across health, socio-economic, and environmental metrics. This allows us to say SER 5.6 is slightly present at HKUST, based on the sample. In the HKUST Sustainability Unit Report 2013-14 we see the language used indicates a strong intent to minimise negative environmental, health and societal effects: "Since the university is constantly changing, the Sustainability Unit supports this transformation in ways that make it more healthy, inspiring, and environmentally responsible. The goal is to support operational units as they undertake actions that improve the campus environment... and students who want to improve conditions through their hands-on actions" (HKUST Sustainability Unit, 2014). The Green UST initiative report also provides supportive indications that these intents were designed in to the campus buildings as well as the specialised Sustainability Unit: "Locating our campus on a site that had once been an army barracks rather than on undeveloped land was one way to reduce disturbance of the natural environment. Our campus buildings were designed to minimize solar load and maximize natural sunlight to reduce air conditioning and artificial lighting use. Using amply available seawater to cool the generators that provide the air conditioning was another energy-saving feature of the campus design" (Patchell et al., 2008). More recently, we see further progress in the minimisation of primarily environmental negative impacts in High Performance Building Standards, which subscribe to the HKUST mission statement for the 2020 Sustainability challenge.

SER 5.7

SER 5.7 Research and education generates societal impact and public awareness**W= 5.20: Gr. 12, De.1.**

- a) 'Walking the talk': enhance research and education function to generate societal processes of change towards desired quality-of-life;
- b) 'Talk the walk': a significant level of public consciousness is detectable that the research and education the university does has positive societal impact

The depth and breadth of evidence collected supports the observation that the asset *SER 5.7 research and education generates societal impact and public awareness* is strongly present at HKUST. The PRME report's reference to the course at HKUST business school, Social Entrepreneurship and Venture philanthropy, lists learning outcomes for students that indicates educational actions having an impact in the public community: "*Understanding of Social Entrepreneurship and Venture philanthropy as innovative methods of creating social impact by applying business processes and practices; Knowledge and understanding of how to define, address and solve social issues by using business and investment skills*". Strong statements in the Research@HKUST report by President Chan also demonstrate HKUST's orientation to societal impact: "*we continue to build on our existing strengths to generate new knowledge and push forward research frontiers, to deepen our contribution and impact on society*" (Lim et al., 2016). Given that a significant proportion on students enrolled at HKUST are local, and that Hong Kong has been dominated by the law and finance industries, with little 'bandwidth' for start-ups and student-spin-off entrepreneurs, HKUST's move to incentivise and facilitate an

entrepreneurial environment for its students can be argued to be a aligning education and research for impact on wider society: *“we are working hard in creating an enhanced entrepreneurial environment for our students and faculty. We just completed our 5th annual HK\$1M Entrepreneurship Competition. We run a “Build your own Business” seminar series. We are completing an on-campus space devoted to student entrepreneurship activities, to be run by students. And we have introduced an entrepreneurship minor for all majors”* (Chan, 2015). This observation is corroborated by similar language in ‘Research@HKUST’ regarding graduates as the outcomes that lead to societal impact and public awareness: *“Postgraduate education and research opportunities enable graduates and fellows to contribute further creative input to the wider community as academics, hi-tech entrepreneurs, and industry and institutional dynamos”* (Lim et al., 2016). Taking this thematic finding of ensuring student mobility and employability in the local area, the Chairman’s Forward further supports HKUST’s performance in generating societal impact and public awareness: *“the positive outcomes of such endeavours [HKUST research areas and innovation] for the wider community were recognized internationally through HKUST’s position at No.16 in the widely cited Global Employability University Ranking in 2014”* (HKUST, 2015a). Providing evidence that HKUST performs evaluation of its own on its societal impact, Bookhart’s account showed that the HKUST Research and Graduate Studies department performs ‘Impact Cases’ to determine the extent to which there are outcomes of the research HKUST does on its surrounding society (Bookhart, 2016). Moreover, HKUST’s participation and selection for the GCSO, a trans-institutional network for sustainability solution implementation, demonstrates the awareness of external actors of its impacts and potential, as Fung’s account demonstrated in our interview (2016). Finally, the fact that the government needs HKUST as much as the other way around shows public awareness for the capabilities of HKUST for societal impact, as Loretta Luk explained (2016).

SER 5.8

SER 5.8 Sustainability reporting standards and instruments implemented

- Global, regional & national sustainability standards, instruments & principles are implemented in measurement and reporting process. Communicate progress made.

W= 1.30: Gr. 3, De. 0.

SER 5.8 *Sustainability reporting standards and instruments implemented* is slightly present at HKUST, and likely to be an asset that sees significant development in the coming years. Hodgson remarked that HKUST was seeking to move towards more integrated reporting for example. Whereas the HSEO and the ENVR have been following environmental and sustainability standards for more than a decade, and the conversation with the VPAB and others, including Paul Forster *show standards and principles are implemented operationally and educationally. Additional evidence of integrated sustainability reporting was seen in HKUST high performance building standards: “Project stage review reporting should include sustainability component to ensure that issues can be addressed early in the design process. It should provide an update on all elements of the standards and provide a forward look at how sustainability aspirations will be addressed up to the next stage review”* (HKUST Sustainability Unit, 2017a).

It seems likely that HKUST has positively developed its own programs and processes of monitoring, assessing and reporting on its environmental and sustainability performance, as it continues to make progress towards specific objectives, as shown in the most recent annual report sampled by this research:

Figure 6: Figures for Greenhouse Gas emissions, Waste and recycling at HKUST from the Annual Report of 2015-16. In that reporting year, 96% of HKUST's Greenhouse Gas emissions were from electricity (HKUST, 2015a).

7.3.3 ANALYSIS OUTPUTS

7.3.3.1 SUBSTANTIATING ASSOCIATIONS & LINKS USING NETWORK SIGNIFICANCE

Table 4 below presents the output of the conceptual associations produced when internal evidence linked more than one category or code. When more than three quotes were shared between codes, the relationship was tested in Atlas to establish the pathway or action strategy that HKUST ostensibly took. Associations, as expected before the case work began, are cross-scalar *as well as* cross-theoretical perspective. Micro-level criteria, such as 4.1 *Strategic trajectory, liaison and learning* seems to affect the meso-level emergence of 4.2a *Internal Evaluation of Environmental Social Governance* and is strongly associated with 5.5 *Sustainability research demonstration, knowledge enterprise*. Given the density of the links and overlap with the data, this suggests that a series of steps may have been taken along a pathway of organisational transformation, indicating a distinct action strategy. Thus, with the substantiation of associations and links, it may become clearer what the potential causality might be in these relationships.

Network Maps Synopsis

Atlas.ti network map functions were used as a means to substantiate, re-evaluate, apportion, and validate links made in the data. Not all network diagrams are included in this report due to their number and complexity. 11 maps in total were used in this hermeneutic unit. An example of a network map used in the analysis is included in *Appendix 3*. When links between categories were validated, these maps were superimposed onto the ID tool template to visually depict the action strategies and unique transformation signature. The next section demonstrates and describes the outputs of this procedure.

Source	Link Type	Scale	Lens	Target
1.1 Psycho-social wellbeing	is associated with	Micro-Meso	BSP-BSP	1.5 Organisational positive behaviour
1.5 Organisational positive behaviour	is associated with	Meso-Macro	BSP-BSP	1.6.1 Organisational experimentalism
1.6.1 Organisational experimentalism	is associated with	Macro-Macro	BSP-SER	5.6 Minimisation of negative health, socio-economic and environmental effects
2.3 Purposeful-adaptive evolution	is associated with	Meso-Meso	OCM-BSP	1.4 Organisational lobbying competence
2.3 Purposeful-adaptive evolution	likely causes	Meso-Macro	OCM-SER	5.7 Research and education generates societal impact and public awareness
3.1.1 Effective intrapreneurship	likely causes	Micro-Micro	SES-SER	5.1 Sustainability Competence Training for Transformation
3.1.1 Effective intrapreneurship	likely causes	Micro-Meso	SES-SER	5.5 Sustainability research demonstration, knowledge enterprise
3.1.1 Effective intrapreneurship	likely causes	Micro-Macro	SES-BSP	1.6.1 Organisational experimentalism
3.2a Internal governance for sustainability	is associated with	Meso-Meso	SES-CGS	4.2a Internal Evaluation of Environmental Social Governance
4.1 Strategic trajectory, liaison and learning	is associated with	Micro-Meso	CGS-SER	5.5 Sustainability research demonstration, knowledge enterprise
4.1 Strategic trajectory, liaison and learning	likely causes	Micro-Meso	CGS-CGS	4.2a Internal Evaluation of Environmental Social Governance
4.3 Externality Recognition & Internalisation	is associated with	Meso-Macro	CGS-BSP	1.6.1 Organisational experimentalism
4.3 Externality Recognition & Internalisation	is associated with	Meso-Meso	CGS-SES	3.1.2 Effective transformative leadership
5.1 Sustainability Competence Training for Transformation	is associated with	Micro-Meso	SER-SER	5.5 Sustainability research demonstration, knowledge enterprise
5.1 Sustainability Competence Training for Transformation	is associated with	Micro-Macro	SER-BSP	1.6.1 Organisational experimentalism
5.1 Sustainability Competence Training for Transformation	is weakly associated with	Micro-Micro	SER-BSP	1.2 Pro-sustainability behaviour

Table 4: Based on the Atlas output list of Code-Code links. Three distinct strategic chains of categories connected by the internal evidence are shown in **black (A)**, **brown (B)**, and **turquoise (C)**. The column 'Link Type' shows the type of association in Atlas. Whether dialogical (two-way interaction observed between actions, strategies or episodes), or unidirectional (one episode, action or pattern of behaviour clearly affecting another), these are reflected by two-way or one-way arrows in the transformation signature.

7.3.3.2 SCALAR PERFORMANCE COMPARISON

Charts 1, 3 and 5, presented sequentially, allow a direct visual comparison of HKUST's sustainability transformation performance at the micro-, meso-, and macro-levels. Alongside each other, we can see that HKUST's most pronounced assets appear at the meso-level, when it comes to internal organisational sustainability governance and sustainability research demonstration, both at $W \approx 6.5$. There are similarly outstanding assets at the micro-level, suggesting a balanced intra-organisational and group/individual scale asset development. For example, we see good weightings for strategic trajectory ($W=5.64$) and transformative leadership ($W=6.07$) at the micro-level. It also shows a strong aptitude at the macro-level with respect to organisational experimentalism, at over $W \geq 6$. However, at the macro-level, there are not as many

highly weighted rubrics with $W \geq 5$, aside from impact and awareness of its research and education. Overall, this suggests an organisational design, governance and experimentalism aptitude in transformation towards sustainability, with aligned bottom-up and top-down efforts, with a more tailored, selective and even strategically cautious approach to the institutional surroundings that primarily focusses on scaling the academic mission of the university for Hong Kong as a whole.

7.3.3.3 HKUST TRANSFORMATION SIGNATURE & ITS ACTION STRATEGIES

HKUST's performance is visually depicted using the diagnostic tool, using the

proximity and overlap of categories of analysis. Using Atlas.ti, categories were mapped against each other according to groundedness and density respectively. Links in the action strategies were substantiated with the internal evidence using the network map function in Atlas. The connections tracing out action strategies are shown in *Table 5*. Further criteria of inclusion into the action strategies include: **Gr**≥10; **De**>2. The associations were arranged semantically and according to scale level on the tool template. The resulting three action strategies holistically form HKUST's unique 'transformation' signature. Certain elements are shown as larger or more highlighted based on their weightedness value (see *Section 7.3.2*).

HKUST Action strategy A, 'sustainability demonstration and competence training, transformative leadership, governance, and experimentalism'

is a major strategy, corresponding to the chain in **black** in *Figure 7*. There are many links between and across scales, however, key associations are notable between the micro-level rubrics of *transformative agency* (SES 3.1), *effective intrapreneurship* (SES 3.1.1), *strategic trajectory* (CGS 4.1) and *sustainability competence training* (SER 5.1). These undergird significant meso-level rubrics, such as *internal evaluation of ESG* (CGS 4.2a), *sustainability research demonstration* (SER 5.5), and *effective transformative leadership* (SES 3.1.2). The *sustainability research demonstration* (SER 5.5) rubric, is particularly evident, corroborated by documentary and verbal accounts concerning the HKUST 2020 Sustainability Challenge and its respective Action Plan. Creating more visibility for sustainability features and research – including a 'Sustainability Corner' – was influenced directly by the recommendations of an external advisory group for the operations committee installed on sustainability (HKUST Sustainability Unit, 2016). Rubrics are also interlinked across the meso and macro-levels of CGS and BSP. Here the associations particularly focus on *BSP 1.6.1 organisational experimentalism*, showing HKUST's propensity to use itself as a learning lab towards social, economic and ecological positive transformation of itself and its surroundings.

HKUST Action strategy B, 'lobbying competences, purposeful-adaptive evolution, sustainability research and education for external impact'

shows in **brown** a distinct pathway between *organisational lobbying competences* (BSP 1.4), *purposeful-adaptive evolution* (OCM 2.3), and *societal impact and public awareness in research and education* (SER 5.7), the association of which is supported by interviews at the HKUST Sustainability Unit. These yielding information concerning: the identification of HKSCC (Hong Kong Sustainable Campus Consortium); HKUST Research and Graduate Studies department, which performs impact cases to determine the extent to which HKUST research outcomes impact its surrounding society; HKUST's participation in GCSO, which demonstrates the awareness of external actors of its impacts and potential; and, the fact that the HK government needs higher education institutions like HKUST as much as the other way around, which shows public awareness for the capabilities and impact of universities.

Figure 7: HKUST Transformation Signature. One major action strategy, and two minor ones interlinked. The visualisation is designed for a holistic view, with rubrics shown proportionally according to groundedness (as in Charts 1-6); conceptual density/ association is represented by arrow design. HKUST assets weighted more towards meso- and micro-levels and SER/SES/CGS lenses. BSP 1.6.1 is a significant feature for systemic change manifesting at the macro-level.

HKUST Action strategy C, 'student and staff wellbeing, positive inspiration and experimentalism' is a minor pathway, shown in **turquoise**, which overlaps with the action strategy A in its culmination at *organisational experimentalism* (BSP 1.6.1) at the macro-level, undergirded by *psycho-social wellbeing of students and staff* (BSP 1.1), and *organisational positive behaviour* (BSP 1.3). Whilst these lower scale rubrics reinforced BSP 1.6.1, it associates too with the less significant capacity to *minimise negative health, socio-economic, and environmental effects* of HKUST (SER 5.6) at the interface with the wider world. A key quote from the HKUST Sustainability Unit report of 2013/2014 also illustrates the action strategy in context: *"Since the university is constantly changing, the Sustainability Unit supports this transformation in ways that make it more healthy, inspiring, and environmentally responsible. The goal is to support operational units as they undertake actions that improve the campus environment; faculty as they use the campus as a living laboratory for new ideas and demonstrations of research; and students who want to improve conditions through their hands-on actions"* (HKUST Sustainability Unit, 2014).

Transformation Signature HKUST: Summary

The transformation signature of HKUST is characterised by many interlinkages. The action strategies discussed above consist firstly of a highly prominent one, 'sustainability demonstration and competence training, transformative leadership, governance, and experimentalism'; secondly, 'lobbying competences, purposeful-adaptive evolution, sustainability research and education for external impact'; and, thirdly, 'student and staff wellbeing, positive inspiration and experimentalism'.

The next section, the discussion, expands on the meaning of the data analysis from the intelligence gathered.

At HKUST, the transformation signature consists of three action strategies, coloured **black** (A), **brown** (B), and **turquoise** (C).

7.4 DISCUSSION

Based on previous section's analysis, this section discusses the accounts, interpretations and corroborating evidence for the competencies, qualities and patterns unearthed at HKUST using the diagnostic tool. These organisational assets, illustrated by the highest-weighted rubrics, form part of HKUST's overall sustainability transformation pathway. This is, in turn, composed of distinct action strategies, which actors in HKUST employed to navigate the transformation pathways observed. In fact, each action strategy could also be interpreted as its own coherent pathway. This level of insight and detail has been achieved through applying the diagnostic tool. Now that the first research question has been answered in detail, showing the assets – competencies, qualities or patterns – discerned using the tool, and that the signature of organisational transformation for sustainability has been presented and described in *Section 7.3.3.3*, this section zooms out to discuss its meaning, structure and characteristics. During the final stages of the analysis, it was hard to separate the actor's roles from the process and structure of the transformation pathway. The discussion has therefore been structured according to the three scales followed in the diagnosis. The micro-, meso-, and macro-level sections each discuss the evidence produced in the analysis in different yet inter-related ways, for example, by looking at the patterns created by the action strategies in the context of the bigger picture, and interpreting defining roles of the actors who have navigated pathways of transformation to sustainability at HKUST.

7.4.1 MICRO-LEVEL: ROLES & AGENCY IN THE TRANSFORMATION PATHWAY

This section helps to paint a meaningful picture of certain types of actor and the roles they play in the transformation pathway by highlighting emerging themes which could be reproduced under certain conditions elsewhere.

General Account of Community Identity: Experimentalism & Perseverance

The ability to navigate the transformation pathway by overcoming barriers within the institution, through pioneering new strategies and learning-by-doing, speaks to the experimental culture of HKUST. There was no manual. Mole mentioned they had to 'make it up as we go along', because the book is not written yet on a university-wide program of interdisciplinary research and sustainability education. Evidence of how the barrier of inertia and traditional university design were overcome can be seen in the outputs of the new strategy for sustainability in education and the campus sustainability guidelines. These provide the framework for the HKUST community to inform itself. Referring to the obstacles more as challenges that can be overcome despite their difficulty, Mole and Fung's accounts show us the exploratory, optimistic and 'design as we go' approach employed inside HKUST. This also demonstrates how positive psychology overcomes opacity in public administration. A mental tipping point, a fulcrum between ignorance and vision through demonstration of research (see *BSP 1.4 organisational lobbying*). Framed by the description of key sustainability managers at HKUST, as the move from opacity in traditional university management, to turning it inside-out to visibly demonstrate what is being done on the sustainability front.

The actors identified as significant in HKUST's organisational development towards sustainability, and in particular those who were consulted and interviewed, were in a

large part directly or indirectly associated with ESSCOM. Several members of the original team of the ESSCOM that crafted the influential HKUST 2008 sustainability strategy were interviewed in depth, and the lead author of the Green Campus Initiative paper, Gerald Patchell, as well as David Mole and Davis Bookhart, shared substantial and valuable documents relevant to understanding how these actors have been navigating HKUST's sustainability pathway. At the time of the field work, many of these documents, especially concerning the then nascent Sustainability Education Strategy, and Sustainability Guidelines, were sensitive and discrete. The fact that this intelligence was shared with an outsider is interpreted as testament to the transparency, collaboration and trust-based principles that were identified as contributing to HKUST's culture towards sustainability. The ESSCOM group, and those associated with it at ENVR, the Sustainability Unit, FMO and HSEO have persevered in the manner described by Gerald Patchell and further by David Mole with strategic trajectory, identifying opportunity, necessity and potential for change, whilst co-generating and nourishing a culture of experimentalism that is highly apparent at HKUST. The creation of the HKUST sustainability unit was a part of this pathway and further cemented the trajectory with the addition of an experienced and wily sustainability administrator and coordinator, Davis Bookhart.

This quality is best exemplified by the *SER 5.4, Sustainability research demonstration*, and its association with the micro-level *SER 5.1, Sustainability competence training*, both being driven by *SES 3.1.1, Effective intrapreneurship*. These asset interlinkages were woven together using the intelligence gathered from Mole's and Bookhart's account of the sustainability education strategy, stipulated educational goals for the 2020 Challenge, and the HKUST Sustainability Guidelines.

Scalar Bandwidth & Systemic Awareness

A common property, or pattern of behaviour was shown in the analysis, which highlights the pivotal role of actor's work across scales in increasing the traction of transformation for sustainability around them. This property is justified as an asset with respect to the relevance of the post-case development in February 2019, the Sustainable Smart Campus as a Living Lab. This demonstrates a maturity and awareness of approach by the actors researched, in keeping with the high-end civic-engagement in the theory of dynamic organisational-social learning underlying *OCM 2.4*. We may call this quality the scalar 'bandwidth' of change-agents of possible leverage in the system through which greater interaction with the Hong Kong public and awareness-raising concerning sustainability research and education (*SER 5.7*). The cross-scalar and systemic change competencies demonstrated in the roles of the actors researched at HKUST be seen from HKUST's transformation signature, where action strategies mapped in *Figure 7* (specifically 'A' and 'C'), graduate from micro to meso and macro levels with balanced pronouncement (see scalar comparison, *Section 7.3.3.1*). Another tangible example of this in the administrative system at HKUST is the formalised process of interdisciplinary hiring. This practice of interdisciplinary hiring of faculty members from 2016 onwards appears to help mediate against the tendency towards siloes in the institution, overcoming internal barriers to working with sustainability in practice. This also aligns itself with the six strategic themes from the 25th anniversary exhibition, which is now university policy according to Fung. This means that new

hires have to be jointly hired across themes, and this policy drives interdisciplinary sustainability-related education and research, as the policy is “inscribed as an incentive for how faculty are expected to work from now on” “really forcing interdisciplinary research” as Fung stated (2016).

Transformative Leadership & Shared Ownership

Another defining role which emerged from the analysis is the transformative leadership embodied by successive actors at the head of the university. This was represented by the association between different categories, such as *OCM 2.2 Collaborate to innovate*, *SES 3.1 Transformative agency*, *SES 3.1.2 Transformative leadership*, and *SER 5.4 Ideal-typical transdisciplinary research*. These linked significant quotes between David Mole and Jimmy Fung’s accounts, for example, across the micro-meso scale and between perspectives. This interlinkage explains the relationship between the intrapreneurial effectiveness of the identified stakeholders, the quality of transformative agency in their actions, with support from the leadership, and the furthering of transdisciplinary research praxis.

7.4.2 MESO-LEVEL: IDIOSYNCRASIES, GROUP AND FACULTY EXPERIENCE OF THE TRANSFORMATION PATHWAY

This section presents unique, context-specific characteristics of HKUST’s pathway of organisational transformation. After retrospection on empirical findings, research notes and journals, the results, campus and community impressions, and methods, these exemplars emerged. These are useful to examine idiosyncratic cultural, and socio-organisational aspects of HKUST, which more tangibly and meaningfully depict transformative performance. They also represent selected cross-organisational initiatives which are intellectual, social, and material outcomes.

7.4.2.1 THE HKUST SUSTAINABILITY UNIT

As a specialised mode of internal governance and liaison with the campus community, HKUST Sustainability Unit is housed within HSEO, which is in turn housed in the Division of Environment and Sustainability and partly administered by FMO. It is managed by Davis Bookhart to “*facilitate the creation and implementation of a comprehensive sustainability master plan, focussing on reducing or eliminating [HKUST’s] environmental impacts, addressing and managing risks that arise from climate change and resource scarcities, and preparing students for careers that will be shaped by an increasingly stressed planet*” (HKUST, 2019c). There is a strong student participation rate with the Unit’s projects, including ‘Eco-reps’ acting as sustainability ambassadors across campus, and interns working on specific projects. These students are the responsibility of Loretta Luk, Sustainability Program Manager at the Unit, who works closely with the students, engaging stakeholders across campus and promoting sustainability throughout HKUST. Denise Chow is the third member of the Unit’s team, working as their Health, Safety and Environment Specialist. She is responsible for collation and analysis of HKUST sustainability data. The Unit was founded as a direct result of the strategic trajectory, lobbying and scientific advocacy of action on sustainability and climate change in the ESSCOM Green Campus Initiative report of 2008.

Recent developments help show how the Unit is an exemplar of HKUST’s

transformation towards sustainability, being core to the network of associations of initiatives and efforts researched. One is the long-term HKUST Sustainability vision implemented through a 5-year plan, HKUST 2020 Sustainability Challenge¹⁹. The plan includes four areas of focus with allocated leadership accountability and responsibility, which corresponds to the generally accepted portfolio of sustainability in higher education. The Education Goal aims to construct a sustainability curricular framework, strengthen faculty support networks, and administrative and academic connections between the operations and academic sectors of the university. This is linked to using the campus as a living laboratory for experiential learning in sustainability (highlighted as a strongly present asset at HKUST, *BSP 1.6.1*). Second, the Operations Goal aspires to reduce GHG emissions by 10% and waste by 50% from the 2013-14 baseline. This would be achieved through a combination of reductions and streamlining efforts. ExCom advises the VPAB on opportunities and expectations in staying on track. Policies and procedures for each administrative and business Unit have also been revised into a set of Sustainable Unit Level Guidelines; criteria have also been developed for reviewing, evaluating, and approving campus greening project ideas. Thirdly, and coinciding with HKUST's second most present asset, *SER 5.5*, the Demonstration goal sees on-site demonstration projects realised, that contribute to campus sustainability goals while showcasing the work of HKUST researchers as contributors to solving global sustainability challenges. This includes demonstration projects in prominent campus locations to showcase global and local sustainability ideas and approaches to solving problems. Finally, the Community goal seeks, by 2020, to have formed a HKUST Sustainability Network as a social backbone to support and advance sustainability actions and policies across departments, schools, and the campus. The creation of the HKUST Sustainability Network hinges on two groups: first, Sustainability Management Officers (SMOs), who are members assigned to serve in an official capacity as their office or department's representative; and, secondly, volunteers who form the Network Green Team.

7.4.2.2 THE ENVIRONMENTAL SUSTAINABILITY STEERING COMMITTEE

Another exemplar, although related to the form and function of the Sustainability Unit, goes a step behind the organisational design for sustainability, into the intent and actions of those who steered the most positive changes within HKUST over the years. This exemplar is the strength and significance of *Strategic Trajectory, liaison and learning (CGS 4.1)* seen in ESSCOM, and its associated actors. It is shown how this factor enabled a number of outcomes in the progress of change-agent's efforts, including the creation and founding of the Sustainability Unit, with the recruitment of Davis Bookhart in 2013. Prior to that the approval and coordination amongst ESSCOM for HKUST's sustainability strategy of 2008, and more recently in progress the comprehensive sustainability education strategy. Indeed, ESSCOM appeared to be the key body of persons most associated in the research with HKUST's progress in its sustainability journey.

¹⁹ The timing of this research visit coincided with the development of HKUST's 2020 Sustainability Plan. An example of how HKUST engages local sustainability-oriented organisations: they contracted 'The Purpose Business', a local firm with specific expertise on Hong Kong sustainability issues.

Mole refers the original efforts of the members of ESSCOM – which was categorised into the broader code set of *3.1 Transformative agency (sub-codes 3.1.1-3.1.2)*. What they actually managed to do - in terms of translating their intent to get sustainability more embedded in the HKUST community - was the successful set up of HKUST Sustainability Unit. ESSCOM leveraged and “drafted a strategic document” to “work up the system for adoption by the university” (Mole, 2016). Despite the fact that ESSCOM no longer meets, more active groups concerning HKUST sustainability strategy meet more regularly on the four focus areas relevant to the 2020 Sustainability Challenge. Regarding the organisational set-up, Samuel Yu’s depiction of the relationship between FMO and HSEO supports Jimmy Fung’s description of how HSEO, ENVR, and FMO have generally worked well together (see Artefact 1 in Appendix) according to Yu, Fung, Mole, Patchell, and Bookhart. Yet some issues still remain regarding sensors and recycling according to Gibson.

7.4.2.3 A SMART CAMPUS LIVING LAB AS PART OF A HONG KONG SUSTAINABLE CAMPUS CONSORTIUM,

The Hong Kong Sustainable Campus Consortium represents a regional cooperation, solutions sharing and producing agreements so that all member universities in Hong Kong can make progress in their sustainability trajectory. This investigation uncovered what appears to be quite a unique inter-organisational technique or initiative to address national and regional environmental and sustainability policy obstacles; for the eight largest public research universities in Hong Kong, the imperative to collaborate to produce new ways of dealing with old problems they were dealing with individually within their own institution has been very clear for a decade. Universities convene to share knowledge on their sustainability initiatives in operations, research and education, and communications with strategic engagement on their own campuses, and assist others in the network to see if these are applicable and how elsewhere in Hong Kong.

Furthermore, in 2019, manifesting the *organisational experimentalism* that characterises HKUST’s signature approach, HKUST launched the Sustainable Smart Campus as a Living Lab (SSC), which aims to transform the campus into the vision identified in the case research (see *BSP 1.6.1* for verified accounts). As “a testing ground for learning, experimenting and advancing smart and innovative ideas to address real-life challenges”, it will look for cross-disciplinary HKUST sustainability projects, developed by its own students, staff and alumni (HKUST, 2019a). As shown in the analysis, HKUST’s experimental approach has a macro-level component in its orientation to the Hong Kong community. The data supports that intrinsic organisational learning within HKUST took place before this project was launched, as a result of 2016 efforts towards the 2020 Sustainability Challenge. In fact, references to the idea of viewing the campus as a living or learning lab were traced back to the 2008 ESSCOM Sustainability Strategy. Notable is that SSC is spearheaded through HKUST’s GREAT Smart Cities Center²⁰ (GSCC), in collaboration with the HKUST Sustainability Unit. The SSC aims to help develop Hong Kong, using sustainability principles embedded in science, technology and societal impact. President Shyy’s language is indicative also of how

20 For more information on how HKUST’s internal sustainability projects target smart city-level sustainability outcomes see <https://gsc.ust.hk/>.

HKUST is placing itself in the wider region, and how it views its role towards society:

“With this endeavour to help advise society’s transition to a future that is greener, more liveable, and human centric. SSC is meant to be a springboard for testing new ideas and approaches. Projects need not include cutting edge technologies, nor do they need to succeed on the first try. But by turning our campus into a ‘living lab, we hope to instil a culture of learning from failure and self-initiated changes, which will eventually spread to a larger community beyond our campus” (Shyy, HKUST, 2019a).

This freedom of learning through failure demonstrates HKUST leadership’s support of the capacity of its own students and staff for intrapreneurship driving solutions to sustainability challenges. It also clearly shows how President Shyy sees the role of HKUST as a steward of wider societal transformation towards sustainability.

7.4.3 MACRO-LEVEL: OVERALL STRUCTURE & CHARACTERISTICS OF THE TRANSFORMATION PATHWAY

As part of the inquiry into how HKUST approaches the external environment, Yvonne Lee’s description of the communications strategy for sustainability allowed a deeper understanding of HKUST’s positioning at the meso and macro-levels to emerge. She linked sustainability communications to entrepreneurship and public policy at the macro-level, positioning the institution in its local, national, regional, and global environment. This can be interpreted as HKUST seeking to go beyond traditional rankings in their search for partners. As part of this, the international affairs team, within the Public Affairs office, pursues analysis and scans for potential external partners, critically looking behind traditional rankings numbers for an interconnected three-pronged approach to sustainability, entrepreneurship and public policy. As Lee put it “we need to have global partners [in order] not to just do it on paper” (2016).

Furthermore, zooming out to the big picture of the pathway followed by HKUST, it is clear that external economic and social shocks acted as stimuli that triggered the university to establish itself as a transformative force in the territory. This allowed it to develop the intrinsic capacity for systemic change in its 25 year history since the dramatic transformation of Hong Kong from a manufacturing to service-based economy, with a connected economic slow-down, justifying the policy recommendation to found HKUST in 1992 in order to positive impact its socio-economic region (H.-G. Lee, 2013; Schenk, 2008). The Hong Kong regional governance association for higher education is also a key external stimulus, allowing 60% of the university’s funding to derive from the government, whereas, overall, the Hong Kong authorities earmark 25% of their budget for education, thanks to the lesser need for military and defence budgets. The leadership is well aware of the advantages of leveraging their place in the global higher education scene, representing a two-way conduit to the Mainland and as an international hub. We can see how this has affected HKUST’s internal actions, particularly exhibited in Chan’s paper on the global impact of China’s higher education explosion, Yvonne Lee’s exposition of the positioning and communications strategy of HKUST, and the unprompted disclosure from Fung regarding the trip with Bookhart to the inaugural meeting of the ASU-founded GCSO, an external recognition from another pioneering institution that *SER 5.7 Research & education generates societal impact & public awareness*. These associations are significant windows into how external stimuli led

to the development of certain intrinsic attributes such as *OCM 2.3 Purposeful-adaptive evolution* and *SES 3.1.2 Effective transformative leadership*. Membership in the GCSO network, entrepreneurial efforts, and strategic partnerships with Mainland businesses in the Pearl River Delta, also demonstrate HKUST's external engagement strategy in relation to its sustainability transformation pathway.

More recently, HKUST's long-term vision on sustainability has been implemented through a 5-year plan: *HKUST 2020 Sustainability Challenge*, a significant milestone that appears to have accelerated its organisational development in the period from 2015. Its outputs and continuous associated working groups function effectively to provide direction for HKUST students and staff along the pathway of transformation, whether currently being navigated – with respect to, for example, 'HKUST High Performance Building Standards', 'Sustainable Procurement Policies', and the Sustainability Guidelines more generally - or in the near future, as with Moles' work on the Sustainable Education Strategy. The organisational learning embarked upon by all these groups and processes within HKUST have helped structure its extrinsic orientation, as well as its recognition in the region and in global higher education leadership, science and technology, and sustainability circles. A good indicator of such standing is its membership in GCSO. To back-up this statement, when we look at HKUST's age, it has come a long way with its achievements being top of Asian university rankings, as well as initially visible implementation efforts. These include, not exclusively, the counselling and mindfulness centre for students and the library exhibition physically presenting the new strategic programme of senior leadership. External engagement, positioning and institutional advancement have also played a role in the pathway of transformation studied at HKUST. As Chan presciently stated: "*HKUST has benefited from our proximity to Shenzhen, and we are in fact part of the broader surrounding region known as the Pearl River Delta, which includes Guangzhou, the capital of Guangdong province*" (Chan, 2015). This account is supported by the documentation cited, as well as by third-party assessments, like the external report for the ExCom on Sustainable Operations (HKUST Sustainability Unit, 2016).

7.5 CONCLUSION

Was it already in the initial design and make-up of HKUST to be transformational from its inception? Based on the evidence at hand, and compared with previous case studies, it can be said with a reasonable confidence that HKUST stands out for being transformative from its inception. Although no transformation is continuous, there a continuous process of organisational development and learning is evident. HKUST's design and innovation appears to follow the American higher education model, whilst being uniquely situated between East-West, with pioneering practices in sustainability education and research demonstration firmly rooted in the cultural, contextual and intrinsic logic of Hong Kong's academic and city communities. This is best exemplified by the tight-rope walk between being bold, targeted and strategic in its extrinsic-orientation, for example the HKSCC and SCC, whilst at the same time (the researcher's impression on site) cautiously avoiding any taboo topic such as the youth's critique of the erosion of autonomy and the one country two systems model, hard for anyone in 2019 to miss with respect to Hong Kong and the PRC. This asset, as they themselves put it in the Annual Report 2013-14, of 'Global Wisdom' as well as

local contextual sensitivity, and other characteristics this analysis has identified, make HKUST's navigation of its transformation pathway veritably unique. It signifies a bold manifestation of what higher education can and should be doing in the 21st task environment that its students want to seek fulfilment within. Undergirded by the highest weighted rubrics as steps in the action strategies, we can take some inspiration from what has been achieved here. Indeed, the impact of HKUST's transformative signature has been noted by other international pioneers, which was verified by its selection as a member institute in the GCSO. Unlike siloed and defragmented institutional structures well-known as an unavoidable reality of university life elsewhere, schools at HKUST are more active and open to collaborate with each other.

Hong Kong University of Science and Technology is unique amongst the cases studied in this research project because of the character of its situational variables. It is barely over 25 years old, has achieved international recognition in the rankings, both of newer Chinese rankings systems, and in the Young University rankings. It boasts a scenic and beautiful campus with excellent facilities for the pursuit of leading-edge knowledge creation in science and technology, as well as being evidently committed to interdisciplinarity, the wellbeing of its students and staff, and the demonstration of its commitment to embed sustainability into its core and supporting processes. Having this background to this 2016 case work in Hong Kong, the question could not hesitate to be asked, how has this perceived success, at the interface between cultures, taken place so quickly, and at such scale? By capitalising on globalisation and shifts in the higher education market perhaps? A scientific approach to organisational research would demand an incisive inquiry, and thanks to the hosting, referrals and introductions of the staff at HKUST Sustainability unit, the researcher got a strong indication of the sincerity, experimentalism and enthusiasm that defines the culture at HKUST. The core finding was that a planned process of organisational development towards sustainability at HKUST has taken place, and has been less disruptive than other cases due to the crisis-imperative of the Hong Kong economic down-turn in the early nineties, and the legal precedent of creating social and economic development to ameliorate the situation in-built into the Hong Kong university mandate.

In combination with the learning on the short history of HKUST, the initial design and make-up of HKUST was transformational, however its pathway forwards is not characterised by disruptive changes in Senior Leadership, large or traumatic organisational overhauls, nor by reaction to strong external perturbations. Thus, the theoretical characterisation of organisational transformation is not supported. The manner of progress along its pathway towards sustainability can be concluded more as organisational *development* rather than organisational *transformation*, with actors within, and the HKUST organisation as a whole, pioneering in innovation, societal impact of scientific research and education, ethical practices and sustainability. HKUST's prior organisational development for sustainability allowed progressive small leaps forward for the community, defined here as collective and visible presentations of new shared visions for sustainability, such as the set of implementation-oriented initiatives after and around the 25th anniversary. Since 2015-16 key actors have been collaborating to accelerate HKUST's organisational development for sustainability, recognising what has gone before whilst seeing and building on its existing assets.

As well as the focus on assets, certain weak points (sensors supporting recycling units on campus, for example) also need to be addressed appreciatively. The difficult but arguably necessary question remains regarding the balance of interests between the very apparent wish to ensure students in Hong Kong can pursue inquiry and learning freely, with the interests of the Mainland. Tension between the PRC and the Hong Kong territory has certainly been felt in the student body, and the youth who have the greatest stake in the future being left to them. Despite the omission of any reference to this issue during the case work, HKUST's tradition of learning about itself and acting boldly for science, technology and sustainability may well speak to a discretion and sensitivity of political discourse, whilst internally pursuing soul-searching conversations amongst academic and administrative leadership that is naturally at the core of any life centred on intellectual and scientific inquiry.

Ultimately, HKUST is a remarkably interesting case that shows how actors within universities navigate a planned change process for sustainability, with internal elements of intrapreneurship, strategic trajectory, and sub-optimal practice challenge bolstering and being influenced in turn by the external task environment. Remarkably, as an organisational-social system, unlike the other cases studied in this project (Leuphana University Lüneburg, and ASU) it does not appear to have undergone fundamental transformation. This is because of the initial purpose of establishing HKUST to have a remediating impact on its surroundings in 1992. Purposeful-adaptive change management, self-diagnosis and internal redesign were built-in from the start, to its people and processes, reflected in the competencies of those identified and interviewed in this study. Broadly speaking, HKUST has been embarking on an intrinsically orientated inquiry of organisational development towards sustainability, exhibited by organisational-societal learning, and somewhat determined by its original design purpose. This purpose has graduated into bringing the region stability, sustainability and prosperity in research and development through its focus on science, technology. The sustainability of the university *intrinsically* being realised, has led to an increased likelihood of societal transformation *extrinsically*, with HKUST acting as a steward for sustainability in Hong Kong as a semi-autonomous city-state.

Addendum to HKUST: July 2018-December 2019:

Referring to an interview with Tony Chan in 2011, the model at HKUST “demonstrates the ability of universities in this part of the world to quickly become players in global HE”. A key to this “is having no hesitation about embracing the American model of HE”. Chan did not hesitate to say that HKUST is the most American of the Hong Kong universities “The role of research universities in producing knowledge-based technological innovation and thus promoting economic development in no small measure accounts for the relevance of this institutional model in developing nations” (Jaschik, 2011). This supports the view that a redistribution of human capital ought to take place with greater access to Higher Education throughout the global knowledge economy, thereby apportioning complex, adaptive knowledge enterprise to developing nations (Crow & Dabars, 2012).

Given the disruptive external conditions that brought HKUST into the world, it would be a missed opportunity not to discuss the findings in light of the recent

strife, and ongoing uproar on the streets of Hong Kong regarding democratic change. Irrespective of the controversy, this thesis focusses on how universities transform themselves against the backdrop of traumatic external circumstance. As was concluded at the end of Chapter 6, HKUST is part of a unique network of Hong Kong universities that represent a community full of positive attributes which could constitute a transformative sustainability network. I would focus my efforts on knowledge sharing in and amongst that community; HKUST appears to be doing this well with its concentration on the forefront of renewable energy application and other sustainability technology innovations.

APPENDICES: CHAPTER 7

APPENDIX 1: LIST OF THE 39 PRIMARY DOCUMENTS, AND 12 INTERVIEWS USED IN THE ANALYSIS

PD Family	PDs
Davis Bookhart	HKUST high performance building standard (draft).docx HKUST Operations ExCo Implementation Plan (26-07-16).docx HKUST Sustainability Guidelines (comprehensive) (30 May 2016).docx HKUST Sustainability Policy.docx HKUST Sustainable Catering Policy.docx Comprehensive S Education strategy HKUST DISCRETE 2017 (graphic).pdf
HKUST Sustainability	Code of Conduct for Outsourcing Services of HKUST_Suppliers.pdf Final_Report_of_External_Advisory_Group_17-5-16_.pdf HKUST 2020 Sustainability Challenge Website.docx HKUST Sustainability- News_Design Thinking_HK Model Green City.pdf HKUST_2020_sustainability_challenge.pdf IAU HKUST Listing S Objective Mission.docx Message from Environment Division Head Jimmy Fung.docx Sustainability Effort HKUST Safety Wise HSEO Dec 2008 ABS.docx final report on HKUST student recycling 2014.pdf SUSTAINABLE UST 2 8.doc HKUST high performance building standard (draft).docx HKUST Operations ExCo Implementation Plan (26-07-16).docx HKUST Sustainability Guidelines (comprehensive) (30 May 2016).docx HKUST Sustainability Policy.docx HKUST Sustainable Catering Policy.docx Mole David 2016 Paper Portfolio development sustainability education HKUST.pdf
Interviews	DB 06.10.docx DM 20.10.docx GP 26.10.docx HT 28.10.docx JF 17.10.docx LL 14.10.docx MH 01.11.docx PF 20.10.docx PV 01.11.docx SL 02.11.docx SY 27.10.docx YL 15.11.docx RG 17.10.docx

Chapter 7: Case-Study Three

Miscellaneous	<p>Library Exhibition.jpg</p> <p>Counselling Centre.jpg</p> <p>PREPARING FOR A PARADIGM SHIFT _HKUST Business School Tam 2016.pdf</p> <p>Facts & Figures HKUST Dec 2015.docx</p> <p>FactsAndFigures_160006_s Focused Elite Research HKUST.pdf</p> <p>HKUST Research & Graduate Studies Org Chart.docx</p> <p>PRMEReportfromHKUSTJune2013toJune2015.doc</p> <p>Research @ HKUST 25th Anniversary Report.pdf</p>
President Chan	<p>2011_11_01-Metro_Intl Education is The Biggest Good Chan 2011.pdf</p> <p>2011_11_09-yonhapnews HKUST Secret Success No 1.pdf</p> <p>2013_04_12-JoongAng_Ilbo Chan HKUST Secrets to Rapid Rise Asia Top 10.pdf</p> <p>2015_06_17-21-Glion China Global Higher Education.pdf</p> <p>Chan 2012 Europe Should Look Beyond Itself.docx</p> <p>HKUST how to succeed in 25 yrs.docx</p> <p>The American Model HKUST Jaschik 2011.docx</p>
Reporting	<p>HKUST annual_report_13/14.pdf</p> <p>HKUST annual_report_14/15.pdf</p> <p>HKUST annual_report_15/16.pdf</p> <p>HKUST S Report S Unit 13/14.docx</p>

APPENDIX 2: NETWORK & ORGANISATIONAL MAP EXAMPLES

Map 1: Empirical links and conceptual associations in the accounts/data regarding the Glion Colloquium Global Higher Education summit report by Chan which provided key intelligence on HKUST's external positioning combined with Yvonne Lee's interview. Many more maps like this were used in the analysis to explore and substantiate the various facets and perspectives that emerged from the coding.

Artefact 1: Organisation Design - Samuel Yu's depiction of the relationship between the FMO and Health, Safety and Environment Office (HSEO) history of EHS activities before the Sustainability Unit was founded.

CHAPTER 8. A SYNTHESIS OF PIONEERING PUBLIC RESEARCH UNIVERSITIES IN THREE GLOBAL REGIONS

PATHWAYS OF ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY

Based on: Baker-Shelley, A., van Zeijl-Rozema, A., & Martens, P. (2020): Pathways of Organisational Transformation for Sustainability: a University Case-study Synthesis presenting Competencies for Systemic Change & Rubrics of Transformation. International Journal of Sustainable Development & World Ecology

“Making a switch to sustainable development requires deep, structural transformation in our economic, cultural, and technological systems. We need new ways of interpreting, analyzing, and understanding the world, and we need new tools to help us deal with tumultuous changes and an uncertain future. If higher education is to play a meaningful role in this undertaking, then we will need to reshape its institutions, pedagogy, and organization.”

Steven Volk¹

¹ Blog post and comment by Steven Volk from Oberlin College on CEMUS and the relevance for liberal arts education. The CEMUS Project – Lessons for Oberlin? Igniting a Learning Revolution: Student-Run Higher Education for Sustainable Development’. See: <http://www.cemus.uu.se/about/>.

SUMMARY

Three international embedded case studies of public research universities took place at Leuphana Universität Lüneburg (LU), Arizona State University (ASU), and Hong Kong University of Science and Technology (HKUST) in 2016. They diagnosed and interpreted the organisational development and transformation of three pioneering outliers in Higher Education. This chapter presents empirical backgrounds, action strategies, and transformation signatures of each case. It helps establish how universities (and actors with them) navigate organisational transformation towards sustainability, and implies a renewed role of universities as societal stewards in activating, leveraging, and facilitating their region's transformation towards sustainability. The universities evaluated were able to develop their own capacity for systemic change because they first invested significant time, energy, and human resources in learning and researching themselves, before embarking along meso and macro-level signature transformation pathways. I show that universities which transform from within - that is recognising and enhancing competencies of systemic change intrinsic to their organisations - seem better equipped to apply knowledge of transformations within and about their surrounding societies. Since they are nested in society their sustainability is therefore dependent on that of their social environment. Institutions like HKUST, ASU and LU, seemingly aware of their strengths and areas to learn more and collaborate, will most likely lead the way in the development of solutions, by trial and error, and utilising their already established and growing cultures of inquiry, practice and mutual experimentation. In essence, I propose that extrinsic capacity for transformation is interdependent with intrinsic competencies for systemic change.

There is currently much zeal in business-academy networks about how to drive innovation and transformations for sustainability in (university) organisations. The focus seems to lean in the direction of developing blueprints of organisational transformation for sustainability, even common algorithmic ones. It appears ineffective to attempt this without the practitioners being firmly rooted in a true and holistic understanding the intrinsic logics and cultures of the organisations in question, as per integral and systems theory. Nonetheless, I show that effective navigation of organisational transformation for sustainability benefits from tangible systemic rubrics, which provide the means to recognise the intrinsic competencies that enable organisational transformation for sustainability to flourish, itself highly context specific. These rubrics are made tangible by embedded research of actors' competencies of response to internal and external stimuli. Through reflective evaluation, a diagnostic tool was developed, consisting 33 of these systemic rubrics. The most grounded rubrics qualify as shared qualities and common patterns of transformation pathways. These may prove meaningful for leaders elsewhere to prioritise specific asset development within their own organisations, as they denote concrete qualities and characteristics. They provide evidentiary outcomes for knowledge actors (academic, administrative, student or leadership), concerning how universities navigate organisational and societal transformation towards sustainability, in light of the radical adaptation that must now take place in organised human life. These may eventually work as green lights for systemic change, which equate to thresholds beyond which the system profoundly and positively changes its equilibrium state.

8.1 INTRODUCTION

The preceding case study chapters have attempted to encroach into the territory or realm “where word and deed have not parted company” in Arendt’s words (d’Entrevres, 2014). As such, this chapter presents a systematic synthesis of all three external cases, providing a more nuanced view of whether or not, and more importantly to what extent, and how, organisational transformation for sustainability took place, which therefore may shed light on how actors might navigate it. The work took a creative and holistic approach that aimed to systematically make rhetorical sustainability performance claims more trustworthy and authentic, through synthesis, evaluative interpretation, and account corroboration, rooted in multiple schools of thought. It has been a multi-paradigmatic investigation, grounded in an appreciative-transformational sustainability science and practice, which complements and enhances the role of critical-transformational sustainability science, to increase university actor’s capacity to implement action research of, with and within the Academy.

This chapter thus focusses on the patterns of behaviour, holistic substance and nature of the university as an organisational system; its intrinsic logics and *competencies of systemic change*, influencing transformation towards sustainability at various scales from within, as well as the extrinsic stimuli that actors respond to in signature approaches to transformation. It builds on the three case studies presented in *Chapters 5 to 7*, applied in three regions of the global higher education sector: **LU**, Europe, **ASU**, North America, and **HKUST**, East Asia. The organisational research of pioneering public research universities aimed to better understand how transformation pathways towards sustainability emerge and proceed. Based on the qualitative data analysis, it is postulated how extrinsic capacity for transformation or impact in the wider social and ecological system, and the development of intrinsic competencies for systemic change, are interdependent on each other. The preceding case-study chapters, and the following synthesis, provide support of this postulation, by showing how:

- The case universities developed intrinsic capacities or competencies for systemic change.
- Internal organisational development or transformation is catalysed by a stimulus or shock to the system from its surrounding institutional architecture.
- Internal or external stimuli generated positive impact in the local socio-ecological system *via* organisational transformation of the university itself.

As discussed in *Chapter 2*, this research is placed in the transformational strand of sustainability science, building upon the post-normal scientific paradigm (Funtowicz & Ravetz, 1993), which goes beyond the analytical and descriptive call for knowledge on sustainability problems and systems change (Kates et al., 2001). It thus aimed to answer the call that “organisations must not only meet economic, environmental, social and governance requirements but also learn to embody them in their practices and values even during times of turbulence and extraordinary upheaval” (Edwards, 2010).

8.1.1 OBJECTIVES OF THIS SYNTHESIS

The target was to achieve clarity and salience by, firstly, distilling what the socio-

organisational qualities and characteristics are in each case that enabled transformative change. Secondly, this chapter aims to interpret the organisational ‘chemistry’ at play in how this change was leveraged or brought about via the studied pathways. The objectives of this part of the project were to synthesise the claims made in the case analyses of LU, ASU, and HKUST, in search for possible common patterns in the pathways of transformation seen. Thirdly, this study aims to reflect on the nature of the outcomes of the analysis, and what can be potentially abstracted at the level of general validity. This chapter thus aims to demonstrate globally differentiated yet similarly driven organisational transformations towards sustainability in specific contexts. Validity claims are made based on outcomes such as the transformation signatures and their underlying action strategies as using the diagnostic tool.

Whereas the case study chapters largely allowed certain insights, experiences and even answers to enlighten the answers to research questions 4 and 5 (competencies-signature pathway, and the role of identified actors), this chapter sought to provide more answers to research question 6 using a comparison and synthesis of each of the cases independently. That is, *which rubrics and action strategies² were instrumental in the signature transformations, how do they compare, and what common patterns could be drawn³ that help other universities recognise their own potential for transformation?*

8.2 APPROACH TO THE SYNTHESIS

This section briefly outlines the iterative research line running through the field work and case analysis. The purpose of this is to assist and inform other insider/action researchers in and of the academic system who seek to teach, train, understand and disclose knowledge of how to diagnose and navigate organisational transformation for sustainability.

8.2.1 THE DIAGNOSTIC TOOL

The objective of the field work was to generate actionable solutions that ameliorate the pathology of systemic sustainability problems in complex socio-organisational systems, through diagnosis, interpretation and isolation of deeper underlying symptoms and structures (Keeler et al., 2016). Accordingly, through application and reflexive evaluation at several case studies, a diagnostic tool has been developed that enables analysis of different universities from similar perspectives. The tangible systemic rubrics have now been operationalised in the iterative testing, refining and development of this tool. The hermeneutic units and their associated data have all been coded across this spectrum of rubrics. The tool resulted from the operationalisation of the core elements of organisational transformation for sustainability at universities, which function at three organisational levels, from individuals and dyads (micro-level/individual), to groups, larger units and departments (meso-level/intra-organisational), to the organisation’s interface and relationship with the outside world (macro-level/extra-organisational). They operate across five metatheoretical perspectives. These consist of: behavioural science and psychology (**BSP**), organisational change management (**OCM**), socio-

2 Including the significance of the nature of the connections between rubrics that constitute the action strategies.

3 I.e. from the various competencies, shared qualities and patterns identified which define the synthesised transformations

ecological systems (SES), corporate governance for sustainability (CGS), and sustainability in education and research (SER) (Baker-Shelley et al., 2017). Their conceptual distinction, their ability to encapsulate the data as distinct categories of analysis, was tested systemically throughout the analysis. This iterative process eventually produced 33 tangible systemic rubrics across the three spatial scales and five thematic areas.

Figure 1: Refresher of the structure of the diagnostic tool of pathways of organisational transformation for sustainability.

Regarding this tool, two interdependent utility aspects were formulated whereby users may be able to:

1) Identify assets-based intrinsic competencies for systemic change.

Each of the 33 rubrics of the ID-tool has the potential to act as green lights for systemic change and organisational transformation: enabling a university organisation – and actors within it - to understand, appreciate, and redesign itself in order to trigger pathways of transformation for sustainability. The rubrics can assist interpretation of findings from insider action-oriented case-study research within the organisation on itself.

2) Substantiate and scope out the potential for transformation:

internal or external stimuli trigger capacity-building, where university actors may improve performance across rubrics to scope ways to enhance internal capacity for systemic change. In this way, the ‘soil’ can be tested to see whether a particular organisation is fertile ground for transformation or if more asset development is needed. Hence, tangible systemic rubrics (shown in *Table 1*) identified as green lights in a particular case, may act as pragmatic design aspirations, guiding and encouraging university actors along transformation process.

It has been seen that by applying the tangible systemic rubrics of the tool, it is possible to pinpoint – that is to say, *diagnose* then provide guidance, or *prognose* - potential green lights for systemic change, which predicate organisational transformation for sustainability. Secondly, the tool may enable university actors to actually navigate transformation, instilling possible action strategies based on their strongest assets - green lights. The tangible systemic rubrics of organisational transformation for sustainability at universities are presented below in *Table 1*, and are further operationalised in *Chapter 4*.

RUBRIC NAME	SCALE-LEVEL	RUBRIC NAME	SCALE-LEVEL
Full Theme Name		Full Theme Name	
Behavioural Science and Psychology		Corporate Governance for Sustainability	
BSP 1.1 Psycho-social wellbeing	Micro	CGS 4.1 Strategic trajectory, liaison and learning	Micro
BSP 1.2 Pro-sustainability behaviour	Micro	CGS 4.2a Internal Evaluation of Environmental Social Governance	Meso
BSP 1.3 Organisational cultural health	Meso	CGS 4.2b Accountable Disclosure of Environmental Social Governance	Macro
BSP 1.4 Organisational lobbying competence	Meso	CGS 4.3 Externality Recognition	Meso
BSP 1.5 Organisational positive behaviour	Meso	CGS 4.4 University Social Responsibility Assumption	Macro
BSP 1.6.1 Organisational experimentalism	Macro		
BSP 1.6 Organisational development	Macro		
Organisational Change Management		Sustainability in Education and Research	
OCM 2.1 Triple Bottom Line: Intrinsic change agency	Micro	SER 5.1 Sustainability Competence Training for Transformation	Micro
OCM 2.2 Collaborate to Innovate: extrinsic change-agency	Meso	SER 5.2 Intergenerational and socio-ecological ethics	Micro-Meso
OCM 2.3 Purposeful-adaptive evolution	Meso	SER 5.3a Integrated sustainability praxis across functions	Meso
OCM 2.4 Organisational-societal learning	Macro	SER 5.3b Integrated sustainability praxis external impact	Macro
OCM 2.5 Organisational extroversion & openness	Macro	SER 5.4 Ideal-typical Transdisciplinary Research Praxis	Meso
Socio-Ecological Systems		SER 5.5 Sustainability research demonstration, knowledge enterprise	Meso-Macro
SES 3.1.1 Effective intrapreneurship	Micro	SER 5.6 Minimisation of negative health, socio-economic and environmental effects	Macro
SES 3.1.2 Effective transformative leadership	Micro-Meso	SER 5.7 Research and education generates societal impact and public awareness	Macro
SES 3.1 Transformative agency: sub-optimal practice challenge	Micro	SER 5.8 Sustainability reporting standards and instruments implemented	Macro
SES 3.2a Internal governance for sustainability	Meso		
SES 3.2b External implementation of governance for sustainability	Macro		
SES 3.3 Environmental literacy competencies	Micro-Meso		
SES 3.4 University-driven asset-based community development	Macro		

Table 1: Table of Tangible Systemic Rubrics of Organisational Transformation for Sustainability, according to the five disciplinary perspectives and scale-levels

The next section recapitulates the application of the tool.

8.2.2 RECAP: APPLICATION OF THE DIAGNOSTIC TOOL

The three embedded case studies were selected as outliers because they were undergoing or had recently undergone organisational development and transformation. Each case highlights how networks of internal and external actors at universities can work together to develop and generate intrinsic systemic change competencies. Their inner sustainability journeys were discerned through analysing, evaluating and interpreting documentary, verbal and direct-observational data. This was done through qualitative data analysis, coding and assigning data to specific categories in Atlas.ti, across the three organisational scales (micro, meso, and macro) and the five perspectives.

From the investigation of the antecedents and background of the case study universities – their organisational design, institutional architecture and wider societal, environmental, economic and political conditions – how the case universities navigated their organisational transformation towards sustainability could be identified. 35 semi-structured interviews were performed, along with dozens of meetings and exploratory conversations with scores of participatory stakeholders. With the documents, this formed the primary data. Using the ID-tool, following an iterative process of learning through evaluation (Luederitz et al., 2016) and qualitative data analysis (Dey, 1993).

Different analysis pathways were taken through the data of each case that allows for emergent possible interpretations of the data, various accounts and the conclusions made based on validity, representativeness and reliability (Dey, 1993). Specific episodes in the identified pathways were deemed as singularities, whereas specific structures (e.g. transdisciplinary configurations and interorganisational networks) were presented as exemplars for the application of systems thinking in the organisational design process. These are already presented in *Chapters 5-7* and are the unique manifestations of the sustainability transformation at each case. Before the synthesis, it was first necessary to validate, verify and substantiate connections, groundings and links in the categories of analysis, as well as the rubrics. The procedure for this is described in the next section.

8.2.2.1 PROCEDURE FOR SYNTHESIS OF THE CASES

In the categorisation of the data collected on the three cases, the analyst had to make judgements concerning how to distinguish between databits. Because of the larger quantity of data collected, data was broken down according to passages, or paragraphs dependant on the concept or experience. The fact that there were 639 codings in total demonstrates the depth and breadth attained. However, the choice of dividing databits and coding is ultimately subject to the judgement of the analyst and therefore the weighted outputs are subjective to the conceptual and empirical knowledge constructed throughout this project. Linking data is also subject to the same analytical judgement, yet, in the attempt of doing this, wherever data did not correspond or codes were not acute enough, alterations were made to improve the quality assurance, conceptual distinction and validity of the links made within cases. Indeed, as mentioned earlier, this describes how the categories of analysis were actually tested. Criteria developed from the meta-theoretical review and conceptual synthesis were initially applied to the data at LU (see *Chapter 4*). However, as the example of linking and categorising data shows, these criteria needed to be refined in a cumulative process. As a result of this

refinement process, choices were made to merge some criteria (e.g. *SER 5.7a* & *b*), adapt the encapsulating language in others (*CGS 4.1*, *SER 5.5*), whilst splitting still more (e.g. *SES 3.1*, *BSP 1.6*). The last phase of the qualitative evaluation attempts to establish general validity claims through connecting categories whilst using maps and matrices across cases to explore alternative ways in which the data can be integrated (Dey, 1993). In this way the synthesis had to involve a merger of the three hermeneutic units to examine the overall trends through the lenses provided by the codes and subsequent weights using the tool. This whole procedure followed the structure outlined by Dey in his guide to qualitative data analysis (1993). *Table 2* summarises total ‘object’ sizes per type and demonstrates the depth and breadth attained in the analysis:

Object Type	Hermeneutic Unit Merger (LU+ASU+HKUST)
Primary Documents (incl. interview transcripts & summaries)	144
Total quotations	569
Codings	639
Codes	33
Memos	11
Network Views	59
Primary Document Families	14
Code Families (corresponding 5 theoretical perspectives)	5
Code-links	46
Hyper-links (links between databits)	79

Table 2: *Atlas.ti* object types and their respective values after the synthesis. The operation of merging the data involved using the ‘merger’ function in *Atlas* for each complete collection of case-study data – these three hermeneutic units (HU’s) worked with to produce the analysis outputs for the tool per case.

Some quotations overlap, as codes were used on the same passages at different levels of detail, hence the smaller value of quotations than codings. Primary Document Families were used to break down and distinguish between data sources so as not to confuse the experiential accounts in the interviews, for example, with more academically rigorous information emergent from the previous studies and reports on the three cases. The five code families correspond to the five theoretical perspectives. *Chapters 5 to 7* presented integrated pathways, or action strategies that were constructed using the maps function of *Atlas.ti* to explore and substantiate grounded links between categories of the tool.

The weighted categories mapped onto the template provided by the diagnostic tool. Common patterns or elements appear when parts of the signatures are transposed, and significant categories emerge as clusters of action. The most significant categories emerged using the merger of hermeneutic units in Atlas to aggregate all the analysis. This was to see which categories were the most grounded and conceptually dense per scale and perspective *across cases*. It was from this procedure that shared qualities and common patterns emerged. Subsequently, these three quality criteria were also developed to distinguish a threshold that rubrics needed to fulfil:

- Substantiation: overwhelming internal evidence of the rubric's presence in the data at all cases. Rubrics which have 'W' values above 3.5, occurring across all three cases.
- Corroboration: backing-up of the presence of actions and behaviours described by a rubric with harder quantitative data, in particular numerical evidence, or direct observational data (e.g. student admittance numbers from the lower socio-economic quartile at ASU).
- Triangulation: 3 or more different kinds of sources (verbal, direct-observational, documentary) support the claim of presence at each case.

De-Limitations

With respect to work conducted in Germany, Phoenix-Tempe and Hong Kong, the signatures and action strategies represent the state of affairs at each of the cases in 2016/2017 only. It may be the case that were the ID tool to be applied now, slightly different pictures might emerge, although it is asserted that the underlying socio-behavioural qualities would remain distinguishable. Certain extra developments during the analysis had to be included in order to be comprehensive and fair after the field work had finished. Examples include but are not limited to the new sustainability governance structure instated at LU in 2017. In each instance, it was found that the ID-tool allowed not just a snapshot of the organisation, but a moving picture, with frames composed of episodes related to in the documentary and verbal evidence. That significant episodes regarding the inner workings of university intrapreneurs manifested themselves on site seemed due to the embedded-insider methodology adopted. It validated the need for careful interpretative diagnosis in encapsulating organisational transformations for sustainability as they are lived and practised, building the theory of how it works with the narrative of those who 'do' it (Pentland, 1999). Without this insight into the methods themselves, we may overlook or miss entirely the opportunity to zoom in to a university's unique transformation pathway towards sustainability.

8.3 SYNTHESIS AND COMPARISON OF TRANSFORMATION SIGNATURES

8.3.1 OVERVIEW OF LU, ASU, & HKUST TRANSFORMATION PATHWAY SIGNATURES TO SUSTAINABILITY

This section overviews the transformation signatures per case, as in the preceding case study chapters, for comparison and synthesis. These charts visualise the rubrics, with their size altered respective to their weighting. Thereafter, a scalar (8.3.2) and thematic (8.3.3) comparison isolates the most significant patterns. Action strategies

are interpreted in the context of the overall transformation signatures in section 8.4.

8.3.1.1 LU TRANSFORMATION PATHWAY SIGNATURE

The LU transformation signature consists of three action strategies, shown below in Figure 2 as orange (A), black (B) and turquoise (C) outlines

LU Action strategy A ‘Sustainability competences and environmental literacy’, shown in Figure 2 in **turquoise** connects the micro-level to the meso-level and can be characterised by the implementation of sustainability competencies at the individual-dyad level in Leuphana (*SER 5.1*). The sustainability minor within LU’s ‘Leuphana Semester’ introduces its approach to sustainability competence training for students and staff, which are referred to in its sustainability reporting and the Leuphana “Sustainability Science Initiative as Competence-building in Sustainability” (Schaltegger, 2009). This action strategy links sustainability competencies with environmental literacy in the socio-ecological systems theme (*SES 3.1*), as well as positive behaviour (*BSP 1.5*) and lobbying (*BSP 1.4*) in behavioural science and psychology. Multi-scalar awareness of power and agency, and the material and social environment, presented themselves in many of the meetings with LU researchers and staff.

LU Action strategy B ‘Environmental evaluation and governance’ is shown in **orange** scaling across three levels. It is rooted in the strong ability of LU actors to manage and account for their triple-bottom-line (*OCM 2.1*), measuring how their university complements to people, planet and profit responsibilities. Multiple references to EMAS training and diversity in the documentation and sustainability reporting was linked to integrated sustainability praxis (*SER 5.3a*), and a cluster of evaluation and disclosure of environmental social governance (**ESG**) at the meso and macro levels (*CGS 4.2a & b*). These also linked into the use of interdisciplinary resources and sustainability standards (*SER 5.8*) (e.g. the Global Reporting Initiative), at a macro-level, and back across into internal governance for sustainability (*SES 3.2a*), strategic trajectory at the micro-level (*CGS 4.1*), and ideal-transdisciplinary research praxis (*SER 5.4*), at the meso-level.

LU Action Strategy C ‘Sustainability research and education, and intrapreneurial outreach’ appears in **black** with a significant scalar range and research and education marked by triggering external impact and awareness (*SER 5.7*). It seems rooted in the micro-level qualities of transformative agency and effective intrapreneurship (*SES 3.1-3.1.1*). These were interrelated with organisational cultural health (*BSP 1.3*) which, in turn, was seen to affect the appearance of impactful, awareness-raising research and education. A joint project with ASU in Kosovo and Albania exemplified this, with LU as the European basis of projects maximising societal impact and public awareness, with many international partners. They received several awards for such research projects within the UNESCO Decade ESD (nine Project Awards in total since 2006) based on LU’s chronological evolution (LU, 2010).

Figure 2: LU Transformation Signature. Own design using E-Draw mind mapping software. Three distinct strategic chains of action taken by change-agents connected by the internal evidence are shown in **orange** (A), **black** (B) and **turquoise** (C).

Transformation signature of LU: Summary

Three action strategies show that sustainability competencies and environmental literacy [A], environmental evaluation and governance [B], as well as sustainability research and education, and intrapreneurial outreach [C], all played an important role in LU's transformation.

8.3.3.2 ASU TRANSFORMATION PATHWAY SIGNATURE

At ASU, the transformation signature includes two action strategies, shown in purple (A) and blue-grey (B) in Figure 3.

ASU Action Strategy A, Agency, leadership, reflexive governance and organisational learning in the region' in purple, depicts transformative agency concerning the challenging of sub-optimal practices (SES 3.1), particularly characterised by effective transformative leadership (SES 3.1.2), linked to internal governance for sustainability (SES 3.2a). This aspect is in turn interestingly linked to the rubric for sustainability research demonstration (SER 5.5), as the top-down redesign of ASU by Crow shows. SER 5.5 is associated with ASU's ability to learn about itself and its societal surroundings (OCM 2.4). Crow's office researched the history of university institutional models, grounding ASU's New American University Prototype as a new iteration (President's Office, 2012). Thus, we see the link with the purposeful-adaptive evolution of ASU (OCM 2.3). Furthermore, this links into ASU's sustainability governance structure for sustainability (SES 3.2a) which has evolved into a functional system relative to the size of ASU, and the scale and scope

of its activities as a comprehensive knowledge enterprise.

The effective governance and demonstration of sustainability in the organisation substantiates ASU's role in the Phoenix-Tempe-Mesa region's transformation towards sustainability indicating their departure from traditional governance modes. Transdisciplinary configurations also form a part of this purposeful-adaptive evolution, as well as internal governance structures, like the Office for Knowledge Enterprise Development, and the Centre for Science, Policy and Outcomes⁴, reconstituted in 2004 from the previous Columbia-based initiative (Crow & Dabars, 2015, p. 285).

ASU Action Strategy B 'Transdisciplinary sustainability research and education, praxis and organisational experimentalism' in **blue-grey** occurs mostly at the meso- and macro-levels. Notable is the incidence of transdisciplinary research praxis (SER 5.4). Several interviews with staff members reference ASU education and research generating societal impact and public awareness (SER 5.7), including the Dean of SOS and the Joint Director of GCSO: Programs "*created and generated from ASU and from GIOS in terms of the sustainability consortium [are] having a big impact on supply chains and businesses and corporations*", which act as best practices including "*other organisations that are having impacts in the larger community. Like DCDC, Decision Centre for a Desert City,*" and GCSO as "*a vehicle by which we can scale a lot of this work and knowledge that we've generated within the university so that we'll have a larger more global impact*" (Nixon-Carter, 2016). Evidence shows the presence of the rubric cluster denoting integrated sustainability praxis (SER 5.3a), showing how effectively integrating sustainability across portfolio functions spills-over externally (SER 5.3b) through ASU's various spin-off communities; for example, the SkySong Center (President's Office, 2012), and trans-institutional networks such as GCSO. SER 5.3b is interestingly connected to ASU's ability to run test-beds, and campus labs, shown by the rubric organisational experimentalism (BSP 1.6.1), in close connection with organisational development at the macro-level (BSP 1.6), partially orientated by positive organisational behaviour (BSP 1.5). Further links across into leadership agency for response to extrinsic drivers (OCM 2.2), and university-driven community development (SES 3.4) show significant internal processes connected to external impulses ASU makes for the public good.

⁴ CSPO - Centre for Science, Policy and Outcomes, a Columbia-based initiative of 1997; reconstituted in 2004 as a 'transdisciplinary configuration' at ASU.

Figure 3: ASU Transformation Signature. Own design using E-Draw mind mapping software. Two distinct strategic chains of action taken by change-agents connected by the internal evidence are shown in **purple (A)** and **blue-grey (B)**.

Transformation signature ASU: Summary

Two action strategies show that agency, leadership, reflexive governance and organisational learning in the region (A), as well as transdisciplinary sustainability research and education, praxis and organisational experimentalism (B) played an important role in ASU's transformation.

8.3.3.3 HKUST TRANSFORMATION PATHWAY SIGNATURE

At HKUST, the transformation signature consists of three action strategies, coloured **black (A)**, **brown (B)**, and **turquoise (C)**.

HKUST Action Strategy A, 'sustainability demonstration and competence training, transformative leadership, governance, and experimentalism' is a major strategy, corresponding to the chain in **black** in Figure 4. There are many links between and across scales, however, key associations are notable between the micro-level rubrics of transformative agency (*SES 3.1*), effective intrapreneurship (*SES 3.1.1*), strategic trajectory (*CGS 4.1*) and sustainability competence training (*SER 5.1*). These undergird significant meso-level rubrics, such as internal evaluation of ESG (*CGS 4.2a*), sustainability research demonstration (*SER 5.5*), and effective transformative leadership (*SES 3.1.2*). *SER 5.5* is corroborated by documentary and verbal accounts concerning the HKUST 2020 Sustainability Challenge and its respective Action Plan.

Creating more visibility for sustainability features and research was influenced directly by the recommendations of an external advisory group for the operations committee installed on sustainability to “[i]dentify projects that ... have an obvious educational benefit, and then install them in highly visible places where they become the focus of the campus community” (HKUST Sustainability Unit, 2016). Accordingly, to achieve the 2020 Sustainability Challenge, a ‘Sustainability Corner’ was recommended by the operations committee, to permanently display in a highly visible manner “efforts the university has undertaken, demonstration of University-driven research, and exhibition of new and promising technologies that will push the sustainability boundaries in the future” (HKUST Sustainability Unit, 2017b). Rubrics are also interlinked across the meso and macro-levels of CGS and BSP. Here the associations particularly focus on *BSP 1.6.1*, organisational experimentalism, showing HKUST’s propensity to physically, socially, economically and ecological transform its surroundings.

HKUST Action Strategy B ‘lobbying competences, purposeful-adaptive evolution, sustainability research and education for external impact’, (in **brown**) is a distinct pathway between organisational lobbying competences (BSP 1.4), purposeful-adaptive evolution (OCM 2.3), and societal impact and public awareness of research and education (SER 5.7), the association of which is supported by interviews at the HKUST Sustainability Unit, yielding information concerning:

- the identification of the Hong Kong Sustainable Campus Consortium,
- the HKUST Research and Graduate Studies department, which performs impact cases to determine the extent to which HKUST research outcomes impact its surrounding society.
- HKUST’s participation in GCSO, which demonstrates the awareness of external actors of its impacts and potential.
- The fact that the HK government needs HKUST as much as the other way around, which shows public awareness for the capabilities of HKUST.

HKUST Action Strategy C ‘student and staff wellbeing, positive inspiration and experimentalism’ is a minor pathway, shown in **turquoise**, which overlaps with action strategy A in its culmination at organisational experimentalism (*BSP 1.6.1*) at the macro-level, undergirded by psycho-social wellbeing of students and staff (*BSP 1.1*), and organisational positive behaviour (*BSP 1.3*). Whilst these lower scale rubrics reinforced *BSP 1.6.1*, it associates too with the less significant capacity to minimise negative health, socio-economic, and environmental effects of HKUST (*SER 5.6*) at the interface with the wider world. The HKUST Sustainability Unit report of 2013/2014 illustrates this action strategy in context: “Since the university is constantly changing, the Sustainability Unit supports this transformation in ways that make it more healthy, inspiring, and environmentally responsible. The goal is to support operational units as they undertake actions that improve the campus environment; faculty as they use the campus as a living laboratory for new ideas and demonstrations of research; and students who want to improve conditions through their hands-on actions” (HKUST Sustainability Unit, 2014).

Figure 4: HKUST Transformation Signature. Own design using E-Draw mind mapping software. One major strategy interlinked with one of two minor strategic chains of action taken by change-agents, shown in **black** (A), **brown** (B), and **turquoise** (C).

Transformation signature HKUST: Summary

Many interlinkages show one major and two minor action strategies: firstly, a highly prominent one, 'sustainability demonstration and competence training, transformative leadership, governance, and experimentalism' [A]; secondly, 'lobbying competences, purposeful-adaptive evolution, sustainability research and education for external impact' [B]; and, thirdly, 'student and staff wellbeing, positive inspiration and experimentalism' [C].

8.3.2 SCALAR COMPARISON

8.3.2.1 MICRO-LEVEL COMPARISON

Charts 1-3: Miniaturised replicas of those presented in each chapter at the micro-level rubric weighting analysis. Note ASU and HKUST's diagnosis included one more rubric at the micro-level: *SES 3.1.2 Transformative Leadership*

There are diverse patterns at the micro-level per case. LU has the highest weighted rubrics, reflected in its own sustainability competence training programmes as described in LU Action Strategy A. Worthy of note, ASU is a much larger institution with many different organisational units in comparison with LU. Therefore, the strength of ASU's rubrics of transformative agency (*SES 3.1*) and triple bottom line accounting (*OCM 2.1*) is significant. Comparing ASU's level of pro-sustainability behaviour (*BSP 1.2*) and effective intrapreneurship (*SES 3.1.1*) with LU, these rubrics are much more pronounced, which supports the attestation by some GIOS/SOS alumni for bottom-up student engagement to be better enabled and connected across campus. Differences are subtler once we compare HKUST and LU. HKUST micro-level performance looks more balanced, with similar proportionality according to their presence in the data. At HKUST, psycho-social well-being (*BSP 1.1*) and strategic trajectory, liaison and learning (*CGS 4.1*) are more pronounced, which the analysis suggested was due to a visible and accessible campus counselling centre, indicating that HKUST ensures the wellbeing of its students and staff. Compared with ASU, HKUST's performance shows more strength and balance across transformative agency (*SES 3.1*), effective intrapreneurship (*SES 3.1.1*), strategic trajectory (*CGS 4.1*), and sustainability competencies (*SER 5.1*).

8.3.2.2 MESO-LEVEL COMPARISON

Charts 4-6: Miniaturised replicas of those presented in each chapter at the meso-level rubric weighting analysis. Note ASU's diagnosis included one more rubric at the meso-level due to the nature of the data regarding experimentalism and testbeds within ASU: **BSP 1.6.1 Organisational Experimentalism**. This was applied to HKUST but not retrospectively to LU.

The differences are more pronounced at the meso-level. Purposeful-adaptive evolution (OCM 2.3) is most significant at ASU, due to its redesign as a complex-adaptive knowledge enterprise. Whereas ASU slightly lacks pronouncement in the areas of organisational cultural health (BSP 1.3) and environmental literacy competencies (SES 3.3), where LU and HKUST excel more. Internal governance for sustainability (SES 3.2a) and transformative agency (SES 3.1) is highly present in all three cases, exemplified by the renewed sustainability governance structure at LU in 2016/17, ASU's transdisciplinary configurations, and HKUST's 2020 Sustainability Action Plan. Integrated sustainability praxis across functions (SER 5.3a) stands out at LU, whereas it is less-pronounced at ASU and HKUST.

One major difference that marks HKUST out against ASU and LU, is the high level of pronouncement of SER 5.5 with regards to how it demonstrated sustainability-related research physically on campus, concretely seen in HKUST's 2020 Sustainability Challenge (HKUST Action Strategy A above). Nevertheless, in Phoenix, sustainability research exhibition (SER 5.5) was also pronounced, whilst it seemed orientated more towards communications and disclosure of ASU research and education that specifically benefits the public (SER 5.7). These two rubrics indicate how the case universities leveraged knowledge of sustainability, whilst implementing it in practice to achieve organisational or societal impact.

8.3.2.3 MACRO-LEVEL COMPARISON

Charts 7-9: Miniaturised replicas of those presented in each chapter at the macro-level rubric weighting analysis. Note HKUST's diagnosis included *BSP 1.6.1 Organisational Experimentalism* at the macro-level due to how HKUST used its own campus for experimentalism and community engagement.

The macro-level shows the greatest differences. ASU's cluster of organisational positive behaviour (*OCM 1.5*), organisational development (*OCM 1.6*), and organisational experimentalism (*OCM 1.6.1*) is highly pronounced and unique. HKUST and ASU both excel more generally than LU, with many more pronounced rubrics. Except for accountable disclosure of Environmental Social Governance (ESG) (*CGS 4.2b*) with sustainability reporting (*SER 5.8*), which allows LU to punch above its weight. This may have been due to the small size of Leuphana compared to the other two and the limitations of external documentary evidence translatable from German. However, due to the significance of the OECD-funded Innovation Incubator, and LU's specific focus on societal impact at the strategic level in 2017, the local community appeared increasingly aware of university-driven initiatives.

Ideal-typical research praxis (*SER 5.4*) is also present to gradually less extents as we look at LU, ASU and HKUST in declining order. Nonetheless, significant rubrics indicated university-regional interdependency; these are all equally highly present at HKUST, ASU and LU. Internal evidence strongly suggests that the research and education performed in each case produce some impact and the public is aware of this

(*SER 5.7*). Additionally, although more pronounced at ASU and HKUST, university-driven assets-based community development (**ABCD**) (*SES 3.4*) provides an example of how researchers, students and practitioners lead by forming partnerships with civic actors to find innovative solutions to drive societal transformation. Lastly, the presence of *SER 5.3b*, at ASU especially, and to a lesser extent at HKUST, shows how sustainability practices embedded in research, education, operations, governance and communications (*SER 5.3a*) encourage university community actions, increasing the likelihood of developing resilient and sustainable lifestyles externally.

8.3.3 PERSPECTIVE COMPARISON

8.3.1 BEHAVIOURAL SCIENCE AND PSYCHOLOGY (BSP)

The most prominent rubrics are spread broadly across scale levels at LU. HKUST is also strong in this area and has more strategic actions assigned to BSP rubrics; however, LU shows the most balanced distribution. Aside from its notable cluster at the macro-level (*BSP 1.5, 1.6.1, 1.6*), ASU has limited pronouncement in the BSP area. HKUST's experimentalism, as a macro-level organisational mind-set, illustrates how it uses its campus as a testbed for sustainability and innovation in science and technology. This is demonstrated by the presence of psychosocial wellbeing and organisational positive behavioural traits, which appear to bolster the ability to run campus-level experiments, without risk aversion or fear of failure, in a learning mindset that reflects the psycho-social health of HKUST's citizens.

8.3.2 ORGANISATIONAL CHANGE MANAGEMENT (OCM)

In organisational change management, each case shows a similar distribution. Except for a more pronounced weighting of triple-bottom-line agency (OCM 2.1) in LU. Given the inertia created by competition with much larger regional universities, it is logical that LU had to, therefore, develop its intrinsic competencies to punch through the ‘glass-ceiling’ created by this competition and institutional architecture. LU’s transformation appears driven from the bottom-up, through change-agents taking active responsibility at the group-level to manage the triple bottom line of operations and decision-making, taking account of social, and environmental risks, obligations and opportunities. However, at higher levels, we see ASU and HKUST have more substance. A purposeful-adaptive mode of change management rooted in anticipation and proactivity was identified in ASU. This seems especially due to Crow’s strong influence in ASU’s redesign as the New American University prototype, reflecting the assets of the following rubrics: transformative agency/leadership (*SES 3.1/3.1.2*), purposeful-adaptive evolution (OCM 2.3), and organisational experimentalism (*BSP 1.6.1*). Whilst HKUST is characterised by the attributes of triple-bottom-line (OCM 2.1), organisational extroversion and openness (OCM 2.5), organisational-societal learning (OCM 2.5), and – in the context of one action strategy - purposeful-adaptive evolution (OCM 2.3). This depicts a pragmatic yet collaborative resilience in HK universities, exemplified by HKUST’s role in the HKSCC, and inter-organisational components regarding how universities impact their surrounding regions. One interpretation may be the specialised ‘one-country two-systems’ policy, and the proximity, influences, and relationship with the Mainland.

8.3.3 SOCIO-ECOLOGICAL SYSTEMS (SES)

Each case has well-grounded SES rubrics at the micro and meso-level, especially concerning transformative agency, effective intrapreneurship and transformative leadership (*SES 3.1, 3.1.1, and 3.1.2*). LU's attributes more strongly associated with transformative change-agency and effective intrapreneurship compared with ASU and HKUST. The

SES perspective shows notably more distinguished associations per case. For example, internal governance for sustainability (*SES 3.2a*) seems to rely on the presence of transformative agency (*SES 3.1*), at the micro-level at ASU, its strongest asset. Whereas, at HKUST, we see a markedly stronger presence of external governance for sustainability (*SES 3.2b*) compared to ASU and LU, demonstrating that knowledge of good governance of natural resources is developed and implemented for other organisations and societal actors. University-driven ABCD (*SES 3.4*) is similarly present at HKUST and ASU. Overall, LU shows more micro-level weighting, ASU more weighting towards the meso-level, and HKUST towards meso-macro.

8.3.4 CORPORATE GOVERNANCE FOR SUSTAINABILITY

Figure 14-16: Segment Snapshot - Visual CGS Perspective Comparison, top to bottom, LU, ASU, HKUST.

NB: Effective transformative leadership, showing qualities of the top-down redesign of the organisation, and change-agency in leadership, was a data-informed code, developed inductively at ASU; this was not applied retrospectively to LU's data.

HKUST demonstrated significant CGS-rubrics at the micro- and meso-level, with strategic trajectory (CGS 4.1), internal evaluation of ESG (CGS 4.2a) and externality recognition and internalisation (CGS 4.3). LU showed the most similarity to HKUST, except with less pronouncement. However, at LU, the combination of CGS 4.2a and 4.2b shows their asset of internally evaluating ESG performance and its accountable disclosure in sustainability reporting and communication. This was also seen at ASU, yet they were not so well associated with other rubrics in the identified action strategies. Only LU's performance in this area shows a balance across scales and rubric presence. Were it not for a lack of substantive evidence collected when evaluating for externality recognition (CGS 4.3) at ASU, then this may also have been similar for the American case.

8.3.5 SUSTAINABILITY IN EDUCATION AND RESEARCH (SER)

Figure 17-19: Segment Snapshot - Visual SER Perspective Comparison, from top to bottom: LU, ASU, HKUST.

Out of all the thematic areas, SER shows the greatest difference in groundedness, association and scale. Both LU and HKUST perform strongly with regards to sustainability competence training (SER 5.1); however, LU shows the highest grounding. The greatest weighting towards the macro-level can be seen at ASU, where sustainability praxis external impact (SER 5.3b), sustainability

research demonstration (SER 5.5), research and education generates societal impact (SER 5.7), and sustainability reporting (SER 5.8) are all fairly strong and balanced. SER 5.5 occurs more at the macro- than meso- level for ASU and vice-a-versa for HKUST, exhibiting greater association. Presence of SER rubrics at LU is not so well distributed apart from sustainability competence training (SER 5.1), integrated sustainability praxis across functions (SER 5.3a), ideal-typical transdisciplinary research praxis (SER 5.4), and research and education generates societal impact (SER 5.7). Interesting similarities are seen once all three case's performance are compared across rubrics SER 5.3a, 5.4, and 5.7. Only at ASU are all three of these rubrics associated together in the same action strategy at the meso- and macro-level. This is an important indication of how its internal competencies, developed at GIOS, manifested in the relationship with the region, as ASU's action strategy B was intricately connected to three other perspectives, including the cluster in the behavioural science and psychology theme, and disparate rubrics in change management and socio-ecological systems.

8.3.4 AGGREGATION OF THE DATA IN ATLAS: OUTPUTS

This section presents, and attempts to synthesise, patterns in the conceptual quality and explanatory power of the 33 categories of analysis applied to each case in *Chapters 5-7*. In this operation, the data of all three cases have been aggregated. Common patterns have also been identified that correspond to a high-level of conceptual density, or linkage, between categories, that were originally presented in the action strategies of LU, ASU and HKUST. By comparing these strategies and the star charts - that mapped the strength of incidence of each code in the data - similar trends were observed in the experiential and documentary evidence. The synthesis was performed by taking the LU, ASU, HKUST hermeneutic units in Atlas.ti and using the merger function. Thus, the integrated evidence-based weighting using Diagnostic Tool was enabled, with $N_q = 635$. See below for the results of the merged HUs data aggregation per scale level.

8.3.4.1 MICRO-LEVEL AGGREGATION

Aggregated weights per perspective - based on links observed in the micro-level data.

Chart 10: An Aggregation of the data for each case study at the micro-level. It shows that *SER 5.1 Sustainability Competences* is the most pronounced, followed by *SES 3.1 Transformative Agency*, and *CGS 4.1 Strategic trajectory*. *OCM 2.1 Triple bottom line* is also prevalent, as well as the *SES 3.1.2 Transformative leadership*, the sister rubric of *SES 3.1*.

8.3.4.2 MESO-LEVEL AGGREGATION

Aggregated weights per perspective - based on links observed in the meso-level data.

Rubric	Gr.	De	Weight
BSP 1.3	11,00	2,00	1,74
BSP 1.4	10,00	2,00	1,58
BSP 1.5	19,00	4,00	3,00
BSP 1.6.1	23,00	8,00	3,65
OCM 2.2	18,00	2,00	2,84
OCM 2.3	24,00	4,00	3,79
SES 3.2a	42,00	4,00	6,64
SES 3.3	13,00	2,00	2,05
CGS 4.2a	21,00	5,00	3,32
CGS 4.3	16,00	2,00	2,52
SER 5.2	9,00	0,00	1,42
SER 5.3a	28,00	5,00	4,43
SER 5.5	32,00	6,00	5,07

Chart 11: An Aggregation of the data for each case study at the meso-level. It shows that SES 3.2a Internal governance for sustainability is highly developed property shared by all cases, and the most pronounced, followed by SER 5.5 Sustainability research demonstration, and SER 5.3a Integrated sustainability praxis. OCM 2.3 Purposeful-adaptive evolution and BSP 1.6.1 Organisational experimentalism are also noteworthy shared qualities that predispose the cases to navigating pathways of organisational transformation for sustainability.

8.3.4.3 MACRO-LEVEL AGGREGATION

Aggregated weights per perspective - based on links observed in the macro-level data.

Rubric	Gr _c	De	Weight
BSP 1.6	14,00	1,00	2,21
OCM 2.4	15,00	2,00	2,37
OCM 2.5	13,00	0,00	2,05
SES 3.2b	13,00	0,00	2,05
SES 3.4	12,00	2,00	1,89
CGS 4.2b	11,00	2,00	1,74
CGS 4.4	12,00	0,00	1,89
SER 5.3b	16,00	3,00	2,53
SER 5.4	31,00	2,00	4,89
SER 5.6	7,00	1,00	1,10
SER 5.7	35,00	4,00	5,53
SER 5.8	16,00	2,00	2,52

Chart 12: An Aggregation of the data for each case study at the macro-level. It shows that *SER 5.7 Research and education generates societal impact* is the most pronounced, followed by *SER 5.4 Ideal-typical Transdisciplinary Research Praxis*. No other noteworthy rubrics pass the threshold of the three quality criteria (wherein, for example, the first, substantiation requires a **W**-value of more than 3.5) to be considered significant shared qualities that other universities might draw from to guide their own sustainability transformations.

8.3.4.4 SYNTHESISED META-THEORETICAL PERSPECTIVE WEIGHT

Perspective	Weight
BSP	2,48
OCM	2,97
SES	3,27
CGS	2,65
SER	3,62

Chart 13: Average Meta-theoretical Perspective Weight.

The most significant perspectives are the socio-ecological systems and the sustainability in education and research perspective lenses, with average weights across all three cases of 3.27 and 3.62, respectively. This highlights the importance of systems thinking and practice to the university research and education missions as it is itself a *socio-ecological system*.

8.3.5 DRAWING OUT COMMON PATTERNS & SHARED QUALITIES

All rubrics that passed the three quality criteria of substantiation, corroboration and triangulation, mentioned above, were tested with the formation of networks of associations – see *Synthesis Patterns 1-3*, which provide examples of this operation. Once the HU's of the three cases - the totality of all coded and linked data – had been merged in Atlas, then opening the network function again (as with the singular case analyses) allowed an integrated visualisation of the synthesised dataset in terms of rubric boxes and interpreted relationships. Any irrelevant or unsubstantiated links or codes in the chains were eliminated in this Atlas.ti network function program. What remained were considered as shared qualities and common patterns since they define two common, and equally important aspects of sustainability transformation pathways: first, the most significant rubrics for all three cases; second, the connections between rubrics which were also common to all three. This effectively means that if you were transpose each image of the transformation pathway signatures, and trace out the overlapping connections and rubrics, the outputs would yield the connections and rubrics that form the synthesised transformation pathways. This provides the basis with which we can begin to see *what shared qualities and common patterns can be drawn that help other universities recognise their own potential for transformation*. These can be summarised from each of the preceding sections scalar aggregation as follows:

- Micro-level: SER 5.1 Sustainability Competences, SES 3.1 Transformative Agency, CGS 4.1 Strategic trajectory, OCM 2.1 Triple bottom line, SES 3.1.2 Transformative leadership.
- Meso-level: SES 3.2a Internal governance for sustainability, SER 5.5 Sustainability research demonstration, SER 5.3a Integrated sustainability praxis, OCM 2.3 Purposeful-

adaptive evolution, BSP 1.6.1 Organisational experimentalism.

- *Macro-level: SER 5.7 Research and education generates societal impact, SER 5.4 Ideal-typical Transdisciplinary Research Praxis.*

The figures below depict rubrics which operate across the three scales from bottom to top; that is the bottom-most clusters are micro-level, midmost are meso-, and the topmost are macro-level.

Figure 20: *Synthesis Pattern A: 1st set of Shared Qualities in a Common Pattern across cases.*

Starting at the micro-level, *SES 3.1 Transformative Agency*, *SES 3.1.2 Transformative leadership* (and to a lesser extent *SES 3.1.1*) operated in tandem in all cases to lead to *SES 3.2a Internal governance for sustainability*, in turn associated (two-way relationship) with *CGS 4.1 Strategic trajectory* – that is, they seemed to occur in action simultaneously and as a result of one another. A further association like this occurs between *SES 3.2a* and *CGS 4.2a Internal evaluation of environmental social governance*, however, *CGS 4.2a* only just missed the ‘W’ threshold of 3.5, so is on the cusp of being a significant shared quality. Lastly, *CGS 4.1* seemed to lead to the instance of actions coded with *CGS 4.2a*, which could lead us to include it as a shared quality after all.

Figure 21: *Synthesis Pattern B: 2nd set of Shared Qualities in a Common Pattern across cases.*

When we regard *Figure 21* from the top, it shows how dominant *SER 5.7 Research*

and education generates societal impact is in the analysis at the macro-level at all cases. This observation is only strengthened by the fact that *SER 5.7* was a node, in that it was connected to all other rubrics present in the remaining cluster passing the criteria. It can also be seen that, in this way, *SER 5.7* was influenced in some significant way by the connected macro-meso-level rubric, *SER 5.4 Ideal-typical Transdisciplinary Research Praxis*, as well as the meso-level rubric *OCM 2.3 Purposeful-adaptive evolution*, and to *OCM 1.3 Organisational cultural health* despite not weighing very highly, to be considered a minor shared quality. In turn, the synthesis also shows how at all three cases, the instance of actions coded with *SER 5.7* appeared as part of the instance of actions coded with *SER 5.3b Integrated sustainability praxis external impact*, although this relation is weaker than the others, as is the **W**-value for *SER 5.3b*, therefore also seen as a minor one.

Figure 22: *Synthesis Pattern C: 3rd set of Shared Qualities in a Common Pattern across cases.*

Finally, Figure 22 shows the third aggregate cluster that depicts *SER 5.1 Sustainability Competences* as the most weighted at the micro-level, being associated with both *SER 5.5 Sustainability research demonstration* and *BSP 1.6.1⁵ Organisational experimentalism*. *SER 5.5* is also associated with *OCM 2.3* which occurs in the second cluster above (these were kept separate for simplicity). Notably, *OCM 1.6.1* is also associated with actions coded with *SER 5.3a Integrated sustainability praxis*. We also see the singular importance of the role *OCM 2.1 Triple bottom line* plays in the synthesis as it appears to contribute to the integrated sustainability in portfolio functions coded by *SER 5.3a*. Hence *OCM 2.1* is also seen as a significant shared quality.

Importantly, these figures allow us to understand exactly how the concepts of shared qualities and common patterns in sustainability transformations are to be understood in this research: the ‘common pattern’ is the network and its connections, whereas the ‘shared qualities’ are the nodes in the networks.

The next section delves into the discussion of these synthesis findings by looking at the common patterns and shared qualities in context.

5 Formerly *OCM 1.55* in the 2017 analysis package hence the name in the diagram.

8.4 DISCUSSION: IMPLICATIONS OF INTERPRETATIVE ORGANISATIONAL DIAGNOSTICS

Common to all cases was the effort to ‘transcend’ their task environments and economic-institutional and policy constraints to better implement knowledge – through their research and education missions – with sustainability outcomes and solutions. Additionally, all three universities’ studied actors demonstrated willingness to experiment, to work in transdisciplinary and interdisciplinary ways, to support and elucidate roles for effective intrapreneurship, strategic trajectory and lobbying competences, as well as positive behavioural traits and the attempt to evaluate the overall societal impact of their unit, project, or organisation. This supports previous research in this emerging field that observes universities increasingly engaging themselves in multi-stakeholder and interorganisational networks, catalysing their own sustainability and their capacity as stewards for surrounding societal transformation (Baker-Shelley et al., 2017; Baker-Shelley, van Zeijl-Rozema, & Martens, 2020; Keeler et al., 2016; Lang & Wiek, 2013; G. Trencher et al., 2014).

8.4.1 INTERPRETING MEANING FROM COMMON PATTERNS & SHARED QUALITIES

A first common pattern at the micro-level was transformative agency and intrapreneurship, in combination with sustainability competence training of students and staff, a focus on the triple-bottom-line, and the strategic trajectory, liaison and lobbying of engaged actors. These traits delineate the common pattern of intrapreneurs’ strategic capability, as well as their persuasion and leverage of those higher up the pecking order who have more say over the nature and direction of the sustainability transformation pathway taken. This is termed the ‘liaison’ function.

Secondly, at the meso-level, a common pattern of mutual intelligibility and dialogical communications across disciplines and departments revealed itself, in line with Bakhtin’s (2006) dialogical communications theory. This is made tangible by regarding the node-like hub organisations present in each case operating across boundaries, for example, the Faculty of Sustainability at LU, GIOS at ASU, and HKUST Sustainability Unit. This facet is termed the ‘matrix’ function, which counters siloed-thinking and institutional isomorphism, due to the often-fragmented structure of university organisations. This function corresponds with seeing the university as a complex-adaptive knowledge enterprise, where “self-determination is the crux of the distinction between the bureaucratic mindset of an agency and the boundary-spanning dynamism of an academic enterprise” (Crow & Dabars, 2015a, p. 307). Although hard to pinpoint exactly, common threads appeared in the rubrics for internal governance for sustainability, organisational positive behaviour and transformative leadership.

A third common pattern at the macro-level, appears as a possible pathway for navigating organisational transformation for sustainability. We term this the ‘action research’ function, defined by a culture of innovation and experimentation (*BSP 1.6.1*) embodied in the adequate demarcation of intrapreneurial units (*SES 3.1.1*), and the 3rd person action research practice of the development of the organisation as a whole (*BSP 1.6*). Each case adopted specialised experimental approaches to redesigning their own organisations, employing transformative leadership whilst supporting action research, inquiry, and intrapreneurship with respect to the university surroundings.

A fourth common pattern can be seen based on the rubric of integrated sustainability praxis, where sustainability practices are embedded in research, education, operations, governance and communications (*SER 5.3a-b*), encouraging university-community co-creativity and generating awareness of the societal impact of the universities' research and education (*SER 5.7*). Benessia et al. (2012) corroborate the concept of 'sustainability praxis'⁶, and its external impact when utilised by universities as when: "sustainability is fruitfully hybridized with artistic research and practice... These hybrids can work as encouragements to abandon modern divides and pitfalls and engage in a new kind of collective diagnosis and praxis for our present" [predicament] (Benessia et al., 2012).

Thus, application of the diagnostic tool yielded common patterns of interdependent qualities, occurring across scales and thematic areas. One wonders if this interconnectivity itself is a systemic quality which allows for the action strategies-as-pathways to emerge.

8.4.2 CLUSTERS OF ACTION, EXTERNAL TRACTION

Commonalities also seemed to extend to the trans-national relationship between the case studies, and other universities. During the fieldwork, the nascent GCSO network was discovered, which aims to implement sustainability outcomes at scale in various geographical and socio-economic contexts that have the best problem-solution fit. This network exemplifies how universities can amplify the impact of their research and learning about themselves by sharing solutions and implementing knowledge outcomes at a transnational scale (Keeler et al., 2016). What was remarkable about GCSO was that it confirmed ASU, LU and HKUST as early members, which was not known at the time of choosing the case studies. In this way, GCSO illustrates that sharing experiences and implementing lessons learnt in different contexts collaboratively may spur the development of intrinsic competencies for systemic change. Hence, to the extent that actors within each university organisation benefitted from the shared knowledge and collective research projects allowed by inter-organisational networks, they seemed better equipped to transform their immediate organisational contexts using this newly acquired agency within their institutional architecture.

In terms of the power and agency to influence the transformation of an organisation from within, further external leverage can be characterised with insider efforts working in collaboration with external organisations and change-agencies across sectors and scales. These avoid a prescriptive implementation of policies that negate affected communities' capacity to articulate their problem situation; their agency in understanding their socio-ecological system can be amplified by working alongside sustainability scientists in co-research teams (as rubric *SES 3.4* exemplifies). Different examples occur in the evaluation to support this, with LU's innovation incubator, then ASU's cooperative project with LU in Albania, and with the identified example at HKUST of HKSCC.

⁶ Based on Arendtian Praxis in the *vita activa*; as part of the inherent function of political life in change-agency. Praxis is something the actors do to create *Möglichkeitsräume* (possibility spaces), in response to stimulus but not the stimulus itself. In this sense 'action' allows intrinsic competencies to emerge. The nature, form and substance of action is rooted in the intrinsic logics of the organisation and its actors.

8.5 CONCLUSIONS

8.5.1 GENERIC LESSONS, UNIQUE PATHWAYS OF TRANSFORMATION

Shared socio-organisational qualities and common patterns are borne out by certain key rubrics of the diagnostic tool of organisational transformation for sustainability. The clusters of action also centred around these rubrics. Generically, the cases derived success and progression in their academic missions from the extent to which they generate positive societal impact via their education, research and practice. The steps they take to include the public and make them aware speak to this orientation. Demonstrably, the very academic mission of the university can itself be scaled as a knowledge enterprise, making the outcomes of scientific research visible and creating an impact within the wider community. This perspective aligns with Hessels, van Lente and Smits' (2009) conceptualisation of the university's science-society contract, and its credibility cycle regarding how "scientific practice relates to external pressures" and "how internal developments influence science's relationship with society" (Hessels et al., 2009, p. 398). This can be seen, for instance, in the form of external economic and social shocks that acted as stimuli for systemic change in the case-studies. Such stimuli include:

- the institutional transformation of the Higher Education sector in Germany as a result of unification from the 90's to the '00s, opening up competition in Lower Saxony, driving LUs own restructuring (Wolter, 2004);
- a trend of increased cuts of fiscal state Higher Education funding by almost 50% in Arizona over the period 2002-2012, driving the leadership change and subsequent reconceptualisation at ASU from 2002 onwards (ASU, 2013);
- the dramatic transformation of Hong Kong from a manufacturing to a service-based economy with a connected economic slow-down, justifying the policy recommendation to establish HKUST in 1992 (H.-G. Lee, 2013; Schenk, 2008).

However, simultaneously to these shared qualities and common patterns, each case study university followed unique pathways; some common rubrics were seen but commonalities in their action strategies were hard to discern. Highly specialised approaches to organisational transformation exist. This high context-dependency supports that the effectiveness of each university's approach to navigating organisational transformation for sustainability comes from within. Regardless, the question now still remains as to whether the rubrics identified as significant earlier across all three cases might also behave as green lights which light the way for systemic change elsewhere, indicating an organisation's readiness for transformation. It helps therefore to discuss how such green lights could crystallise from the intrinsic competencies for systemic change.

8.5.2 INTRINSIC COMPETENCIES FOR SYSTEMIC CHANGE?

The patterns identified by the action strategies represent intrinsic competencies for systemic change. These, in turn, consist of actors researching, learning about and diagnosing their own organisations, their awareness of system boundaries and qualities,

and the relationship and interdependency between the organisation and its surrounding society and ecosystems. It is with these patterns that the elementary substance of the rubrics maintains a core commonality across three different international contexts, whereas their combination in practice and sequence is unique. This is supported by previous work that states “comprehensive reconceptualisation of an organisation or institution must ... proceed according to its own intrinsic logic, especially in the case of an institution as complex as a major research university” (Crow & Dabars, 2015a, p. 64).

In conclusion, it was noted that the rubrics assist interpretation of qualitative findings from case-study research. This ideally requires rigorous internal research from within the organisation *on itself*. The diagnostic tool may *substantiate potential for transformation*: internal or external stimuli trigger capacity-building, where university actors may improve performance across rubrics *to scope ways to* enhance internal capacity for systemic change. In this way, the ‘soil’ can be tested to see whether a particular organisation is a fertile ground for transformation or if more asset development is needed. Hence, tangible systemic rubrics may act as pragmatic design aspirations, guiding and encouraging university actors along transformation pathways.

8.5.3 A TYPOLOGY OF TRANSFORMATION?

Like Crow and Dabars (2015, p. 64), we stress the important injunction that prescription of “a set of design strategies applicable in all contexts” is not recommended, since “no such algorithm or protocol exists”, in line with our statement that the search for a blueprint to organisational transformation for sustainability would unlikely bear fruit. Much more research needs to be done, in both industry/consultancy practice, and core social-organisational science before concrete green lights can be identified, although some general shared qualities and common patterns could be found in this work. Cutting corners on the hunt for a likely quite lucrative blueprint risks precluding the intrinsically rooted nature of transformation for sustainability present in the actors involved. This is therefore to be avoided. Nonetheless, this difficult and ambitious collaborative research endeavour is also a necessary one. One wonders if these findings could lead to a typology of characteristics that can help other universities to understand the approaches suitable for their own transformation. Currently, it is still very difficult to come up with such a typology, precisely due to the highly specific conditions that need to be present for organisational transformation for sustainability to take place, as well as the insider and political nature of some of the behaviour that may need to be researched. However, this is definitely a recommendation for the future: to analyse current pathways and see if certain pathways occur more often and under what circumstances in order to derive typologies from that. The duration of uninterrupted, *in-situ* (not remote) field work is recommended at several months so as to build the necessary relationships, trust and coverage in the case organisation. There should be a diligent, responsible and inclusive research team. Future work should not attempt to do this solo, prescriptively or with fewer than three active research partners. Being able to identify, diagnose and navigate pathways in such a holistic manner is at the cutting edge in applying systems thinking to the study of organisational development and behaviour in the context of transformative sustainability at the University.

PART III. ACTION INQUIRY AS INTERVENTION: SYSTEMIC CHANGE FROM WITHIN

*“It is hard to find words to capture
the fact that humans are facing the
most important question in their
history – whether organised human life
will survive in anything like the form
we know – and are answering it by
accelerating the race to disaster.”*

*Noam Chomsky (Chomsky & Polychro-
niou, 2017, p.121)*

OVERVIEW

This research demonstrates how universities enact their aspirations to contribute to a healthy, flourishing and resilient society. Having learnt the importance of the intrinsic nature and behavioural patterns of organisational transformation, it also makes sense to inquire into how to design, manage and lead a healthy and flourishing university organisation. In addition to this, the challenges we face as a species are rooted in the pathology of our society. Thus, it seems necessary to ask ourselves: what system of pathology would we therefore diagnose our organisations with, and how might we ‘treat’ this therapeutically, navigating developmental pathways out from the ecological, social and public health crises that now confront us. This research does not claim to be capable of answering these questions, but it does amplify the need for bolder research to pursue such avenues. *Part C* will finish this thesis with some discussion in the direction of these inquiries for other researchers and practitioners to pick up.

At this point, it is helpful to summarise the thesis so far before beginning the final part. *Chapter 1* focussed on setting the scene by looking into the research problem and state of the art in sustainability, governance and innovation in organisational scientific research of universities, from the background desk work to the case study universities themselves. *Chapter 2* positioned action research as the methodological strategy most appropriate for tackling barriers to effective navigation of organisational transformation, and the methods and research design employed for the three external cases and the insider case. *Chapter 3* established a conceptual synthesis and integral metatheory that describes and explains organisational transformation for sustainability. From that conceptual synthesis, the outcome arose to identify and develop rubrics for transformation through testing an interpretative-diagnostic (**ID**) tool through case studies. *Chapter 4* then presented the operationalisation of the core elements of sustainability transformation into tangible systemic rubrics with which to analyse the cases. *Chapters 5-7* presented comprehensive, detailed analyses, and grounded lessons, exemplars, patterns and strategies identified in the transformation signature of the three case studies. *Chapter 8* focussed on the synthesis of the three external cases to search for common patterns that could help other universities, and other kinds of organisations, recognise their own potential for transformation.

With the lessons learnt about the shared qualities and common patterns of pathways of organisational transformation for sustainability at LU, ASU and HKUST, the organisational approach to sustainability at UM could then be systemically evaluated using the ID-tool and its rubrics. Now we move into the pragmatic-insider action research conducted with the Green Office inside Maastricht University, and the application of the tool to Maastricht University as a whole, in *Chapter 9*. *Chapter 10* then presents the conclusions of this research project, recommendations and a discussion to leave avenues for future research.

CHAPTER 9. THE INSIDER CASE OF MAASTRICHT UNIVERSITY

A TRANSFORMATIVE COMMUNITY AT THE 'CORE'

"The only reason this University works is because nobody knows how it works."

Anonymous UM insider, 2014

"There is no clear system for sustainability at UM. Even though there is a new sustainability structure (i.e. the Task Force), it is not really clear who is in charge of what. It is also not clear who you can approach if you have a concern about sustainability, or if you would like to start / contribute to a sustainability project yourself."

Students and staff of UM at the 2018 Make the SDGs Yours symposium.

PREAMBLE

Unlike the external cases, the application of the diagnostic tool alone in action research is not sufficient to provide meaningful and significant answers to the remaining research questions; nor, indeed the experiential reflection required in good action research. For this reason, I now trace back to the roots of this action inquiry: the relational dynamics between student-driven subunits and the various leadership and administrative elements that formed the interface between top-down and bottom-up inside UM.

This neatly transitions into the subjective format of reporting action research findings: after introducing the crucible of this research, as well as an international movement for student-driven transformation to sustainability, I present a timeline of inquiry-driven interventions that made up this project. This begins with the project's roots in ICIS and the Green Office team of 2010 onwards, the second person inquiry form, which, woven together with a retrospective account of the interventions, paints a picture of the AR cycles of this project from late 2013 to early 2019.

This chapter, therefore, begins with an overview of the Green Office inception at Maastricht University, and its general design, structure, and vision. Then it moves into an overview of the budding Green Office Movement created by the network of new Green Offices that have gradually spread across Europe to other parts of the world in the last decade, since the founding of the first Green Office in 2010, and that of its network organisation, rootAbility, now a part of SOS (Students Organising for Sustainability).

As much as the first half (*section 9.1*) of the chapter focusses on the action research inquiry based at UM's student-driven, staff-supported sustainability services hub, the Green Office (UMGO), the second part focusses on diagnosing whether and to what extent organisational transformation towards sustainability from within UM, and, based on that answer what the prescription might be. It is in this second part, that this chapter begins again to resemble the preceding case-study chapters in structure. Towards the end of the discussion of the diagnosis using the tool, however, I bring in the findings of the case studies shared qualities and common patterns to help interpret UM's complex transformation signature. From this point onwards, I bring the two strands of the research together and produce conclusions from each strand.

9.1 INTRODUCTION TO THE GREEN OFFICE AND ITS MOVEMENT

“Educational institutions and governments should provide the institutional support, resources and legitimacy for youth-led change towards sustainability.

This requires a combination of bottom-up initiatives and top-down steering. Mechanisms should include dedicated funding, institutional integration, working space, mandates, recognition, and training for youth-led sustainability initiatives.”

UNESCO Education for Sustainable Development Youth Statement, 2015, added as a result of a consultation process discussing the Maastricht University Green Office Model.

The Green Office is the alpha and omega of this research project. The inquiry began here in collaboration with Maastricht Sustainability Institute (formerly ICIS); its deliverables aimed to have positive impact on the ground, the policy and administrative levels of this university. Insider observations of the Green Office, alongside successive team members and its counterparts within UM, contributed in collective action inquiry towards deciphering the barriers, inertia, obstacles and the political context under which striving for transformational change to sustainability operates. The deeper implications of the systemic pathology I have interpreted with the diagnostic tool is covered in *section 9.2* below in greater depth. The data presented in that section, I hope, will speak for itself. For reasons I will not go into in this chapter, some of the experiential, personal and *journalistic/action inquiry outcomes* have been omitted. Nevertheless, I must stress the necessity of the action inquiry to the literature review and conceptual synthesis in *Chapter 3*, but *also* to the understanding of the problem situation of UMGO from the perspective of UM, and vice-a-versa. It is hoped future PhD projects have more scope and institutional support to include these. Moving on, it is in this chapter that I tried to weave together the two research strands forming the integrated research design presented in *Chapter 2*. I subsequently present the loops, peaks and troughs in the action learning cycles that we underwent – by this I mean myself as action researcher and the co-research team at UMGO and ICIS. This account of the learning trajectory forms the basis for this first section of this chapter,

in 9.1, before moving into the application of the diagnostic tool, which provides a comparable scientific basis upon which to conclude how UM performs, after having worked with the tool on three different international cases.

9.1.1 CONTEXTUALISING THE MAASTRICHT GREEN OFFICE EXPERIENCE INTO THE WIDER MOVEMENT

This part begins by reflecting on the nature of the Green Office movement¹ - more relevant to UMGO actors and Green Officers generally than to UM as an organisation. For example, the Green Office movement's registration as an independent foundation, and rootAbility's integration into the Denmark-based Students Organising for Sustainability (SOS). As the quality of second person inquiry and action is paramount (Coghlan & Brannick, 2014, p. 7), section 9.1.2 will give space to the experience and learning from the action research with UMGO. This section now focusses more on situating the conditions and experiences detailed below from the perspective of UMGO into the wider social and political movement to which it belongs. In this way, an attempt at third-person reflection is made to complete the perspective prerequisites of good action research and to strengthen the chances of the expansion of a community-level transformative action inquiry (Bradbury-Huang, 2010; Coghlan & Brannick, 2014; Reason & Torbert, 2001).

9.1.1.1 HISTORY AND CONTEXT OF THE GREEN OFFICE

In 2010, a student-initiative rooted in University College Maastricht (UCM), supported by sustainability champions within UM at ICIS, the executive board and at facilities services, came up with the idea to establish a dedicated office that would support students and staff in advancing sustainability at the university. They dubbed it the 'Green Office'. In that year, whilst many student initiatives worked on sustainability, raising awareness amongst the student body, they had little impact on the largely administrative university organisation and the academic institution, composed of its disciplines, faculties, political blocs and dynamics within and outside the UM 'organisation. In the university organisation at the time was an environmental coordinator and advisor based at FS as well as a sustainability committee composed of academic leadership and sustainability researchers from ICIS (present since 2006-7). Both were necessary in the development of UM towards sustainability more broadly, yet they lacked the time, energy and resources to make a significant transformative difference.

What the Green Office is and what it is not

The Green Office was intended as a platform *for everyone* (rootAbility & Leuphana University, 2017, p. 18). This platform informs, connects and supports the wider university community to act on sustainability. Whilst there is this 'extrinsic' orientation to serve the university community, there is an equal 'intrinsic' orientation for a Green Office to develop and realise its own ideas on how to advance sustainability in education, research and operations (and even governance). Continuing to draw

¹ Further action research on the contemporary developments of these kinds of transformative social and political movements is ongoing and out-of-scope for this thesis. More narrative, investigative and reflexive accounts are forthcoming in a non-academic form after publication of this thesis.

Figure 1: *The Organisational Design for the first Green Office:* Thanks to a sustainability committee, the environmental coordinator and sustainability researchers, the pre-2010 dynamic where the governance and innovation of sustainability projects was inaccessible to students was disrupted. Previously, multiple disconnected student-initiatives existed towards sustainability (rootAbility & Leuphana University, 2017, p. 16).

from the official Green Office Model Guide, there are generally two variations of the model, understood on reflection in this research as representing two ends of a spectrum of possible variations and adaptations depending on the local, organisational, and institutional conditions. First, a team of students and staff, together constituting a dedicated sustainability team. Second, a student-led sustainability hub that works alongside an existing staff team. At the essence of the model is that a Green Office can be used in a flexible way in order to advance visibility, awareness, collaboration, strategy development, behaviour change or engagement (rootAbility & Leuphana University, 2019).

RootAbility and Leuphana University (2017, p. 18) also stated what the Green Office *is not*. Significantly, *it is not intended to work as a group of student interns supporting an environmental or sustainability manager or management body*. Neither, conversely, is it intended to operate as a singular student initiative working outside of the university structure (unless formally registered as a representative foundation in a negotiated agreement with the university authorities and other stakeholders); nor is it meant as one environmental or sustainability coordinator trying to change the whole university on her own, or a high-level committee that decides about the sustainability strategy (rootAbility & Leuphana University, 2017). In essence, what is circumscribed by this key account, is that the Green Office works *next to* these bodies and provides additional benefits therein: for example, enhancing the capacity to implement sustainability throughout the whole institution, with students taking the lead to advance sustainability together with staff (rootAbility & Leuphana University, 2017, 2019). The distinction made between interns and student-led hub, although fairly subtle, is important, as the group of student interns are therefore obliged, if not mandated, to ‘do what they are told’, whereas the student-led sustainability hub (key-word being *student-led* or *-driven*) has a certain level of autonomy over the development and realisation of their own ideas with regards to how to advance sustainability across university portfolios.

In conclusion, what is fundamentally and intelligently written into the DNA of the Green Office model is the student-driven mandate to innovate; in other words, their transformative change agency, or their intrapreneurial capacity is allowed to them by

definition as soon as a Green Office is formally founded within a university. Autonomy, decision-making rights and transparency are at the heart of the design of the Green Office model. Now, at the time of writing, there are 47 other green offices that officially exist, with a combined budget of more than €2 million per year, and more than 200 employees. With more about to be launched, this movement's political and ecological lobbying power as part of the wider youth movement for sustainability and climate action is indeed a force to be reckoned with (greenofficemovement, 2019). I conclude having a vibrant bottom-up component is necessary for universities to successfully transform towards sustainability.

9.1.1.2 GREEN OFFICE MOVEMENT & MODEL GUIDE

The following excerpts from rootAbility and Leuphana University's recent Green Office Model guide serves to corroborate the picture of events elucidated below, and to extend and encourage current and future teams to ask important questions regarding collective Green Office characteristics, principles, benefits and obstacles to running one effectively. It also serves to educate and remind associated stakeholders in the current organisational design and governance for sustainability what a Green Office is, what it is not and therefore to what extent a Green Office is compatible, appropriate and desirable with the current set-up. I suggest beginning with the principles of the Green Office Model inscribed by the Green Office Movement:

6 Green Office Principles: all Green Offices share the following characteristics:

Students and staff: a team of student employees is directly responsible for running the Green Office and its activities, with more volunteers supporting them in turn, together with supporting university staff. At least one staff member acts as supervisor, mentor, coach and university contact person for the students.

Funding, space and resources: University management grants a budget for salaries, training, project expenses and office space management or outside sponsors fund the activities, salaries and office space of the Green Office. This office space is to run meetings, host events and should be accessible during office hours. Resources are crucial to guarantee the continuity and commitment of students and enables the implementation of high-impact projects.

Integration: The Green Office is integrated into the university organisational structure, is supervised by a steering group and joins relevant sustainability committees. This means it is included in the governance and management of sustainability in the University to a significant yet balanced degree.

Collaboration and activities: all Green Office activities are conducted in close collaboration and partnership with internal and external stakeholders to inform, connect, and support students and staff to act on sustainability.

Mandate: The Green Office receives an official mandate to drive the sustainability transformation of the University by creating new impulses, connecting and empowering actors, improving communications, and implementing sustainability strategies. Management legitimises the Green Office as an official project or department for two to three years

Training and mentoring: the student employees receive training and mentoring from other Green Office alumni in the Movement to guarantee their development as sustainability professionals, as well as the quality and impact of their work (rootAbility, 2015; rootAbility & Leuphana University, 2019, p. 5).

In summary, the Green Office Model, according to rootAbility, consists of students and staff, has an official mandate to enhance sustainability in the institute of higher education and receives resources to achieve this, is integrated into the institution’s organisational structure, collaborates with internal and external stakeholders and learns how to achieve this change through training. As such, the Green Office is in a unique position with both characteristics of ‘traditional’ university sustainability programs and grassroots student sustainability groups.

The Green office model differs from other student and staff-led initiatives in the following ways presented in *Figure 2*.

Figure 2: Green Office Definition and Comparison Table with Student and Staff-led Initiatives (rootAbility & Leuphana University, 2019, p. 4)

In the Green Office Model Guide, the authors encourage aspiring green officers to think collectively what their vision of sustainable university is and also what the obstacles are to achieve this vision:

What obstacles block you from achieving your vision?

- Do only a few students and staff engage in sustainability?
- Does university management see sustainability as a low priority issue?
- Are existing sustainability initiatives disconnected from each other?
- Do sustainability efforts have low visibility? (rootAbility & Leuphana University, 2019, p. 3)

Benefits: A Green Office allows you and your university to:

- Legitimacy: Embed sustainability structurally in your organisation and make

it a top priority.

- Collaboration: Strengthen synergies between initiatives to launch more joint projects.
- Visibility: Create a central sustainability contact point and make sustainability efforts more visible.
- Empowerment: Inspire and enable more students and staff to create a bottom-up movement for sustainability.
- Capacity: Mobilise funding and create positions for students and staff to work on sustainability projects (rootAbility & Leuphana University, 2019, p. 6).

Types of Green Offices: Three ways to organise a Green Office

According to rootAbility and Leuphana University (2019, p. 8) three types of Green Office emerged over the 10 years since UMGO was established.

1. A student-led team with a staff contact: Students lead the Green Office and one staff member acts as their contact person
2. A joint team of students and staff: Students and at least one staff member work together in the Green Office
3. Separate student and staff teams: A student-led Green Office works alongside

Green Office Case Studies

	Konstanz	Leuven	Utrecht
Challenge	After the university let go of the sustainability coordinator, nobody was responsible for sustainability.	A staff-led sustainability team already existed, but student involvement was low.	Students and staff faced challenges to get involved in sustainability and collaborate in joint projects.
Solution	Students successfully lobbied for the Green office as the official sustainability department of Konstanz University.	Staff members created the Green Office to give students a voice in the university's sustainability efforts.	The Green Office was launched to enable students and staff to exchange ideas and initiate projects.

Table 1: An excerpt of three Green Office cases by rootAbility and Leuphana University (2019).

The above conditions, and the selected Green Office case studies, may serve to establish a Green Office Conditions Guarantee on the model's mandate to a university that either seeks to set one up, or to renew conditions around existing Green Offices.

9.1.1.3 THE ROLE OF THE ROOTABILITY IN THE MOVEMENT AND THIS PROJECT

RootAbility and The Green Office Movement continue to evolve as a youth-driven social and political movement for transformative sustainability. The network organisation and social enterprise, rootAbility – whose primary success has been to spread the Green

Office Model throughout Europe and beyond – has now (2019) merged under the umbrella of the Danish and British Student Unions’ initiative, ‘Students Organising for Sustainability’ (SOS). The core group who began the movement ten years ago adopted theories of change such as the role of tempered radicals in institutional entrepreneurship. They recognised the need to create legitimacy for student sustainability professionals in academia, as well as the potential benefits from research outputs and collaborations with higher management and commissions. With this savviness, the early GO founding team and colleagues successfully lobbied for the approval of the ICIS-GO PhD; along with key internal support from sustainability scientists and a supportive member and advocate for the GO on the Executive Board, it was finally approved.

The same savviness to which rootAbility’s long-term success can be attributed may have also resulted in relationships with higher management at UM that later led to rootAbility being commissioned by the Executive Board to audit the Green Office in 2016. Based on a query from rootAbility in early 2016, I also looked in to the practice of social entrepreneurship and intrapreneurship in connection to their role, as well as the internal functioning of Green Offices. I followed this line, through expert workshops in Stockholm, Lund and elsewhere, to ICIS master thesis research I supervised in 2017-18, which looked look into mission-drift and value commodification with social entrepreneurs in the Netherlands (Drost, 2017; van Vliet, 2017). I saw similar effects in the case of rootAbility, as the master thesis research had unearthed; with regards to their relations both with the institution that span them off, and with respect to the Green Offices at grass-roots level within this institution and others, to whom their mission was oriented (and rooted to – pun acknowledged). In rootAbility’s case this resulted in a move away from the complex and risky endeavour of engaging the university itself in its own organisational transformation for sustainability - and a move towards fulfilling the still admirable and important task of spreading and assisting other Green Offices to kick-start elsewhere; it is reasonable to state that pursuing the latter strategy towards a larger scale impact by setting up and supporting early-stage Green Offices elsewhere was the wiser move. This also made sense given this research project’s focus was distinct from theirs and we had ongoing conversations to negotiate and balance our efforts at the different scales each of us operated on.

In conclusion, the founders of UM Green Office’s efforts to draft the ICIS-GO PhD project to research the conditions necessary to navigate organisational transformation to sustainability from within the university, has played out over time to vindicate the purpose and the need for a Green Office in some institutions. As part of the insider action research of this project, I worked on change from the inside-out, whereas the network organisation worked at change from the outside-in. These links with rootAbility were essential to understanding how organisational transformation for sustainability revolves around a particular constitution of conditions for change: the potential, competencies, power and interests which all need to be primed for the soil to be fertile enough for transformation. In the following sections, I continue to revisit the roots of this action inquiry by looking at the perceived work process and expected operations I expected to fulfil in the research project, as well as provide a brief retrospective account of the action research pathway, so that references in the diagnosis and evidence of *section 9.2* are put into some context.

Summary

The history and context of the Green Office at UM, the success of the Green Office Movement and its model's innate yet flexible design principles, as well as the significant role of rootAbility over time, highlights the role of the Green Office as an embedded potentially transformative change-agency for sustainability, with the purpose to change the organisation around it, using various competencies such as effective intrapreneurship, lobbying, systems thinking, and sustainability assessment and reporting.

9.1.2 THIS PROJECT'S ROOTS: A RETROSPECTIVE ACTION RESEARCH ACCOUNT

Format of second-person inquiry

As part of the ICIS-GO PhD research design, I regularly attended meetings with sustainability and environment policy officers, coordinators, management, board members and, most of all, with the day-to-day organisational life of the Green Office and its counterparts in UM. This was almost on a weekly basis towards 0.2 FTE, throughout my 5 years of engagement. This combined with real-time and retrospective observations and reflections forms the backbone of my experiential account.

I begin by outlining the dyadic working relationships that formed the basis of the whole project from a first-person perspective. Parts are written in the first-person, as other parts of this chapter, wherever I considered it relevant to clarify my own agency and subjectivity.

Reflexive Collaboration with the UM Environment & Sustainability Advisor

After having been introduced in early 2014, the Green Office coordinator and UM environment and sustainability advisor and I continued to meet almost every two weeks for four years until his departure in January 2018. This relationship was crucial for me to learn how the system worked; that is, the more practical, operational dimensions under the surface. Whereas I brought my experience in Sweden and at ICIS in sustainability science and policy into direct contact with the organisation itself by supporting the advisor's work with the Green Office and for UM as a whole. This therefore created a formative, formal, action learning loop, providing the academic background to communications strategy, governance and reporting for sustainability proposals. Not only was the relationship professionally mutually beneficial, it also enabled me to critically reflect on the nature and impact of our actions in the action research, as well as together with the Green Office team, which inevitably involved trial and error, especially in the first few years. The advisor's experience of the system challenged how I saw my role as a boundary worker to balance the need to inquire into the institutions sub-optimal practices.

Context of this Project: Post-2010 Dynamic

The context for my documentary background analysis began with the UMGO reporting process, in 2010 with the Climate Action report, and other milestone UMGO sustainability reports and annual plans in the first years of 2010-2012. The conceptual understanding of the role of the Green Office as change-making for sustainability through the notion of 'tempered radicals' was exemplified by parts of the founding

team, like Tappeser, Meyer and others as part of institutional theory and institutional entrepreneurship. The Green Office network organisation and social enterprise, rootAbility, established in 2012, formed of core members of the original founding team of the first Green Office. Meanwhile, internally to UM, living lab proposals were made to forward interdisciplinary sustainability programs as early as 2011-12. This coalesced with the evolving management and governance structures of the Green Office, such as its Supervisory Board, and a specialised communications position linked into Marketing and Communications.

This all formed part of their lobbying efforts, which led to the formation and approval for the ICIS-Green Office PhD project proposal in 2013.

To demonstrate the thinking at the early stage of UM's recent sustainability learning journey, I refer to the very first UMGO Annual Plan 2011, where the roles and expectations for the Green Office from UM, and vice-a-versa were first laid out. This strand forms an important component of my diagnosis later:

"It is important however to clearly indicate the scope and responsibility of the functioning and the role of the GO for Maastricht University. As the only established institution with promoting sustainability as its sole purpose, the GO is the face and central point for sustainability at UM. On the other hand, the GO should not be considered as carrying the sole responsibility for the realisation of the sustainability ambitions that are set by UM.

As the GO we cooperate and support the University towards this transition but cannot be held accountable for the overall achievements for UM as an institution in becoming more sustainable. The Green Office for that matter has an advisory role towards the University and a strategy of proposing changes and pushing for their implementation. In this position the Green Office maintains a reflective and critical attitude towards the university" (UMGO, 2011, pp. 3-4)

It was here and elsewhere stressed that UMGO should have had sole responsibility for matters to do with the policy, reporting and management of sustainability at UM. This distinction, although subtle, was also important. Actions outside of the control and resources of the Green Office were later perceived to be their responsibility by the UM community as they were seen as the centre of the management of sustainability on campus.

A Condensed Account of the Lived Experience of the Action Research Project from 2013

Figure 3: Action Research Timeline with boxes showing the action research cycles of the project – see accompanying excerpt below of Figure found in Chapter 4, p.98. AR cycles depicted by orange loops coincide with action inquiry cycles and interventions.

On the basis of the original proposal (see Chapter 11), and the previous research line established by UMGO student researchers like Tappeser and Meyer, ICIS researchers including van Zeijl-Rozema, and some mid and high-level stakeholders completed

the above ICIS-GO PhD proposal with a view to recruiting internal and external candidates. The project began with intensive orientation meetings, conversations and interviews with many former members of UMGO (many of whom established the social enterprise, rootAbility, in 2012) and all those involved in the formation of the ICIS-GO project. For example, Strasser, Tappeser, Spira and the former environmental coordinator in late 2013, early 2014. I proceeded from this background knowledge to respect and learn from what had come previously, and tried to build upon it in a rigorous, holistic and appreciative manner. It acted as my transition into the context and cultural conditions of UM and its Green Office, punctuated with a key moment to test reflections, lessons, and my updated version of the PhD research design at a COPERNICUS conference on sustainability in higher education at the University of Gloucestershire in Cheltenham, England, January 2014.

In the following Spring, from observations and dialogue in UMGO meetings, the investigation was spurred by problems experienced by the UMGO with respect to its supervisory board, in particular on the mutual *roles and expectations of the Green Office and its Supervisory Board*. I began to look at the communications practices tracing out the relational dynamics between the Green Officers, its counterparts, supervisors and higher management from a dialogical standpoint as in communication theory (Bakhtin, 2006). The reasoning was to ascertain how UMGO was perceived by the supervisory board, academic and administrative staff, and the student body, and then to compare this with policy documentation that led to its foundation, as well as Green Officer successes from UM-based reporting. It became apparent to question the role and the purpose of the supervisory board of UMGO in order to balance the inquiry of UMGO's role and purpose, both real and perceived. A key question that arose, centred on the principle of being a student-driven, staff-supported organisational niche to manage UM's sustainability portfolio, was how its roles changed over time. This led us into whether the responsibility for organisational transformation and the plethora associated projects rested upon the green officers themselves, or whether it should be taken up by actors elsewhere in the university to ensure an adequate 'continuum' of knowledge transfer and whole-institutional change. Given the requirement for an annual assessment of the GO, it seemed logical to also examine the institutional context within which the former operates. A lack of awareness of the functioning of UMGO across the campus was experienced leading into the *first intervention of the action research: a Communications Strategy for Sustainability at UM*, co-created with UMGO and a former Uppsala Masters course mate and sustainability consultant based in Sweden. The communications strategy for sustainability proposal was unsuccessful due to lack of approval for initial funding from the Vice-Director communications of Marketing and Communications at the time, but I still defend it went in the direction of figuring out how the university actually worked and therefore how to best talk about its sustainability efforts in a meaningful way, therefore creating the conditions for liaison and learning.

Moreover, what we saw as both an essential opportunity and a risk in the action research process was the political context under which it operated. Looking at the literature in insider action research, in particular, Brannick and Coghlan (2007), and action research in for organisational change in universities like Hoover and Harder (2015), this grew

into a concern for how this might affect the implementation of the planned Living Laboratory phase of the project. In this phase of the learning trajectory – and in light of the aforementioned risks – I decided to co-create the diagnostic tool with the UMGO in second-person reflexive practice, providing another source of knowing in addition to the meta-theoretical review of the literature; during this period (‘embedded formative research’, *Figure 3’s lower AR diagram*) findings were also discussed in research presentations at ICIS and elsewhere in UM. Finally, at the Rotterdam Green Office Summit of 2015 at the Impact Hub, an early design of the framework was shared in an interactive session and participants found it useful for understanding the navigation of university transformation towards sustainability better. This process was not solely responsible for shaping the trajectory of the inquiry, but also the interviews I had with the green officers in 2014-15, like Judith Enders, Ricardo Leclaire, Max Polwin, Einav Bloom, Doris Baumberger, Anselm Grahl, Priyanka Chowdhury and Florian Lorisich. Subsequent interviews and recommendations later contributed to the design of the second intervention: an alternative system of governance for sustainability formally proposed to the Executive Board (**EB**) of UM in 2014 and 2015 via the Environment and Sustainability Advisor. This intervention propose a new design of institutional governance for sustainability, and led from the previous interverntion for a communications strategy for sustainability.

In parallel, between these two meso-level interventions (where formal proposals were made), another micro-level intervention emerged; as part of this collective inquiry with the Green Officers I had interviewed, and with whom I had co-researched the task environment, a series of workshops that focussed on helping green officers and students read the complex university system emerged. The Navigating Institutional Dynamics workshops, formed a third micro-scale intervention piloted at the first Green Office summit in Berlin, 2014, then continued with successive UMGO courses, and with the team members themselves at weekend, winter and summer retreats. The workshops focussed on how to navigate the institutional structures and political processes of the university that are hard to decipher, under the surface of the hidden complexity of organisational change for sustainability, as Hoover and Harder put it (2015). It also continued for as long as the Green Impact and other GO-offered courses ran under Einav Bloom’s coordination.

Because the institutional dynamics workshop series was part of an action inquiry into the university system that also shared knowledge as it was co-generated, I regard the bottom-up sustainability governance redesign as a dovetailed outcome of this process too. This is to say that one intervention led into the conditions of the other and vice-versa. It is hard to really say which one came first, except to say that they operated on different levels of the system. This interlinked action inquiry was based on the roles and expectations research from the previous year, and the bi-weekly meetings with the green office coordinator and environmental and sustainability advisor to better understand the system conditions. The governance for sustainability inquiry was undertaken together with the coordinator and the GO. The proposal centred on the case to balance the top-down-bottom-up dynamic by building an organisational ‘upgrade’ over the Green Office, linking it into other faculties, service centres, and the executive with the appointment of a full-time sustainability coordinator, and other researchers

and administrators with sustainability management knowledge (see *Appendix 3* for a diagram of the organisational design map that formed a part of this proposal).

Subsequently - and in parallel to our governance proposal of the previous year - the team of the environment and sustainability advisor with the consultants hired in from a civil engineering firm in 2016, advised to create portfolio-based working groups around research, education and operations. In our initial proposal, we had carefully structured this to include community and governance, based on two years prior research of the UM community – see *Table 2* below. According to van der Wetering (2016), the assessment of UM was clear, framing its success as ‘leader’ in 2010 compared to 2016 as ‘defender’, for reasons that can be attributed to the drop in rankings of UM as whole according to SustainaBul, the Dutch annual university sustainability rankings tool. This seems to be supported by an earlier Green Office-UCM study regarding sustainability ranking performance and marketing: ‘a high ranking will shape an image around Maastricht university that will profit from extra students coming’ (Noirhomme et al., 2013).

Before commissioning the consultant on the matter, our reform centring on the governance of sustainability at UM was proposed, spurred by the findings on the sub-optimal set-up of the supervisory board, the architecture around the Green Office, and the time limitations of Marc Fischer’s role as both Green Office coordinator and UM environment and sustainability advisor. The following passage specifically outlines what was envisaged in the process of internal dialogue that arose from the governance redesign:

“The vision of our working group/ meetings structure is outlined in the following table. It is important to point out, that in some cases, we are still lacking the concrete people/positions to designate to the working groups:

	Governance	Research & Education	Operations	Community
UMGO	Administration, Strategy and Assessment Coordinators	Research and Education Coordinators + Governance representative	Technology and Logistics Coordinations + Governance representative	Community Coordinator + Governance representative
Higher level stakeholder	Member of the highest level of university management, Vice Rector for Education, Sustainability Coordinator (currently Marc Fischer)	Vice Rector for Education	Head of the Facility Services, Sustainability coordinator (currently Marc Fischer)	High ranking employee of Marketing and communications department
University Community representatives	A person within the University Council, responsible for Sustainability Portfolio (currently the Strategy coordinator)	Head of the University Council Research and Education Committee and representatives of high-ranking academic staff	Head of the Operations Committee of the University Council	Interested University Council Members, heads of student organisations that deal with sustainability
Working groups	Members of the working groups (depending on projects)			

Table 2: Description of the proposed governance of sustainability set-up made to the management in 2016 before the external consultation (UMGO, 2016b).

Further diagnosis, planning, action and evaluation of small-scale interventions continued throughout and around the case study year 2016. Lessons and best practices from the field were shared directly with UMGO team and ICIS staff, which in dialogue brought the action inquiry into a renewed focus as 2017 began. This promoted bottom-up experimentation and lead to trial-and-error with various approaches, initiatives and design proposals; for example, applying the Lean start-up approach, and using examples of sustainability course majors at other cases to inform education portfolio approaches in Maastricht. This, in turn, influenced and enabled key stakeholder symposia like the Education for Sustainability symposium in 2017, spearheaded by a UMGO Education Coordinator, Camilo Straatsma.

Another inquiry strand (or intervention) was a *university sustainability reporting and assessment framework* - UniSAF-NL - developed with a UMGO team member from 2016 onwards based on six years of sustainability reporting conducted by the Green Office since its founding. This *data-informed sustainability reporting intervention* did not take root inside UM. Instead it was developed through rootAbility, and applied in other Green Office universities elsewhere. UMGO's contribution to sustainability reporting, and its innovation of new standards from existing ones like IIRC and GRI ended with the departure of UniSAF-NL to rootAbility and the wider Green Office movement in 2017. A good sustainability reporting process was a crucial part of our governance redesign the previous year, and is indeed an important element of any corporate governance structure (Aras & Crowther, 2008). This would have involved a sustainability commission formed of in-house UM student and staff experts, yet this was instead reframed into the Taskforce restructuring.

To continue with another iteration in the AR cycle, I resume with the final stage of the planned research of the '*SDG Fitness Living Lab*', where the Green Office and I *facilitated multiple stakeholder groups*, including academic leadership, student professionals and various researchers to *comprehensively apply the UN SDGs to UMs' activities*. The need from the top to get a quick scan done for faster answers on which SDG's were the most present in the policy documentation created pressure between doing what we considered was a necessarily careful and considerate approach to planning participatory action research on campus, and of analysing the research and education outputs, as well as in operations and communications, over a longer time period². *This stage of the inquiry concluded with the 'Make the SDGs Yours' symposium.*

This was my last formal event as ICIS-GO PhD, and one of the last large-scale attempts at action research at UM in that role, with the Green Office and the Impact Lab organising the event. The goal, in line with the action research³ as a whole, was to spur collaborative inter-disciplinary research and education for sustainability. The

2 We consulted the Handbook of Action Research for the design of the participatory sessions, and found appreciative inquiry to be the most appropriate approach for this cycle's intervention. Had UM applied our proposal, it could well be leading in the application of the SDG's as an integrated framework for organising sustainability in research, education and operations.

3 Action research in the pragmatist sense aims to facilitate social learning and the development of novel, scientifically sound, yet practicable knowledge by involving relevant stakeholders, including the researcher, in multiple cycles of planning, action, observation and reflection (Watterman et al., 2001).

learnings and reflections of the group, consisting of more than two dozen staff and students from the UM community, were compiled and shared with the leadership by the Green Office members (UMGO & Impact Lab, 2018; UMGO, Impact Lab, Rhetorica Maastricht University, & NOVUM, 2018a, 2018b). This research has no record of any reaction having been received; the only academic leaders present were two members of current Taskforce and ICIS/MSI academic and administrative management. To my knowledge, no actions were taken based on the recommendations of the staff and students in attendance. In conclusion, this proposed project never got off the ground, despite lobbying and clear recommendations to allocate sufficient time and resources to intrinsic efforts to map the SDGs.

Structure and Agency in the Community of Inquiry

The planning and implementation of AR interventions the Green Office and I performed was a coherent line of action inquiry – and a form of collective intelligence - not curtailed distinctly by punctuated phases, but instead, forming the essence of the entire research process. Empirical and experiential insights from early interviews contributed towards the conceptual synthesis of organisational transformation for sustainability, and in the other direction, I later shared key case study insights and set up and activated contacts between UMGO team members and innovative cases of education for sustainability in HKUST, ASU and Leuphana. In this sense, the Green Office were co-researchers, participants, and implementation agents of this project. It was understood that the visible effectiveness of the action inquiry interventions may overrun the planned timeline of the PhD project itself, as change processes take time to shape and propagate. This became a goal in itself: to infuse the collective intelligence of our community of inquiry - which strove to delve deeper into the organisational system - into the wider bottom-up movement in and around UM as this project's formal timeline ended. Consequently, I would now characterise the structure and agency of our action inquiry using the leverage points framework for sustainability transformation in the complex-adaptive system that the university (Abson et al., 2017; Meadows, 1999). This was understood as forms of 'pressure' applied where the GO works with different informed stakeholder groups at and especially outside of UM's various associated structures.

9.2 ORGANISATIONAL TRANSFORMATION FOR SUSTAINABILITY AT UM?

This section is structured like the other three external cases, and primarily concerns the application of the diagnostic tool to UM to see whether, how and to what extent it has undergone organisational transformation for sustainability. I primarily applied the tool to UM to answer *research question seven* of the thesis:

- ❖ How can UM be described using the diagnostic tool for organisational transformation towards sustainability?

In order to answer this question, *research questions four to six* are posed for UM, in a similar manner to how LU, ASU and HKUST were researched. To refresh the reader these case study questions are repeated below:

- ❖ What competencies, qualities and patterns are unearthed when the diagnostic tool is applied to UM?

- ❖ What is UM's signature pathway of organisational development/transformation for sustainability?
- ❖ What is the role of specific actors and groups (social entre/intrapreneurs, change-agents, boundary workers, and the sustainability department) in organisational development/transformation for sustainability at UM?

There were also deeper reasons for applying the tool. There was some doubt as to whether it should be conducted given the very large amount of information gathered, and the extent to which I had embedded myself in the institution. I revisited my initial reasons for pursuing a PhD, and the action inquiry I had before I even began this project. At the root of this inquiry, I wanted to study what universities campaign on, but rather on how they may actually navigate their transformations towards sustainability, in whatever form their contexts and circumstances allow. Thus, the scope of this case does not only limit itself to an examination of how UM displays itself to the world in terms of sustainability, but also how its sustainability claims are substantiated by its behaviour and actions, and comparing the two. I was interested in finding out if there could be a gradient or spectrum along which the embedded insider could ascertain the substance underneath sustainability claims. This may also include a focus on actors' efforts to transform the organisation themselves, whether successful or not. The next sections, therefore, start with the organisational design for sustainability, the application of the tool and progresses into the discussion and conclusion regarding these diagnostics.

9.2.1 ORGANISATIONAL DESIGN (FOR SUSTAINABILITY)

Maastricht University has a decentralised design and structure, with executive decisions devolved to the Management Team, consisting of the members of the Executive Board, the Vice-Rector for Education and the faculty deans at each of its 6 faculties (UM, 2019b). As well as an overall Strategic Programme for the whole institution, each faculty plans, executes and published its own strategic plans, and have distinct organisational cultures. There are five service centres who tailor to the academic, administrative, operational and communications functions of each faculty, as shown in both the below figures. All these units are managed as a whole by the Executive Board (**EB**⁴) formed of three appointed executives: Martin Paul, President of UM, Nic Bos, Vice-president and Operations overseer, and Rianne Letschert, the Rector Magnifica. Maastricht University Office (**MUO**) advises and supports the Executive Board, the faculties and the service centres. The Supervisory Board⁵ advises the EB, vets important documents, and has oversight of the code of conduct and other administrative and management regulations. It comprises of appointed or commissioned members from government or business world (including a former vice-president of SABIC Europe, a Partner at Saxton Bampfylde, and a Partner in the Dutch office Allen & Overy LLP) and is accountable to the Minister of Education (UM, 2019d). In *Figure 4*, the overall

4 In documents and references, the acronym 'CvB' is also used, standing for 'College van Bestuur' in Dutch. Because this text is in English for an international audience, I use the English acronym, EB.

5 More on the composition and tasks of the Supervisory Board and compliance with the codes of conduct is on the Regulations page: <https://www.maastrichtuniversity.nl/about-um/organisation/codes-conduct-regulations>.

structure of UM as a composite organisation is shown, as in 2014. Maastricht University Office is in turn composed of corporate functional units – presented in *Figure 5* - such as marketing and communications, the corporate information office, human resources management, and academic units such as Academic Affairs and Development and Alumni Relations.

Figure 4: UM organisational structure with faculties, service centres, and supervisory/executive/democratic bodies in 2014 (UM, 2014b) - at the start of this project. Note 'sustainable development' refers to the International Centre for Integrated Assessment and Sustainable Development, now called Maastricht Sustainability Institute. The Green Office was located in Facility Services in the organisational structure. See *Figure 3* for a more recent organigramme.

Figure 5: Organigramme of Maastricht University Office (UM, 2014a). Provides more detail into the supporting service bodies as well as the other campuses of UM.

The University Council (UC) is the central democratic and representative body for staff and students, whereas the Local Consultative Body is in the effect the labour union of the university, a central council in which employer (EB) and employees discuss topics such as the legal status of employees and working conditions. In 2019, five years later, subtle yet distinct changes have been made. *Figure 6* shows the shift and reconstitution of the faculty of Humanities and Sciences into the still under construction Faculty of Science and Engineering (e.g. ICIS is now a part of the School of Business and Economics, rather than Humanities and Sciences). Furthermore, EDLAB, an educational innovation unit has been formed since 2016, with a requisite Vice-Rector Education, Harm Hoppers (formerly Dean of UCM) at the helm.

Figure 6: Recent UM organisational structure with faculties, service centres, and supervisory/executive/democratic bodies in 2019 (UM, 2019c).

Figure 7: Sustainability Governance Structure in the last active year of this research, 2019, Sustainable-UM2030 Taskforce (UM, 2019e).

From 2017-2019, UM formed its new sustainability governance structure under the UM ‘taskforce Sustainable2030’ programme. It is the process behind this organisational design for sustainability that is put under the microscope in the next sections.

9.2.2 APPLICATION OF THE DIAGNOSTIC TOOL

This section presents the application of the instrument developed from analytical framework to the data collected at UM, as with the other cases, only over a longer timeframe. This application represents stages three and four in the operationalisation of the tool shown in *Chapter 4*. After the three international cases, the objective was to crystallise the categories into tangible and systemic rubric forms. At the conclusion of the iterative reflexive evaluation the tool reached data saturation. At the time of application to this hermeneutic unit (HU), the framework had been prototyped at LU, tested and applied on ASU’s HU, and further tested and applied on HKUST’s.

Figure 8: Table of Codes with Groundedness and Density values for UM (screenshot from Atlas.ti 8.0).

The following sections system(at)ically progress through the lenses of 33 tangible systemic rubrics, which help to uncover and diagnose organisational transformation for sustainability. The procedure is shown in greater detail in the previous chapters. The aim was to attempt to diagnose and substantiate the cascade of actions, experiences, and underlying strategies characterising UM's sustainability journey from the early 2000's to 2019. The context and evolution provide a more detailed history going back to UM's foundation. The HU is significantly more complex, rich and voluminous than those of the other cases. This is expected considering the length of time, depth and breadth of inquiry undertaken from 2014-2019. It was categorised using the ID-tool's rubrics, corroboration of accounts from different sources, triangulation across types of data, and substantiation in the content and context of the data. This process was undertaken using the Atlas.ti code comment function to log the nature of significant or in-flux codings. The resulting rubrics' groundedness in the data and conceptual density are presented above in *Figure 8*.

Equation for weighting categories of analysis

$$W = \frac{Gr_c}{N_q} \times \left(100 + \frac{De}{10} \right)$$

Legend for Figure 4, outlining abbreviations used, and colour codes assigned to each of the perspectives throughout this chapter

Pink = BSP: Behavioral Science & Psychology

Orange = OCM: Organisational Change Management

Green = SES: Socio-Ecological Systems

Purple = CGS: Corporate Governance for Sustainability

Blue = SER: Sustainability in Education & Research

The qualitative data analysis software Atlas.ti-generated output table shows that *SES 3.1 transformative agency* is the most weighted with 39 groundings and 11 validated links to other rubrics, making it a very significant quality of the UM culture. This is followed respectively by *SER 5.1 sustainability competence training* (G=31, D=7), *BSP 1.6 organisational action research* (G=31, D=6), *CGS 4.1 strategic trajectory* (G=25, D=7), and *SES 3.2a internal governance for sustainability* (G=24, D=7). Taking weights into account, *BSP 1.2 pro-sustainability behaviour*, *BSP 1.4 organisational lobbying*, and *CGS 4.2a internal evaluation of ESG* are the next most significant categories.

We now move to the description of the data (quotes, documents, diagrams, exhibits etcetera) per code, categorised according to the micro, meso and macro level at which they operate. The total number of coded data bits taken into analysis at UM, was taken as constant at **634**.

9.2.2.1 OVERVIEW OF THE DATA PER CATEGORY AT UM & HOLISTIC DESCRIPTION AT SCALE

9.2.2.1.1 Micro-level Diagnosis: Individuals & Groups

The Micro-level concerns the personal and professional development of the actors concerned with transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 2)	Aggregate Weight per Perspective	Rubric	Groundedness	Density	Weight* (chart 1)
BSP	2.54	5.08	1.1	8.00	1.00	1.26
			1.2	24.00	5.00	3.80
OCM	1.91	1.91	2.1	12.00	8.00	1.91
SES	3.85	11.56	3.1	37.00	11.00	5.90
			3.1.1	19.00	3.00	3.01
			3.1.2	16.00	4.00	2.53
CGS	3.97	3.97	4.1	25.00	7.00	3.97
SER	4.92	4.92	5.1	31.00	7.00	4.92

Table 4: *Weights per rubric at micro-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective, are shown in the left two columns. *Charts 1 and 2.*

Chart 1: *Weights per Rubric at the Micro-level.*

Chart 2: Average weight across rubrics per perspective, micro-level: evaluation according to each of the five theoretical perspectives at the micro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Micro-level Diagnosis⁶

The micro-level at UM is dominated by attributes strongly associated with the socio-ecological systems perspective, particularly *transformative change-agency* and its sub-categories. *SES 3.1 Transformative agency* is the highest weighted category ($W=5.9$), whereas its sister codes *SES 3.1.1 Effective intrapreneurship* and *SES 3.1.2 Transformative leadership* are somewhat less prevalent, but still significant ($W=3.01$ & 2.58 respectively). *SER 5.1 Sustainability competence training for transformation* is second-highest ($W=4.92$) followed by *CGS 4.1 Strategic trajectory, liaison and learning* is the next highest weighted ($W=3.97$).

Seemingly in contradiction to UM's foundation as the 'eight medical faculty' - with its *Basisfilosofie Achtste Medische Faculteit*, and strong social and public health influences - when it comes to the present day, psycho-social wellbeing appears somewhat at a tension. It is strange how little evidence was returned whilst analysing the HU of collected intelligence despite numerous events where mental health is supposedly discussed. Anecdotal evidence raised the issue of staff observing increased rates of burnout amongst their younger peers, student and staff alike. Whereas documentary evidence does not seem to admit to a problem at all...The psycho-social climate at UM can still be characterised as Blijham puts it in Klijn's history of the Maastricht Experiment: "to make a contribution to a 'process of creation' in a 'pressure cooker'" (Klijn, 2016, p. 15). However, in very recent developments, the University Library hospitality services had taken it upon their own initiative to provide 'Wellbeing' spaces where students can take mindfulness classes, creating needed space away from study-driven stress (in the 'Quiet Space' provided next to the main library desks).

⁶ For a detailed, comprehensive deep dive into data per category at the micro-level, see the following section, *Detailed Overview of Data per Micro-level Category*, otherwise, move to the next diagnostic summary at the meso-level.

With regards to the highly developed assets for *SES 3.1 Transformative* agency predominantly represented in this analysis by UMGO and the community of university stakeholders it cultivated in its sustainability projects, it is as if this group of actors have some of the qualities for effective intrapreneurship yet they never managed to overcome silo-based power interests to fulfil the potential a successful bottom-up action strategy would show. In this way, *SES 3.1.1* codings are not full hits. Effective intrapreneurship also requires conditions to be right external to the intrapreneurial group, that is via possessing sufficient autonomy, decision-making rights, and an effective supervisory body, etcetera. With respect to the former Rector, it was clear from this interview that his language shows key attributes of transformative leadership in potential at least.

Rather than an indication of the presence of *SES 3.1.2*, the rootAbility (rA) recommendation to the EB of 2016 is still valid for how to improve the effectiveness of the current Taskforce in a way that does not stifle the bottom-up governance for sustainability at UM. Green Impact was certainly a positive and inclusive move which received a lot of visibility; what was not seen however were the internal negative consequences on UMGO, which had to simply fall in line, without a voice or decision-making rights to co-create projects and initiatives for sustainability on campus, as had been the case since its founding. Subsequent to this (see *SES 3.1.2*) they also notably recommended: “the Executive Board to actively participate in this process, as well as to agree to a governance structure and mobilize resources”. It is now clear the EB instead of following this recommendation, went outside this ongoing process, hiring in an external consultant to formulate a new governance structure, breaking the trust of bottom-up efforts as agreed years earlier in the Roadmap 2030 (see *SES 3.1.1*) (UMGO, 2013a). This process was initiated with University Council appointed committees for each sustainability working group, which were certainly a laudable and democratically inclusive step.

Detailed Overview of Data per Micro-level Category

The micro-level concerns how individuals and pairs(dyads) work on sustainability transformation.

BSP 1.1

BSP 1.1 Psycho-social wellbeing	■ Engendering positive psychological and social resources overcame negative reactions, ensuring psycho-social wellbeing at an individual level.
W= 1.26: Gr. 8, De. 1.	

According to the evidence uncovered, the rubric *Psycho-social wellbeing* is not so present at the UM-wide level, as most these incidences were found in the faculty strategic programmes. For example, in the FASOS strategic programme, a positive indication is seen for its recognition in the ‘CHE Excellence’ ranking for students in their final stages of studies: “Judgements by students at the doctoral and master levels (on overall setting, courses, exams, counselling, career preparation, IT-facilities and library)”. This suggests students have been satisfied with the level of counselling received, although this is not clear whether this is mental health-related, and it is not whole-institutional. A partial return was observed in the FPN Strategic Programme 2012-16. In referral to “the development of post academic education in ‘Forensic Psychology’ for interested partner organisations (i.e. the police, forensic institutes), and in addressing forensics at a European level”, a whole

passage discusses all the academic development and clinical collaboration, laudable on its own terms, but without indication of focus on UM students and staff themselves. This is further cemented by the statement: “FPN *will also further intensify its successful collaboration with clinical institutes in the context of health and wellbeing.*” This is ostensibly about collaboration, although still rather vague.

A good match was returned with respect to UM Sports; *“Both staff and students at UM can sometimes lead sedentary lifestyles or find themselves dealing with stress. UM SPORT’s objective is to improve members’ physical and mental health, give them energy and help them relax – in short, to keep the UM community fit”*. Whereas the most recent FASoS Strategic Programme 2016-2020 demonstrates an encouraging and explicit consideration of the psycho-social wellbeing of staff: *“Smart choices in the field of HR are deeply inter-connected with decisions in the field of teaching and research. Moreover, we want to invest in a working environment that facilitates long-term sustainability of staff, talent development and further professionalisation of HR policy. All these measures should positively contribute to a better balance between work and private life and create more clarity about career perspectives”*.

Thus, good self-awareness exists at FASoS of the psycho-social wellbeing of students and staff, but, according to this diagnosis, UM as a whole seems to lack a system-wide acceptance of the mental health issues of its students and staff coupled with therapeutic appreciation. Such introspection and clinical expertise could be expected not just from Human Resources but the Faculty of Psychology and Neuroscience itself. A final bit of data overviews UM’s aspersions to health and wellbeing rather negatively: *“UM’s key areas of focus: Health, well-being and climate, with a global focus. Impression of current vision (keywords): vague, inconcise, messy, incomplete, impractical, invisible, hard to find, shallow, only claims (i.e. no concrete actions).”* This statement – from the participants of the SDG symposium workshop in 2012 - assessed the UM Health and Wellbeing Key focus in the Sustainable UM Vision Document of 2030 (UMGO et al., 2018a).

BSP 1.2

BSP 1.2 Positive pro-sustainability behaviour

■ Positive reactions to sustainability are broadly exhibited in attitudes towards it, subjective social norms for it, and perceived behavioural control towards it.

W= 3.8: Gr. 24, De. 5.

There is a substantial amount of evidence supporting the presence of *BSP 1.2, Positive pro-sustainability behaviour* at UM, which suggest a great deal of pro-sustainability behavioural attitudes, norms and controls in UM at the individual and dyad level. At a weighting of 3.8, this rubric has a fairly high proportional representation in the data, of which 24 codings were made. As a sample, the most significant are included beginning with the 2015 sustainability vision document of UM. Authored by the former Environment and Sustainability Advisor, it aimed to stress and contribute to the role of sustainability in the next UM Strategic Programme, and overviewed the past efforts on operations within UM. One project in particular indicates attempts to engender and research pro-sustainability behaviour: *“PC Powerman pilots (ICIS, SBE) to save energy due to IT-equipment. Until now not successful due to behavioural/technical issues. Further optimisation and/or testing required”* (Fischer, 2015b). This was a promising effort that was not continued. Without explicit leadership support at a higher level, the example is not set for appropriate engagement in the campus community. The importance of leadership support creates a linkage with the rubric, *OCM 2.2 Collaborate to innovate: leadership agency*; an interview account with a UMGO team member also corroborates this:

“in the end they are the ones that will have to show sustainable behaviour, but their sustainable behaviour is driven to a very large extent by the staff, their managers and the people who lead them, and for the students it’s to a large extent driven by how the MENSA is organised and what they thought of their curricula... I think that when you have some key top positions and big influencers, when you have them coming along with you and doing what we should be doing then I think that the students and the staff will follow...” (Leclaire, 2014).

More evidence supports the clear presence of the pro-sustainability behavioural asset. For example, in the interview with the former Rector Magnificus, Luc Soete, he exemplified a pro-sustainability mindset in his academic leadership, as well as in his role in the Supervisory Board of UMGO. He used the example of the Swedish highway system to illustrate the naive dangers of over-incentivisation in the economic direction, and then implied that experiments need to be run within UM in this direction, linking specifically with research expertise and behavioural sciences: hence the link to *BSP 1.2 pro-sustainability behaviour* (Soete, 2014). There is also clear evidence of the student-driven UMGO work towards sustainability reporting in higher education, according to an independent master-student project as part of UMGO’s Living Lab: *“The Green Office is also attempting to stimulate sustainability awareness, engagement, and behaviour among all stakeholders of the UM”* (Dirat et al., 2015).

Another example was the inclination towards assessing *“travel behaviour of students and staff members in greater detail”* as part of the 12th objective of the UMGO 2015 Sustainability policy. It is not clear if this ever took place, or if there was enough funding, time, and support to back up this policy objective claim (UMGO, 2015). Moreover, gaps in UM’s approach were identified in 2018 as: *“[b]ehavioural experts at FPN were not included in the process of implementing the recycling bins. Such involvement could have been helpful in promoting better recycling behaviour”* (UMGO et al., 2018a, p. 10). Despite the numerous times behavioural change interventions were proposed by the student-driven, staff-supported sustainability associations, these experiments never took place, and the lacking support from the top did not allow sufficient engagement and coverage in the community, the success of which depends on adequate time, resources and funding being allocated.

Despite the gaps identified, visions and objectives continued into the new SustainableUM2030 regime, such as to *“stimulate ownership in daily behaviour, e.g. commuting by bike, or separate waste”* (Fischer & van der Wetering, 2017). Evidence of the monitoring or steps towards realisation lack. This was already implemented by the UMGO team but no follow-up was observed: *“2013: Comprehensive analysis of students and staff travel behaviour including local and long distance”* (UMGO, 2013a). The rootAbility audit shows this indeed took place in 2012 *“Student-led research projects: Three groups of Masters students on sustainable behaviour, waste reduction, and the renovation of historic building. (Completed, but no tangible action followed from project)”* (rootAbility, 2016a).

OCM 2.1

OCM 2.1 Triple Bottom Line: Intrinsic change agency

W= 1.9: Gr. 12, De. 8.

■ Triple-bottom-line accounting framework employed by individuals: attempt made to measure/gauge organisational complement to people, planet and profit with the goal of creating shared value.

The rubric for intrinsic change agency and triple-bottom-line accounting, OCM 2.1, is present to a fair extent at UM, but remains underdeveloped relative to other agency-based

rubrics when its weight value of 1.9 is considered. The 2015 Business Innovation and Sustainable Development UMGO Living lab report proves highly relevant, concentrating on the incidence of integrated thinking (and thus integrated reporting) within UM. In a key section of their report, *Developing a Framework for Integrated Thinking in UM*, they conclude the following passage, worth quoting at length for its significance in describing the conditions which lack:

“In that sense, integrated thinking breaks the specialized barriers of different knowledge silos in an organization and allows them to interconnect in order to holistically see the big picture of their actions and consequences upon the organization. As a result, the framework connects each section of a university on the upper level to the overall idea of the triple bottom line (Hart, 2010). The triple bottom line, caring for people, planet and profit, serves to break the barriers among knowledge silos by displaying that every change, by any of the four university sections, has consequences on the university as a whole - in terms of its social capital, its environment, and in terms of total financial profit it earns. This means that only integrated thinking allows an organization to maximize these three measurements. As a result our university framework ... stresses therefore that every “knowledge silo” in an organization is responsible to take initiative and play his role to interconnect with other knowledge silos in order to create holistic solutions that truly maximize the 3P’s.” (Dirat et al., 2015, p. 9)

It has been shown through the experience of this research that UM struggles with structural barriers of its knowledge silos. Yet these initiatives driven by UMGO, represented by the SBE study, show years of accounting for the triple-bottom-line of UM on its behalf, whilst also innovating a new framework for sustainability reporting in Higher Education – UniSAF-NL - which has since been brought to scale by rootAbility. This shows the potential of the intrinsic change-agency function of the individuals behind these efforts over the years, despite the lack of academic and administrative leadership support. To this extent, the evidence shows that their ambition to “[c]onsistently improve sustainability reporting at UM with the aim of achieving fully integrated reporting” also presented in the Sustainability Policy 2016-18, has not been substantively achieved beyond written statements (UMGO, 2015). Finally, as if to cement this point, both the Integrated Thinking UM SBE Thinktank client project for UMGO, and van Zeijl-Rozema’s definition of sustainable development, links the triple-bottom-line to the need to think integratively and approach the management of sustainability in organisations holistically. No new UMGO contributions towards sustainability reporting, or sustainability reports generally conducted about UM’s performance appear in the evidence base after 2017’s UMGO Annual Plan.

SES 3.1

SES 3.1 Transformative agency: sub-optimal practice challenge

W= 5.9: Gr. 37, De. 11.

■ Intrapreneurs identified in small groups within the organisation that challenge sub-optimal practices through linking strategies, opportunity contexts & innovation

SES 3.1, Transformative agency is the most substantiated asset at UM, being grounded in the data 37 times and with the highest weight value of all rubrics at 5.9. In overview, this asset is predominantly isolated in and around the Green Office in its consistent mission to transform the university towards sustainability; by definition, it is in its own ‘DNA’ to challenge sub-optimal practices, linking strategies, effectuating opportunity contexts⁷, and

⁷ Colloquially referred to as ‘knocking on doors’ in earlier advice to UMGO, this tactic of effectuating opportunity contexts was oddly not as welcome in 2016 and later by the same early advisors of UMGO who advocated this approach several years previously – resulting in the nega-

innovation. There are many significant examples of transformative agency from UMGO, its counterparts and associated actors from 2010 onwards; the following quotes and readings are a qualitative sample.

Change-agency was actually a core part of UM's previous sustainability vision 2030, with one of its three defined goals explicitly stating this: *"Educating green change agents through a holistic approach to sustainability Education and Research"* (Noirhomme et al., 2013; UMGO, 2012b). However, there is limited reference to it as a political as well as a social and organisational function in the new vision. Evidence is hard to track down on the possible interests resisting this, except for anecdotally across numerous anonymous sources connected to UM with knowledge of leadership and those in power.

Next, an example of transformative agency is shown in a solution-orientated, community-centred project proposal cited in the UM Sustainability Policy of 2012-14. The objective was to develop a "(wo)man on the Maas" research project in the field of Sustainable Development linking all relevant research centres. The problem was that *"Maastricht University lacks a community-building major inter-disciplinary research project that promises a large contribution to society"* (UMGO, 2012a). A successful example of such a project is the \$100 laptop (One Laptop per Child), which combines sustainable development research with hands-on solutions for today's society. It was anticipated that UM would include sustainability as one of their subtopics of research focus whilst funding of a team of researchers to identify the "(wo)man on the Maas" project. Research centres and researchers across the university would have collaborated to create the spark of innovation for the benefit of society, with coordination from ICIS under the project ownership of the UMGO research portfolio. What happened to this project is unclear.

As the UM Sustainability Policy laid out already in 2012: *"Universities play a central role in driving this global transformation towards sustainability, by generating new knowledge and educating change agents and future leaders, while at the same time lowering their ecological and social footprint. Already in recent years, Sustainability has played a more prominent role in the educational and research program, as well as the operations and management of Maastricht University. However, recognizing that the present lifestyles in post-industrialized countries are not sustainable and the challenges ahead to create sustainable societies, we rapidly need to allocate more resources and leadership to speed up our efforts"* (UMGO, 2012a). It is also not clear that these policy recommendations were adopted, despite being formally recognised as UM's sustainability policy on advice from the Green Office.

Another example of transformative agency is interesting for understanding the barriers to structural change towards inter and trans-disciplinary education for sustainability, especially when driven from the bottom-up as this rubric denotes. The December 2014 UMGO Sustain + Go Evaluation Report by Einav Bloom, UMGO Education Coordinator at the time, proves highly significant and exemplifies the larger systemic issues at play in UM; this is therefore worth pursuing at greater length. In the report, Bloom characterised and structured the obstacles that were faced, in particular to the accreditation of the course piloted by UMGO Education portfolio:

"• In the process of conceptualization and formulating the project proposal, the Education portfolio was in touch with a respective stakeholder responsible for academic innovation. However, too much time was spent on preliminary talks, making it difficult to meet project deadlines.

• The Education coordinator was subsequently invited to a larger panel talk concerning the subject, but later

tive framing of UMGO as the 'sustainability police'.

was not approached with the details of the panel and failed to attend because of lack of information and transparency.

- *In an attempt to seek accreditation for the course, the Education coordinator acquired a form requiring various information of the course. Great difficulties were met on providing a financial course of action that was both feasible for the Green Office and UM” (UMGO & Bloom, 2014).*

This is clear evidence that attempts at integrating sustainability into curricula did actually occur and was actively sought by the GO, yet this fact, and the reasons for the implementation failure exogenous to GO, were not present in the RootAbility audit of 2016. A RootAbility member was directly involved in these efforts in December 2013, yet the integration attempt by the GO was not reflected upon in the 2016 report. RootAbility was arguably dependent on the support of UM, and could therefore have hesitated to mention any negative aspects of the institutional leadership upon which they depended. RootAbility’s audit did not apparently take account of the self-reflections on the obstacles the education portfolio faced when attempting to make curricula more sustainability-related. It seems the lack of transparency, clear in the analysis of the less obvious hierarchy of UM, prevented such attempts at embedding sustainability from taking place.

This kind of ‘glass-ceiling’ inertia continued into 2018, where a workshop facilitated by Alan Atkisson, generated feedback on the new Sustainability Vision 2030, formed in collaboration between an external consultant from Arcadis and the former UMGO Supervisor and Environmental Advisor. This feedback was submitted to the Executive Board in an open summary report, also used for triangulation and corroboration in this analysis. The feedback report on the Sustainability Vision 2030 continues in keywords as: *“vague, in-concise, messy, incomplete, impractical, invisible, hard to find, shallow; only claims (i.e. no concrete actions)”* (UMGO et al., 2018a). The finding was that the vision was under-developed; the participants also observed that UM’s claim to focus on ‘inclusive and innovative sustainability’ rang somewhat hollow. This jarred with the actual lack of inclusion of “both students and UM employees” in social and organisational innovations for sustainability: a logical prerequisite for inclusion into political discourse for sustainability praxis. In this same feedback document, the importance of transformative agency throughout the university is exemplified by the following question, discussed passionately by dozens of the participants: *“A UM degree - but then what? How can students build on their degree and become sustainability change-agents?”* (UMGO et al., 2018a). This was an unprompted articulation of the demand students themselves put forward in response to the perceived skills gap between receiving their UM education, and graduating into a crisis-ridden world. In summary, we see that sub-optimal practices have been challenged over time, but transformative agency is unable to gain traction into the system’s structural inertia.

SES 3.1.1

SES 3.1.1 Effective intrapreneurship

W= 3.01: Gr. 19, De. 3.

- Intrapreneurship from the bottom-up acts as a driver for organisational transformation to sustainability: intrapreneurs, in teams of professors and students challenge sub-optimal practices, and overcome silo-based power systems.

Intrapreneurship is a related facet of the parent rubric to *SES 3.1 Effective intrapreneurship* above. Yet, it does not specifically denote successful episodes of intrapreneurship, where an innovation is employed by the organisation as a whole, or more widely. These successful episodes, defined by intrapreneurship driven by change agencies like UMGO, in turn driving verifiable organisational transformation, are fewer in number and harder to find. When we couple this with the aforementioned glass-ceiling inertia in the parent rubric, *transformative*

agency, this helps perhaps to explain the lower weighting and observed presence of *effective intrapreneurship*.

The first criterion of driving transformation is fulfilled well by UMGO-based efforts, with respect to its transformative mandate for example; whereas its second criteria for overcoming silo-based power systems is difficult to discern. The best place to start, given the focus on vision documents elsewhere in this analysis, seems to be the UMGO Roadmap 2030; the production and approval of this roadmap represents effective intrapreneurship on the part of the UMGO team members. The Roadmap was, however, criticised for not being realistic, given the timeframes. Many goals and objectives are nonetheless highly prescient in the context of the latter developments (and opportunities missed) captured by this analysis, which regards the substance of the roadmap as clear and concise. In a key quote, the underlying philosophy of UMGO shows the centrality of its bottom-up transformative agency and mandate to innovate:

“Bottom-up initiatives: Vision 2030: Provide bottom-up initiatives with the means to drive the transformation towards a sustainable University. To realize the Sustainability Vision 2030 Maastricht University embraces bottom-up initiatives and regards them as the driving force behind institutional change. The aim is to achieve a high level of participation by the University’s community in all sustainability related projects and take the opinions of students and staff seriously. Ambitious student and staff members will be provided with the necessary resources to exercise their projects.” This vision was not respected by UM in light of what came later, in particular the following stipulated goals from 2017: “Encourage students and staff projects realizing the Sustainability Vision 2030” and “Develop a structure that facilitates these projects and provides the necessary resources” (UMGO, 2013a). Furthermore, it was completely overwritten by a new prescribed vision from above and outside (Fischer & van der Wetering, 2017), and not tangibly present based on observations.

Verbal data also confirms that UMGO was capable of performing effective intrapreneurship in the interview with GO officers Doris Baumberger. When asked her view on role of students and staff in achieving sustainability, Baumberger related: *“Well, you have to make a distinction I think between those students and staff members that are actually involved in the implementation of a project, so those that help to make it happen... and those that are passively influenced by a project. So, for those that are actively supporting us while they should support us, keep their promises and help us make it work, and those that are like a bit more passively involved, well, we always face this resistance to change, and A: And inertia? D: Yeah, and that’s something they should overcome, I mean they should be a bit more open about a slight change in anything they are doing for instance. And they should be open about seeing the value of it”* (Baumberger, 2014). She also highlighted that UMGO staff were sometimes seen as ‘semi-outside of the whole structure and still giving new good ideas’.

In 2017, confirmation of the inherent tension and importance of autonomy for UMGO intrapreneurial effectiveness came from Jan Mory, a related SBE Master Thesis student working independently to this research on *Intrapreneurship and Innovation for Sustainability in Higher Education* (Mory, 2018b): *“with respect to the nature of innovations we are talking about, there is a quote from transition management which hits the point very well: ‘although sustainable innovations are radical for the university the pragmatic reality is incremental innovation’... What came out of the interviews as sort of the major insight was that autonomy is by far the most important factor for intrapreneurship work from the predicted characteristics. To a lesser degree innovativeness and proactiveness play a role. Risk-taking however is something that is not seen as much of a beneficial quality, rather the ability to experiment small scale and mitigate risks of the projects you conduct.*

In terms of new insights to the intrapreneurial qualities, 2/3 main factors emerged: Longevity/perseverance: the ability to keep engaging people, work against the internal inertia, and not giving up. May that be to constantly push to get something done or lay off a project for some time and pick it up at the right time” (Mory, 2018a). This supports the view of the rest of the evidence for this rubric which shows potential for effective intrapreneurship exists but has not been nurtured. It also outlines the positive aspects, and functionality, of how transformative leadership can support and open the door to effective intrapreneurship. This leads into the next rubric.

SES 3.1.2

SES 3.1.2 Effective transformative leadership

**W= 2.53: Gr. 16,
De. 4.**

■ Intrapreneurship from the top-down: leadership exhibits intrapreneurial characteristics, redesigning the organisation from the top-down, to challenge sub-optimal practices and policies at the regional and national level. Stewardship by the leadership to re-design of colleges, schools, units and departments to improve interconnection and transdisciplinary research and education. An ‘organisational revolutionary’, who fights to change the system from within at the level of institutional innovation and design.

The presence of an effective transformative leadership at UM is not evident based on the data. Limited intrapreneurial characteristics could be identified at the management or executive level except for the below partial match examples. Therefore, rubric *SES 3.1.2 Effective transformative leadership* is not present to a great extent at UM. A good place to start to substantiate this is the rootAbility audit of UMGO in 2016. This research corroborates the fact that UMGO followed rootAbility’s following recommendation: *“We recommend UMGO to initiate a dialogue between the Executive Board, Facility Services, student groups and sustainability researchers to discuss how to generate sustainability leadership from more stakeholders, put adequate governance structures in place and mobilize resources”* (rootAbility, 2016b, p. 8). A key part of their recommendation built on ongoing work run by UMGO, reflected in the several proposals submitted to the board regarding communications, governance and sustainability reporting.

The moral and pragmatic facets underlying the imperative for transformative leadership of the UNESCO Education for Sustainable Development Youth Statement (see opening of this chapter) were also explicitly mentioned in the UM Sustainability Policy 2016-18; UNSECO also officially recognised the Green Office Model in 2015. The following statement was added as a result of consultation with Former UMGO rootAbility leaders: *“Educational institutions and governments should provide the institutional support, resources and legitimacy for youth-led change towards sustainability. This requires a combination of bottom-up initiatives and top-down steering. Mechanisms should include dedicated funding, institutional integration, working space, mandates, recognition, and training for youth-led sustainability initiatives”* (UMGO, 2015). The statement leaves the imperative for support, resources and legitimacy for youth-led change at the door of higher education leaders. A highly significant excerpt from the interview with the former Rector demonstrates one observed instance of executive level transformative leadership in the mindset exhibited; Soete, when asked what he would improve suggested:

“I still think that the extremely valuable part of the GO is that it’s bottom-up, student-based. But I think that maybe by linking it up with what we don’t call in this country, students, but PhD fellows like yourself, that we would link it up more to staff, so that the GO has still a very strong student base and bottom-up student-led organisation, but that it moves more and more into the organisation and to the staff part of the organisation through PhD fellows, given that they are employees of the university.. Then you would get a much more sustainable long-term future for the GO ... fed by new students each time with new ideas, new

reflections. You see this most of course with the link between green issues and social media also, it's something which we say, old generation are amenable with, but students being brought up basically with social media and this will increase also with time. A: second nature for them to know how to communicate. L: Precisely. So that's where I think we can gain and why the students should still be in charge, but it should go much more through the interaction with staff in the university. A: Okay, so there should be a component whereby the GO is connected to the academic staff, perhaps even the operational staff of the university through PhD candidates? L: Yes, precisely. A: As connections with their professors, their supervisors, and therein lies the connection between this student-driven bottom-up governance initiative... L: Yep... A: which you focus on as very valuable and perhaps the more top-down hierarchical dynamic. Connecting the two... L: Yes, exactly. And this is where you are. Because I wouldn't want to go to the professors because then you typically can't imagine that you have the Rob Bauer, or Piet Eichholtz or René Kemp or Pim Martens and others from ICIS etcetera. You immediately would get a sort of academic dominance there immediately. I don't think it would be very helpful because immediately it would be termed in terms of research topics fields etcetera, in which of course the academic dominance of this professor or that professor or this field would become the issue of debate. No. Let it be bottom-up-based by, primarily by students, but make the link through the PhD's because they play really this bridging role... They know the student's desires. They know the institution in general if they're here for longer... So I think they should play a bigger role" (Soete, 2014).

The assessment of this rubric's presence can be summarised with an illustrative quote that also links to CGS 4.4 university social responsibility assumption: "The university embraces its role as a change agent within its local context and leads in global dialogues in sustainable development." (UMGO, 2012b, p. 3). No evidence was returned to support this claim; that UM or its leadership actually behaves like a change-agent within its local context and leads in global dialogue in sustainable development. Conversely, the analysis shows that the GO and its movement exhibit attributes for transformative leadership. As Soete observed, UM can tap into this by using PhD candidates as the lynch-pin between the essential bottom-up drive, and the organisation itself, to balance out the executive academic dominance.

CGS 4.1

CGS 4.1 Strategic trajectory, liaison and learning

W= 3.97: Gr. 25, De. 7.

- 1) Actors play the roles of brokers, bricoleurs, connectors, by liaising and facilitating;
- 2) Resulting in: sustainability being boiled down to the organisational context;
- 3) Therefore: it becomes relevant, understood and important for influential and interested stakeholders. Further resources are allocated and sustainability raised higher on organisational learning agenda.

The underlying attributes for CGS 4.1 Strategic trajectory, liaison and learning are clearly present at the individual and group-level within UM, being the third most highly weighted at this scale. The mere fact that a group of UCM students effectively liaised amongst academic and administrative leaders, in 2009 and 2010, towards the foundation of the first student-driven staff-supported Green Office certainly seems to prove this presence:

"Green Office was set up in 2010 by a group of students and staff members passionate about sustainability, after their proposal was positively received by the management of the university. Since then we have been consistently building a track record of successes, while learning from mistakes" (rootAbility & UMGO, 2014). The implied learning process appears to have taken place in the period 2010-2015, an upward trend of strategic trajectory, liaison and learning until the glass ceiling inertia was reached, once the GO attained a certain level of institutionalisation.

The problem analysis of the community aspect of the Green Office portfolio demonstrates the fragmented structure and lack of praxis within UM: *"With the establishment of the Green Office, the operationalization of sustainability is gaining more and more momentum within Maastricht University. However, there is still little debate on the issue on a political level. In order to guarantee ownership of and involvement in policies and projects in the field of sustainability by the democratically elected political bodies of Maastricht University, more exchange between the political and operational spheres of this institution are needed"* (UMGO, 2012a).

This supports the proposition that a public space for praxis is also needed at the core of transformative sustainability in universities. Most codings of *CGS 4.1* refer to attempts at the first of its criteria: brokering deals, connecting, liaising and facilitating communications and actions, successfully achieving a vertical and/or horizontal trajectory to their sustainability strategy rather than the other two, as it is not clear that operationalisation of sustainability issues was fully achieved towards the target actors; most efforts were not properly supported, were ignored or kicked down the road. It is even further from the third criteria which specifies how sustainability should have been raised on the organisational learning agenda; it is up for debate whether there is indeed an organisational learning in the first place within UM.

Leading on from the observed fragmentation, the following solution was proposed in the interactive workshop examining sustainability issues from the perspective of student and staff participants from across UM during the UMGO-Impact Lab-Rhetorica organised Symposium 'Make the SDGs Yours' – specifically, the outcomes of 'What the community recommends': *"Introduce a UM-wide integration committee: As mentioned earlier, many of UM's sustainability initiatives are currently disjointed, often operating in parallel at a small scale. An integration committee, formed by representatives from each faculty, is needed in order to coordinate these efforts. These representatives could meet together regularly, give each other updates, and explore possibilities for collaboration and liaison towards UM's sustainability goals"* (Vasylyeva, Quammie, Baker-Shelley, & Fischer, 2017).

As further expanded in the action research description of *Section 9.1.2*, several interventions were conducted in the research period. One specifically concerned the context of the following memo to the Board regarding a proposal for a Sustainability Coordinator and surrounding organisational design: *"Pre-emptively assure stakeholders that the sustainability coordinator has 'access to power' and an advanced liaison function, with an allocated mandate from 'the top' (as at ETH where their sustainability co-ordinator is directly accountable to the president)"*. These were based on Annemarie van Zeijl-Rozema's recommendations, who appears the most longitudinally engaged amongst the stakeholders sampled still at UM, being central and behind-the-scenes since records start in 2007. This validates the presence of the attribute for raising sustainability higher on the organisational learning agenda.

The Environmental Advisor, ICIS-GO PhD and the Green Office directly contributed to the formulation of this related policy recommendation for the strategic programme:

1. *"Develop a sustainability knowledge pool accessible for all course coordinators and other staff members concerned with shaping the curriculum"*
2. *Communicate sustainability as a one of the key values of Maastricht University*
3. *Expand possibilities for funding of interdisciplinary research projects in sustainability*
4. *Include internalising of environmental externalities on UM's operations (waste, water, energy)*

5. *Increase social responsibility within all university departments*” (Fischer, 2015b).

The substance of these points had been carried forward from the communications strategy proposal (Baker-Shelley & Corti, 2014). This communications strategy for sustainability proposal of 2014 also exhibited attributes of strategic trajectory as a project, the ultimate goal being to raise sustainability higher on the learning agenda and create better connections between units and departments on matters concerning sustainability (Baker-Shelley & Corti, 2014). There was no evidence that this proposal was used by the Marketing and Communications department. The proposal was certainly of interest based on the meetings held, but there was no willingness to pay for a small pilot. In any case, the meeting and correspondence was not transparent, and information given regarding how to successfully lobby this was not accurate. Gatekeepers appeared to say one thing and do another behind the scenes with no logical reasons given.

SER 5.1

SER 5.1 Sustainability Competence Training for Transformation

W= 4.92: Gr. 31, De. 7.

- 1) Programs are identifiable in educational curricula and in offered professional training courses where some or all of the five key sustainability competencies are present;
- 2) Students and staff, more generally are trained and taught in sustainability competencies for the purpose of transformation.

The rubric, *SER 5.1 Sustainability competence training for transformation* is strongly present at UM. A large amount of evidence supports this, with 31 groundings and the second highest weight value of 4.92 at this scale.

There are some oral, sensitive accounts of a minor in sustainable development being a possibility at UM from 2019-20, however no written evidence completely supports that this is being followed through. It is either too sensitive to be discussed openly, or the data sampling missed the appropriate supporting evidence; this is more unlikely in a hermeneutic unit of 88 primary documents, and other material in secondary and tertiary sources. Perhaps incidentally, this is also reflected in the former UM Sustainability Roadmap 2030 as the ongoing goal to “[e]xpand education possibilities in sustainability by developing new programmes, such as: a minor, an online course or an interdisciplinary bachelor in sustainability” (UMGO, 2013a). Later, it became clear that precisely this has been attempted multiple times by UMGO and ICIS actors in the period 2014 to present. For example, in the context of a ‘Global Studies Programme’ and a minor in sustainability have been discussed in relation to the SustainableUM2030 Education portfolio. It is unclear how successful this has been as no accessible information was retrieved about this at the time of writing.

More examples of the attempt to integrate sustainability competences into educational curricula are prolific in the data. One key initiative, Sustain + Go was arguably one of UMGO’s most successful projects according to rootAbility (2016a), along with piloting the ‘Green Academy’, and the annual update of an inventory of all sustainability courses. This last initiative was the cause of quite unexpected controversy, with some academics painting UMGO as ‘sustainability police’ for approaching coordinators and deans to request information for such an inventory. Regardless, Sustain + Go was a comprehensive, extra-curricular student-run sustainability course utilizing Problem-Based Learning to its maximum potential, finding deliberate lessons from the similarly-run CEMUS (Centre for Environment and Development Studies) in Uppsala, Sweden (L. Anderson, 2017). Sustain + Go was reflectively evaluated according to its goals by its coordinator, Einav Bloom in December 2014, based on the explicit foundation of several key documents: UM

Sustainability Roadmap 2030, UM Sustainability Policy 2014-2016, and UMGO Annual Plan 2014. The following goals show that the second criteria for this rubric - that students and staff are trained and taught in sustainability competencies - was clearly intended and acted upon, firstly from the Roadmap 2030 and then the course itself:

- *“Making sustainability an integral component of educational programmes offered by the university.*
- *Offering internationally acclaimed and innovative sustainability curriculum.*

Increasing wide-ranging and measurable awareness of sustainability issues at all levels of university staff members” (UMGO, 2013a; UMGO & Bloom, 2014).

Sustain + Go goal: *“This course aims to empower students by giving them the ability to decide which subjects they would like to research”* (UMGO & Bloom, 2014).

As part of UMGO student-driven courses, in the Green Academy, the ICIS-GO PhD developed a workshop for understanding and navigating institutional dynamics based on the needs observed. This workshop was developed through many sessions per year in the period 2014-2016, at the Green Academy, and UMGO retreats; key enablers were seen as training and education, so this was conducted with students themselves:

“The barriers and enablers to navigating institutional dynamics also remain quite similar in the public and private sectors, including vested interests in a particular management style, board prioritisation in organisational strategy and policies, and delaying applicable technologies that reduce energy waste and water expenses related to the natural flows. Enablers might then include employee engagement, training and education on sustainability and how it applies to an individual level, stakeholder engagement across environmental societal governance issues” (Baker-Shelley, 2014b).

The navigating institutional dynamics workshop, if viewed as teaching material, taught students how to build knowledge of their own organisation, in connection to the Green Academy and Sustain + Go courses, which also taught sustainability competencies for transformation. In connection to this, UMGO more generally developed such programs, where some or all of the five key sustainability competences are present: *“Green Office seeks to cultivate among the UM community a sense of agency, as well as the competencies required for effective action for change”* (UMGO, 2013b). In as much as the rubric for transformative agency is so highly weighted, this cultivation of agency has been successful, for a time.

The Green Office also conducted a series of Education symposia which were *“annual inter-faculty symposium that allow course coordinators, tutors, researchers and students to discuss important issues on sustainable education in focus groups”* (UMGO, 2017). In June 2017, the topic of the symposium focussed specifically on *“How can competencies for Education for Sustainable Development be implemented in UM’s general curriculum?”* (UMGO, 2017; UMGO & Straatsma, 2017). Finally, specific pedagogical issues were raised with the current system pertinent to improving how competencies are inculcated in students, as well as the recommendation towards reviving the notion of ownership and praxis in sustainability competence training and education

“Point 1: Projects are sometimes frustrated by a lack of competencies. Competences (especially those that transcend institutional boundaries) foster maturity, personal growth and create more awareness... Competences can be seen in a pyramidal form: • General academic skills form the base (e.g. groups skills, project management skills) • Domain-specific skills form the middle • Sustainability-specific skills form the apex

Point 2: Happiness as a competence: Sustainable Development is about the quality of life, well-being and healthy relationships. This is important for student success.

Point 3: Competencies in Sustainable Development are made harder by other trends (e.g. short internships, 'CV fillers'). Education is increasingly short-term which may constrain the development of important competencies.

Point 4: Students should be encouraged to self-organize and become producers instead of only consumers. Self-organization (e.g. having students: organize lectures, work in projects with outside stakeholders, engage with the region) helps students gain experience and important competencies.

Point 5: It is important to determine ways of assessing sustainability competences (including soft skills, cognitive skills regarding holism). However, assessment is difficult since the process of building competencies is mostly intangible, despite being noticeable by educators... developing competences generally takes a long period of time" (UMGO & Straatsma, 2017).

9.2.2.1.2 Meso-level Diagnosis: Intra-organisational Scale- Groups & Units

The Micro-level concerns the personal and professional development of the actors concerned with transformation towards sustainability in the university.

Perspective	Average Weight per Perspective* (chart 4)	Aggregate Weight per Perspective	Rubric	Groundedness	Density	Weight
BSP	1.90	5.70	1.3	8.00	2.00	1.26
			1.4	23.00	2.00	3.64
			1.5	5.00	0.00	0.79
OCM	1.89	3.79	2.2	12.00	1.00	1.89
			2.3	12.00	0.00	1.89
SES	3.27	6.53	3.2	24.00	7.00	3.81
			3.3	17.00	3.00	2.69
CGS	2.14	4.28	4.2	21.00	4.00	3.33
			4.3	6.00	2.00	0.95
SER	1.81	5.42	5.2	6.00	2.00	0.95
			5.3	18.00	7.00	2.86
			5.5	10.00	1.00	1.58

Table 5: *Weights per rubric at the meso-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns.*
**Charts 3 and 4.*

Chart 3: *Weights per category at the meso-level. Detailed descriptions per rubric given below.*

Chart 4: Average weight across rubrics per perspective, meso-level: evaluation according to each of the five theoretical perspectives at the meso-level, taking the average of all rubric weights per perspective to show relative performance at this scale.

Summary Description of Meso-level Diagnosis⁸

At the meso-level, *BSP 1.4 Organisational lobbying* ($W=3.64$), *SES 3.2a Internal governance for sustainability* ($W=3.81$), and *CGS 4.2a Internal evaluation of ESG* ($W=3.33$), all stood out as the most weighted rubrics, followed by *SER 5.3a Integrated sustainability praxis* ($W=2.86$) which is also fairly prominent.

A lot of the analysis at this level hinges around UMGO's repeated attempts to improve communications and visibility of sustainability at UM, as it was repeatedly criticised for having sole responsibility for this aspect of the whole organisation's sustainability efforts. This was never the intent or the job of just the Green Office. According to the rootAbility audit of 2016, under its assessment of the situation in that year and its recommendations, they specifically recommend to "clarify the role of GO", which was indeed given much internal attention and work in a winter weekend retreat in Belgium in 2016 for the whole GO team and the ICIS-GO PhD (besides previous efforts to investigate the roles and expectations back in 2014). The new vision, mission and values statements with the GO as a 'sustainability services hub' for the university was a key outcome from this (UMGO, 2016a, 2017). RootAbility recommended "that UMGO drafts a proposal to the Executive Board to clarify, strengthen and adapt the role of UMGO, and identify areas that lie beyond its scope". Based on this audit they identified roles they thought UMGO could fulfil well, which it proceeded to embody, as the overview of data per category below shows. Amongst these roles were to:

1. Monitor and report on sustainability progress,
2. Assist with policy development of visions, roadmaps and policies,
3. Critically reflect about the current state of sustainability at UM and

⁸ For a comprehensive deep dive into data per category at the meso-level, see the following section, *Detailed Overview of Data per Meso-level Category*, otherwise, move to the next diagnostic summary at the macro-level.

encourage the university to do better,

4. Take a service approach to assist Facility Services, ICTS, Human Resources, ICIS and other research institutes to work on sustainability projects,
5. Support and empower individual and groups of students, staff and faculty to advance sustainability at UM,
6. Develop and pilot innovative sustainability projects, as well as ideas and concepts that are then piloted by others,
7. Improve communications and visibility of sustainability at UM (rootAbility, 2016b, p. 3).

Despite later changes in the governance for sustainability being perceived as due to a UMGO deficit of communications expertise, as well as the view that it failed in its attempts to increase visibility, UMGO is clearly recognised externally for its capacity to ““Improve communications and visibility of sustainability at UM” (Beuerle & Moreira, 2019). This counters prior criticism that the UMGO alone had issues with communications and making itself, as well as sustainability generally more visible, as the following overview of data per category will show. That this GO-specific failure was a key driver for the EB to commission an external consultancy to fix the problem was wrongly construed. Any organisation-wide improvement in communications for sustainability -could not be feasibly achieved or developed well without active top-level sponsorship or support- as the 2014 proposal attempted to set in motion (Baker-Shelley & Corti, 2014); this is where the governance dynamic was largely sub-optimal at UM. Weaker overall weight values for the rubrics at the meso-level - in particular the governance and change management perspectives - support this diagnosis.

Indeed, the UMGO team reached out constantly, listened to and implanted feedback and criticism, and were very active in engaging academic and administrative staff, often to their annoyance. This begins to highlight a lack of structured support from the leadership, as rootAbility’s recommendation would not have otherwise focused on “better staff guidance for student leadership”. It is not clear whether the substance of this recommendation was heeded. Placing the onus for integrating sustainability into practice and program formed part of many calls to action for the leadership over the years. According to the coded information in strategic and communications documents, as well as the interviews, this points rather towards a lack of sustainability praxis, especially as the activities and network of expertise around the Green Office’s ability to be the platform for students and staff in this area has diminished over time.

In conclusion, the diagnosis is that there has been a tension between the expectations, the responsibility and the mandate the UMGO had. What exactly the consequences were of this tension is difficult for many outside of the lived experience of the Green Office to say. In the end the external consultant was hired and Sustainable UM 2030 emerged.

Detailed Overview of Data per Meso-level Category

The Meso-level concerns the groups, teams and units working on sustainability transformation in the university.

BSP 1.3

BSP 1.3 Organisational cultural health

W= 1.26: Gr. 8, De. 2.

■ Organisational behaviour exhibits these traits: rules and regulations are present and consensually agreed regarding ethics, there is a culture conducive to moral judgement and extrinsic societal orientation, as well as ethical organisational norms.

Quite a limited sample of evidence was found in the search for ethically orientated and consensually agreed rules and regulations aimed at sustainability, as well as the more difficult to evaluate cultural health aspect. There are even some negative hits. For example, the 2016 rootAbility audit of UMGO found *“no written documentation that has been approved by the university which further specifies the responsibility and authority of UMGO”*, and *“As a result, stakeholders have different ideas on how UMGO should fulfil its mission”* (rootAbility, 2016b, p. 3). Combined with some negative experiential and reflective accounts in the insider action research of UM, this points to an organisational culture hesitant or unclear in its support of ringfencing the responsibility or authority of UMGO. This links into the key quote in *BSP 1.5 Organisational positive behaviour* below regarding the importance of clearly indicating the scope and responsibility of the functioning and role of UMGO for UM more broadly. The risk posed by this lack of clarification on the roles and expectations of UMGO in the wider organisational culture was flagged in the UMGO 2011 Annual Plan (UMGO, 2011, p. 3). As somewhat detached from UM as a whole, UMGO itself appears to exhibit a counter, or even, ‘micro-culture’, conducive to moral judgement and ethical norms oriented to transformative sustainability; that is, based on its vision statements of its Annual Report 2016 and Annual Plan 2017 (UMGO, 2016a, 2017). In other parts of UM, however, a clear societal orientation is indicated, at least in isolation, at faculty levels from the Strategic Programmes of FPN, FHML and MUMC+. All these facets considered, this does not indicate a strong positive presence of *BSP 1.3* in UM as a whole; only in small isolated parts.

BSP 1.4

BSP 1.4 Organisational lobbying competence

W= 3.64: Gr. 23, De. 2.

■ Organisational behaviour exhibits that: there is access and appropriation of physical resources, persuasive communications strategies, and effective engagement of an assortment of middle management.

The *organisational lobbying competence* rubric, *BSP 1.4*, is fairly well incident in the body of evidence collected. With the weight value of 3.64, being grounded 23 times in the data, it is the second most prominent rubric at this scale. There are many notable examples of how UMGO and affiliated actors have tried to implement persuasive communications strategies whilst engaging middle management and ensuring that there is access to physical resources. One key quote illustrates the attempt by the ICIS-GO PhD and UMGO to lobby for preliminary funding to design an experimental approach to a UM-wide communications strategy for sustainability:

“The financial return is connected with the communication strategy as it shall be used as an internal lobbying tool to achieve results set by University departments. This will happen thanks to the interdisciplinary nature of the Green Office, which involves several sectors of the university. The Green Office has the leading position in engaging with departments, setting high value goals and demanding commitments; the communication strategy shall enhance the commitment of such entities exposing each department to its own stakeholders”

(Baker-Shelley & Corti, 2014).

The objectives were designed to align with UM's needs as an organisation as well as support the connection between UMGO's communications officer and Marketing and Communications:

- *"Make the case for a sustainability communications strategy within UM.*
- *"increase international recognition & university branding (external goal).*
- *"increase organisational (social, environmental, economic) responsibility and awareness of activities and performance within all university departments (internal goal)" (Baker-Shelley & Corti, 2014).*

Whilst, in October 2013, the exploration of viable options and possible lobbying for funding of an additional independent Living Lab programme took place. This was envisaged to be institutionalised like similar UM programmatic educational innovations, such as MARBLE and PREMIUM, by the Education Coordinator of UMGO at the time, Tim Strasser (2013).

BOX 1: ACTION RESEARCH PERSPECTIVE ON THE GREEN OFFICE MANAGEMENT DYNAMIC IN 2014: A TRIGGER TO INQUIRE DEEPER.

Roles and Expectations: Taking account of the Green Office, its Supervisory Board and its counterparts

In 2013-14, UMGO experienced a lack of attendance of its supervisory board, difficulties scheduling meetings and, generally, of internal communication. Although this ostensibly seemed due to busy schedules of the members, discussions within UMGO seemed to indicate a deeper malaise, possibly with respect to perceived roles, expectations and purposes. As such, the first intervention aimed to investigate roles, purposes and expectations of the Green Office and its Supervisory Board, and thus clarify the problems experienced by UMGO. Thus, we hoped to analyse and discern the weak and strong points of the Green Office in bringing about organisational change towards sustainability. The significance of these interviews was reasoned in the following way in 2014:

"It therefore becomes apparent to also question the role and the purpose of the Supervisory Board of the GO in order to match the inquiry of how the GO's role and purpose is perceived, both of its internally and externally -based constituents, and to those who are implicated by and in its managerial position. If there is indeed a lack of awareness with respect to the functioning of the GO across UM, why is this the case, what should the SB then do, and can this be ameliorated by a better communications strategy for sustainability? In terms of what is communicated, when it is communicated and over what, the SB could arguably manage such a guided disclosure".

This inquiry led us to deeper questions, such as, was the Green Office a well-understood and integrated university department at UM?

Interestingly, despite the numerous incidences of *BSP 1.4* in the evidence, rootAbility and UMGO self-reported that this skill seemed to be lacking. UMGO felt the need was not met from regular rootAbility training on how to lobby within their own university. The Navigating Institutional Dynamics series of workshops by the ICIS-GO PhD, piloted at the first international GO summit in Berlin, 2014, and continued within UMGO-led sustainability courses (see *SER 5.1* above), was designed towards this need. The context of

rootAbility's sixth recommendation in the 2016 audit was to improve UM's sustainability governance structure, which they realistically argued *"UMGO alone will not be able to push, lobby for and propose changes of this magnitude"* (rootAbility, 2016b, p. 8). The task with the navigation workshops and rootAbility's trainings, when they were not focussed on spreading the model elsewhere, was to help UMGO punch above its weight. In summary, this aspect of the analysis shows that regardless of how good the lobbying competences were for UMGO, the challenge still remained: *"Collective leadership, governance structures and resources beyond UMGO were not developed at the same time, as commitments increased"* (rootAbility, 2016b, p. 8).

These commitments came to UMGO from UM leadership's wishes to increase its standings in the Sustainability rankings. Organisational lobbying also extended from UMGO policy throughout the Netherlands and across Europe as part of the objective in the UMGO Sustainability Policy of 2016-2018 (according to the 1st official draft which the ICIS-GO archive had access to from May 2015) to *"Cooperate with Green Offices in the Netherlands through Studenten voor Morgen and with Green Offices in other European countries with the aim of establishing a European Green Office Association. To fulfil this objective this cooperation should:"... "be aimed at establishing a European Green Office association capable of providing a platform for knowledge exchange between universities as well as being capable of lobbying on a national and European level for greater sustainability in higher education"* (UMGO, 2015, p. 9).

Illustrative of the disproportionate perceived success of top-down public relations efforts compared to bottom-up ones, the following shows UM's prowess in lobbying and public relations generally: *"With its research themes, UM has successfully focused its efforts to address societal challenges at the regional, national and international levels. Further, through its proactive strategy for public affairs and lobbying, UM aims to become an active player in shaping the Dutch and European Science Agenda. To increase their earning power, the faculties will be asked to develop strategic plans for research that dovetail with the overarching UM strategy"* (UM, 2016, p. 16).

A key long-serving Green Officer, Anselm Grahl, also framed the role and purpose of UMGO in lobbying terms: *"something that I've often said, that some people have agreed with me very much and some people have said they have different view on this, is that I kind of see the GO as a lobby in a sense... That our role is to push for sustainability, and not so much do these things on our own, carry out these projects on our own, but rather bring the right people together. And also convince the right people to take action"* (Grahl, 2014). This internal view of what the Green Office was for remained consistent throughout the time period studied in this research.

BSP 1.5

BSP 1.5 Organisational positive behaviour

W= 0.79: Gr. 5, De. 0.

Positive organisational behaviour is exhibited that demonstrates: capacities for self-awareness and self-diagnosis which are facilitated; competences for balanced decision-making and critical thinking; practices of transparency (whistle-blower support) and ethical debate.

The asset base for BSP 1.5 organisational positive behaviour is barely perceptible from the evidence, at only five groundings and one of the lowest weight values out of the whole diagnosis. This indicates a lack of presence for this rubric, with some negative issues illustrated from the codings. For example, in the 'sustainability as a ranking instrument' UM SBE study, the risk of "problems in transparency of data" was raised: *"If the decision makers and stakeholders cannot be informed about the current state of sustainability and its progress, it becomes increasingly difficult to*

improve sustainability” (Noirhomme et al., 2013). Moreover, the 2014 UCM Thinktank study referenced the EPA in saying “Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Nevertheless, it might be hard for a university to deal with all three due to a lack of resources (i.e. Wageningen Green Office) or because students might have a weak decision-making power (i.e. Maastricht Green Office), and so, usually, only the environmental aspect is taken into account” (van der Zwan et al., 2014, p. 20). This study appears to explain, reflect, and presciently predict the analysed interactions in this research, where UMGO was also observed to suffer weak decision-making power, as well as sustainability only being accepted as to do with environmental aspects by executive decision makers of UM. van der Zwan et al. (2014) seem to be proven right in their characterisation of UMGO, with diminished decision making power by the later account in the Sustainable UM 2030 memo; “In this new structure UMGO is accountable to the (chair of the) Taskforce and will be managed by one of the sustainability coordinators⁹ of the Programme” (Fischer & van der Wetering, 2017, p. 7). Finally, it appears that PBL, as employed at FASOS according to its Strategic Plan 2011-2015, exhibits the qualities and attributes of positive organisational behaviour.

OCM 2.2

OCM 2.2 Collaborate to Innovate: extrinsic leadership agency

W=1.89: Gr.12, De. 1.

Identify evidence in leadership of visioning, organisational alignment, strategic collaboration, innovation, towards ends of partnership and good governance in wider society, with an extrinsic engagement with external task environment

OCM 2.2, the rubric representing strategic collaboration and *extrinsic leadership agency* is present to a limited extent at UM. Some evidence leans in the direction for how to build on this asset in future, as in the rootAbility audit, which in its recommendation for ‘better staff guidance and student leadership’ encouraged “*the university to set-up support mechanisms to guarantee the quality of student work across generations and to assist with guiding the students, while at the same time leaving enough room for student leadership. We recognize that this is a challenging balancing act. At the same time, we recommend the UMGO team to reach out to its allies and friends within the university to ask for support when needed*” (rootAbility, 2016b, p. 5). The evidence for BSP 1.4 certainly shows that they were already doing this.

Further illustration of leadership agency is found early in the 2011 UMGO Annual Plan: “*At its very core, Maastricht University as an institution stands for leading in learning. Therefore, Maastricht University is most suited to demonstrate leadership in establishing sustainability as an integral part of all its practices and programs*” (UMGO, 2011, p. 3). Additional insight into visioning, organisational alignment and strategic collaboration is seen in the UM Strategic Programme 2017-2021 with respect to women in academia: “*special emphasis will be placed on the appointment of women to leadership positions, for example by increasing the proportion of female professors. By 2025, at least 25% of UM professorial staff should be female*” (UM, 2016, p. 31). This appears as a reactionary statement of intent. After the internal discussion regarding the poor numbers of women in senior academic or leadership positions in the Netherlands and UM in particular, and the appointment of the new female Rector Magnificus, instilling opportunities for young academics and women gained more attention, for example by aiming to appoint more female Professors as stipulated in the 2025 goal. It is not clear that evidence supports this move in action, yet. It is interesting

⁹ This was framed as the proposed new strategy of UMGO. Important to point out that did not mean it was proposed by UMGO or that it was brought into discussions, or that UMGO agreed with this strategy. The Sustainable UM 2030 programme asked for an adjusted scope of work of UMGO, which was implemented in 2018 along with reduced budget and decision-making rights.

how the best indication of the presence of this rubric occurs in the written evidence from FASOS, which is itself experiencing cuts due to the diminishing role and space in the UM organisation and strategy for the arts and social sciences. They insightfully mention how the strategic document is “*merely an instrument*” and that the “*journey of implementing*” the plan is “*as important as the final output*” going on to mention that “*the different experiences and lessons learned on the way matter as much as the destination we hope to reach by 2021*” (FASOS UM, 2016, p. 5).

Recommendations for the role of leadership figures in UM to encourage pro-sustainability behaviour were also presented in the interview with Green Officer Ricardo Leclaire (2014), as shown in more detail in *BSP 1.2*. This perspective for improvement is further bolstered by the interview with the former Rector, who, when asked about his expectations of the management style of the Supervisory Board, said he had none really, before moving to the role of student leadership as was his wont: “*it is a very nice way of expressing their potential leadership talents. And if they can express them through this [Green] office, and they can get the combination between their personal motivation on these issues and showing how they can manage these topics, that’s fantastic training, ‘une formation’*” (Soete, 2014). This moves the incidence of this rubric lower to the UMGO itself. This is made clear when looking at its purpose, mission and vision statement of 2013, articulating a form of leadership in connecting individuals and groups: “*We operationalize our purpose and work towards our vision... through initiating our own projects, by supporting the projects of actors in and around the university and by creating an alliance for change. This involves bridging the boundaries between faculties and departments, as well as between the university, its students and the broader community*” (UMGO, 2013b).

OCM 2.3

OCM 2.3 Purposeful-adaptive evolution

W= 1.89: Gr. 12, De. 0.

■ Evolutionary and teleological organisational change management employed, driven purposefully and adaptively by change-agents and leadership in response to external circumstances, situational variables, and the human environment.

OCM 2.3, *Purposeful-adaptive evolution* is also present to a limited extent at the intra-organisational level of UM. Evidence is predominantly located in Green Office reporting, internal documentation and the ICIS-GO PhD project archive. A first good instance to include is found in the sustainability ranking instrument project by the SBE Business Innovation and Sustainable Development course; in particular their interview with Maiko Schaffrath, a co-founder of UMGO. When asked if he expected students to be attracted and react positively to ranking he replied: “*The green office believes that by promoting sustainability, marketing purposes can be met. Having a high ranking will shape an image around Maastricht university that will profit from extra students coming to the university and more publicity. Sustainability will also save money in the future which can be invested in students. So, profit wise it makes sense as well*” (Noirhomme et al., 2013, p. 32). Schaffrath’s vision of marketing for sustainability based on the rankings is very close to what was later observed as a meso-level behavioural pattern. This earlier team placed a high emphasis on marketing and communications for sustainability.

Another illustration is found in the 2011 UMGO Annual Plan, which describes UMGO playing “*a central role for Maastricht University for incubating and coordinating projects related to sustainability. The function of the GO is to provide a central platform and keep an overview of all different activities in the field of sustainability. Moreover, the GO actively supports the transition towards a more sustainable university by informing, addressing and motivating actors and departments to follow along the lines of this trend... the GO is the face and central point for sustainability at UM*” (UMGO, 2011, p. 3). This raises the question as to whether the Green Office was the catalyst of UM’s change management with regards to

its governance of sustainability, to be later discussed. This concluding statement of the former UM sustainability vision, demonstrates leadership and navigation qualities, and matches this rubric except for the lack of pro-active involvement of the Executive Board (UMGO, 2013a, p. 24). An instance found in van der Wetering (2016), however, seemed to show that good rhetoric surrounding sustainability performance was in order to look higher on the rankings. Using the framework applied in the SustainableUM2030 Vision, to appear as a ‘leader’, as UM was assessed in 2010, compared to the rather damning assessment of UMGO and its Roadmap as ‘defender’ under ‘compliance and economic advantage’, seems to contradict the larger body of evidence, which rather casts UMGO as a transformation agency under the systems view (see *SES 3.1*, *SES 3.1.1*, *SES 3.1.2*).

Illustrating UM’s strategic organisational positioning, the opening statement found in the 2017-21 strategic programme, can be characterised as a statement of intent to become more adaptive and purposeful: “*The purpose of this new Strategic Programme is, 40 years after the foundation of UM, to take stock of our achievements, adapt them where needed, and add new perspectives and challenges in order to enhance our academic mission*” (UM, 2016, p. 3). However, evidence is lacking from the sustainability perspective that this is being translated into action. Perhaps this will be seen in time as we approach the 2021-25 UM strategy. To conclude, this rubric can perhaps be framed more towards the group level (close to micro) to indicate its presence at the GO in earlier teams, who cast the UMGO adaptive vision as ‘tempered radicals’. The way their roles were described by key UMGO team members, interviewed in 2014, certainly supports this, as was the case with Judith Enders, whose articulation of long-term goal monitoring, assessment and adaptation towards 2030 indicates the presence of *OCM 2.3* (Enders, 2014).

SES 3.2a

SES 3.2a Internal governance for sustainability

W= 3.81: Gr. 24, De. 7.

- Organisation takes internal responsibility that natural resources and ecosystem services are managed and governed correctly by individuals and social groups practicing leadership, institutional entrepreneurship and socio-technical innovation.

SES 3.2a, Internal governance for sustainability is present to a relatively good extent at UM, being highly interconnected with other assets uncovered by the diagnosis, as well as being the most highly weighted at this scale (**W=3.81**). This is partly due to its broad incidence across the evidence base, in different records, ranging from the 2016 rootAbility audit, UMGO-produced Sustainability Policy of 2016-18, faculty strategic programmes, the ICIS-GO PhD ‘navigating institutional dynamics’ workshop series, to the Sustainability Vision UM 2030 advice from the former Environment and Sustainability Advisor, the Green Office Impact Model, and the UMGO Supervisory Board interviews.

To begin with, the quotes considered most significant, puzzling or illustrative are included, as there are 24 in total. In the rootAbility audit¹⁰, an interesting assessment of the ‘current situation’ as in October 2016, introduces a complex and murky picture: “*The current situation of Maastricht University Green Office and sustainability governance at UM is defined by the following*

¹⁰ Evidence that rootAbility, co-founders of UMGO, had links with and ‘were commissioned by UM Executive Board’ can be found in the first page of the ‘whole GO’ audit document “to conduct a short analysis of UMGO’s past achievements and current situation” (rootAbility, 2016b). A focussed yearly assessment of the Green Office, rather than one of UM as a whole, was initially a requirement for this research, before I questioned this orientation for its logic towards answering the research question of how universities (as a whole system) transform for sustainability.

developments:

- *Through the Sustainability Vision 2030, Roadmap and new Strategic Plan 2017-2021, sustainability became more important for UM.*
- *Less guidance from university staff in the daily operations of the Green Office.*
- *Key stakeholders perceive a declining spirit and visibility of recent UMGO teams.*

UM declined in SustainaBul rankings from the 1st place in 2010 to ‘these institutions also participated’ in 2016” (rootAbility, 2016b).

When UM is assessed through the content of its own public relations, in its strategic programmes, for example, the picture becomes more opaque, with large, ambitious, positive orientations belied by a lack of substantive evidence. In the 2012-2016 Strategic Programme, for instance, UM demonstrates an awareness of European grand societal challenges, such as ‘returning to growth’ and ‘fighting climate change’. Stating the European Commission’s (EC) Horizon 2020 funding programme will help produce solutions for this, it subsequently positions its role as an arbiter and ‘key player’ of ‘collaboration between public and private sectors’ in the Meuse-Rhine region (UM, 2012). This, combined with the other sources, indicates a deterioration observed in *internal governance for sustainability*, when we compare and contrast for these criteria: 1) taking responsibility for the management and governance of natural resources and ecosystem services; 2) adopting a flexible and integrated approach towards this management and governance; 3) practicing leadership, institutional entrepreneurship and socio-technical innovation as part of this management and governance. A more visual record demonstrates the work that took place behind the scenes to create positive structural changes to the sustainability governance of UM in 2015, as a partial result of the findings of the preceding interviews into the Green Office and its Supervisory Board. *Figure 9* was an early output of the collaboration between the ICIS-GO PhD and the former Environment and Sustainability Advisor, in consultation with UMGO team members. It shows that the proposed new structure would rely on balanced reporting lines and relationships between the Green Office, a Board or Committee for UM Sustainability, combined with ethical behaviour and democratic representation from multiple stakeholder groups, including students as well as deans, directors and staff, and where the coordinator, for example “enhances the GO mandate” rather than the existing “power” structures (Baker-Shelley & Fischer, 2015). This proposed role and structuration, as specified here, of a full-time Sustainability Coordinator was recommended to the Board. There is no record of a confirmation of receipt of the proposal, nor signature indicating a decision (Baker-Shelley, 2015b).

More partial matches in the evidence for *SES 3.2a* are found in the interview with UMGO Supervisory Board member Michiel Ritzen, who mentioned that the Green Office and its Supervisory Board were counterparts in institutional entrepreneurship (Ritzen, 2015). Although this is a partial match - with no direct reference to governance of sustainability, natural resources or ecosystem services - it appears implicit to the interviewee’s articulation that the supervisory board and GO both somehow contribute to sustainability governance at UM. Former Rector Magnificus, Luc Soete, gave prescient and insightful recommendations regarding what could be improved about UM’s sustainability (as shown in *SES 3.1.2*) which also has implications for internal governance for sustainability. He specifically recommends more student-driven autonomy in the governance of sustainability and emphasises the strategic importance of PhDs who can balance the academic dominance with the student community whilst connecting more to the staff (Soete, 2014).

Figure 9: Model of Institutional Governance for Sustainability, own design. Presented elements of institutional governance for sustainability formed part of the proposed role of the Sustainability Coordinator recommended by the researcher and Marc Fischer in 2015 to the Board.

A final example - under the heading 'Status of Sustainability (Planet aspect in operations) within UM' in Fischer's Advice for sustainability's position in the 2017-21 strategic programme - begins to migrate towards the macro-level, and to this rubric's sister, *SES 3.2b*. It demonstrates a little evidence of knowledge sharing on good governance of natural resources/ecosystem services by UMGO with other Green Office's in the growing network curated by rootAbility:

"Since UMGO was founded, many steps have been taken in the governance of sustainability, including the Vision 2030, the Roadmap 2030, the Policies of 2012-2014 and 2014-2016, the Climate Action Report and Sustainability Progress Reports, Integrated Reporting at a university level, as well as cooperation and

knowledge exchange with other Green Offices” (Fischer, 2015b, p. 3).

Questions still remain with regards to the aspired governance model outlined in the 2012-2016 Strategic programme below. Exactly how the mentioned targets formed a ‘framework for assessing the performance’ eludes this research:

“Governance: Maastricht University management is equally balanced between central strategy and decentralised responsibility. Education, research and service to society take place within the faculties, under final responsibility to the deans. Targets will be formulated for those goals. These targets will form the framework for assessing the performance of the faculties and the university as a whole” (UM, 2012, p. 10)

An initially open programme of consultation preceded the formation of the following 2017-2021 strategic programme ‘Community at the CORE’, with committees and working groups formed of university council members concentrating on different aspects of the strategic programme, including sustainability. This seemed to be well-choreographed and received, as it was also communicated openly to the UM community as part of informing the campus about the new programme. This is a positive aspect of the leadership’s management and collaborative governance, in this respect.

SES 3.3

SES 3.3 Environmental literacy competences

W= 2.69; Gr. 17, De. 3.

■ Skills and competences for environmental literacy are exhibited by organisational actors: P3: Awareness of multi-level interference in organisations and institutions of power & agency; P6: Learning between actors, environmental self-awareness, and motivations & knowledge concerning impacts, feedbacks; P7: Planning and analysis of sustainable human-environmental interactions, substantiation of material and social environment, and matrix formation.

The evidence shows that *SES 3.3 environmental literacy competences* is present to a good extent at UM. This is grounded in the rootAbility sources, the 2018 UMGO SDG symposium, internal workshops, and the 2014 UMGO team interviews. For instance, the inculcation of certain environmental literacy competences in Green Office team members is shown by a rootAbility-UCM Thinktank recommendation, which also emphasises the important Green Office principle of being student-driven:

“Working for a Green Office is a unique and practical ‘hands-on’ learning experience for students. They acquire skills that will enable them to support the green movement even after they leave university. Employing students therefore contributes to the realization of several aspects of rootAbility’s vision which is why we recommend holding on to the principle that Green Offices should be student-driven” (van der Zwan et al., 2014).

In the same study, however, there is also an apparent warning against opaque practices when an integrative approach to sustainability is sought after; this also demonstrates the substantiation of postulates three and six (see heading):

“choosing an integrative approach is possible as long as the parties are aware of its presence in the first place, due to which they can manage to combine business, networks, research, and sustainability knowledge, core competencies from all types of organizations and create unique combinations of values to benefit themselves, as well as the community at large” (van der Zwan et al., 2014).

This reference was a rootAbility commissioned study, performed by a University College Maastricht student thinktank in search of the ‘Green Office Model 2.0’. Many of the founding team of the Green Office also had strong links to UCM four years prior.

In the summary and recommendations of the Make the SDGs Yours symposium, the section ‘What the Community Recommends’ strongly expresses an awareness of the interlinkages at scale (which are an important component of environmental literacy) in the human and environmental systems concerned:

“Increasing external partnership, with a focus on local and regional partnerships: Increasing external partnerships can improve the relevance of education and research, as well as ensure that students apply their knowledge and skills for societal good. One example could be starting projects with external corporations or institutions. Although this exists to some extent, the organisation of these projects should be streamlined and professionalized so that students gain a better understanding of the knowledge and skills expected of them in the labour market” (UMGO et al, 2018b, p. 2).

Lastly, a key excerpt from the interview with GO Community Coordinator, Florian Lorisich in 2014 enabled a perspicacious understanding of the competences demonstrated within the sustainability infrastructure of UM:

“We achieved that the Green Office now increasingly defined its role. It’s now increasingly being obvious what the Green Office stands for and what the Green Office is good at. We furthermore learned, and I think this also is an achievement, [...] In terms of actual projects that have been implemented, we can see that we kicked off quite a vivid sustainability community within the student body ... and I think we are going to increase our dedication to that in terms of having a corporation with stakeholders...

We created an awareness among the employees of the university – there is something wrong and we could do something about it. So, maybe something you can’t actually measure, but you can see if you’re in it that something is happening, there are processes happening now, and the output is improving in a way, slowly but there’s progress, so I think that’s a big success... Generally.. we used our mandate to create awareness among staff members, among employees... we are increasingly also getting approached by staff members in order to help them of their own volition” (Lorisich, 2014).

The interview with Florian Lorisich illustrates the main achievements of the Green Office, which were also recorded in official documentation. However, external audits and restructurations focussed on the Green Offices failings, overlooking its subtle yet remarkable successes over the years. Its success is determined and indicated by the level of community awareness and actions taken ‘of their own volition’; it is not identifiable in this dataset that any kind of top-down or external research attempted to inquire about this in a valid way. In general, environmental literacy competences have increased at UM, for a large part through efforts made by UMGO.

CGS 4.2a

CGS 4.2a Internal Evaluation of Environmental Social Governance

W= 3.33: Gr. 21, De. 4.

- ESG issues, material to the organisation and its stakeholders are measured, managed and monitored internally by integrating sustainability strategy into governance, management and administrative structures:
- 1) Responsible actors measure, manage, and monitor sustainability performance with material ESG metrics;
- 2) ESG issues are prioritised according to stakeholder’s interests and influence. *3rd step continued in CGS 4.2b.*

The evidence supporting the presence of rubric *CGS 4.2a* can be clearly seen when one examines UMGO sustainability policy and reporting between 2011-2017. *Internal evaluation of environmental social governance* has also been undertaken to some extent in certain parts of the UM organisation; this much is positive and evident. However, certain transparency and continuity issues have been raised.

Multiple pieces of evidence demonstrate that UMGO initiated internal ESG evaluation and strove to institute integrated reporting into UM's respective structures and processes. One instance is found in the 2015 SBE Project on Integrated Thinking: "*Since 2010 the UMGO has initiated integrated reporting in order to report on and improve the sustainability at a university level*" (Dirat et al., 2015, p. 5; UMGO & Grahl, 2015, p. 3). Another instance occurs in the frame of a challenge to be remedied in the EB-commissioned audits by rootAbility in 2016¹¹: "*The recent successes and activities of the Green Office remain invisible to higher management and the university community at large. Also, the data that the GO gathered in its Sustainability Progress Reports on the sustainability performance of UM is largely invisible to stakeholders and not made decision-relevant*" (rootAbility, 2016b, p. 6). These sources are also strengthened in reference to the larger Green Office-written UM Sustainability Policy 2016-18, in which its second governance objective states the aim to "*Consistently improve sustainability reporting at UM with the aim of achieving fully integrated reporting*" (UMGO, 2015, p. 4).

In the document, *Sustainability in Strategic Programme UM*, a useful overview of projects is provided which shows how the evaluation of ESG issues has been monitored and assessed by the former Environmental and Sustainability Advisor up to 2015, as well as future envisaged efforts for the subsequent period 2016-2020 (Fischer, 2015b). This is auspicious for this research disclosure at the time of writing. Both of the tables – featured and emphasised below in *Figures 11 & 12 in the Intermezzo* – represent prioritised ESG issues the former Advisor identified with the help of GO's sustainability reporting and policy formulation. It is therefore clear from the records that there was an improving sustainability reporting process initiated and managed by the former Environmental and Sustainability Advisor in cooperation with the Green Office and the ICIS-GO PhD. After the aforementioned top-down structural reforms, the transparency and continuity of UM-wide ESG information was disrupted; at the time of writing, no recent reports are available on the UM website after 2017, with the UMGO website corroborating this; the specialised position at UMGO, held by Anselm Grahl and other officers, was effectively terminated in 2018.

In a 2014 UMGO Green Academy session - which hosted the *navigating institutional dynamics* workshops - the essentials for how to evaluate and manage ESG issues were discussed with the student participants. See **Figure 10** for the materiality matrix applied to the university's own ESG issues; it shows more evidence of Internal Evaluation of ESG being taught to students and UM stakeholders. This contributed and complemented the existing sustainability reporting activities of UMGO and a key collaboration was formed between the researcher and the assessment and reporting Green Officer, Anselm Grahl. This workshop made training internal ESG evaluation into a student exercise for the Green Academy and SUSTAIN+GO courses, as well as for the Green Office Team as a whole. Another exercise in the workshops specifically focussed on stimulating discussion about differences between add-on sustainability reporting and integrated reporting.

11 UMGO was assessed on its lack of visibility in the community and its sustainability reporting performance, which was causally linked to the observed drop in rankings. As we proceed in analysis, we begin to see this was a limited, atomistic misrepresentation of the totality of shared responsibility for awareness-raising and advocacy for sustainability initiatives in the UM community. The truth is much more nuanced than decisions taken suggest; things can seem invisible when it is not in one's interests to pay attention.

Figure 10: The ESG matrix as presented to Green Academy participants, 2014 (Baker-Shelley & Bloom, 2014) based on (Mohin, 2012).

Another instance occurs later on, in summer 2016, where a key partnership was unsuccessfully negotiated between rootAbility, ICIS, and UMGO. In the UniSAF collaboration agreement titled ‘Enhancing data-driven sustainability governance at Dutch universities’ the rationale for why the current state of sustainability reporting in universities is less than beneficial is marked out plainly: “Most universities in Europe are still struggling to engage in data-driven sustainability governance. For instance, only 10% of all German universities had a sustainability report in 2014 (Sassen et al 2015). Many universities are struggling to provide data on basic sustainability performance like waste, energy or transportation. An understanding of the state of sustainability in education and research is oftentimes even more opaque. This is a problem, as **without a proper understanding of which sustainability challenges are relevant for the organisation, goal setting becomes arbitrary, performance tracking and disclosure fruitless**” (Grah, Spira, & Baker-Shelley, 2016) – emphasis added. In combination with more recent records in the archive, this creates the impression of a departure of expertise with the responsible members for advances in sustainability reporting leaving elsewhere, along with a UMGO-based innovation in sustainability reporting, the University Sustainability Assessment Framework (UniSAF).

CGS 4.3

CGS 4.3 Externality Recognition & Internalisation

W= 0.95: Gr. 6, De. 2.

■ Pursue and make progress in:

- 1) convergence between private costs & social costs, compensation to ‘victims’;
- 2) quantitative reduction in the physical volume of throughput, setting a maximum aggregate limit of discharge/wasted resources.

There is a limited amount of evidence under the rubric for *externality recognition and internalisation* (CGS 4.3). However, some selected excerpts do demonstrate to a certain

extent how UM makes progress in the quantitative reduction in throughput via certain (often UMGO-initiated) projects: *“The global information-communications technology industry currently accounts for approximately 2 percent of global carbon dioxide (CO2) emissions. [UM] has to address the ecological challenges resulting from the use of ICT in the fields of education as well as day-to-day operation. As universities around the globe rely more and more on the use of ICT in the fields of education as well as day-to-day operation, they also have to address the ecological challenges resulting from it. One initiative adopted by the [UMGO] is the Control-Alt-Delete-Emissions project. Inspired by this initiative, [UMGO] aims to increase energy efficiency of the university’s ICT Infrastructure”* (UMGO, 2012a, p. 22). This problem analysis from the UM Sustainability Policy 2012-14, authored by the Green Office, presents the policy recommendation to UM to account for and internalise negative ecological impacts of ICT using a project which demonstrates its own actions to resolve this.

Furthermore, in the former UM Sustainability Roadmap 2030, several pertinent goals are presented for reducing social and environmental externalities. For example, in ICT: *“reducing travel-related greenhouse gases through different modes of travel, reduction and compensation”* is presented as an overarching goal, with sub-goals on the way to 2030 such as *“2020: Provide infrastructure that allows for low carbon travel for staff and students”¹²* and *“2022: Establish Maastricht University as a car-free University”¹³* (UMGO, 2013a, p. 16). Moreover, also in procurement: *“Vision 2030: Implementing strict ecological and social criteria for 100% of the University’s contractors, including catering”* (UMGO, 2013a, p. 15).

It is too soon to tell if these goals are being effectively acted upon, although there were discussions and initiatives taken by the former Environment and Sustainability Advisor. Faculty-level efforts do nonetheless demonstrate a clear willingness to act, most prominently in the evidence collected at FASOS where sustainability in energy and materials was clearly targeted:

“FASoS subscribes to the UM objective to embrace a sustainable approach to energy and materials. FASoS is convinced of the importance of this objective and it would like to take into account the views of staff and students alike. The historical buildings that house our offices complicate this concern” (FASOS UM, 2011, p. 71).

Finally, in the newer vision document of 2030, in a table in the annex, under “Follower = sustainability consideration” and “Input from UM in 2017: 40 interviews and 2 meetings”, a more confusing picture emerges:

“-Develop incentives to make commuting more prevention, reduction, Strip sustainable (e.g. recharging of bikes and cars preserving and reduction of parking spaces) compensation - Reduce parking spaces. If needed, make it water permeable - Improve sustainable travel options to Belgium and Aachen - Strive to limit the travelling by plane in EU - Compensate extra costs of travelling by train instead of by plane in EU - Have attention for student transportation” (Fischer & van der Wetering, 2017, p. 15).

12 *Has the infrastructure allowing for low carbon travel for staff and students been provided in 2020?*

13 *Is UM on track to being a car-free [or at least combustion engine free] university by 2022?*

Intermezzo: These tables show a history of operational sustainability projects up to 2015, as well as a projection of planned projects up to 2020, providing a good vehicle to pause halfway through this large chapter to review the journey taken by UM. This is positioned primarily under internal evaluation of ESG, but also connects to other operational and management rubrics.

Figure 11 (left): In this excerpt table, *Main Sustainability efforts and results on operations till 2015*, Fischer presented past efforts on sustainability in operations. This demonstrates the kinds of projects the former Advisor managed in cooperation with UMGO (Fischer, 2015b, p. 6).

Figure 12 (below): In this excerpt table, *planned projects 2016-2020*, Fischer sustainability operations efforts are categorised under 'waste', 'real estate', 'procurement', 'energy', 'catering', and 'organization' (Fischer, 2015b, p. 7). The subsequent performance of UM could in theory be compared with actual outcomes using these points as ESG metrics.

Project	Result
Waste separation inner city library	Pilot successful in 2013, resulted in several learning points. Efforts of UM GO/FS together with Albron and Stal led to the use of more space for waste separation within catering.
Waste separation FS office environment	Successful pilot in 2015.
Planned waste separation at mensa location Randwyck	Input for project waste separation at all UM locations in Maastricht. Introduction planned at start of new year (2016).
Project started to prepare waste separation in all UM buildings	Kick-off in October. Implementation of waste separation foreseen in 2016.
E-waste policy	IT-managers more aware of central disposal. Centrally disposed e-waste more than doubled. e-waste contract with IT-Donations.
Tongerstraat 6, renovated pilot TSS3 "UM Diner onderdak", a joint project of FS, SBE, ICIS, FPN and Zuyd Hogeschool	Real estate Energy efficient building (low-temperature wall heating, detection) Start of baseline measurement
Cradle-to-cradle floor covering	In several buildings floor coverings are replaced in a sustainable way
Tenders	Procurement 100% sustainability criteria applied (environmental) according to RVO in central tenders, additional questions on sustainability and social issues. Energy efficient printers, mainly central devices, responsible removal of old equipment
Efforts related to the new printer tender	Energy average of 2.2 percent per year
Energy efficiency measures resulting in efficiency increase according to VAG	Until now not successful due to behavioural / technical issues. Further optimisation and/or testing required.
PC power management pilots (ICIS, SBE) to save energy due to IT-equipment	Expected to be installed by the end of 2015
Solar panels on BO N2	Installed by the end of 2015
Solar panels on new sporting facility	Expected to be installed in 2016
Solar panels on UNS50	Signed in November 2016
Local energy agreement with Maastricht	Installed by the end of 2015
E-car charging points at MBB4-6 and Zwingeput 4 (UCM businesscase) pilots	Not successful. In meantime several pilots with these types of equipment at FS
Certificates of origin for electricity production	Starting with certificated from Norwegian hydropower and switching to certificates of (local) Dutch wind power or currently biofuel from Limburg (waste stream of food industry).
Greening of gas consumption	Green gas production is planned, greened by forestry projects of supplier. Energy efficiency measures
Several buildings with installations operated on presence (ventilation, light, heating)	catering Rise in offer of sustainable products for vending.
Sustainable vending machine	Rise of share organic 5%-15%, share sustainable (RVO) 26%-36%
Catering project / contract	organization Compliance to legislation
Environmental management system upgraded according to ISO 14001	Connecting research and education to operations of UM
Living lab project	

Project
Waste Introduce plastic and paper separation at all UM facilities and organic waste separation at any facilities where large quantities of such waste are disposed of. Implement the E-waste policy of 2014 and ensure the chain of custody approach and transparent reporting for the disposal of e-waste at UM.
Real estate Approve a policy of requiring plus-energy efficiency standards for newly constructed buildings of the university (new buildings (nearly) energy neutral) Progressively renovate buildings to fulfil the highest sustainability criteria (social, economic and real estate). Project 'UM under sustainable roof', the corporation between research, education and operation within UM to foster sustainability as a whole. Ensure that drinking water fountains are easily accessible to students and visitors at all UM facilities.
Procurement Include more and more demanding sustainability criteria in tendering through greater internal dialogue prior publishing tenders and ensure that agreements on sustainability are met. Criteria for Social Responsible Tendering are covered in central tenders of UM. Where possible KPI's will be formulated in contracts to monitor the progress.
Energy Continue to adhere to the objectives of the Multiple Year Agreement on Energy Efficiency (MJA3) by improving energy efficiency by at least 2 % every year. Achieve 3 % of energy consumption to be self-generated through renewable energy production (on UM location or in participation projects) Compensate the remaining energy consumption (gas / electricity) with certificates of origin from Dutch production (load) or the best available means for gas. Continuously improve the level of sustainability in the printing-environment. Implement PC power-management at all UM facilities where this is feasible. Ensure high levels of sustainability for the ICT environment of UM, including dealing with servers and outsourcing of ICT services.
catering Continue to assure that contractual agreements on sustainability are met in catering and stay in continuous dialogue with concerned parties to further improve the level of sustainability in catering.
organization Implement the transportation policy of 2013 and assess travel behaviour of students and staff members in greater detail. Living lab project

SER 5.2

SER 5.2 Intergenerational and socio-ecological ethics

W= 0.95: Gr. 6, De. 2.

- Ethics are identifiable in the norms and values of individuals and groups of: 1) intergenerational moral norm of ecological sustainability; a safe operating space for all of humanity; 2) intragenerational ethical development projects (e.g. resolving poverty and inequality, more resource distribution)

SER 5.2, *Intergenerational and socio-ecologic ethics* appear sparsely in the evidence base; as frequently grounded as CGS 4.3, its attribution in UM is hard to discern. It is where this rubric's incidences overlay with the actor's definitions of sustainability that we begin to see evidence of intergenerational moral norms for ecological sustainability. This was particularly evident in the interviews with the Green Office team and Supervisory Board of 2014/15. Some key excerpts:

"Well, for me sustainability is first and foremost the long-term way in which systems can survive or can be maintained. In the first instance, there is of course, the one we are most aware of... the ecological system, because it's been the clearest which has been documented in terms of its unsustainability... economic growth and economic dynamics doesn't acknowledge the negative sides of growth in terms of these long-term futures... Paul Crutzen here the Nobel prize winner... he is really saying 'for my children', 'for our children, we can't do this. We can't afford to.' We have to end the responsibility there of economics as this science about scarcity and about limited resources... the transfer to policy urgency is still something we have failed to achieve" (Soete, 2014).

"It's always about thinking about the impacts of your actions, now, immediately when you are undertaking a certain action, but also in the future, and thinking about the impacts here and elsewhere in the world. So, it's always this temporal and spatial element in sustainable development, and that is why a systemic and integrated view and approach is so important. Things do not happen in isolation" (van Zeijl-Rozema, 2014).

"I mean sustainability is really thinking in the long term and seeing what is best... A lot of people are starting to depart from this idea of sustainable development, but I would have to be someone who still sticks to it a bit and who says that we need to make sure that we have the right basis in the future, the right infrastructure, so that people in the future, but also we ourselves in the future - because often people are in fact short-sighted in terms of their own lifespan - have the proper infrastructure to carry on in a sustainable manner" (Grahl, 2014).

Other recent examples of the intragenerational ethic are the *Tapijn Tuin*, a Maastricht Municipality urban gardening project and *Shelter City Maastricht*, external but local projects, which partners students, staff and community leaders with local actors. The most direct match seems to occur in the FASOS strategic program's description of their community: *"An Intergenerational Community... We also aspire to be a sustainable intergenerational community in which both young and senior academics have ample opportunities to make the most of their capacities as teachers, scholars and, occasionally, policymakers"* (FASOS UM, 2011, p. 25).

SER 5.3a

SER 5.3a Integrated sustainability praxis across functions

W= 2.86: Gr. 18, De. 7.

- Sustainability practices are embedded in the universities portfolio activities of Research, Education, Operations, Governance, Communications & partnership (REOGC), through the disclosure and creation of spaces for praxis and action in collective open inquiry.

Looking through the lens of the students and staff driving sustainability from the ground-up at UM, the asset of *SER 5.3a, Integrated sustainability praxis across functions* is clearly present to a good extent. In line with the interconnected nature of this rubric - which is well defined in connection to other assets in the analysis - it has a density of 7, indicating validated associations with other rubrics: *CGS 4.1*, *SES 3.2a*, and *SES 3.1a*, for example.

A good place to introduce the intelligence gathered is the advent of the previous iteration of UM's vision 2030: *"In 2012 a vision was formulated to embed sustainability in the long-term plans of UM. The 'Vision 2030' describes a roadmap towards a sustainable university by fostering sustainability in education and research, in the operations, in the community and in the administrative parts of the academic institutions"* (Dirat et al., 2015, p. 3). Dirat et al., an SBE Masters study group, demonstrated that UMGO circumscribed and enacted integrated thinking across portfolios five years prior to 'SustainableUM2030'. Indeed, similar aspersions are made in the 2017 vision 2030 document, signed by the Executive Board in October of that year: *"Every three years an action plan based on the roadmap will define concrete projects and actions for the Now/How/Wow prioritisation. This iterative way towards sustainability enables UM to adapt to technical, economic and social developments. With this programme, sustainability in the veins of UM will be obtained by: • embedding sustainability in the roles / functions of the organisation; • addressing and facilitating ideas and initiatives; taking ownership in daily operation; sharing ideas and activities over and between faculties, services and other bodies at UM"* (Fischer & van der Wetering, 2017, p. 2). As the first three-year mark for the next action plan approaches, in 2020 it will be interesting to see and compare the actions actually taken with what has been written. However well-intentioned the 2017 formulation was, there had already been a 5-year demonstrable track-record of integrated sustainability praxis to build on from 2012 onwards. This text indicates the intention to integrate sustainability into praxis across functions, yet there is limited evidence to corroborate that sustainability matters are really taken into the politics¹⁴ of the institution. When the leadership supports this in their actions, this is an indicator of positive (green light) *SER 5.3a*. Thus, it remains to be seen how exactly all this prior activity was learnt from and factored into the new state of affairs within the SustainableUM2030 Taskforce by the Executive Board.

The description of how UMGO attempted to embed sustainability is furthermore corroborated by Friederike Sonnenberg's Capstone on intrapreneurship in universities, which developed out of her position as action research assistant in the ICIS-GO PhD project. In it she aimed to investigate *"how the UMGO can use the lean start-up methodology to optimise its project development in order to induce an organisational transformation towards embedding sustainability at Maastricht University"* (Sonnenberg, 2017a, p. 3). Outlining the transformative capacity and agency function of UMGO in embedding sustainability, integrated praxis assets were identified. This study contributed towards assessing whether and which transformation pathways (could) take place within UM, recommending further participative experimentation using action research. The dissonance between these embedded action research studies, and the written information of 2017 onwards, was brought up by the two dozen participants who took part in the Atkisson workshop in the Make the SDGs Yours Symposium the following year (UMGO et al., 2018a, p. 9). The symposium's results were critical of UM's recent Vision 2030 which was mandated by the EB to proceed with the structural adjustment program resulting in the SustainableUM2030 Taskforce. The result concludes the lack of a clear system for sustainability at UM, controverting claims made towards *"embedding sustainability in the roles/functions of the organisation"* (Fischer & van der Wetering, 2017).

¹⁴ Politics here, as with praxis and action research, are meant in the Arendtian sense, as actors creating spaces for newness (in her terms, 'natality') and possibility through collective action.

In spite of Fischer's ambition to unite research, education and operations under one 'roof' ('daak') in the Duurzaam onder Daak project - which seems to have ultimately been realised into the three portfolios of the Taskforce structure - the assessment of these participants of the 2018 SDG symposium compared the UM Vision 2030 document with the observed structures and processes at the time (UMGO et al., 2018a, p. 9). They found that *"there is no clear system for sustainability at UM. Even though there is a new sustainability structure (i.e. the Task Force), it is not really clear who is in charge of what. It is also not clear who you can approach if you have a concern about sustainability, or if you would like to start/contribute to a sustainability project yourself"*.

SER 5.5

SER 5.5 Sustainability research demonstration, knowledge enterprise

W= 1.58: Gr. 10, De. 1.

- Demonstration of sustainability-related research on campus, representing substantiated knowledge enterprise. Increasing visibility to university community: Communicating how to do sustainability, demonstrating fulfilled intent on prior goals/commitments. Using interdisciplinary resources for campus environmental management, stakeholder engagement and scope of responsibility

Sustainability research demonstration and knowledge enterprise was not all that evident in the data. Attributes, traits, and group behaviours that indicate the demonstration of sustainability-research on campus, by increasing visibility to the community on how to 'do' sustainability, was particularly lacking. Therefore *SER 5.5* is not present to a great extent within UM, although certain small scale or indirectly related activities appear to have engaged the community in other ways, however sporadic or lackadaisical. For example, in 2013, UMGO's education coordinator, proposed the benefits of the Living Lab Project Plan submitted with other partners at ICIS, and student research practice programs like PEERS, PREMIUM and MaRBL: **"enhanced visibility, effectiveness and complementarity of existing sustainability efforts in research, education and operations"** (Strasser & UMGO, 2013, p. 3). Next, an almost embryonic form of UM's own knowledge enterprise¹⁵ for sustainability is seen in the organisational problem analysis of the UMGO Sustainability Policy 2012-14. Could this vision be used to inspire the community?

"Maastricht University currently develops independent sustainability policies with a timeframe of three years and without a long-term focus. However, especially in the field of sustainable development, long-term thinking is crucial. Therefore, a sustainability vision is deemed imperative to link short- and medium-term steps to a long-term trajectory. Furthermore, a vision shared within the community, may inspire and incite its members to work towards the common goal of making Maastricht University more sustainable" (UMGO, 2012a, p. 6).

As seems to be made clear, visions are meaningless without step-wise short and medium-term targets that are realisable and followed up in practice. Continuing, if the next instance is interpreted as bringing research and education into operations, it could almost be a match for the demonstration of sustainability research. Although recommended activities to bring this into action beyond the words on the page remain to be seen. These would have possibly included FS and student research groups, as well as highly visible ways in which FS contributes to UM's sustainability as at the other cases:

"Sustainable FOLLOWING [sic] ambition in Operations, by

¹⁵ As observed and derived from ASU's reconceptualisation, this is akin to the practices and conceptualisation of 'design aspirations' and 'design principles' which are then made very visible all across campus.

- ✓ *Being social responsible by linking to society (internally and externally) [sic] and connect e.g. to MUMC+ and municipality;*
- ✓ *Following - and if relevant implementing – trends and ‘best practices’ from other organisations;*
- ✓ *Focusing on proven technology;*
- ✓ *Additionally being LEADING [sic] in operations as an innovator when inclusion, of e.g. knowledge from Education & Research, is possible.”*

The ‘FOLLOWING’ ambition is defined by the consultant as where UM is following the market trends on social responsibility, whereas the inclusion of research and education knowledge in operations is ‘LEADING as an innovator’ (Fischer & van der Wetering, 2017, p. 3). The latter, if actually performed, would indicate SER 5.5 Sustainability research demonstration. In the same Sustainable UM 2030 memo document, titled ‘possibility for inclusion at UM’ in Appendix 1, reference to “the challenge is to connect topics from Education and Research in Operations” is seen where the possibility to “Apply the sustainable knowledge from different departments to strengthen the sustainability of Operations” is mentioned (Fischer & van der Wetering, 2017, p. 10). The juxtaposition between the potential for realisation on the one hand, and the lack of evidence supporting said realisation on the other has more negative connotations. This is further highlighted by an identified “lack of communication about, and demonstration of sustainability efforts at UM” as presented in the 2018 SDG symposium findings report (UMGO et al., 2018b, p. 3): “Due to its fragmented structure, many sustainability initiatives happen in parallel. Increasing disclosure, demonstration, and organisational learning should make it easier for different initiatives to collaborate and hence increase their impact”.

9.2.2.1.3 Macro-level Diagnosis: Extra-organisational Scale - Institution & Environment

The Macro-level concerns the whole organisation’s behaviour, learning process, and overall transformation towards sustainability, and how it interacts with its surrounding environment (as well as how it is affected by its environment in turn).

Perspective	Average Weight per Perspective* (chart 6)	Aggregate Weight per Perspective	Rubric	Gr _c	Density	Weight per Category* (chart 5)
BSP	3.70	7.41	1.6	31.00	6.00	4.92
			1.6.1	15.00	3.00	2.37
OCM	1.26	2.52	2.4	10.00	0.00	1.58
			2.5	6.00	0.00	0.95
SES	1.03	2.06	3.2b	7.00	3.00	1.11
			3.4	6.00	1.00	0.95
CGS	1.58	3.16	4.2b	4.00	2.00	0.63
			4.4	16.00	1.00	2.53
SER	1.62	8.09	5.3b	5.00	1.00	0.79
			5.4	13.00	2.00	2.05
			5.6	15.00	2.00	2.37
			5.7	9.00	0.00	1.42
			5.8	9.00	1.00	1.42

Table 6: *Weights per rubric at the macro-level, with groundedness and density values, in the rightmost columns. Average and Aggregate weights per perspective in the left two columns. *Charts 5 and 6.*

Chart 5: *Weights per rubric at the macro-level. Detailed descriptions per rubric given below*

Chart 6: *Average weight across rubrics per perspective, macro-level: evaluation according to each of the five theoretical perspectives at the macro-level, taking the average of all rubric weights per perspective to show relative performance at this scale.*

Summary Description of Macro-level Diagnosis¹⁶

At UM, the rubrics representing extra-organisational assets of transformative sustainability are underdeveloped in proportion to the meso- and micro-levels. All rubrics are weighted at 2.53 and under, whereas one rubric stands out considerably: *BSP 1.6 organisational action research* at $W=4.92$. The next most developed at 2.53 and 2.38 respectively are *CGS 4.4 social responsibility assumption* and *BSP 1.6.1 organisational experimentalism*.

¹⁶ For a comprehensive deep dive into data per category at the macro-level, see the following section, *Detailed Overview of Data per Macro-level Category*, otherwise, move to the overall analysis outputs, *Section 9.2.3*.

UM makes the claim to take its social responsibility seriously. This may well be the case but evidentiary questions remain. Although the effect UM has had on its region is very evident, with a great deal of university actions accepting social responsibility (for example the refugee project Maastricht), the finer detail is hard to discern. For example, are the strategic document quotes just words or is there evidence to back up their objective intentions? How does UM guarantee social wellbeing?

With regards to UM's efforts to incorporate sustainability into education, ICIS, previously a part of the faculty of humanities and sciences, is a good example. ICIS aspires to expand their knowledge and now offers bachelor, master, and PhD programs solely about sustainability and intends to create a network of scholars that are able to make the world more sustainable. Furthermore, UM does currently provide courses on sustainability, through the SustainableUM2030 education portfolio. Incidentally, Ritzen, when asked how UM had developed with respect to sustainability since 2010, mentioned that despite sustainability being cast into UM's organisational DNA with the founding of the Green Office, UM could have been more ambitious. It could have cooperated regionally with Zuyd university and potentially other universities in the Euregio: Hasselt, Liège, and maybe Ghent; however, cross-border facilitation of projects is very difficult, where the example of the Sustainable Urban Neighbourhoods (**SUN**) project was mentioned.

The roles and expectations research of 2014 marked a new precedent when the project proceeded to expand the assessment of sustainability to a system-wide, institutional scope in keeping with the research questions. This holistic inquiry was tellingly juxtaposed and contravened by top-down external audits and judgements which tended to focus on the Green Office. Nor was creating the Taskforce inclusive or respectful of its views or experiences. This development, only perceptible due to the application of the tool combined with the insider action research, is likely an indication of the power dynamic that ought to be addressed should UM actually seek to transform itself along a more positive direction.

Once you take UMGO's reporting history, the creation of its own reporting instrument (UniSAF), the navigating institutional dynamics workshop series, and UMGO's attempts to report according to STARS out of the equation, there is no evidence that sustainability reporting standards and instruments are applied by UM. The good intent of the UM strategic document of 2017-2021 is laudable, but one lacks the substantive orientation and support for insider action research to fully qualify this as an organisational level of action research with transdisciplinary components. Perhaps the elements and potential are there, but they are not nearly nurtured enough to become part of the way of doing research and education towards sustainability in UM. Indeed, the whole university does not appear to fulfil rubric *SER 5.3b integrated sustainability praxis external impact* well. GO-driven efforts over the years did strive towards substantive impact of UM as a whole on its surroundings. Whilst trying to measure, monitor and account for UM's external impacts – whether, where, and to what extent it took place, in order to amplify its positive effects – the traction needed for the wider organisation to undergo the necessary learning for this to become a management practice was not achieved. Due to diminishing resources and support, the results were limited in terms of cross-fertilising the necessary integrative thinking.

Detailed Overview of Data per Macro-level Category

The Macro-level concerns the whole organisation's transformation towards sustainability and how this is nested within its environment.

BSP 1.6

BSP 1.6 Organisational Action Research

W= 4.92: Gr. 31 De. 6.

■ Evidence of: jointly organised transdisciplinary processes, community reach-out programs, boundary work, participatory and/or action research, behavioural interventions, 3rd person action research practice or inquiry (as per Torbert)

The qualities underlying the *Organisational action research* asset is heavily incident in the body of evidence and is the second most-highly weighted. This clearly indicates its presence within UM. This contradicts the thus far fragmented organisational structure of UM, to the extent that organisation development in the form of third-person action inquiry could not take place to a fully realised extent. This would suggest a lot of unrealised potential that could be unleashed should UM be 'defragmented' with more holistic sustainability transformation policy and praxis. In the body of evidence on actions and practices, it can be seen that policy making does not appear as participatory as when the SBE sustainability ranking study referenced the UMGO 2012 sustainability vision: "*Living a culture of sustainability of participatory policy-making*" (Noirhomme et al., 2013; UMGO, 2012a). Seven years later, it has since been over-written by the structural Taskforce reforms. This statement is continued in the later 2015 SBE study on integrated thinking, which assessed the idea of a reporting-driven sustainability transformation for UM: "*Looking at the community and its development towards the 'Living a culture of sustainability and participatory policy-making' the UMGO draws the conclusion that the university is on the right track to foster a sustainable mind-set and create consciousness for sustainability issues. It is at this point our project comes into play. We feel it prudent to investigate how the university can stimulate a holistic, integrated way of thinking and create awareness about sustainability among all its stakeholders*" (Dirat et al., 2015, p. 3). Both these studies, having been conducted as part of the SBE course Business Innovation and Sustainable Development, in cooperation with the UMGO Living Lab project, demonstrate that insider action research efforts do take place. However, from 2013 onwards, this recommendation never amounted to anything substantive at the policy and leadership levels.

Trans-disciplinary research interventions related to behavioural interventions engaging social actors appear to take place at the faculty-level at FPN, yet the text lacks evidence of actual external engagement. An example from Maastricht UMC+'s strategy report 'Healthy Living' presents its integrated philosophy to health. It includes reference to the multi-disciplinary training project Healthy Population, however, no focus on broader, interconnected, co-creative or insider sustainability aspects or research of UM itself. Sonnenberg's Capstone was connected to a direct account of action and pragmatic research within, about and around the organisation itself, which was connected to this research's own insider work: "*This Capstone is based on a previous undergraduate research which was part of an extensive PhD project, which looked specifically at how universities can navigate their organisational transformation towards sustainability and how that can be effectively achieved. It builds on the research results acquired through a participatory action research at Maastricht University (UM) and its Green Office (UMGO) extended through a case study of Leuphana University Lüneburg in Germany*" (Sonnenberg, 2017a, 2017b). This PhD research itself represents substantiated action research practice attempts within UM.

In the UM 2017-2021 Strategic Programme, aspirations towards participatory and transdisciplinary research that connects disciplines UM-wide are shared: "*Placing initiatives*

such as the long-term projects and open, collaborative learning labs in a broader context should facilitate the development of a learning ecosystem: a system that... allows the co-creation of knowledge across disciplines, and furthers the university's aim of becoming a more collaborative and inclusive academic community" (UM, 2016, p. 12). In 2018's SDG symposium, a panel discussion was hosted which openly discussed "[c]urrent actions and challenges in achieving the SDGs" and experiences by the "panellists (either personally or at their workplace)". The panel discussion was composed of UM staff, students and community leaders and was wrapped up by "looking at collaborative opportunities within the Maastricht community" which aimed to spur participation and engage "the views and ideas of the audience to come up with concrete actions that we, as a community, can take" (UMGO & Impact Lab, 2018).

The following passage openly shows reflexive practice between and within the ICIS-GO and UMGO team regarding how to implement advice from a senior ICIS researcher: "I have reflected on Annemarie's advice below, cc'ed her in so that she can see developments, and to say that I find her advice balanced and strengthening with respect to enabling this intervention to be more successful. Seeing that R&E is indeed the core business of UM, it makes sense to pivot our arguments more strategically on them, identifying as you have been advised at FS, to be more specific with how integrating sustainability like this will bring benefits. My suggestion has been to add some ROI's or ESG issues that having a coordinator and commission would bring and compare these in a 'before' and 'after' scenario that envisages the transition and clear returns to the EB" (Baker-Shelley, 2015a). This formed part of the co-research team's experiment to attempt to restructure governance for sustainability from the bottom-up (see **Section 9.1.2**). This internal communiqué, passing on recommendations from an UM-ICIS sustainability researcher - herself long involved and central to the emergence of UM's sustainability change-agency, governance and research - is a good demonstration of attempts at insider action research to expand a community of inquiry.

In 2014, a key brief disclosed to all stakeholders involved in the Green Office and Supervisory Board 'roles and expectations' interviews identified "both an essential opportunity and a risk in the research process" in this project as "the political context under which it operates (Brannick & Coghlan, 2007; Hoover & Harder, 2015), and how it might affect the implementation of the Living Laboratory phase of the project under the Action Research methodology (Coghlan & Brannick, 2014; Heiskanen & Rask, 2008; Waterman et al., 2001). Especially being that an annual assessment of the GO is a key deliverable in the PhD, it is logical to assume that the institutional context within which the former operates becomes an essential part of the appraisal process and can significantly affect the success of the activities and projects under the GO portfolios, in addition to the organisational-level systemic shift that contributes better to a sustainable development" (Baker-Shelley, 2014a). This prediction was later proven highly relevant. This indicates the presence of corroborating language, however the culture identified and experienced seemed to preclude experimentation and inquiry into the institution, its political dynamics, and agency with respect to sustainability work. Moving to the roles and expectations interviews themselves, key members shared their views on the roles of students and staff together in achieving sustainability at UM: Michiel Ritzen made a proposal for inter-disciplinary collaboration of diverse internal (and external actors via the SB) actors, in response to the recommendation to bring in a Finance representative, Hanneke Rademakers for integrated reporting expertise (Ritzen, 2015). This can be framed as a warning to keep it open. Indeed, it appears this was a prescient prediction.

In the 2017 proposal 'Making UM SDG Fit: Mapping UM's progress with the Sustainable Development Goals' – itself the response to the President's request for UMGO to concentrate efforts on the SDGs - the Green Office aligned its mission and prepared the project to map UM's activities according to the SDGs, comprehensively, using UM's own research and education community. This proposal also actively tried to align to the UM

‘Community at the CORE’ strategy. The methodology and participatory approach aimed to bring the leadership’s community at the CORE (collaborative open research and education) into being when it came to making sustainability actions more holistic (Vasylyeva et al., 2017): *“The benefits of such an undertaking would be twofold in that it would provide a standardized framework for UM to measure and report on its progress towards becoming a sustainable institution. Furthermore, given that UM also aims to be an innovator, and that the application of the SDGs to universities is a novel approach, developing and carrying out such a project would position UM as a pioneer in sustainability reporting, performance and evaluation within the Dutch higher education scene, the Euregio, and amongst its international competitors”* (Vasylyeva et al., 2017). The key piece of information taken away from the reaction to the proposal is the aversion in UM to insider research on its own research and education procedures. This contradicts the view of UM as being amenable to holistic and comprehensive action-oriented research within its own cloisters. Even when the benefits were made clear, when alignment to the CORE strategic programme was attained in the proposal, and logical reasons for why this kind of work should not be rushed were presented, the consultant team and the leadership pushed towards the ‘quick scan’ option, effectively disabling more comprehensive efforts from taking place. Overall, the email correspondence between the former environmental and sustainability advisor and the assigned consultant on one hand, and the ICIS-GO PhD and responsible members of the strategy, reporting and assessment, and governance portfolios of the Green Office on the other, is highly significant. The latter group had already met to formulate a clear and detailed proposal for such a long-term action research project by the time the correspondence - and subsequent demand to do the quick scan - was made. It shows that flags were raised early on, but went unheeded:

*“An initial SDG alignment to UM research and education can help us to see our progress towards achieving and evaluating the societal impact desired by UM. Having done some preliminary research, we struggled to find a good framework for such assessment of the university level. There are scattershot examples, but no normalized approach (see attached from university of Edinburgh, slide 4 especially). Hence, this can also be our chance to demonstrate ‘Leading in learning’ by creating an academically rigorous university assessment and becoming a pilot for this, starting with 2017 as a baseline. In our opinion (unless there are certain time constraints), **we should not rush it, but rather do a proper analysis on it by January...** Naturally the goals would be first transformed into the university-related context, boiling them down for their materiality using the strategic programme. They have to complement UM stakeholders’ context, and not be superfluous to them. There will be a diverse and rich data set that needs to be organised effectively, in collaboration with these stakeholders”* (Baker-Shelley, 2017b).

BSP 1.6.1

BSP 1.6.1 Organisational Experimentalism

W= 2.37: Gr. 15, De. 3.

Manifests at Macro-level

■ Reference to living laboratories or test beds, where actors relate to the use of their university campus as: a community of inquiry/practice that uses its own social and material surroundings to experiment. Adoptive of living lab approach or having the campus objective with socio-behavioural & inclusive experimentation

BSP 1.6.1 is present to a good extent at UM, but to varying degrees. Although not nearly as pronounced as its sister, this rubric has nonetheless returned some interesting aspects of UM’s organisational behaviour, manifesting at the macro-level in particular¹⁷.

¹⁷ In the other cases the findings for this rubric mostly manifested at the meso-level of sub-unit and group behaviour.

For example, in UM's 2012-16 strategic programme, UM describes itself as at a unique vantage point for European unification: *"Many challenges that the process of unification may bring, are already encountered in our region, and that makes the Limburg-Liege-Aachen area a unique test bed where the European challenges of the near future can be studied in advance. Indeed, we firmly believe that our future is Europe, and that Maastricht University, together with our Euregional partners, can help in preparing our own future, by focusing on the Euregion"* (UM, 2012). This does not specifically refer to sustainability-related activities, however, a test-bed at the regional scale is claimed in the context of using the Euregion for studying European Integration/Unification as a whole.

The Living Lab project that was in operation at UMGO from roughly 2013 to 2018 is also a clear representation of organisational experimentalism, with many innovative student research projects forming a part of a continuous evidence line for the analysis and to corroborate accounts. See, for example, the series of studies referenced by the SBE Business Innovation and Sustainable Development master's students of Marc van Wegberg (Dirat et al., 2015; Noirhomme et al., 2013). In partial contrast to the living lab approach from before 2017, the new UM Vision 2030 makes indirect reference to living labs: *"Based on the input of the interviews and sustainability meetings in 2017, UM states that sustainability: needs a focus on inclusion of UM in the community and vice versa in Education, Research and Operations to: connect education and research to topics of UM's operations (living labs)"* (Fischer & van der Wetering, 2017). No evidence supports the properties of an experimental culture so far surrounding more recent events, defined as one that does not preclude actors from inquiring openly into the nature and function of their own organisation and its surroundings. Following this line of inquiry into the strategic documentation, further indirect references were found in the more recent UM strategic programme of 2017-2021: *"Centres such as the Institute for Transnational and Euregional cooperation and Mobility (ITEM), focusing on cross-border issues, serve as interesting 'living labs', helping to create an innovative knowledge region with international appeal right on our doorstep"* (UM, 2016, p. 20). Again, limited evidence is apparent beyond the strategic policy language.

A good narrative account of an experimental mindset being applied was found in Harm Hospers' nostalgic reference to the early days of UMGO, with Lukas Warming's attempt to Green UCM: *"Have you read Lukas Warming? He's a funny one... He was such a strategic genius because he just, he knew where he wanted to get.. A: Personally?.. H: Yeah, so, but also, no with, but on the sustainability issue. So his goal was to make the buildings... One of the projects he was on was to turn UCM into a more sustainable building, or to do something about sustainable buildings at UCM, and he was a UCM student, and he is a UM student case-study... A: A living lab? H: Yep. And he was, I never needed to tell Lukas what order to do things, who to involve, he knew it all... But, interestingly both projects failed at UCM... And one of the most beautiful things he did, he produced a document, a paper, why it failed and he looked at it. A: He turned the failure into a learning experience"* (Hospers, 2014). Hospers clearly admired and supported this early team, who despite failures made sure to learn from them. This trait has continued prevalently in successive teams; the support and admiration wore off. Certain negative experiences become more common when the UMGO and PhD co-research team ran into walls, with feelings sometimes turning quite sour indeed, especially in light of the top-down restructurations the team lived through in 2016-2018:

"The commonly held, but rarely discussed view is that you cannot dare to act as a change-agent within a university until you at least have a PhD. This precludes the whole student population, the very logic of the Green Office, and organisational sustainability itself. Their idealism and enthusiasm to try out new things and experiment using the campus as a test bed is discouraged because inquiry into how the

organisation works is implicitly undermined” (Baker-Shelley, 2017a).

This reference is quite a negative interpretation of a culture and institutional environment that precludes test-beds from fully taking place, **“because inquiry into how the organisation works is implicitly undermined”**. After searching for evidence of implemented experimental test-beds, in writing or in the interviews of public dialogue on the internal workings of UM, none was found, which would support this conclusion.

BOX 2: A first-person Description of UMGO SDG fitness proposal of 2017.

SDG Fitness Proposal as a final intervention towards the Living Lab

Together with the group I coordinated to get the SDG living lab off the ground - Green Officers and an engaged UNU-MERIT researcher - we recommended an internal participatory research approach for mapping UM’s activities according to the systemic and integrated approach we thought was a prerequisite to working with the SDGs. We formally submitted a proposal detailing a more long-term, participatory, and comprehensive approach, asking for a modest grant to begin. This proposal was also aligned with the content of the new Community at the CORE UM strategic programme, following the recommendation of the former Rector Magnificus. His advice to me and the former environment and sustainability advisor on his departure was to focus on PhD candidates as a natural connector between students and staff in sustainability work in the university, and that more appointments that straddled academic and administrative functions like the ICIS-GO PhD would be needed for the transformation to sustainability. He also advised to make a strong push for sustainability being a core part of the Strategic Programme 2017-2021. This informed and linked the action research strategy together for the last period – see [Section 9.1.2](#).

A more grounded reference to the SDG fitness proposal alludes to a planned experiment with UM students and staff: *“This approach, we propose, adds to the community-driven aspect that forms UM’s ‘unique selling point’: integration of UM’s research and education in a collaborative and open manner. Furthermore, in establishing a firm, shared and analytical baseline for UM’s SDG fitness, we therefore prime UM’s campuses as living laboratories for experimentation and demonstration of the sustainability research and education that we do. This stimulates research processes with real-world, real-time data, and by involving student projects and tutorials, education follows suit in praxis. We are currently in touch with the University of Edinburgh’s Social Responsibility and Sustainability department to learn how to best do this, as they are also aligning SDGs to their activities” (Vasylyeva et al., 2017).*

This was the last time the attempt was made to scale the Living Lab for transformation to sustainability initially designed into the ICIS-GO PhD project. The ICIS-GO PhD project embodied organisational experimentalism, as shown in the 2015 sustainability vision advice: *“In the area of research, the annually published Maastricht University Journal of Sustainability Studies was established, regular knowledge exchange symposia take place and a living lab enables students to conduct research on real life sustainability issues. Next a PhD position was created to research institutional transformations using Maastricht University as a key case study” (Fischer, 2015b).* The ICIS-GO PhD can be seen as a knowledge innovation for learning about transformations towards sustainability with UM as a case study, therefore creating space for internal inquiry. Further references to the living lab approach between UM, the Province and the Brightlands campuses were found in the same document (2015b).

OCM 2.4

**OCM 2.4
Organisational-
societal learning**

- The organisation learns from and anticipates issues mature on the societal agenda, that is approached and internalised by adopting a civic orientation towards the external task environment

W= 1.58: Gr. 10, De. 0.

Organisational-societal learning, the rubric where the organisation learns from and anticipates issues mature in societal discourses by adopting a civic orientation (OCM 2.4), is present to a limited extent when we look at UM's interactions with its external environment. The rubric is not well connected in the analysis through the data, with the 10 groundings that were found isolated from associations with other codes. This seems to suggest that much potential exists to enhance the attributes and assets uncovered by this research. For example, the Navigating Institutional Dynamics series of workshops aimed to instil a civic engagement in the university through raising awareness about how it worked as an organisation (Baker-Shelley & Bloom, 2014). In the June 2017 'Making UM SDG Fit' proposal to President Paul, Vasylyeva et al. (2017) proposed an organisational learning technique that would enable faculty to describe how their work relates to the SDGs, as part of our overall proposal - eventually unsuccessful in garnering support - to map UM's activities, intrinsically and holistically according to the SDGs themselves.

Positive indications of a civic orientation towards the external task environment are seen in the UM 2017-2021 strategic programme, where the 'collaborative' part of 'collaborative open research education' (CORE) is explained: *"collaborative refers to forging links with different stakeholders in the city, the Euregion, the broader European continent and the rest of the world. Creating meaningful relationships between the university and society and encouraging students to become actively involved in their community is not only beneficial for society, but also contributes to a meaningful study experience and enhances employability. The emphasis on societal engagement as an inherent part of UM's character additionally serves to enhance the profile and distinctiveness of our institution"* (UM, 2016, p. 5). Certainly, UM's intent to be in sync with its societal environment is clear from the 'collaborative' aspect of the strategic programme. Yet, a big part of this rubric also includes organisational learning, of which there is limited evidence. As a core part of this rubric, it is this process and dynamic of organisational learning that appears to be lacking. For example, Sonnenberg, as action research assistant in this project, performed an action-oriented PEERS research of UMGO (preceding her Capstone, 'Intrapreneurship in Universities: "the dreamers who do [sustainability]"') as part of a key 2017 initiative to experiment with the usefulness of the Lean Start-up methodology with the Green Office team (Sonnenberg, 2017a, 2017b). Despite the failure of implementation of the methodology, lessons were learnt regarding the resistance to learning about the organisation. This was an attempt at starting up a new 'flywheel', or feedback loop at the group level, that would have hopefully developed into organisational learning with sufficient wholesale buy-in and top-down support.

Attempts at inculcating organisational learning continued with the 2018 'Make the SDGs Yours' Symposium, which comprised of a significant afternoon workshop, facilitated by Alan Atkisson, based on the 'VISIS method' pioneered for cocreating sustainability innovation in groups: *"The afternoon session consisted of a workshop, based on the VISIS method, which gave the audience practical tools to facilitate the process of tackling the SDGs (as well as any other environmental or social problem). The workshop was divided into four discussion topics, namely: research and education, operations, societal engagement, and life after UM. Each group discussed how sustainable*

development could be furthered within their respective topics. We recognize that UM may already be tackling some of the problems mentioned below. The fact that problems were still mentioned, however, may indicate gaps in communication and/or implementation. **Instead, these points serve to identify gaps in the new sustainability approach that we, as the UM community, may tackle together**" (UMGO et al., 2018b, p. 1). The contents continued with the group's recommendations for improving UM's sustainability approach; a brief summary of the workshop's main findings, and a separate, more in-depth overview of what was discussed in each group was shared as a separate extended summary (UMGO et al., 2018a). The summary and recommendations, moreover, presented certain drawbacks of the new sustainability approach adopted by the leadership at the time: "UM as an influential economic and political player: UM has certain limitations in bringing about change, due to resources as well as developments at the provincial and national levels. UM, however, is an important economic and political player at the regional level, and plays a prominent role in the international sphere, at least in the areas of research and education. **UM can use this power and influence to mobilize sustainability efforts within UM, as well as the wider Maastricht/Limburg community. In other words, UM should embrace proactivity and anticipation rather than reactivity and constriction**"¹⁸ (UMGO et al., 2018b, p. 4).

OCM 2.5

OCM 2.5 Organisational extroversion & openness

W= 0.95; Gr. 6, De. 0.

- Adopts extroverted role with open boundaries: a porous organisational 'membrane':
- 1) Reacting quickly to changes in the external environment;
- 2) Focussed on wider world with respect to societal wellbeing & ecological carrying capacity

OCM 2.5 *organisational extroversion and openness* is not very present at UM. Six groundings in the data support that UM reacts quickly to changes in its environment, which on its own would indeed show organisational extroversion, but coupled with the very low return on evidence in the key qualifiers of openness and transparency, this taints the diagnosis. Based on the analysis of UM's responses to societal discourses and needs (for instance, the student occupation of Maagdenhuis in Amsterdam in 2015, and the more recent calls for fossil fuel divestment from youth climate justice activists), it reacts quickly to external changes but is less than proactive and open when it comes to an intrinsic focus on societal wellbeing and ecological carrying capacity.

An early SBE strategic programme shows an extroversion and openness to the wider world at the faculty-level, yet UM's attitude to the outside world in terms of sustainability exhibits an incipient and fragmented structure according to each faculty, rather than an integrated, holistic approach. This suggests power division between faculties and their deans, and the EB and central management. In spite of this observation, the overall UM 2012-2016 Strategic Programme showed that the university is conscious of its role as being a part of a European region: "*to be aware of their position in a globalizing world. Regional economic prosperity will depend upon the degree to which regions adapt a diverse institutional presence. Only then regions can harness the forces of globalization to their own ends*" (UM, 2012, p. 3). This statement's rationale is based on economic gains and development, with social and ecological aspects missing.

Further hits in combing the dataset for OCM 2.5 attributes included references in the Maastricht UMC+ 2020 Strategic Programme: "*The strength of [our research programme] lies in part in its long-term and successful cooperation with regional health care partners. For example, the*

¹⁸ This directly supports Annemieke Klijn's observation that it is time for UM to let go of its "successfully cultivated inferiority complex" (Klijn, 2016, p. 11).

Limburg Alzheimer Centre has, for a considerable time now, been formed by the clinical departments of the hospital, the Elderly Care department at RLAGG Maastricht (ambulatory mental health services), and MHeNs¹⁹... The regional organization providing specialist mental health care has for decades had a unique and internationally prominent collaboration with Maastricht UMC+. The structural cooperation with regional health care institutions in the field of academic research makes it possible to convert innovations directly for use with patients and their environment” (Maastricht UMC+, 2015). This shows a central focus on care and public health; founding principles and orientations since the founding of the eighth medical faculty led to a university in Maastricht. The key term analysed in this rubric’s presence was openness.

Overall, despite the low weighting of this rubric, as with *BSP 1.3*, there is some isolated evidence of UM’s extroversion and openness. In the analysis, this was clearly shown by the formation of a code to show data that specifically referred to the activities of UM’s recently established satellite campuses in Heerlen and Venlo, such as the Brightlands Health, Chemelot, and Smart services campuses, as well as the new University College Venlo.

SES 3.2b

SES 3.2b External implementation of governance for sustainability

W= 1.11: Gr.7, De. 3.

- The organisation takes responsibility that knowledge of good governance and management of natural resources and ecosystem services is developed and implemented extrinsically, practicing leadership, entrepreneurship and socio-technical innovation for other organisations & societal actors

External implementation of governance for sustainability is present to a limited extent in and around UM. In comparison with its meso-scale sister *SES 3.2a*, *SES 3.2b* is a third less-weighted in the evidence (**W**=1.11 compared with *SES 3.2a* **W**=3.81). This indicates clear differences between internal governance for sustainability within UM’s units and departments, and taking responsibility that knowledge of good governance and management of natural resources and ecosystem services is developed and implemented in UM’s immediate and wider environment. It also shows a lack of transference of internal sustainability governance practice to UM’s surroundings; conceivably, this also shows that potential exists for how to implement this knowledge. Tentatively, UM could well be doing this more with its satellite campuses, e.g. via Brightlands.

In the 2014 UCM thinktank, ‘Steps towards the Green Office Model 2.0’, positive matches were found under the recommendation for Green Offices to “explore possible financial support available from external organizations”; continuing, they explain the potential returns for investors in terms of knowledge of sustainability: *“They will probably want to see some kind of input in their companies related to sustainability. When approaching a company outside the university, one can approach the company as a business case. This business case should prove to the company how the increase in sustainability measures on for example their operations, has a positive result on the company’s success. In return for the help the Green Office gives on making the cooperation more sustainable, the GO can demand a little amount of financial support to initiate new projects at the university”* (van der Zwan et al., 2014, p. 33). Moreover, the ‘Dutch Sustainable Growth Coalition²⁰’ is mentioned as a

¹⁹ Maastricht School for Mental Health and Neuroscience: if the human resources at MHeNs are allocated internally, rubric *BSP 1.1* Psycho-social wellbeing can be further developed, with a greater focus on UM’s own students and staff, engendering their positive psychological and social resources.

²⁰ However incompatible economic growth is in the framework of ecological carrying capacity and planetary boundaries, the Dutch Sustainable Growth Coalition, comprising of Unilever,

possible target for this strategy (van der Zwan et al., 2014, p. 34). In conclusion, then, limited evidence of *external implementation of governance for sustainability* was found at the interface of UM and its surroundings, however, potential exists to better transfer and scale the more-developed *internal governance for sustainability* component.

SES 3.4

SES 3.4 University-driven asset-based community development

W= 0.95: Gr. 6, De. 1.

■ Students, educators, researchers, & practitioners lead by forming partnerships with civic actors to find innovative solutions to drive societal transformation. Teams of staff and students go out into the community to:

- 1) understand community problems;
- 2) identify the spaces for sustainability to come in to solve community problems;
- 3) resolve problems in innovative ways via interventions driving societal transformation

SES 3.4, university-driven assets-based community development, is present to quite a limited extent at UM. However, interestingly, there are several positive signs that this rubric can be enhanced in the near future. For example, the 2014 UCM Thinktank recommended UM to move in the direction of cross-sector collaboration, supporting this with ‘Public Integrative Leadership Theory’²¹ to explain how *“this type of cross-sector collaboration between Green Offices and institutions operating in different sectors outside the university can prove beneficial to all the parties involved by making use of the core assets available to these organizations operating in different fields. It would be possible for Green Offices to ‘shape and take advantage of windows of opportunities’ by simply collaborating with external institutions, such as NGOs, businesses, municipalities, and other parties on mutually beneficial initiatives (Crosby & Bryson, 2014)”* (van der Zwan et al., 2014, p. 42). In the same study (also indicative of *BSP 1.6*), the UCM Thinktank team interviewed the UMGO research coordinator, Judith Enders: *“We work 14 hours a week but there is so much to do that you can practically have a full-time person working on this. For example, my responsibility is to stimulate cross-faculty and interdisciplinary sustainability research. That is a huge task in itself because you need to bring researchers from different faculties together and so you need to organize symposia, which I’m doing twice a year. We also stimulate student research in the sustainability area through the publications, and paper in the UM sustainability Journal of sustainability studies”* (Enders in van der Zwan et al., 2014, p. 87). This quote indicates a partial presence of rubric *SES 3.4*. Students, educators, researchers and practitioners did form partnerships in and around the symposia and other UMGO-induced activities, in an attempt to also understand community problems and see how sustainability solutions could help. However, these activities seemed over-reliant on UMGO, and therefore it cannot be said that without the GO they would still occur; without the necessary institutional and teaching support, resolving community problems in innovative ways via interventions remained hard to attain.

Another match was found in key correspondence with Jan Mory, where he framed communications skills in his characterisation of intrapreneurial qualities, after having studied UM and UMGO in 2017-18. He summarised that: *“[y]ou need to be able to... help*

DSM, AkzoNobel, Friesland Campina, Philips, Shell, KLM and Heineken developed a strategy to couple financial and economic growth with social and environmental return.

21 Integrative public leadership refers to the work of integrating people, resources, and organisations across various boundaries to tackle complex public problems and achieve the common good. (Crosby & Bryson, 2014)

people understand their role with respect to sustainability and engraining it in their everyday life routines so they don't perceive sustainability efforts as "additional workload" for them" (Mory, 2018a). His point regarding engraining sustainability in quotidian routine so that it no longer seems like extra work for university actors describes the barrier of misperceiving UMGO as creating extra work and policing people seen in other parts of the analysis. A final example is drawn from the more recent UCM Thinktank of 2018, 'Where to go UMGO? The Road Towards SDG-oriented Research', which refers to the 'World Café' model to increase "student interest and motivation related to the SDGs via facilitation by UM authorities and researchers": they continue by suggesting authorities and researchers "use a participatory planning, community-based approach [that] provides the students with the chance to obtain knowledge about the more technical and political facets of the UM authorities and researchers..." This approach would have – if adopted – helped to meet the third community engagement and intervention criterion of this rubric: "the Café allows the students to evaluate these factors 'according to their own set of values and preferences' towards SDG-orientation (Slocum, 2003)" (Caredda et al., 2018, pp. 52-53). This covers the first two criteria and a hypothetical recommendation. There is much value to be added by building on the clear potential that exists at UM under the rubric of *SES 3.4 university-based ABCD*, towards healing and re-invigorating the current situation.

CGS 4.2b

CGS 4.2b Accountable Disclosure of Environmental Social Governance

W= 0.62: Gr. 4, De. 2

- 3) After materiality analysis (1&2 in 4a), the whole organisation's sustainability performance is collated and made presentable in a comprehensive, high-quality sustainability or integrated report. Internal evaluation of ESG issues (4.2a) are communicated externally to relevant stakeholders

The findings for *CGS 4.2b* with respect to its lower level sister indicate a similar dynamic as with the governance for sustainability rubrics. The attributes underlying *accountable disclosure of ESG* are five times less prevalent in the data than those for *internal ESG evaluation*. This logically points towards the lack of comprehensive, high-quality sustainability or integrated reporting (processes) at UM. From the four cases where relevant information was retrieved, two help best to diagnose the situation. Firstly, in an independent student research study at SBE, it was corroborated that the Green Office (as well as the Environmental and Sustainability advisor) took sole executive responsibility for the sustainability reporting process: "Since 2010 the UMGO has initiated integrated reporting in order to report on and improve the sustainability at a university level" (UMGO & Grahls, 2015, p. 5). Secondly, in 2018, the larger organisational issues supporting this observation that UMGO drove sustainability reporting were presented in the Make the SDGs Yours output reports: that "there is a lack of communication about, and demonstration of sustainability efforts at UM. Due to its fragmented structure, many sustainability initiatives happen in parallel. Increasing disclosure, demonstration, and organisational learning should make it easier for different initiatives to collaborate and hence increase their impact". This last point relates to the aforementioned lack of organisational learning presented in *OCM 2.4* and forms an association with the sustainability research demonstration rubric *SES 5.5*. This 2nd-person review by UM community members produced a negative result for both codes; a well-functioning sustainability reporting process as well as the requisite structures and people would help alleviate this fragmentation.

CGS 4.4

CGS 4.4 University Social Responsibility Assumption

W= 2.53: Gr. 16, De. 1.

- 1) accept the moral obligation of the university defined by its own political economy, accepting social duties, and participating in deigned social cooperation;
- 2) collaborative governance is undertaken through partnership with external societal actors (NGO's, business, citizen groups)

The result for this rubric is difficult to clearly formulate, as on one hand *CGS 4.4 university social responsibility assumption* is well grounded in the evidence and UM has taken clear steps to accept social duties; yet, on the other – as the transformation signature later shows - it remains isolated, aside from a tentative association with *CGS 4.3 externality recognition & internalisation*. This would suggest that this asset remains underdeveloped at UM, but that lots of potential exists to develop its underlying attributes in combination with a possible knock-on effect of enhancing the manifestation of other systemic rubrics as well. The evidence that most demonstrates this facet of the diagnosis is found in UM Sustainability Vision 2030 drawn up by the Environmental and Sustainability Advisor in 2015, where a key passage of text directly resembles previous text UMGO staff, the ICIS-GO PhD, and Fischer, had proposed to work into the new Strategic Programme (see *CGS 4.1* for full quote: e.g. “*Communicate sustainability as a one of the key values of Maastricht University... Increase social responsibility within all university departments*”). The recommendations represented a distillation of *a priori* experiences into an array of different projects, but were also formulated as a subversive call-to-action via established organisational procedure and bureaucracy (Fischer, 2015b, p. 4).

Another relevant finding was the problem and solution formulation in the rationale of the navigating institutional dynamics workshop series. The problem was defined as the ‘significant gap in how the public and private sectors engage on governance for sustainability’. The solution-orientation, an aspirational goal and approach that universities should take centred on ‘*this governance deficit on sustainability (Spector, 2012)... remedied by using pioneers in the business world and higher education that respect their roles in society and environment in collaborative governance of public goods*’. The subsequent three steps covered in the workshop - stakeholder management, materiality, internal/external communications – were designed to help nudge the university’s institutional dynamics towards collaborative governance for sustainability.

Next, the Green Office’s Sustainability Policy for UM 2012-14 recommended - as a policy objective - to “[e]stablish a continuous dialogue on sustainability in the region of Limburg between Maastricht University, the municipality of Maastricht, and the province of Limburg”; useful steps in partnership towards greater social responsibility assumption (UMGO, 2012a, p. 4). Leading on from past UMGO policy, the Roadmap 2030 highlighted the obligations of “*the sustainable University*” to consider “*its ecological and social responsibility*” in the specific context of contracting, tenders and procurement: “*The impact through procurement is substantial. [UM] can play an important role in fostering the idea of sustainability throughout the supply chain*” (UMGO, 2013a, p. 15). It is unclear the extent to which fostering sustainability in UM’s supply chains has taken place, with a lack of initiatives found aiming to implement this recommendation.

Coupled with themes around ‘innovation’, ‘valorisation’ and the ‘dissemination of knowledge’, an economically-framed reference by President Paul is found in the UM Corporate Brochure ‘Leading in Learning: Our value for society’ - a strategic report demonstrating societal value creation: “*Maastricht University is embracing its responsibility as a guarantor of social wellbeing. With this, UM is not only a knowledge institution of international*

importance, but also an economic motor for Limburg and the Euregion" (UM, 2013, p. 2). Following the evidence trail of UM strategic marketing and communications literature, there are consistent efforts throughout the years to create the perception of good social responsibility: *"In an increasingly competitive, globalising society, communication, collaboration, awareness of social relations and social responsibility are vital binding factors"* 'Inspired by Talent' 2007-2010 Strategic Programme (UM, 2006). In 'Inspired by Quality', three themes are targeted of learning and innovation, quality of life, and Europe and a globalising world, *"[i]t's aim is to contribute to solving 'grand societal challenges', that is, the societal problems addressed within the themes. The three central themes will be addressed across the university and together with our primary partners"* (UM, 2012, p. 9). In the context of the larger passage on page nine and ten, the report shows how UM binds itself to taking social responsibility in terms of its social contract with students during and after their studies. This appears to be contradicted in 2018 by the UM community participants of the SDG symposium, on the experiences of students regarding 'a UM degree; and then what' referring to a skills gap: 'Is education at UM still relevant?' (UMGO et al., 2018a, p. 17). Finally, as part of the Strategic programme 2017-2021, and introduction in the Sustainable UM 2030 vision memo, UM's mission and strategy is presented with four core values, one of which is *"[t]o take our social responsibility seriously by linking the University to society, from the local to the global level"* (Fischer & van der Wetering, 2017; UM, 2016).

Further examples include a societal awareness demonstrated at FASOS²²: *While the pressure to publish and win external grants will remain high, some discussions have gained momentum more recently, for instance on the societal impact of research, on research data management, ethical codes of conduct, and other issues"* (FASOS UM, 2016, p. 17). Finally, in the failed 2014 communications strategy for sustainability project one of the internal goals was to *"[i]ncrease Organisational (Social, Environmental, and Economic) Responsibility and awareness of activities and performance within all University departments"* (Baker-Shelley & Corti, 2014).

A 2017 transdisciplinary failed research proposal 'HEIGHTS' that was poised to investigate how Higher Education Institutions (HEI's) can play a role in transforming their surrounding communities and society, also aimed *"to identify the potential and feasibility of HEI's acting as principal change agents for regional sustainability transformation and how the societal impact of universities can be tracked and assessed analysing existing projects run and supported by HEI's"* (REF). The actions of certain group's proposals in research and practical sustainability management (SDG proposal) of the university express an attempt towards the rubric's actions, that were unfortunately never realised due to the lack of success in the funding round (Transformations to Sustainability – T2S) and the rush to 'quick scan' SDGs rather than begin a long-term comprehensive cyclical evaluation and alignment of UM activities to the SDGs using participatory action research of its own actors. In conclusion, despite clear instance in strategic documents and public relations, there is limited corroborating evidence that UM behaves like a responsible change agent within its local context and leads dialogue in sustainable development.

SER 5.3b

SER 5.3b Integrated sustainability praxis external impact

W= 0.79: Gr. 5, De. 1.

- University community actions increase likelihood of sustainable lifestyles externally by fulfilling its REOGC functions, ensuring that sustainability practices are embedded.

²² Contrary to recent developments in higher education funding cuts, and based on the numerous positive matches to the rubrics, more resources should be allocated to FASOS to further develop the transformative sustainability assets identified there.

This higher-level sister code of *SER 5.3a* is less than three times as weighted in the evidence. There is sparse evidence (five instances) showing that university community actions increase the likelihood of sustainable lifestyles externally by integrating sustainability across portfolio functions internally. It could well be the case that UM actors encourage sustainable lifestyles individually or at a group level, but no signal is found that this occurred as a result of the holistic integration of sustainability into the structures, processes and culture of the institution. There have nonetheless been some UMGO attempts at nudging sustainable lifestyles externally by seeking internal improvements. For example, in the 2012-14 Sustainability Policy, as part of the objective to increase awareness of sustainability among all students and staff, UMGO assessed that *“there is very little awareness among a majority of its staff and student population regarding sustainability issues. This has a major influence on the overall sustainability of the institution, as opportunities for improvement are being missed and individual behavioural attitudes remain unchanged”* (UMGO, 2012a, p. 33). Their prerequisite, solution-oriented expected outcomes thus also included *“[p]ublication of ecological map of Maastricht promoting a sustainable lifestyle”* and *“[r]egional media coverage and other sustainability projects of the university”*, both of which, by the subsequent observations of this research project, were achieved.

In ‘what the community recommends’, student-driven organisations (UMGO, Impact Lab, NOVUM and Rhetorica) state UM should increase external partnership, with a focus on local and regional partnerships (see *SES 3.3*). This supports the next point, where in steps three (system change) and four (innovations), the proposed innovation for this problem was to *“[c]reate a platform through which members of UM and the wider Maastricht community can increase their awareness of sustainability initiatives happening in the city and surrounding areas²³”*. This platform would increase collaboration between internal UM and external societal stakeholders. As a record of the outcomes from the discussion from which this innovation emerged, the document further mentions the *“main innovation... the creation of a ‘SDG platform’*. *This platform would include an overview of all the sustainability initiatives happening the wider Maastricht community, using the framework of the SDGs²⁴”* (UMGO et al., 2018a, p. 7). This was then linked into the proposal for UM to facilitate this process: *“With its expertise and influence, UM can increase its role as a facilitator between public and private projects. For example, UM could become a partner with private and public organizations to promote the SDGs by providing knowledge and research. In doing so, it could add to the value of its knowledge and research, as well as contribute to the public good”*(UMGO et al., 2018a, p. 8).

Unfortunately, despite the Symposium results documents being submitted to the higher management, no reaction was noted and no further initiatives were observed in this area under the duration of time studied in this project. The researcher acted as the recommended facilitator without institutional support (**contact Mondiaal/SDG House Maastricht for corroboration**).

23 *Post-script addendum: now the SDG Maas initiative, a network of citizen-oriented actors based in Mondiaal Maastricht are building just such a network around making the UN’s SDGs more tangible to the community in Maastricht.*

24 *In association in the analysis with SES 3.2b, this platform is connected with current efforts by Mondiaal Maastricht, which aims to build such a platform on a Maastricht/Limburg-wide level, using the framework of the SDGs.*

SER 5.4

SER 5.4 Ideal-typical Transdisciplinary Research Praxis**W= 2.05: Gr. 13, De. 2.**

- Three phase ideal–typical transdisciplinary research.
- Phase A: Complex problems are collaboratively framed in inter-disciplinary teams;
- Phase B: solution-orientated transferrable knowledge is co-produced based on framing process;
- Phase C: (Re-)integration and application of co-produced knowledge in scientific and societal practice

The attributes underlying the rubric *Ideal-typical transdisciplinary research* (SER 5.4) are present to a fair extent at UM. Nevertheless, a clear praxis included in the three phases of this mode of transdisciplinary research is less than evident. For example, in the FPN 2012-2016 strategic programme, the reference is made to how the “*UM strategy supports transdisciplinary and collaborative research projects (details to follow with the new UM strategy)*” (FPN UM, n.d., p. 12). However, this perhaps does not align with the three phases of ‘ideal transdisciplinary research praxis’ as no clear evidence is seen as to whether this type of research is undertaken, and that it is supported and nurtured. Another citation demonstrates UM’s strategic intent in the text of the 2017-2021 Strategic Programme: “*UM should strive to be not only interdisciplinary but also transdisciplinary in its combination of education, research and societal engagement*” (UM, 2016, p. 7). In the same document, one of UM’s aims refers to creating “*“triple-helix” hotspots on the Brightlands campuses that serve as drivers of Euregional and European development*” (UM, 2016, p. 4); a cross-association is also made to another code that arose to help categorise referrals to transdisciplinary structures and to the Brightlands campuses. Again, the intent to be transdisciplinary is clearly outlined, however **internal efforts and accounts do not support 1) that there is a systematic understanding of what it actually is and how to conduct it in the realm of sustainability, or 2) that there is willingness or support once researchers and students actually strive to do this.** Arguably, the triple-helix driven Brightlands is a nascent outcome of Phase A of *ideal-typical transdisciplinary research*. This is quite a weak link as this makes the large assumption that the three phases of SER 5.4 have been followed by the creators of Brightlands, whilst a clear and substantiated sustainability orientation is up for debate, until further insider research is performed by responsible, independent UM and regional actors.

Another reference to the collaboration with Brightlands is found in the Sustainable UM 2030 Memo predicating the SustainableUM2030 Taskforce; Brightlands is seen as having the potential as “*an important platform to connect knowledge and experience*” (Fischer & van der Wetering, 2017, p. 10) – the diagram presented in Figure 13 (in Appendix 1 of the document) demonstrates how this was envisaged as part of the *Kennis.As* (Knowledge Axis) and ‘Sustainable Inclusion’ aspiration. Yet, when the larger body of evidence was weighed against this - despite the clear potential to further develop the assets underlying SER 5.4 - there was no indication that the Taskforce and, for example, Brightlands, are working together; nor of ‘green labs’, of ‘skills lectures’, or ‘sustainability competencies’ being taught (especially since the GO courses doing this before were terminated). This leaves the analysis of this rubric with more questions than answers at the time of writing.

In the following key excerpt, from Sonnenberg’s action research of UM from the inside, a discrepancy between the research and the practice of UM can be observed based on this definition of transdisciplinarity and innovation for sustainability. Particularly notable is

Martens' citation²⁵. The first lines up to the Schumpeter reference appear to actually apply to UM: "even though there is a small but steady growing number of Sustainability Science departments and faculties, sustainability is often not systemically incorporated in institutions, particularly beyond education and research also in the areas of operations and community (Cortese, 2016). It is important that environmentally and socially responsible engagement is not only encouraged within relating studies but throughout the whole university. 'Business-as-usual' does not correspond with the expectations anymore that new generations of students have towards their educational institutions.

*New university models such as advocated by Crow & Dabars (2015) demand innovation, systems thinking, and transdisciplinary partnerships in order to be able to respond to the complexity of social and environmental issues that society as a whole faces... Transdisciplinary science integrates academic and societal bodies in finding solutions for societal problems (Lang et al, 2012). The trend of innovation and transdisciplinarity can be observed in the emergence of new modes of scientific discovery and knowledge production that **fully oppose mono-disciplinary science and plead for transdisciplinary science as an approach at the core of sustainability** (Martens, 2016)" (Sonnenberg, 2017a, p. 1). Further perspective was found in the ICIS-GO PhD governance for sustainability intervention internal communiqué of 2015: transdisciplinary research praxis is indicated in the substance of the noted recommendation itself. The emphasis is placed on any university that wishes to attain international standing and competitive advantage acts on building transdisciplinary and cross-faculty collaboration, as well as "towards researching about and educating students on solving the sustainability challenges of our time" (Baker-Shelley, 2015a).*

Figure 13: KennisAs & Sustainable Inclusion, excerpt from Sustainable UM 2030 Memo to the EB (Fischer & van der Wetering, 2017, p. 10).

²⁵ Pim Martens is Professor of Sustainable Development at UM and overall promoter of this PhD project.

*A sustainable energy and climate neutral university***Planned projects for Sustainability (Planet aspect in operations) within UM.****In Annex 2: future efforts on sustainability within operations of UM**

Table 2 (Annex 2) the planned efforts of UM are presented. This policy aims at reaching the upcoming roadmap goals by providing the required projects to do so. With the above mentioned successes, UM is mostly on track or ahead of its commitment made in the Vision 2030. However, the upcoming milestones are far more ambitious than those achieved so far. To give an impression of the energy target: the planned area of solar panels on roofs of UM will result in about 1% renewable energy production of the total consumption of UM. To reach these, even greater efforts are thus required, mainly by looking over UM's borders (f.i. with corporation within the knowledge axes between the partners in the campuses and the Province of Limburg). Corporation within the Brightland campuses (and with the Province of Limburg) can provide the valuable connection between research, education and operation generating knowledge in living labs to further the transition of UM into a sustainable and energy- and climate neutral university.

Figure 14: Excerpt of the Draft of UM Sustainability Policy, 2016-2020.

It clearly states that the UM transformation to sustainability would stutter unless further cooperation was undertaken with Brightlands. This is based on the second draft of the UM Sustainability Policy of 2016-2020 that the Advisor and the Green Office mutually formulated, again demonstrating their crucial role in UM's management of sustainability to date.

SER 5.6

SER 5.6 Minimisation of negative health, socio-economic and environmental effects

W=2.37: Gr.15, De. 2.

- Minimisation of negative environmental, economic, societal, and health effects as a result of the university's activities, and the flow of resources across its boundaries (related to maintaining throughput).

The attributes underlying the rubric for the *minimisation of negative health, socio-economic and environmental effects* (SER 5.6) are present to a good extent at UM, based on the body of evidence, and is the second highest weighted at the macro-scale. This bodes well for the overall (potential for) sustainability transformation at UM. A good example of how UM aims to reduce negative impacts is found in the 2014 'PREMIUM' project proposal by rootAbility, 'Preparing graduates for the 21st century'. In their history of the Green Office, they state how the "*Green Office has been supporting Maastricht University: on the operational side, to reduce its negative environmental and social impacts*" (rootAbility & UMGO, 2014, p. 2). Specifically, this refers to the Green Office working to minimise negative impacts derived from UM activities, harking back to the 2013 UMGO purpose, vision and mission statement (UMGO, 2013b). Next, in the 2012-14 UM sustainability policy, an interesting reference to the information, communications and technology (ICT) infrastructure at UM was found (also included under *CGS 4.3 externality recognition*). The problem analysis, authored by the Green Office, states that "[UM] has to address the ecological challenges resulting from the use of ICT in the fields of education as well as day-to-day operation" whilst referring to a UMGO project, 'Control-Alt-Delete-Emissions', demonstrating its own actions to resolve this as a recommendation for UM to account for and internalise negative ecological impacts of ICT (UMGO, 2012a, p. 21). The outcomes of this project were later shown to be positive in terms of financial savings, electricity and CO₂ reduction and ease of implementation (UMGO, 2012a, p. 23). There are more examples like this occurring throughout the analysis with other strategic

and operational planning and evaluation documents produced by UMGO. In the 2016-18 UM Sustainability Policy, for instance, UMGO presented the following objective under the sub-heading, Reducing travel-related greenhouse gases through different modes of travel reduction and compensation:

- 2013: Goal: Comprehensive analysis of students and staff travel behaviour including local and long distance.
- 2020: Goal: Provide infrastructure that allows for low carbon travel for staff and students', as part of Objective 12 in the UMGO sustainability policy for UM (UMGO, 2015, p. 22)

These policies are echoed in the UMGO Roadmap 2030 (UMGO, 2013a, pp. 14, 17). Interestingly, these objectives do not correspond with preceding objectives for UM operations found in the overall UM Strategic Plan 2007-2010; in particular in the "*reduction in cost of accommodation and internal services, for instance by imposing cost targets*" (UM, 2006, p. 51). This lack of consistency comes from framing the prior objectives in terms of operational optimisation rather than in socio-economic and environmental impact minimisation.

More comprehensive and detailed policies were presented in the 2015 Sustainability Vision 2030 document, submitted to the EB by Fischer (2015b). These are broken down into specific dimensions, and the substance and goals are worth sampling below to show what had already been performed, achieved and concluded before the structural adjustment program. The following excerpt has been redacted, with information not relevant to evaluating this rubric at UM excluded:

"The sustainable university generates a positive environmental impact by reducing its environmental footprint in the following ways:

Energy: The sustainable university has zero net energy consumption and is independent from the electricity grid. Through renewable on-campus energy production the energy that powers research, education and daily life at the sustainable university is emission free. At the same time the university strives to increase energy efficiency, avoiding energy waste. Virtualization and adhering to the highest standards for building and renovation also improve the efficiency of the university's ICT infrastructure.

Waste: In a sustainable university, waste is no longer seen as an undesirable yet inevitable end product of consumption. Instead, waste becomes a new resource. The sustainable university reuses, recycles or composts, engaging in Cradle-to-Cradle approaches and aiming to reduce the amount of residual waste to the minimum. Paperless learning and teaching, for example, contribute to lower waste production.

Procurement & Catering: The sustainable university considers its ecological responsibility and takes it seriously. Strict ecological criteria are therefore implemented and closely monitored in all its procurement activities including Catering.

Water: Addressing the increasing global significance of available clean water, the sustainable university reuses rainwater wherever possible and continues to develop innovative ways of reducing its total water consumption.

Transportation: Reducing its contribution to global climate change is one of the sustainable university's central goals. When possible, the university seeks to reduce university related travel and to find alternatives or compensation for unavoidable carbon-emitting transportation.

ICT: The university prioritizes the fostering of a holistic and systematic approach to address the challenges of ICT infrastructures' energy efficiency. As ICT infrastructures are rapidly growing due to digitization and technological advancements the role of ICT becomes increasingly important to achieve a sustainable university.

Goals in vision 2030 (in brackets the 'smart' (grouped) translation for this memo):

- Reducing net energy consumption for all facilities to zero
- Using 100% renewable and self-generated energy
- Implementing maximum energy efficiency in ICT
- Increasing energy efficiency (Increasing energy efficiency per square meter in 2020 by 30% compared to 2005 and producing 100% renewable energy (on-campus or in a shareholder construct) in 2030 for all facilities/ buildings owned or rented by UM)
- Using a Cradle-to-Cradle approach to reuse, reduce and recycle waste
- Decreasing the use of paper and packaging (using 100% reusable/ recyclable disposables and packaging within UM in combination with optimal waste separation in 2030 in all facilities/ buildings owned or rented by UM and offer preferably only digital readers/ course manuals to students)
- Implementing ecological criteria for 100% of the university's contractors, including catering (including in all tenders and resulting contracts criteria on ecology and corporate social responsibility, monitored by KPI's)
- Using fresh water wisely and rainwater where possible (Using tap water as the only offered drinking water within UM and implementing water saving devices in all toilet taps. Installing grey water circuits in new buildings where possible)
- Reducing travel-related greenhouse gases through different modes of travel, reduction and compensation (reducing/compensating UM's travel-related greenhouse gas emissions to zero in 2030 by mobility policies and compensation means)" (Fischer, 2015b, pp. 2-3).

These policies echo, almost word-for-word, the earlier Sustainability Vision document composed by the Green Office (UMGO, 2012b). Given the previous clarity and coherence of this policy, it is notable that in 2018, the SDG symposium assessed that there was *"no clear system for sustainability at UM. Even though there is a new sustainability structure (i.e. the Task Force), it is not really clear who is in charge of what"* (UMGO et al., 2018a, p. 9) – See SES 5.3a.

SER 5.7

SER 5.7 Research and education generates societal impact and public awareness

W= 1.42: Gr. 9, De. 0.

- a) 'Walking the talk': enhance research and education function to generate societal processes of change towards desired quality-of-life;
- b) 'Talk the walk': a significant level of public consciousness is detectable that the research and education the university does has positive societal impact

SER 5.7, that indicates to what extent UM *Research and education generates societal impact and public awareness*, is harder to substantiate in the evidence base but is still fairly

present. Whilst it is fairly evident that UM has had an indirect net-positive social and economic impact on the post-industrial region of Limburg (e.g. through job creation, social mobility, cultural diversity via internalisation), it is not clear how UM walks its impact talk. For example, does UM, as this operational sustainability plan for 2016 states - referring to the UMGO Roadmap 2030 - really foster “research and education in sustainability”, and empower “the University and larger community to act in more environmentally conscious ways”? (Fischer, 2015a; UMGO, 2013a). In light of the broader findings, the first claim appears more accurate than the second; it is therefore hard to reconcile these good intentions with observed actions and behaviour, when weighed against the mixed performance under other rubrics at this scale (e.g. SER 5.6, SER 5.4). The actions, knowledge and expertise to support this vision are currently not visible; capacity-building, team formation and organisational learning should all be ensured for this to be triggered.

If one looks at student research programmes such as PREMIUM, PEERS, UCM-thinktank and others (cited throughout this chapter), UM’s ambitious vision statements begin to find support, particularly in the ‘Community at the CORE’ strategic program: “RE stands for Research Education. We explicitly use one and not two separate terms to stress the importance of integrating research and education. It is vital that students be exposed to and involved in research from the very start of their study programmes, not just in the final phase. Participating in international research projects in particular is an ideal means of engaging in integrated learning, synthesising acquired knowledge... **Research projects are also excellent tools by which to address values such as innovativeness, sustainability, and personal and social responsibility**” (UM, 2016, p. 7) . It is through this pride for student research that one can see the great potential that exists in the UM community; when viewing the students themselves as outcomes of UM’s sustainability advancement in research and education, they act as the arbiters of the positive impact desired in the ‘larger community’²⁶.

The interview with Anselm Grahl, who’s tenure at UMGO ran from 2013 as a volunteer, then as governance, assessment and reporting, and administrative coordinator in 2017, was enlightening with regards to better understanding the dynamics underling UM’s research and education for sustainability. Thus, he is worth quoting at length:

“[T]here’s been almost no development in terms of academia and academic staff... So, before the GO and unrelated to the GO, there were developments: we have ICIS, we have other research institutions in the university that do certain activities in the field of sustainability; but I don’t feel that there has really been that much of an increase, at least since the GO was founded. And if there was, it has nothing to do with us, it was independent of it I think to a certain extent, so I think that that’s something that is ... starting to change now that we have the sustainability journal, and we’ve also got very good academics involved to come for this symposium. And in education we tried to set up a sustainability minor, that would have been very good. This course we’re doing now is great in terms educating students, and in terms of getting to the student community. But because its independent of the official studies because you can’t get ECTS for it, which was not our choice, which we had to do because we were not able to do something else, because of that I think it is also at this point still not really impacting the general academia of the university, but that could have more of an impact in the future... You can also see that actually for every year there’s the Sustainability where the universities of the Netherlands are ranked according to which one is most sustainable. What you can see is that we have now two years in a row gotten 6th place, and the reason we haven’t done better than that is mostly because of research

26 This is reminiscent of the results from targeted questions asked at other cases, with respect to how the university’s transformation to sustainability could be substantiated; e.g. viewing students as ‘outcomes’ as Dean Boone remarked at ASU (Boone, 2016).

and education, not because of operations“ (Grahl, 2014).

Grahl explains the reasons for the decreased ranking, which appeared to be the impetus for the subsequent structural changes brought about through the commissioning of external audits and consulting. He directly states this was outside of the GO's portfolio and 'not their choice'; specifically, not being able to get ECTS for Sustain +GO and other courses. The Symposia were arguably very successful at tapping into and finding passionate academics. By UM's own definition, research and education are its core missions; indeed, they are integrated now into 'CORE'. This is strong evidence for the phenomenon where the GO has been penalised, reduced and subsumed largely for something that was neither entirely their fault, nor under their jurisdiction or mandate to manage.

More corroboration of the positive potential that sustainability research and education has at UM, like Grahl notes, is seen in ICIS. With the Euregional sister institute Hochschule Niederrhein, the ICIS-GO PhD and Professor Martens facilitated and submitted a research proposal in 2017 that would have, had it been successful, fulfilled the criteria of this rubric. This proposal was called 'HEIGHTS', standing for Higher Education Institutions Generating Holistic Transformations to Sustainability, and invoked the network created through this project's case studies and academic supporters elsewhere (Arizona, Germany and Japan). The objective was the transformative impact through organisational learning and development on universities themselves to attain a wider impact in their communities. It was submitted to the Belmont Forum, Norface-EU funded Transformations to Sustainability call (T2S). One PhD project hosted by ICIS aims to pick up where this proposal left off.

SER 5.8

SER 5.8 Sustainability reporting standards and instruments implemented

W= 1.42: Gr. 9, De. 1.

- Global, regional & national sustainability standards, instruments & principles are implemented in measurement and reporting process. Communicate progress made.

The final rubric, *SER 5.8 sustainability reporting standards and instruments implemented*, is present to a limited extent when one looks at UM's interactions with its external environment. It becomes more interesting when one zooms in to the role UMGO played in taking responsibility for the measurement and reporting process, alongside the former Environment and Sustainability Advisor. The best way to showcase how much UMGO contributed to the application of sustainability reporting derived from common standards is usefully summarised by Fischer in his presentation of the vision to 2020. By his assessment of the 'status of sustainability (planet aspect in operations) within UM', the Green Office took many steps "*in the governance of sustainability including the Vision 2030, the Roadmap 2030, the Policies of 2012-2014 and 2014-2016 [and 2016-2018], the Climate Action Report and Sustainability Progress Reports, [as well as] Integrated Reporting at a university level*". It is this last point regarding integrated reporting that is the most unique aspect; UMGO assessment and reporting coordinator Anselm Grahl, supported by the ICIS-GO PhD, developed a new standard for sustainability reporting in universities that added specific indicators and guidelines where other standards lacked guidance in the areas of research and education specifically. Their

²⁷ See references for more evidence of sustainability reporting by UMGO, which also formed a key line of evidence.

development of the sustainability progress reports of 2011-2017, and their annual reporting of the same period into UniSAF-NL, was presented internally in 2018 in a manner tailored to UM being able to differentiate itself with a knowledge innovation in data-informed sustainability transformation; it was not internally adopted.

In spite of these examples, there are no apparent sustainability reports for UM, that were accessible or visible for this research, after UMGO ceased its reporting activities - due to the structural changes which reduced funding, human resources, autonomy and the mere capacity to start new projects or continue previous ones. UniSAF-NL was nonetheless scaled into the social enterprise rootAbility for usage in the wider Green Office movement. A key source for this research, the SBE student research project 'Sustainability ranking as an instrument to drive sustainability at [UM]: a pre-sustainability audit based on UI GreenMetric' also helped to substantiate the claim that UMGO were pivotal to the measurement, monitoring and assessment process behind UM's sustainability reporting. The study also benchmarked findings against 'UI GreenMetric', a free worldwide ranking of sustainable universities performed by the University of Indonesia (Noirhomme et al., 2013).

Moreover, further policy goals in the 2012-14 Sustainability Policy by UMGO put forward targets for Real Estate to *"Incorporate higher sustainability standards in the real estate handbook and checklist. Monitor the implementation in the construction and renovation of university buildings of the newly developed sustainability standards as outlined in the real estate handbook and checklist"* (UMGO, 2012a, p. 4). These targets appear to have been later fulfilled by the awarding of the BREEAM-NL New Construction and Renovation certificate²⁸ – with an 'excellent' and a score of 80.14% - to the Tapinkazerne barracks redevelopment in June 2019 (going beyond the analysis permitted by the tool). UM states this on its website with a description of what the design plans include (UM, 2019a). The above real estate development award is in keeping with the UM Sustainability Roadmap 2030 made in 2012, which stated the vision in 2030 of having reduced net energy consumption for all facilities to zero. It also stipulated that by 2018 UM had to *"gradually implement plus-energy efficiency standard for new buildings"* and that by 2022 it should *"[d]evelop and apply strict sustainability standards for renovation and real estate projects"* (UMGO, 2013a, p. 13). If the Tapijn redevelopment case is taken as representative of all university-owned municipal buildings in Maastricht (which it is not) then these targets look set to have both been achieved, *as long as* significant action takes place across UM's faculties and facilities. The Sustainable UM 2030 memo to the Management Team accords with these policies. Below, a summary of an Appendix table showing the inputs collected by the consultant's interviews with UM staff (and UMGO as a group):

- *"Need of new policy for e.g. less space (m²), shared and flexible interfaculty housing. Make sustainability a key (budget) driver for renovation, building and maintenance.*
- *Cooperate with municipality to make the monumental buildings in the inner city of Maastricht sustainable.*
- *Apply stringent sustainability standards to buildings (more comfort and efficiency) with clear and visible sustainable components.*
- *Buildings connected to healthy environment.*
- *Implement/ test bio-based materials"* (Fischer & van der Wetering, 2017, p. 14).

The more recent UMGO policy objective for 2016-18 to *"[e]nsure high levels of sustainability for the ICT environment of UM, including dealing with servers and outsourcing of ICT services"* includes

the recommendation to *“apply strict sustainability standards, including high energy efficiency, when determining to where it is outsourcing its server environment or if deciding to construct its own datacentre; consider the continuing energy usage in an outsourced datacentre when determining its achieved energy savings; apply strict sustainability standards when outsourcing any ICT services including the email system; keeping close dialogue between UMGO and ICTS to make further sustainability improvements in the ICTS environment”* (UMGO, 2015, p. 31). In accord with the overall UM adherence to certain sustainability standards, at the faculty level, FASOS made concrete goals to *“[i]mplement UM sustainability standards in case of expansion or remodelling”* (FASOS UM, 2011, p. 71). FASOS is the only faculty, according to this research, to directly cite the implementation of sustainability standards as a concrete goal. The larger point, however, is the question of whether sustainability standard recommendations are being acted upon. An award by a standards body does not necessarily mean that the prerequisite internal sustainability reporting and evaluation processes actually take place.

The SBE Thinktank Report of 2015 described that integrated reporting took place (at that time) in UM as part of bringing sustainability to the forefront and creating more awareness. This analysis shows that outside the Green Office’s history of sustainability reporting and liaising with stakeholders in various departments to create the organisational process and ‘integrated thinking’ behind integrated reporting, there is no evidence of an integrated report that the Green Office did not write. This suggests a gap in the reporting efforts of UM as a whole.

9.2.3 ANALYSIS OUTPUTS

I have now shown how Maastricht University can be described using the diagnostic tool of organisational transformation for sustainability. The following sections explore what this diagnosis means by examining and discussing associations and network significance, scalar performance, and starting to apply the lessons and patterns learnt from the cases.

9.2.3.1 SUBSTANTIATING ASSOCIATIONS & LINKS USING NETWORK SIGNIFICANCE

Unlike with the external cases, there were many more associations made in the data analysis for UM; most likely due to the quantity of the data collected, as well as the complexity and inability to discern clear action strategies for organisational transformation towards sustainability that played out over time.

Associations, as expected before the case work began, are cross-scalar *as well as* across theoretical perspective; yet a series of steps that may have been taken along a pathway of organisational transformation, indicating a distinct action strategy, is very hard to discern. Thus, using the substantiation of associations and links, it is not clear what the potential causality might be in these relationships for UM, as far as searching for deeper casual mechanisms for transformation is concerned. What clearly comes across, however, is a complex, interconnected web of associations validated between many different skillsets and competencies.

9.2.3.2 SCALAR PERFORMANCE
COMPARISON: UM DIAGNOSIS

Across all scales, we see quite a low set of ‘W’ values, except for the outliers which we can say are UM’s best assets for bringing its organisational transformation into fruition. These outliers are: *SES 3.1 Transformative agency*, *SER 5.1 Sustainability competence training*, and *BSP 1.2 Pro-sustainability behaviour* at the micro-level; *BSP 1.4 Lobbying competence* and *SES 3.2a Internal governance for sustainability* at the meso-level; and *BSP 1.6 Organisational action research* at the macro-level. The micro-level appears to hold the most balance across rubrics, with W-value range higher than the other two scales between 2-6 approximately. The meso and macro-levels suffer, in increasing order, from underdeveloped assets across many rubrics.

A scalar performance comparison of UM yields quite an interesting organisational balance.

9.2.3.2 SCALAR PERFORMANCE COMPARISON WITH THE THREE CASES

Reiterating the research question we posed, a good way to show how the *common patterns that could be drawn help other universities recognise their own potential for transformation*, is to see how UM's scalar performance (**above**) compares with those of the other cases (**below**). These spider diagrams are all presented with the same ranges of 'W' values so that they are fairly comparable.

HKUST Performance Comparison

It can be seen that UM's micro-level performance is somewhat similar in weight compared with HKUST's, only with different rubrics standing out and a higher average weight at this level at HKUST. Once we progress to the meso-level, we begin to see greater differences. Whereas the UM rubrics are all below W=4, many of HKUST's are at that level, or much higher. At HKUST, the macro-level was on average fairly modest, yet compared with UM there were three strong outliers, as we see on the right with *SER 5.7*, *BSP 1.6*, and *SER 5.4*. UM has outliers too, *BSP 1.6*, and possibly *CSP 4.4*, but these are not nearly as pronounced.

ASU Performance Comparison

Comparing ASU's micro-level with that of UM's, allows us to see the hidden potential that exists amongst the individuals involved in sustainability researched over the years. Whereas, ASU has a modest distribution, with *SER 3.1.2*, *SES 3.1* and *OCM 2.1* standing out marginally at $W \approx 4$, UM's outlying rubrics exceed this level, with *SES 3.1* and *SER 5.1* approaching and achieving $W=6$. As with HKUST, once we graduate to the meso-level, differences become greater, only at ASU these are even starker. For example, *SES 3.2a* is close to $W=9$, and *SER 5.5* as well as *OCM 2.3* to $W=6$. At UM, all rubrics are under $W=4$. Its macro-level performance, with many rubrics occurring at or below $W=2$, ranks lower in substance than those of ASU, whose all-round performance at this level consistently exceeds $W=2$, ranging up to $W=6$.

LU Performance Comparison

With LU's micro-level performance - being the strongest of all cases - suffice is to say that there are marked differences with UM. Three rubrics, *BSP 1.2*, *OCM 2.1*, and *SES 3.1* have W -values of 5, 6.7 and 6.2 respectively. At UM, of these same rubrics, only transformative agency (*SES 3.1*) attains similar values. *SER 5.1* by far exceeds that of UM at 9.5. Effective intrapreneurship at UM attains a slightly higher W -value than LU (as well as ASU, although not of HKUST). The patterns at the meso-level of LU and UM look more similar, especially when weighing up the rubric performance on the whole; LU has two outliers breaching $W=4$ and 6, whereas UM's do not breach $W=4$ at all at this level. Macro-level performance at LU is characterised by two outliers of *SER 5.4* at $W=6.5$, and *SER 5.7* at $W=5$. The rest except for three are above $W=2$, with two close to $W=4$. Compared to UM - whose own rubrics, except for three, are generally weighted beneath a value of 2, and one outlier at near $W=5$ - LU's performance is stronger.

A preliminary conclusion is that UM, albeit very different from the other three case studies, is not as far developed yet in terms of transformation towards sustainability.

9.2.3.3 UM TRANSFORMATION SIGNATURE & POTENTIAL ACTION STRATEGY

The action strategy for UM is highly interconnected and hard to interpret. It was hard to cluster it into separate strategies - unlike the external cases, where distinctive implemented step-wise action strategies were discernible. This appears to represent an untapped

potential in some rubrics, as once certain attributes are successfully applied in UM's students and staff, one or more clear action strategies would likely emerge. The transformative signature in [Figure 15](#) below, more clearly shows the connections between asset groups that could leverage positive transformation towards sustainability. *The UM Transformation Signature* is dominated by lower-level rubrics such as *SES 3.1 Transformative agency*, *SER 5.1 Sustainability competence training*, and *CGS 4.1 Strategic trajectory*. Its assets are weighted more towards micro- and meso-levels, and socio-ecological systems and behavioural science lenses. *BSP 1.6 Organisational action research* is a significant outlier - possibly due to the specific attention given to this rubric through this PhD work - and could be a green light for systemic change manifesting at the macro-level. It is also hard to discern any one distinct action strategy of rubrics that actors successfully enacted from their extant competencies towards defined objectives in a particular sustainability initiative. A potential action strategy - incipient, and hard to make any more distinct or divisible to smaller clusters - emerges around the assets of transformative agency, sustainability competence training, strategic trajectory, lobbying, pro-sustainability behaviour, internal governance for sustainability and organisational action research (see [Appendix 4](#) for the Atlas diagram). Because UM's possible signature approach to transformation is a lot to break down, I refer to its potential action strategy as: *'Emerging transformative agency, pro-active inquiry, lobbying, liaison and competence training'*.

Figure 15: *UM Transformation Signature. One highly interconnected, inchoate, potential action strategy.*

At UM, the transformation signature is a highly interconnected, inchoate output function of the potential and assets identified by the tool. Coloured navy-blue arrows depict two-way associations and one-way hypothesised causal-symptomatic relations, whereas, more lightly dotted arrows depict less significant links.

9.3 DISCUSSION

This section discusses the emergent accounts from the analysis in the attempt to understand whether organisational transformation for sustainability propagated in UM. It corroborates evidence regarding the competencies, qualities and patterns unearthed using the tool, whilst examining and unpacking the complex web of interconnections using the synthesis of the shared qualities and common patterns at the three outlying cases. Through applying the common patterns and shared qualities, I was able to see *what pathways, rubrics, and/or action strategies can be prescribed towards encouraging the organisational transformation for sustainability to take shape*. In this regard, this discussion also includes some reflection on the basis of the lessons from the three cases and the insider UM research, regarding what the ways forward could be for actors within UM. More crystalline recommendations are included in *Chapter 10*.

9.3.1 APPLYING THE SYNTHESISED COMMON PATTERNS AND SHARED QUALITIES TO UM

To recognise and interpret the potential for transformation at UM, the lessons learnt from the case studies shown in *Chapter 8* can be applied using the shared qualities and common patterns of pathways of organisational transformation for sustainability. With this application of the diagnostic tool, we could see whether rubrics that emerged as significant stepping stones in the pathways of transformation to sustainability at the cases are present to a similar extent in UM, and how and to what extent the patterns resemble aspects of UM's diagnosis. Hence, the diagnostic tool's interpretative function is also tested by defragmenting UM's complex emergent transformation signature. This helps answer the research question regarding *what shared qualities and common patterns can be drawn that help other universities recognise their own potential for transformation*.

The figures below depict the common patterns and shared qualities which operate across the three scales from bottom to top; that is, the bottom-most clusters are micro-level, midmost are meso-, and the topmost are macro-level. The text underneath each Figure explores how UM's own rubric performance is superimposed over the patterns and qualities presented from the cases.

Figure 16: Synthesis Pattern A: first cluster of shared qualities and common patterns from the external cases.

In the whole transformation signature (Fig. 15), it can clearly be seen that *SES 3.1 Transformative Agency*, as UM's strongest underlying asset at $W=5.9$, very much overlaps with the identified shared qualities in the signatures of the other cases. However, when we regard the connections and development of the other rubrics in the chain, there is a lot left to be done. We cannot see a similarly strong knock-on to *SES 3.2a Internal governance for sustainability*, and the balance between *SES 3.1.2 Transformative leadership* and *SES 3.1.1 Effective intrapreneurship* is not so clear. However, the pattern itself between these rubrics can be clearly seen as part of the larger whole in Figure 15. Notably, a key difference, is that no association is made between *SES 3.2a Internal governance for sustainability* and *CGS 4.2a Internal evaluation of environmental social governance* as with the other cases. The connections between *SES 3.2a Internal governance for sustainability* and *CGS 4.1 Strategic trajectory* are still validated in UM, yet the stronger association in the synthesis between *CGS 4.1 Strategic trajectory* and *CGS 4.2a Internal evaluation of environmental social governance* is not present to the same degree in UM (which the dotted line between them in Figure 15 shows).

Figure 17: Synthesis Pattern B: second cluster of shared qualities and common patterns from the external cases.

Applying the second pattern to UM provides even less of a match. In *Synthesis Pattern B*, we can see that *SER 5.7 Research and education generates societal impact* is dominant; a network node, as well as being heavily weighted. Whereas in UM's overall signature, *SER 5.7* is tiny and isolated. It shared no validated connections with other codes in this pattern. Given that this rubric is at the heart of this pattern, in that the other rubrics are not associated with each other, we can only say that these shared qualities in this pattern from the external cases do not match well with UM's capacity for transformation. However, since we found in Chapter 8 that *SER 5.7* was influenced in some significant way by the connected macro-meso-level rubric, *SER 5.4 Ideal-typical Transdisciplinary Research Praxis*, as well as the meso-level rubric, *OCM 2.3 Purposeful-adaptive evolution*, and *OCM 1.3 Organisational cultural health*, should UM develop these qualities first, this could well lead to a higher value for *SER 5.7*. Applying synthesis pattern B also helps lay out, as with the three cases, how the incidence of actions coded with *SER 5.7* appeared as part of the incidence of actions coded with *SER 5.3b Integrated sustainability praxis external impact*. This may mean that UM being recognised

as having embedded sustainability into its portfolios would be an outcome from the preceding hypothetical action strategy, whilst also, in turn, occurring together with an increased public awareness of the (sustainability-related) research and education UM does (merging the content of *SER 5.7* and *SER 5.3b* somewhat for demonstrative purposes).

Figure 18: *Synthesis Pattern C: third aggregate cluster based on the synthesis of the three external cases.*

When applying *Synthesis Pattern C* to UM, we see these matches, signifying underlying potential yet to be reaped: *SER 5.1 Sustainability Competences* is indeed highly weighted at UM too, associated with a weaker *SER 5.5 Sustainability research demonstration* compared with the common pattern of shared qualities. Despite this overlap at UM, *SER 5.1* is not associated with *BSP 1.6.1 Organisational experimentalism* as with the other cases. This might be explained by the lack of translation of the sustainability competencies of the Green Office into the wider organisation through experimentation planned by its Living Laboratory activities, as well as numerous barriers faced with applying triple-bottom line thinking to the organisation from the bottom-up; indeed, *OCM 2.1* at UM unconnected to *SER 5.3 Integrated sustainability praxis across functions*, whereas this is present in the synthesis pattern. What is interesting is the node that *SER 5.3a* seems to form in the UM signature that is not present in the synthesis pattern; *SER 3.2a* is associated with seven other rubrics at UM, including *SER 5.1*, *CGS 4.1*, and *SES 3.2a*. The role *OCM 2.1 Triple bottom line* plays in the synthesis pattern appears to contribute to the integrated sustainability in portfolio functions seems to support this interpretation: that would make it a means to unlock transformative potential. Were UM to build on these competencies in a targeted manner, could it be the case that this might unlock a more holistic transformation? Especially with the missing link of *BSP 1.6.1* being further developed, and given the alignment with the tool seen thus far in the research, it could well be, although more action research would definitely be needed by a diverse group of UM actors.

This comparison of UM's transformative signature to key patterns observed in the three front-runner universities helped to see if significant stepping stones in the transformation pathways are present at UM, and how and to what extent the patterns resemble aspects of UM's diagnosis. After this analysis we see that the key patterns are present to a limited extent only. Nevertheless, given the presence of key rubrics and

some but all of the associations which constitute the patterns of behaviour, it stands to reason the assets these rubrics represent could be brought to the surface if given sufficient room to develop.

9.3.2 MICRO-LEVEL: BALANCE ROLES & AGENCY IN THE APPROACH TO CHANGE

As a reconceptualisation of what leadership means from within an organisation, this diagnosis showed limited presence of transformative leadership (*SES 3.1.2*) which is an important element of the successful cases studied. It is therefore worth mentioning. The limited presence of transformative leadership goes hand in hand with a lack of challenging sub-optimal practices and policies on sustainability at the regional and national level (in line with the function of applying the social enterprise model to universities seen at ASU). For example, limited activities were observed on ecological wellbeing, and the re-design of colleges, schools, units and departments to improve interconnection and transdisciplinary research and education for sustainability.

This analysis does not see zero room for improvement on the performance of the Green Office over the years, however. For example, the Green Office personnel could have managed their stakeholders better, as wise relationship building with key higher stakeholders may have staved off their criticisms and disregard later. We undertook numerous workshops that emphasised the importance of regular stakeholder management, connected to materiality and communications strategy for sustainability. However, this was still practiced, as witnessed by the action research accounts; a minor omission of competence for student employees may be excusable for such a formative period of experience, particularly given it took place in an institution of learning.

The Green Office's behaviour alone does not explain the complex dynamic that was recorded above; it could mean that UMGO did not see whom to manage closely, who to inform strategically, and who to be cautious of at given precarious moments in their learning trajectory. Had they been more aware of the need to manage leadership-level stakeholders closely as well as informing them in a direct and concise manner, then we may say that miscommunication could have been avoided. However, since relational dynamics is not the fault of only one party (particularly the least-powerful) this does not mean the dynamic is not also the responsibility of this higher group of stakeholders either.

There is a clear pattern observable in the analysis: the role and function of UMGO diminished as its activities and proposals increasingly infringed into the area of the governance, management and transparency of sustainability information. Correlation does not prove causation; however, it does seem a convenient coincidence (literally, the two facets appear next to each other numerous times throughout the data). Whether this means that the entrepreneurial change-agency function of UMGO has been eroded (see *SES 3.1*) because of consistent and observably disproportionate criticism, auditing and undermining of its work over the years by the actors overseeing the governance of sustainability in UM, is another matter for future insiders to tackle. The implications for the wider legitimacy of the Green Office model to the climate action and youth-leadership movements is an important aspect worthy of mention because of the ethical responsibility a university has to the students it is ostensibly preparing for

the disruptions wrought by the cascading effects of climate change.

The research also unearthed some troubling signs in power dynamics and (lack of) agency. It makes no sense to go any further here, as the contentious nature of individual behaviour in the maze of relational dynamics and university politics could not find a place in this chapter. However, it must be emphasised that a healthy balance between transformative agency must be struck - embodied by the effective intrapreneurship of change-agencies like the Green Office - and empathetic, transformative leadership; the same kind presented by Chamorro-Premuzic (2019) in his incisive research into organisational behaviour and effective leadership types²⁹. The latter of these qualities – more rooted in effective leadership for sustainability - is lacking in UM, save for one or two fairly invisible leaders who may find such dysfunction around them problematic.

9.3.3 MESO-LEVEL: IDIOSYNCRASIES, GROUP AND FACULTY EXPERIENCE OF CHANGE

Specific idiosyncrasies which emerged as interesting features of UM's performance in the analysis are clustered into two themes of discussion at the meso-level.

An Experimental, Pragmatic turn in Problem-Based Learning

Problem-based learning is a core element of how the UM organisational culture has defined itself since its inception; its presence throughout the data cannot be easily uncoupled from references to educational innovation, and in the context of the analysis on references to sustainability, is also entangled in the rubrics coded most highly. A practice grounded in UM's signature approach to education, problem-based learning has been observed as crucial to this entire project, with many sources, references, evidentiary accounts and reports rooted in this method of student research. This is akin to an action inquiry where organisational, social, political and ecological problems are experienced, researched and experimented with, close up (and sometimes personal) by students, often investigating their own contexts. The thinktanks that emerged from UCM, SBE, and other UM programs like PEERS, MARBLE and PREMIUM - as well as the Green Office, its movement, and this PhD project - can be characterised as an extension or evolution in practice of the Maastricht PBL system; effectively turning it back for use upon its own source institution. This is an experimental approach to problem solving observed at UMGO, where academic knowledge of relevance was 'put into their hands', and solution-oriented, small-scale interventions took place from 2014 to 2018. They were and can still be inculcated and trained in sustainability competencies for transformation - an untapped major asset specific to UM. The Green Office, as observed longitudinally within UM, has acted as a crucible and collaborative ally for change agents for sustainability, and represents the attributes of *transformative agency* and *sub-optimal practice challenge*.

However, when students are attracted to UM for its sustainability credentials, because of the strong historical emphasis on image, rankings and strategic relations, more of

²⁹ The lessons of this research, if applied, might prevent more incompetent men from ascending to the ranks of leadership through charisma, machismo and heavy-handedness alone. His findings - that it is not just about amplifying female and emotionally intelligent leaders in organisations, but also about preventing (and applying the same standards to) the kinds of narcissistic individuals who 'fail upwards' - I consider highly appropriate.

these same students and even staff have begun to question the lack of substance, inaction, and perceived skills gap for UM graduates. As participants in the 2018 SDG symposium asked, ‘a UM degree, now what?’. That the significance of this workshop’s occurrence and outputs returns throughout the whole diagnosis in various ways is a testament (from the perspective of insider research performed, corroborate by the action research assistants) to the centrality of transformative agency to UM’s signature approach to sustainability; rooted in its own promoted method of education, which is, *ipso facto*, a manner of embedding sustainability into its ‘core business’. In that sense, UM trained its students as critical thinkers, activists, and researchers. It is not therefore inconceivable that they would use these faculties on their own university.

The Maastricht Sustainability Institute as Liaison and Conductor

As concluded from the case studies, sustainability research institutes have a unique role to play in the institution, as a liaison point and facilitator between academic disciplines and faculties to help navigate pathways of organisational transformation for sustainability. They thus hold potential to trigger regional sustainability transformations stewarded by the university and other societal actors when this coalescence is performed well. Given the importance of the relationship between the academic research and teaching centres of sustainability science, and teams of change-agents at each case study, it is useful to briefly situate this research into the research institute that hosted it.

The International Centre of Integrated assessment and Sustainable development (ICIS) was founded in 1997 on the basis of the methodology of using integrated assessment to investigate sustainable development from diverse angles. In particular, this included viewing problems through post-normal, mode-2 scientific ontologies, experimenting with constructivist *as well as* positivist epistemologies, using methodologies such as grounded theory, qualitative and quantitative mixed methods approaches, and action-oriented inquiry and research. Having started independently, it was later brought into the fold at the faculty of humanities and sciences (FHS), anecdotally known as the mongrel faculty, due to having so many different institutes under one roof. More recently ICIS, had become the Maastricht Sustainability Institute under the School of Business and Economics. ICIS is important in this account as together with UMGO, they saw the potential for UM to be pioneering and standard-setting in its research and practice of organisational transformation for sustainability, acting on this by helping UMGO 2012 to sculpt this very project.

From the analysis, a certain assessment of the structures around ICIS was possible - as a proxy to those around UMGO, as well as those concerning the management and governance of sustainability of UM. It was understood that much of its capacity to apply inter and trans-disciplinary sustainability science to make connections between faculties, and liaise university actors towards higher sustainability performance - whether in research, education, operations, and even (more recently) in governance - depended on a rather precarious system of funding and legitimacy that somewhat hindered the fulfilment of this potential. Yet, it was also clear how pivotal a role the sustainability institute can play in guiding and informing actors along transformations towards sustainability. The fact that ICIS has not been observed to fulfil this inherent potential then (for example with key opportunities like UniSAF and in other attempted

collaborations with UMGO) is striking and can perhaps be effectively explained in the context of the larger whole of studying UM as an organisation. This should be unlocked in Maastricht Sustainability Institute's new central role in the sustainability governance of UM via the dual roles of its management and researchers in the UM Sustainable2030 Taskforce. However, without funding from UM, an organisation such as MSI that depends to a relatively large extent on external funding, will not be able to make staff sufficiently available for such a role.

9.3.4 MACRO-LEVEL: OVERALL STRUCTURE & CHARACTERISTICS OF THE ORGANISATIONAL CHANGE

The roles and expectations research that characterised the first inquiry-intervention of this research marked a new precedent when the project proceeded to expand the assessment of sustainability to a system-wide, institutional scope, in keeping with the research questions. The expansion in scope of the ICIS-GO project was also one of transition from meso to macro-level. As seen in the analysis, the macro-level did not yield so many well-developed patterns of organisational change for sustainability. The most developed assets, *CGS 4.4 social responsibility assumption* for example, were nonetheless coupled with precursors. The structure, as noted in the transformation signature description earlier, was hard to discern.

UM makes the claim to take its social responsibility seriously. This may well be the case, but evidentiary questions remain. The effect UM has had on its region is evident, with a great deal of university actions accepting social responsibility. How UM guarantees that its word in its policy documents leads into meaningful practice that could be corroborated by the average *Maastrichtenaar* is another question; the macro-level is also defined by how the university is regarded by the general public. ICIS/MSI is also a good example of UM's efforts to incorporate sustainability into their education, as well as its research, with aspirations to regional impact for sustainable development. Furthermore, UM does provide courses on sustainability, through the UM Sustainable2030 Taskforce education portfolio.

At the macro-level, it is evident that the change management perspective is underdeveloped compared to the others. Considered alongside these positive assets, I also unearthed inadequacies and unnecessary conflicts in the approach to organisational change. I draw on Adrianna Kezar's research on modes of organisational change modes to elucidate these. They appear to have arisen from a more stochastic and contingent approach to change by UM; a dialectical form of change management, where conflict, and opacity seems inherent: one image is presented to the exterior, another persists towards the interior. It is also evolutionary to the extent that the leadership reacted strongly to the decrease in rankings in *Sustainabil*, as an external stimulus (from the wider national scale of Dutch Sustainability in Higher Education Policy), but neither does the change observed appear linear and rational, nor does it appear driven by change-agents and leadership - a teleological mode following Kezar's modes of organisational change in Higher Education (2001). The purposeful-adaptive quality also lacks due to the absence of clear intrinsic logics of transformation to sustainability. Finally, it is also unclear how the significant outlier of *BSP 1.6.1 Organisational action research* is manifest in the current state of affairs; this quality was predominantly affected through the

network effects and collective inquiry brought about through the students and staff of UM who participated in this project in some shape or form.

The reading that a lack of upward trajectory in organisational learning is observed at UM - as regards to the structure of organisational change - seems to trace out a cycle of conservatism and ineffective governance on sustainability in the behaviour of the organisation at the macro-level (see rubrics *SES 3.1.2* and *Macro-level Diagnostic Summary*). Moving forward, care and attention should be paid to realising and assessing how the culture and type of the institution affects the approach to organisational change, as much as the political machinations, and competing power and authority structures (Adrianna Kezar, 2001, pp. 68, 115). Combining with the systems perspective, this would avoid the possible risks that reactivity, opportunism, and an erosion of trust and legitimacy might leach into an institution's progress along a sustainability transformation: that is, slipping back into the conservation and inertia phase of the complex-adaptive systems cycle, which seems to have been visible when regarding UM at the macro-level.

9.4 CONCLUSIONS

Introduction

The case study research questions are based on the premise that organisational development or transformation towards sustainability has already taken place in some form or another, under contexts and circumstances that were exceptional in some way. To help the conclusions for the UM case, I asked myself specialised questions, rooted in discussion with the research group, to do with how each of the relational actor groups understood and held certain expectation of each other's roles³⁰. As well as building on the action research, these resonate with what we were trying to uncover in the 2014-15 roles and expectations investigation surrounding UMGO and its supervisory and managerial counterparts.

With regards to the research questions, the previous discussion answered what is the role is of specific actors and groups in the organisational transformation for sustainability at UM. We have now also answered how UM can be described using the diagnostic tool (*section 9.2.2*), as well as which competencies, qualities and patterns are unearthed (*section 9.2.3*), partially in combination with an application of the case-study findings to UM's signature pathway of transformation to sustainability (*section 9.3.1*).

It was hard to draw conclusive findings regarding the signature approach specific to UM without using the synthesis patterns to read its complex signature to unlock potential for change. This is why I integrated references to the other cases from the end of the application of the diagnostic tool onwards. This, additionally, supports the value of the diagnostic tool, posited in *Chapter 8*, for reading the potential for transformation in other organisations, and thus its interpretative capacity, which, is not necessarily synonymous with its diagnostic capacity. At this stage, it is helpful to review why I actually applied the tool to UM: I aimed to find out to what extent organisational transformation had taken place despite the fact that I was an insider, and - as my

30 See Box 1, *BSP 1.4 Organisational lobbying competence*, above.

AR assistant Friederike Sonnenberg observed - with a more embedded standpoint to sustainability 'as lived and practiced' within UM. Secondly, to help substantiate and validate the experiences we had accounted for in the action research; to give these room next to the granularity and depth provided by the tool, I hoped to examine the causal-symptomatic relations underlying the organisational dysfunction that may prevent universities and change-agents from fulfilling their transformative ambitions. This is why I distinguish two sections of conclusions: one for the action research, the other, for the organisational diagnosis in the constructivist vein.

ACTION RESEARCH ROOTED CONCLUSIONS

At this point, I reflect on conclusions that can be drawn in a PhD thesis from the action research. The Green Office was expected to play a pivotal role in the transformation of UM. It does seem, however, that the Green Office was the body that ended up being transformed, as the former environmental advisor (who was also the Green Office coordinator) left in early 2018, and the new structure, SustainableUM2030, came into force. When this occurred, in effect, no leadership or guiding staff remained for UMGO. They lost their coordinator, and, except for me, there was no other staff member close enough to actually understand their perspective, and the history of what had happened since 2014. A junior consultant was hired in the transition, present a few hours per week and accountable to the lead consultant from the commissioned firm. Key positions in the Taskforce, for instance, the overall UM sustainability coordinator, and various portfolio sponsors, remained unfilled into 2019. My contract also ended in February 2018, leaving me feeling very responsible for the ongoing advice and guidance towards the Green Office team, yet without any mandate. A meeting was called at ICIS, whereby the following advice was given by a Senior Researcher:

"We think the situation will change, but we see opportunities also for the Green office. I have always indicated to the executive board that it was not appropriate to put all operational responsibility with the green office. Now that part of that burden will be lifted from your shoulders, I feel you can become a real student body again but with a great network throughout all layers of the university! Of course, it feels like loss now, because you will lose money and influence, but such a radical change also means new pathways open up."

Indeed, the team at that time could have done well to see the positive aspects in the restructuring, and taken up their new role with enthusiasm; but I also cannot help but see this in the context of the events that went before this, which added psychological and emotional pressure on the green officers I worked with. I was also in that experience and may have done well not to caution and inform them too much of all that went before, which indeed might have been somewhat overwhelming.

As student professionals, and with few others disposed towards their situation, I could see no other fair and sensible alternative except to continue to support, mentor and listen where I could. Adjacent to these developments, the UMGO budget was cut substantially, and decision-making and the capacity to innovate diminished as a result, whilst being connected to prior moves that perhaps overly institutionalised the Green Office into UM's structures. Perhaps we suffered from a negativity bias due to our experiences, where we allowed events to disproportionately taint our thinking. At that

time, it felt like UMGO not only lost its key staff-support, but also the autonomous function derived from its being student-driven. That is debatable as others in the research team believe they lost this autonomous function already much earlier on when they became so embedded in UM and had to answer to UM checks and balances. Autonomy does play a central role in effective intrapreneurship, as Jan Mory discovered (Mory, 2018b). Again, the issue becomes a case of losing intrapreneurial function and that this should somehow be ringfenced for Green Offices' to maintain their resilience.

From this point of departure onwards the Green Office at UM, in my view, no longer sufficiently hewed to all of the core six principles of the Green Office Movement³¹ (see Section 9.1.1.2) – specifically: *students and staff, funding, space and resources, integration, and mandate*³². In 2019, fresh team members were recruited with limited prior knowledge of what had happened before to create the Taskforce; the atmosphere did not allow for room to adequately express how these moves had negatively affected the student's ability to perform their functions in UMGO effectively. The preceding team members and I internalised doubt and experienced increased incidence of poor mental health (although my own struggles began in 2015). It was almost as if it was easier to see UMGO (and others) as the problem, rather than to consider the possibility of there being a systemic one. A rhetoric emerged that UMGO was responsible for negatively perceived initiatives across UM, even if these did not originate with our own management or decision-making.

Continuing to reflect and research psychology, I observed that this might connect with how an individual's psycho-social wellbeing is also an outcome of one's systemic environment rather than solely a matter of genes and personality. This is why I now refer to UM's chosen approach as atomistic, since it reduced systemic dysfunction to the level of individuals and units – a tactic employed for decades by fossil fuel companies in their public relations campaigns diverting responsibility to the individual consumer. Systemic issues, despite being flagged and communicated many times by UMGO and associates were disregarded and remained unaddressed³³. The subsequent emergence of the SustainableUM2030 programme is not so much an organisational transformation of UM as it was a controlled, limited structural reform of the governance and strategy for sustainability in certain line organisations and hierarchies. However, this development, characterised by the emergence of the Taskforce, does

31 *The reality of these being maintained in practice are called into question in light of the findings – during the structural reforms of 2017, one Green Office coordinator was in contact with Green Office counterparts in Wageningen, where familiar negative experiences were reported as a precursor to those later experienced in UM. Similar patterns to those which Wageningen GO, and UMGO experienced were also reported from Hildesheim GO later in 2019, corroborating a trend in the movement.*

32 *I cannot say whether or not this is good or bad for organisational transformation; this would imply a subjective judgement. However, if you ask me, it is not ideal as it did not result in wholesale organisational transformation, not fulfilling the principle of holism. Further, less dispassionate reasoning in **Post-Script**.*

33 *The evidence for this is, paradoxically, that there is no evidence that shows the EB reaction's to UMGO's proposals over the years. This is what is so striking and counterintuitive. Nothing comes up anywhere despite extensive effort with the deep analysis. If there was any formal reaction I would have likely found it somewhere.*

not preclude the possibility of a fully-fledged organisational transformation for sustainability in the 2020's. The reform can be described as a significant departure from rational management practice because it overlooked a series of previous internal investigations, proposals, interventions and reports that originated from UM students and staff working with sustainability performance improvement in the years 2014-2019. A "new" UMGO exists under the wings of the SustainableUM2030 programme. It remains to be seen how SustainableUM2030 and UMGO can help UM's transformation. See the recommendations (*section 10.2*) for some pointers regarding optimising the transformative potential of UM.

At this point, I would only point to my central axiom of the means and ends of transformation of sustainability: what transformation costs in terms of collateral damage, can affect the progression of the pathway and the people involved moving forward, in the sense of effectuation or disaffection. That our actions affect the conditions and capacity of others to take action later in time would also hew in discipline closer to the political theory of Arendt which has arisen throughout this thesis.

CONCLUSIONS ON UM'S ORGANISATIONAL TRANSFORMATION

The key difference between the research on UM and the other cases was that the other cases had already begun their organisational transformations for sustainability in earnest; they were identified as outliers because of the external indications that they stood out from their organisational approach to sustainability. Although this comparison may also relate to a temporal component – that is, the other cases began their transformations sooner – looking at UM's transformation signature through the lens of the patterns observed in the other three cases helped uncover significant stepping stones in the transformation pathways available to UM, and how and how far the patterns resemble aspects of UM's diagnosis.

For example, the diagnosis has put weight behind the role and responsibility of the leadership to set the tone and environment within which transformative sustainability work takes place, given their elevation, pay-grade, and expertise in the institution. Students and staff alone, although remarkably adept at transformative agency, sustainability governance and other competencies identified earlier, cannot create this environment themselves. They simply do not have the bandwidth, nor, more importantly, the political capital, continuity or network capacity to do so. High-level Professors, managers and the leadership can therefore use their platforms, and the length of their contracts, to amplify these voices for positive transformation, which complement the calls for intersectional systemic change we see in society more broadly.

At the level of the university as a whole, and to step back into the role of a relatively more objective observer, no true organisational transformation for sustainability has taken place at UM. Nonetheless, there are tell-tale signs, and much capacity for transformation exists under the surface. Several competencies and assets for organisational transformation are strongly present at UM: *SES 3.1 Transformative agency*, *SER 5.1 Sustainability competence training*, and *BSP 1.6 Organisational action research*; however, these did not translate into an organisational transformation. This paradoxical

takeaway does seem in keeping with the entry point we had when we encountered that first barrier to the communications strategy for sustainability project in 2014; the more you wish to investigate how the organisation works, the more you will get resistance.

Coming back to similar grounds of query to the roles and expectations research, it is relevant to try to ascertain to what extent it was actually the Green Office's role to manage this organisational transformation for sustainability. It appears it is the Green Office's role to stoke and nudge the rest of the organisation into transformation, however it is not their role to manage it. It is the role of the leadership - and the rest of the actors across various stakeholder groups - together with student and staff change-agents more broadly, to execute the change management process consented to, but consent there must be all the same. As we have seen, disregarding serious objections to the pathway of change taken produces negative sentiment that does not contribute to a holistic transformation. A link between bottom-up and top-down must be sewn using trust, respect and mutual understanding, as part of a pathway to community empowerment and sustainable environmental management (Fraser, Dougill, Mabee, Reed, & McAlpine, 2006).

In this vein, to answer to what extent is it the leaderships' role, a mindful and transformative leadership of organisational transformation is key for it to actually occur, as was apparent in the LU, and HKUST, ASU cases in different ways. More so than the diagnosis of UM's recent organisational history of sustainability exhibits, the leadership already took a decisive role in the pathway of structural reform for sustainability traced out by the commissioned consultant and former sustainability advisor, leading to the current SustainableUM2030 regime. A rather more bold and holistic approach to change throughout the organisation, indicative of profound organisational transformation, can help unlock the potential assets and resolve other kinds of interconnected crises confidently and competently. Currently, UM is not perceived as leading on tackling the climate crisis, and its sustainability record is in doubt.

To see how to move forward from this knot of buried potentiality, associations and barriers, I compared UM's signature rubric and scalar performance to the data of the other cases using the spider diagrams. Interpreting UM's performance using the three synthesis patterns, I found that UM's signature matches the common patterns and shared qualities from the cases to a limited degree. Key connections are missing and highly weighted rubrics identified as shared in all three cases are not nearly as developed at UM. However, key nodes in the UM signature, like *SER 5.3a* and *OCM 2.1*, did emerge as possible focus points for actors to develop in order to unlock transformation. Similarly, *SER 5.4 Ideal-typical Transdisciplinary Research Praxis*, as well as the meso-level rubric, *OCM 2.3 Purposeful-adaptive evolution*, and to a lesser degree, *OCM 1.3 Organisational cultural health*, if developed further in an inclusive and participative manner, could well lead to a greater awareness and impact of the research and education UM does to do with sustainability (*SER 5.7*); an example of a possible positive systemic cascade the tool allows us to see. Given the presence of key rubrics and some but not all of the associations which constitute the shared patterns of LU, ASU and HKUST, it stands to reason that the assets these rubrics represent could be

brought to the surface if given sufficient room to develop within UM.

In conclusion, UM's potential for strong sustainability has now been unearthed using the diagnostic tool and compared with the shared qualities and common patterns from the other cases. What we now see, from overlaying these on the complex web of associations that make up UM's potential transformation signature, is that there are ways forward, but that there is a lot of work to do. UM, on average, has lower 'W' values than all three other cases. The shared qualities and common patterns help to show what possible mix of internal and external drivers, enablers and change-agents are the most applicable to UM, and thus how it can navigate various pathways of transformation for sustainability available to it. How this is constituted must be shaped, guided and owned by a diverse and inclusive consortium of UM's own stakeholders and actors from across the institution. I hesitate to over-prescribe how this should take place in this chapter.

Addendum 2020

At the time of writing, in 2020, UM performs well under two crises, one digital, one epidemiological, which seems to lend a new sense of esteem in their ability to cope under pressure. This shows that there is clearly capacity for change in UM. Whether this bodes well for its response to the broader climate and ecological crises is still an open question that depends on the actions of its leadership. It also may depend on its awareness of the extra workload and mental health strain on top of the pre-existing individual psycho-social stresses of students and staff.

There has been a commitment to sustainability, however this does not necessarily translate to rigorous attention to developing the organisation as a whole living system. Ownership, dedication and mutual trust as part of this organisational learning process are also unclear. This has led to sustainability being more of a sideshow, particularly during other crises – as has been demonstrated with the hacking of UM in early 2020 and the ongoing corona crisis. This is a precarious situation for UM, as sustainability transformation and systems change are even more a part of societal discourse on and offline. These dimensions are also hard to ignore in the context of the wider discussion on the management and governance of higher education institutions, with equally systemic implications for everything a university does.

UM should therefore make much more significant investments in the human resources and resilience of its community, including its psycho-social wellbeing at the micro-level. As seems to be the case within the halls of SBE, where ICIS/MSI now sits: SBE's new commitment to sustainability in its 2025 strategy appears coupled to funding two internal consortia in which MSI is heavily involved; as befits a business faculty's discipline, they do seem to put their money where their mouths are. But indeed, the focus is currently more on educational renewal and innovation which might be a vehicle for organisational transformation if done in a holistic way.

In the 2020s, students see sustainability, broadly defined, as very important, and increasingly, through the lenses of other crises of ecosystem and biodiversity collapse, as well as structural faults in society, economies, and political systems. Were UM to

treat these challenges as systemic and all-encompassing as they are, its students and staff may be able to better collaborate as a community at the 'CORE' to actually transform how UM as a whole behaves. This is still very much in line with the core business of the university to prepare graduates for the real-world (rather than a more palatable version that does not question outdated practices), and to conduct inter and transdisciplinary research that adds value to the progress of science and society as well as the Earth System as a whole.

In the next chapter, I pose certain recommendations. A policy brief for the UM Board and ICIS/MSI donors of this research is published in tandem with this thesis towards the end of ensuring a therapeutic transformation for the UM community. This policy brief also acts as a stand-alone action strategy report for this community to use to nurture and amplify its transformation to sustainability.

APPENDICES: CHAPTER 9

Appendix 1: List of the 88 Primary Documents used in the Analysis

PD Family	PDs
<u>Bottom-up UMGO Sustainability</u>	<p>Green Academy Session-Baker-Shelley 23.10.14</p> <p>2013- 09- 18- FSP- Green Impact at UM.pdf</p> <p>Group3 Team1_ Thinktank_ Sustainability ranking as an instrument to drive sustainability at UM</p> <p>UMGO Living Lab project plan Oct 2013</p> <p>Overview rootAbility workshops</p> <p>PREMIUM February 2014- Preparing graduates for the 21st century- Green Office and rootAbility</p> <p>Integrated Thinking UM GO SBE Thinktank</p> <p>rootAbility Think Tank June 2014</p> <p>rootAbility GO Audit 2016: Findings and recommendations</p> <p>GO_sustainability_policy_2012-2014 Maastricht University</p> <p>Green Office Impact Model</p> <p>Green Office Education 'Sustain+Go' Evaluation Report</p> <p>UM Policy 2016- 2018- 1st Official Draft</p> <p>GO Annual Plan 2011</p> <p>UM Sustainability Roadmap 2030</p> <p>UMGO Annual report 2016</p> <p>UMGO Annual report 2017</p> <p>Communication Strategy GO</p> <p>MU Project- Roles & Expectations Intervention</p> <p>Green Office Impact Model</p> <p>Green Office Model 2017 e-book: 1st design and text for review</p> <p>For sustainable solutions, look to the entrepreneurs: UWN Baker-Shelley 2017</p> <p>SDG proposal Response to President Paul_June 2017</p> <p>EU Sustainability in HE Network Brainstorm with Felix Spira_Dec 2013</p> <p>UM Taskforce Sustainability Vision 2030</p>
Independent, Semi-Independent, 3 rd Party Studies	<p>rootAbility Think Tank June 2014</p> <p>rootAbility Audit 2016_Findings and recommendations_portfolio overview</p> <p>Capstone- Friederike Sonnenberg- i6084509</p>

Roles & Expectations: Interviews	<p>GO SB Roles and Expectations Interviewee Brief ABS</p> <p>1 Transcript AG 30.06.14</p> <p>2 Transcript DB 30.06.14</p> <p>3 Transcript PC 01.07.14</p> <p>4 Transcript RL 02.07.14</p> <p>7 Transcript HH 07.07.14</p> <p>8 Transcript LS 09.07.14</p> <p>9 Transcript AMvZR 09.09.14</p> <p>Interview Summary MR 07.05.15</p>
Strategy, Policy, Management	<p>K.2 Faculty strategy 2011-2015.pdf</p> <p>MUMC+_-_Heel_de_Mens_-_Nota_strategisch_beleid_2010-2015.pdf</p> <p>Strategic_Programme_FPN_2012-2016.pdf</p> <p>Annual Report 2012_FdEWB_strategisch_plan.pdf</p> <p>corp_brochure_2013_voor_op_website (1).pdf</p> <p>Performance Agreement_Voorstel_Prestatieafspraken_Universiteit_Maastricht.pdf</p> <p>Strategic_Programme_2007-2010.pdf</p> <p>Strategic_Programme_2007-2010_Summary.pdf</p> <p>Samenvatting_Strategisch_Programma_2012-2016_drieslag_los (1).pdf</p> <p>UMA11295_strategischplan_WTLR (1).PDF</p> <p>UM Strategic Program 2017-2021.pdf</p> <p>Strategiedocument Gezond Leven.pdf</p> <p>UMC+ Healthy Living Main report English.pdf</p> <p>FINAL- Strategic Plan FASoS 2016-2020.pdf</p>
Top-down UM Sustainability	<p>130820_Hoofdjaarverslag_def.pdf</p> <p>Cvb-besluit-restructuring2017.pdf</p> <p>Scan_091215_085612.pdf</p> <p>UMGO_Supervisory Board Draft Proposal.pdf</p> <p>Inst Gov S Internal UM ABS MF 23.04.pdf</p> <p>Inst Gov Sustainability Structural Diagram 23.04.pdf</p> <p>20161222_opzet interviewsUM_v1.1.pdf</p> <p>20170626_follow up_sustainable UM.pdf</p> <p>2016_Findings and recommendations_portfolio overview.pdf</p> <p>Taskforce Structure GO Representative Agency_2017.pdf</p>

Appendix 2: Examples of Atlas Network Maps used in the Analysis to Substantiate and Validate Associations in the Data

Network Map Example 1: Untapped potential asset knock-ons

Network Map Example 2: Association between SDG Symposium & Mondiaal work

Appendix 3: Organisational Mapping of UM: Institutional Governance for Sustainability - periodically updated into 2016 but first created in 2014.

Appendix 4: UM Potential Action Strategy: ‘Transformative agency, pro-active inquiry, lobbying, liaison and competence training’: 2012-19; 2020-2026

Appendix 4: An Atlas.ti network map of all the rubrics connected in significant associations that form a potential holistic action strategy at UM. Each rubric is positioned in a hierarchical relationship to the others in order to show key associations. Wherever determination of one rubric’s assets could be substantiated as leading to another, this was marked as either ‘is cause of’, ‘is part of’, or ‘is property of’ by order of decreasing significance in terms of linking information. Where no clear direction could be established, and where the relations in the action strategy were more dialogical, these were marked as ‘is associated with’.

Appendix 5: Interview Framework – Roles and Expectations of UMGO and the Supervisory Board 2014-15

A: Approach each member of the Supervisory Board face-to-face or over the phone: Obtain the following perspectives based on how they see their own role (and the SB), the GO's role, and the roles of staff and students in an informal semi-structured interview format: **Questions for the Supervisory Board Members:**

1. What is your view on your own individual role and purpose as part of the **Supervisory Board** of the Green Office?
2. What is your view on the role and purpose of the **Supervisory Board** collectively?
3. How do you define³⁴ Sustainability?
4. How does **SB** engage and contribute to UM's development in terms of sustainability?
5. What exactly **is supervised** and how?
6. What topics is the **SB** interested in or are relevant to its defined roles?
7. What are your expectations of the management style of the **SB**?
8. What is your view on the role of **students and staff** in achieving sustainability at UM?
9. What are your expectations of **staff and students** in the same respect?
10. How do you think **students and staff** should engage with the projects and activities initiated by GO?
11. What actions should **Board** members take before and after meetings with the GO?
12. What actions should the **GO** take before and after meetings with the SB?
13. What do you think is the fundamental role of the **GO**?
14. What do you think **it** has achieved since its inception in 2010?
15. How do you think UM has developed with respect to sustainability since 2010?
16. Is there anything that can still be improved in this regard? If so what can you suggest?

B: Approach each member of the Green Office: Obtain the following perspectives based on how they see their roles individually and collectively as the GO team, the roles and purpose if the SB, and those of the staff and students in informal semi-structured interview format: **Questions for the Green Office**

Student Employees

1. What is your view on your own individual role and purpose as part of the **Green Office**?
2. What is your view on the role and purpose of the **Green Office** collectively?
3. How do you define Sustainability?
4. How does **GO** engage and contribute to UM's development in terms of sustainability?
5. What topics is the **GO** interested in or are relevant to its defined roles?
6. What has the **GO** achieved since its inception in 2010?
7. What is your view on the role of **students and staff** in achieving sustainability at UM?
8. What are your expectations of **staff and students** in the same respect?

³⁴ *Aim: How does each stakeholder's definition and knowledge (or lack thereof) of sustainability/sustainable development affect the political direction that influences the transformation of UM towards sustainability?*

9. How do you think **students and staff** should engage with the projects and activities initiated by GO?
10. What actions should **GO** members take before and after meetings with SB?
11. What do you think is the fundamental role of the **SB**?
12. What actions should **Board** members take before and after meetings with GO?
13. What exactly is **supervised** and how?
14. What are your expectations of the management style of the **SB**?
15. How do you think UM has developed with respect to sustainability since 2010?
16. Is there anything that can still be improved in this regard? If so what can you suggest?

Appendix 6: A copy of the UNESCO Commitment to Sustainable Practices of Higher Education Institutions, signed by UM President Martin Paul, June 16th 2012.

**Commitment to Sustainable Practices of Higher Education Institutions
on the Occasion of the United Nations Conference on Sustainable
Development**
20-22 June 2012, Rio de Janeiro

"As Chancellors, Presidents, Rectors, Deans and Leaders of Higher Education Institutions and related organizations, we acknowledge the responsibility that we bear in the international pursuit of sustainable development. On the occasion of the United Nations Conference on Sustainable Development, held in Rio de Janeiro from 20-22 June 2012, we agree to support the following actions:

- **Teach sustainable development concepts**, ensuring that they form a part of the core curriculum across all disciplines so that future higher education graduates develop skills necessary to enter sustainable development workforces and have an explicit understanding of how to achieve a society that values people, the planet and profits in a manner that respects the finite resource boundaries of the earth. Schools are also encouraged to provide sustainability training to professionals and practitioners;
- **Encourage research on sustainable development issues**, to improve scientific understanding through exchanges of scientific and technological knowledge, enhancing the development, adaptation, diffusion and transfer of knowledge, including new and innovative technologies.
- **Green our campuses** by: i) reducing the environmental footprint through energy, water and material resource efficiencies in our buildings and facilities; ii) adopting sustainable procurement practices in our supply chains and catering services; iii) providing, sustainable mobility options for students and faculty; iv) adopting effective programmes for waste minimization, recycling and reuse, and v) encouraging more sustainable lifestyles.
- **Support sustainability efforts in the communities in which we reside**, working with local authorities and civil society to foster more liveable, resource-efficient communities that are socially inclusive and have small environmental footprints.
- **Engage with and share results through international frameworks**, such as the UN Decade of Education for Sustainable Development, led by UNESCO, the UN University system, the UN Academic Impact, the Global Compact, the UN-supported Principles for Responsible Management Education initiative and the UN Environment Programme's Environmental Education and Training, in order to exchange knowledge and experiences and to report regularly on progress and challenges."

Date: June 18th, 2012

Organization: Maastricht University

Location: Bus 616 / P.O. Box 616
NL - 6200 MD MAASTRICHT

Name & Title of Signatory: Prof. dr. Martin Paul
President

Signature

An initiative of

CHAPTER 10. CONCLUSIONS, RECOMMENDATIONS & DISCUSSION

SYSTEMIC TRANSFORMATION OF ORGANISED HUMAN LIFE

“Disorientingly, climate change will also send us hurtling forward into an uncharted future...”

[It is] giving us not a deep time of permanence but a deep time of cascading, disorienting change, so deep that it mocks any pretense of permanence on the planet...

Just how long the ecosystems of earth will be thrown into flux and disarray from anthropogenic climate change also depends on how much more of that change we choose to engineer – and perhaps how much we can manage to undo.”

David Wallace-Wells, The Uninhabitable Earth, 2019, p. 203

Hawkins Climate Stripes: Graphics and lead scientist: Ed Hawkins, National Centre for Atmospheric Science, University of Reading. Data: Berkeley Earth, NOAA, UK Met Office, MeteoSwiss, DWD, SMHI, UoR, Meteo France & ZAMG (<https://showyourstripes.info/>)

10.1 CONCLUSIONS & INSIGHT ON OUTCOMES

This Chapter

The first section of this chapter discusses the overall significance, utility and insight of the various outcomes of this thesis, whilst presenting some conclusions the reader can use to inform their own research and praxis-guided approaches to transformation to sustainability. As well as lessons learned from the challenges and limitations encountered. It also produces some avenues for future research.

The second section presents tailored recommendations for Maastricht University, the Green Office of UM, and some policy recommendations for higher education more broadly. In the final section, I zoom out to a big picture discussion regarding the systems transformation towards *human-environment* syntony, and the transformative action turn in the ethos and pathos of the university philosophy accorded to the resolution and remediation of the climate, ecological and social crises we currently encounter.

10.1.1 THE ID-TOOL: A CODEX OF TANGIBLE SYSTEMIC RUBRICS OF ORGANISATIONAL TRANSFORMATION

The purpose of good tools is that they should operationalise complex sustainability theories and concepts into tangible mental models for actors and change-agents to better navigate their task environments. These quality criteria, proposed by Atkisson (2018) in a conversation with the researcher regarding this project, explained the purpose of integrative sustainability tools in reference to Kapitulčinová, Atkisson, Perdue, and Will (2018), and is rooted in sector-specific research. Examples include factors influencing university support for sustainable entrepreneurship, engaging scientists in science communication, and professional, methodical and didactical facets of education for sustainable development (Collins, Galli, Patrizi, & Pulselli, 2018; Fichter & Tiemann, 2018; Hu, Li, Zhang, & Zhu, 2018; Will, Neumann, & Brauweiler, 2018). Furthermore, Coghlan and Brannick defined key terms of diagnostic tools in their section on organisational diagnosis in *Doing Action Research in Your Own Organization*:

“underlying the principle of organizational diagnosis is a notion of organizational health that organizational clinicians use to compare with the present situation (Schein, 1997). Accordingly, frameworks which postulate key organizational variables and relationships are important diagnostic tools. At the same time, we remind you of our important point... that we do not see an activity such as ‘diagnosis’ as an activity aimed at creating an objectivist truth. Rather, we understand the use of frameworks as providing a construction for conversation, and mechanisms for collaborative sense-making and joint action planning and action” (Coghlan & Brannick, 2014, p. 112).

In the systems sense then, the green lights for systemic change and transformation proposed in *Chapter 8* may equate to qualitative indicators of the thresholds beyond which the system profoundly shifts its equilibrium state. After three external cases, and one insider case application, the interpretative-diagnostic (**ID**) tool developed may hold a promising function to assist actors to navigate the bewildering array of theories, frameworks, standards, certifications, management systems, and competencies that need to be woven together in unique signatures of transformations to sustainability.

Based on organisational diagnosis in the context of systems thinking and practice, the

ID-Tool is a system of tangible rubrics that allows a holistic view of the university organisation, representing intrinsic capacity for systemic change that may otherwise be left tacit, unknown, and inaudible. The tool's rubrics, through adaptation in more numerous and various locations can help leaders and actors to tailor asset development within their own organisations, as they denote concrete qualities and characteristics essential to organisational transformation for sustainability. They also provide evidentiary outcomes for these actors (academic, administrative, student or leadership) concerning how universities navigate organisational and societal transformation towards sustainability, in light of the radical and deep adaptation that must now take place in organised human life. The rubrics characterise a fuller picture of how organisations and groups within them behave when they are navigating pathways of transformation for sustainability¹. In the sense of educating universities to conduct their own transformations, they can structure and formulate specific learning objectives for university actors who sincerely aspire to transform themselves.

To provide insight into the recommended use of the tool, it might be useful to briefly revisit the notion of conceptual density, which represents an attempt to quantify the associations between categories of analysis. Category associations were verified by being enlarged in an Atlas.ti network diagram, whereupon if certain isolated links proved un/substantial or un/justified (depending on the internal evidence) they are either confirmed or deleted, with data links acting as the associations between the codes. Hence, conceptual findings are presented as a synthesis within (intrinsic perspective) and across (extrinsic perspective) cases. This would justify the synthesis of the results, which establishes tangible systemic rubrics for organisational transformation for sustainability that may be adopted and applied elsewhere. Nevertheless, empirical findings only discuss the potential significance in a pathway that has been uncovered, its chronology, networks of stakeholders and strategies employed by them, as data links ground observations further and make connections between categories denser. In this sense, this process corresponds well with how to inquire into how a system functions in organisational diagnosis, to unearth the rules of the game by engaging with the following systemic questioning, as Coghlan and Brannick (2014) state according to McCaughan and Palmer (2018):

- “Establishing circuitry: when A does [X], what does B do? What does A do next?
- Establishing patterns: what patterns are evident over time?
- Exploring meaning: what are the meanings held in the system? What are the common meanings attributed to events and actions?
- Exploring covert rules: what unarticulated and hidden rules govern behaviour?
- Exploring the time dimensions: how do time delays have an impact on the system?”

McCaughan and Palmer (2018) in Coghlan and Brannick (2014, p. 113).

¹ *In deep-adaptive, equilibrium-shifting sense meant above, where sustainability is defined by state of dynamic syntony between our species and the wider whole of the Earth system.*

The inquiry into UM found that the shared qualities and common patterns traced out by prior applications of the tool in other cases, enabled underlying qualities to be further clarified and highlighted for their capacity to unlock transformation using the rubrics and guiding green lights. The application of the tool also fused different strands of action research and action inquiry into particular rubrics, made tangible via experiential learning about actors' competencies of response to extrinsic drivers, and their organisations' own intrinsic approaches to managing sustainability projects, experiments and initiatives. Specific green lights for systemic change emerged that codify this action inquiry and sustainability praxis (for example, *SER 5.3a&b*, *CGS 3.4*, and *BSP 1.6 & BSP1.6.1*). These are helpful heuristics for training knowledge actors how to effectively manage and research transformative sustainability in practice, and for more experienced sustainability and social scientists. These, and other rubrics, can be made accessible in an independent publication that comprehensively details a coding guide with the goal of enabling practitioners of systemic change for the common good of a more thrivable, equitable and just world.

Overall, the tangible systemic rubrics could assist actors to effectively navigate organisational transformation for sustainability. These rubrics could also be facilitated into heuristics and mental models at the micro-level, and communities of inquiry at the meso-level, internal to the university organisation. With these rubrics, greater comprehension of the relationship between the university and the wider world might be achieved, and recognition of an 'institutional-environmental' dissonance in need of boundary work across social and organisational cultures.

HOW COULD THE RUBRICS IN THE TOOL BE USED?

The rubrics could be used as a means by which sustainability groups organise themselves. Each of the 33 rubrics has the potential to act as a capacity-building green light. However, they only act as green lights if there is a strong evidentiary basis in the system to which they are applied – that is, the qualities have to exist to some extent already. It is important to note that in the case that there is not sufficient evidence collected to identify whether a rubric is present or not, this *does not necessarily* mean that the organisation in question does not possess the respective qualities of that rubric. It *may rather be* that there has not been a sufficient quantity or scope of data sampled. Be aware of sampling bias, and selection bias, and certainly do work in groups to code data. If certain parts or functions of the organisation, for example, environmental governance, sustainability reporting, and operational management, indicated by certain rubrics, proved crucial in the signature action strategies, then the grounds are ripe for transformation to (continue to) take place, and perhaps have knock-on effects externally. This is where green lights may indicate transformative potential. It is this potential that the term ***intrinsic competency for systemic change*** describes as embodied in a person; the green lights would therefore crystallise competencies based on to what extent evidence of competency development and application are present. When this is not the case, they indicate the nature and strength of latent transformation capacity.

It also seems possible to identify amber (not yet ready for change, but has potential), or even red lights (risk of imbalanced or ineffective holistic transformation, do not

proceed), as the interpretative-diagnosis of UM concluded. This seems in line with how organisations are constrained or enabled by their institutional architecture, if, and to what extent any green, yellow, or indeed red lights can be identified, may determine whether they can undercut, outmanoeuvre, or directly impact their institutional architecture - or even redesign themselves for more holistic sustainability management and performance. An analogy might be the organisation's own 'glass-ceiling', as with the transition management framework levels, niche, regime and landscape (Kemp et al., 2007; Loorbach, 2010; Loorbach & Rotmans, 2010). They may also indicate the nature and strength of potential transformation capacity an organisation has towards sustainability in its social, ecological and even, institutional environs.

At the macro-scale then, the four case studies show that organisations are constrained or enabled by their institutional architecture, which they cannot directly change themselves, yet they can choose to have agency within the bounds that the system they operate within allows. If, and to what extent, the green lights allow actors to focus and tailor key asset development may affect how they undercut, outmanoeuvre, or directly impact their institutional architecture, for example, in terms of higher education regulations, or political and corporate interest groups with competing demands of the university. Developing such key assets would allow them agency in the process of redesigning themselves for more holistic sustainability management and performance, rather than merely reacting to the neverending pressures society asks for. This would overcome the organisation's own 'glass-ceiling' in terms of disrupting the landscape (roughly equivalent to the institutional architecture I mention) through the niche (insider sustainability transformation agents) engaging with the regime (deans, management and leadership), when we apply the widely applied transition management framework levels (Kemp et al., 2007; Loorbach, 2010; Loorbach & Rotmans, 2010). This understanding of transformative agency in higher education management allows a scalar and nuanced spectrum of possible outcomes, scenarios and policy pathways, with differing effects on organisational stakeholders that leaders can plan for rather than feeling powerless and surprised every time a new crisis or controversy comes their way.

Overall, the ID-tool is useful for understanding how the organisations behave when attempting to transform towards sustainability. Weighting the rubrics with the empirics enabled us to clearly map action strategies of transformation. These action strategies combine holistically in specialised transformation signatures. This shows how internal mechanisms for organisational transformations for sustainability can be unearthed so that opportunities for external impact suitable to the context are highlighted and augmented. However, these may need to be substantiated against control groups, with more longitudinal quality, which would require more embedded and action research within universities, combining quantitative and qualitative research methods. Uncertainty may arise from the fact that the criteria in the tool may not be sufficiently concise or have enough explanatory power to have properly encapsulated the breadth and depth of data targeted. However, after initial testing at UM, followed by three rounds of iterative and reflexive adjustments, and a final full-scale application back at UM, this research makes the claim that the 33 rubrics are developed to the extent required to be a useful and valid means to understand how transformations can be

effectively navigated. Eventually, in Maastricht, the tested and substantiated tool provided a credible means with which to comprehensively, and scientifically diagnose the university's attempts to make progress in its sustainability journey, as well as compare its performance with other transformative universities. This utility ought to be weighed against the possible kinks in the tool: when a category is not very highly weighted, whether that means the competencies or assets scanned for are not there in the collected empirics but could still be present in the organisation in question, should remain a key consideration.

In conclusion, while being conscious of the tricky empirical and epistemological problems that beset much organisational research (see *Section 10.3.2*), this inquiry yielded unexpected richness and meaning grounded in the experiences and accounts present in the data collected. This was because of what was learnt whilst iteratively developing and designing the diagnostic tool, and the transformational and solutions-oriented nature situating this work in sustainability science (Wiek & Lang, 2014). In search of unearthing deeper causal mechanisms of organisational transformation, and making validity claims about these processes, one empirical problem is that inquirers can never objectively observe such mechanisms, as to fully encapsulate them the researcher has to – it is argued – perform some kind of insider or action-oriented research. There are also limitations that arise from viewing the system mechanistically. Nonetheless, through applying the diagnostic tool to the vast amount of information collected in this action inquiry from four public research universities², combined with five years of journals full of research notes, observations, and experiences, we found some valid and tangible heuristics. It can be said to a fair degree of confidence that the tangible systemic rubrics can really help diagnose and interpret guiding green lights of systemic change for university communities. I explore avenues I see for future research in the discussion section, after the tailored recommendations. However, for now, it is relevant to end the conclusions regarding the tool with some key principles that ought to be considered with operating it for future pragmatic research of university organisations:

- Holism: universities ought to actually and ideally look at all the thematic and prioritised areas as interconnected and interdependent in a systems view.
- Pro-activism: wherever certain categories of the thematic areas are not present to a significant extent in the socio-organisational system, they ensure that these are actively developed.
- Iterative: the manner of the development of weaker categories takes place along different available pathways (action strategies) in action learning cycles.
- Intrinsic: in order to attain macro-regional-level impact, action strategies need to be undergirded by the development of micro and meso-level competencies, forming an overarching signature of transformation and systemic change.

The following section concentrates on the case conclusions.

² Meaningful material was excluded for practical reasons. See epilogue for personal reflections from the researcher justifying the omission.

10.1.2 LESSONS FROM TRANSFORMATIVE UNIVERSITIES

The case studies have aimed to elucidate and distil sustainability claims from observed and experienced group and organisational level behaviour and action. To this extent, in more simple terms, they have helped to identify and distinguish what was seen and experienced according to:

- 1) What the organisations say they do with respect to sustainability; from the perspective of formal disclosures regarding public relations and communications units aligning with the leadership's vision and strategy.
- 2) What others say they do with respect to sustainability; third-party sources, as well as commissioned independent investigators and/or consultants disclosing what the university is doing according to their perspective as an outsider.
- 3) What the evaluated insider accounts of organisational members actually say that they do with respect to sustainability; primarily insider sources, accounted for in interviews and internal documents that they shared in response to the interview questions and to assist this action inquiry.

10.1.2.1 INSTITUTIONAL ARCHITECTURE & AGENCY

Having reaffirmed the value of the shared qualities and common patterns of organisational transformation for sustainability derived from the cases, it can now be said to a fair level of confidence that all of the three points of the postulation made in *Chapter 8* can be framed as propositions of this thesis, in that:

- *The case universities developed intrinsic competencies for transformation or systemic change;*
- *Internal organisational development or transformation is often (but not always) catalysed by a shock to the system from its surrounding institutional architecture;*
- *Through investing in the work of organisational transformation, internal or external stimuli eventually generated positive impact in the local socio-ecological system via the university itself.*

The outcomes of the case studies of transformative universities prompted reflection about how the universities learnt about themselves in response to strong stimuli. The conclusion was that they did this whilst also learning about how they operate and influence their environments towards higher sustainability; hence, if organisational transformation is induced in the right places intrinsically, this may open up potential for wider societal transformation. No claims can be made of the later sort since the necessary longitudinal research was not conducted at all cases. Despite having access to plenty of historical documents, there is not enough corroboration from groups in the local contexts (i.e. no representative survey of locals). However, what we can speak to is the institutional dimension that seems have a strong effect on universities' ability to act sustainably, as well as that which itself can be overcome somehow by the organisation's agency that arises when a university learns enough about itself to therefore understand how it can transform. The dimensions and conditions that most affect the ability to transform have already been discussed in *Chapter 8* and elsewhere in this chapter. Especially the latter ability (and sincere willingness) to transform is what I

term a green light for systemic change.

In the process of preparing the case synthesis paper, after the European Regional Science Association (ERSA) conference in Cork, which focussed on addressing the external impact universities could have by triggering transformations towards sustainability in their regions, we realised we had been missing a key concept at the interface of the organisation and its wider environment. This concept is mentioned in the entrepreneurship, economics and business studies literature as ‘institutional architecture’; however, in the context of this research, we mean something more distinct. Deducing from the case studies, and from the five perspectives of the ID-tool, institutional architecture describes the policies and influences, and vying interests that governments, business and civil society have over the governance and trajectory of the university organisation, as well as its ability to engage and work in ways that maximise transformation to sustainability.

In light of this concept, it seems useful to apply evaluative framings like DIPSR-logic (driver, impact, pressure, state, and response) to frame how external drivers and stimuli lead to internal responses and behaviours in the cases. Different conflicts arise internally. Sometimes these conflicts or pressures can be overcome via asset-development based on intrinsic logics like participatory governance processes, liaison officers operating cross-organisationally, interdisciplinary research clusters, and transdisciplinary configurations. Applying this logic, institutional architecture can be the deciding recipe of pressures and drivers hindering or promoting transformation of the organisation dependent on it for its legitimacy, for example, national higher education policies, whether socio-economic or political in nature. So, clusters of action as defined in *Chapter 8* are something organisational actors working towards sustainability do in pro-active response to stimulus *not merely as a reaction to the stimulus itself*. In this sense these are then framed in terms of internal responses to extrinsic drivers; the stimuli caused by the architecture create the circumstances but do not entirely define the responses. The nature, form and substance of these responses are rather rooted in the intrinsic logics of the organisation and its actors, and, crucially on their collective agency.

Institutional architecture is captured somewhat in the case-study analysis of the shocks that actors within the universities responded to in their signature approaches to transformation (for instance, the Asian financial crisis with HKUST, the reunification of Germany for LU, and the higher education cuts and inequality of access to education for ASU). Especially at the macro-level, this architecture is evident when we talk about the shocks to which the universities responded to. But, of course, there is also educational policy in general, as well as the influence the university may have on those policies, through the advocacy of members of the leadership at the relevant national policy circles. For example, the President of UM’s advocacy for the multi-lingual status of the university in line with its internationalisation strategy in the Higher Education Sector.

Ultimately the data mostly only speaks to how the universities responded to and leveraged changes in this institutional architecture. Although in the socio-economic

slow-downs their region's experienced it is difficult to discern where the institutional architecture for higher education institutions ends and where the wider economy-society-ecology begins. In the systems view, of course, this makes perfect sense, as the university as a socio-ecological system is interdependently woven into the fabric of the wider world. Recognising this in practice (rather than as a mere intellectual exercise) may start in the local context by looking to the cities the universities operate in, in order to get more of a finger on the pulse of their localities, where more transdisciplinary research (like assets-based community development) needs to be done. This is where the scope of these conclusions on institutional architecture ends and passes the baton onto others in associated fields. It is also where we can move into the role of universities in the wider transformation required of us.

10.1.2.3 UNIVERSITIES AS STEWARDS AND AGENTS OF TRANSFORMATION

What became very clear from the cases performance at the macro-level, was a body of nascent and emerging stewardship competencies of the organisation of the universities with respect to their socio-economic and ecological surroundings. Based on analysis of real-life impacts, and systemic sustainability performance, the case-study universities enabled a cocreation of multi-stakeholder knowledge and learning on transformations to sustainability along a variety of goals and objectives, such as zero-waste, decarbonisation, divestment, curriculum redesign, and many more. One major conclusion was that universities who effectively navigate transformation develop the capacity for self-diagnosis and learning: including awareness by actors of organisational system boundaries, the relationship between the organisation and its surrounding society and ecosystems, and thereby also its interdependency with them.

The conclusions from the case studies therefore imply a renewed role of universities as stewards of surrounding socio-ecological systems in activating, leveraging, and facilitating their region's transformation towards sustainability. The case study universities evaluated were able to develop their own capacity to positively influence and change social and economic systems because they first invested significant time, energy, and human resources in learning and researching themselves, before embarking along signature pathways of organisational transformation for sustainability. Universities which concentrate on transforming from within, can better apply knowledge of transformations about their surrounding societies, since they are nested in society, and their sustainability is therefore dependent on that of their social environment. In essence, therefore, one important central proposition emerges from this thesis: *extrinsic capacity for transformation is interdependent with developing intrinsic competencies for systemic change.*

The implications of my research may put a dampener on the current zeal in business-academy networks about how to drive innovation and transformations for or to sustainability in university organisations, as well as many other types of organisations across different sectors. The focus of this zeal seems to lean in the direction of developing blueprints of organisational transformation for sustainability. My findings, however, suggest that the most appropriate manner to go about organisational transformation or sustainability appears to be to start from within, by understanding

the various intrinsic logics, cultures, idiosyncrasies and identities that exist in the universities intricate, and intimate, web of sub-cultures, disciplines and student houses. Whilst I am tempted to conclude that there can be no common algorithmic blueprint of organisational transformation for sustainability, since this well supported by previous multi-perspectival research in the direction of institutional change in higher education (Adrianna Kezar, 2001), and organisational transformation for sustainability specifically (Edwards, 2009, 2010), I would not go so far as to say we cannot strive towards a continuously evolving typology of shared qualities and common patterns of behaviour of organisations that flourish in their organisational transformations for sustainability. Indeed, we also found from the synthesised cases, was that effective navigation of organisational transformation for sustainability benefits from tangible systemic rubrics, which provide the means to recognise, zoom into and examine the intrinsic logics and drivers of organisational transformation for sustainability, itself highly context specific.

The investigation of how PRUs navigate transformation pathways towards sustainability showed how internal actors and groups react to organisational and situational stimuli in productive or counterproductive ways depending on the agency, ownership they took in what they were able to control. When actors fell into the typical victim-perpetrator dynamic, this did not help shift the sub-optimal dynamic. It was found that pathways of organisational development and transformation towards sustainability appear driven by highly context-dependent intrinsic logics, and often most effectively when there is a symbiotic balance between bottom-up and top-down governance and praxis for sustainability. These pathways are not absolute, but part of an adaptive, iterative and self-reflexive learning process, which orientates and guides the university's socio-ecological stewardship of its region depending on its culture, geography, governance structure and power relationships (Velazquez et al., 2006; Westley et al., 2013). Universities' resilience as socio-ecological systems, therefore, depends on their intrinsic competencies of systemic change, like transformative agency; these enhance their capacity to transform their regions towards more sustainable ways of life, once their own organisational transformations are navigated effectively. This process seems to take place in adaptation, anticipation and syntony with their social environment, which actors within universities drive, producing a feedback loop that enhances intrinsic competencies for systemic change in turn. The success of this navigation seems determined by action-beyond-intent to carve out 'spaces for possibility'³. Such organisational behaviour is built on the shared vision of the university as a steward in its surrounding society's transformation.

Universities that undertake a transformative and open inquiry into their own workings as organisations, in ways outlined by the most substantiated rubrics (for example *BSP 1.6.1 Organisational experimentalism*, *SES 3.1.2 Transformative leadership*, *SES 3.1 Transformative agency*, and *SES 3.2a Internal governance for sustainability*) seem more capable of triggering transformation pathways towards sustainability in their regional environments. Dedicated actors and teams within universities help to develop their

³ Derived from the German term *Möglichkeitsräume*, via observation of emerging projects at LU, such as 'Stadt als Möglichkeitsraum'. The LU case study is thus labelled *Universität als Möglichkeitsraum*..

intrinsic competencies through a dynamic process of organisational-societal learning (Argyris & Schön, 1996; Baker-Shelley, 2013; Zadek, 2006). They are then able to play a more central role in transforming their surrounding communities and society extrinsically *exactly because* they have striven to attain a greater depth of sustainability intrinsically. In practice, this would take place with, for example, coalitions and consortia of researchers, students, practitioners and civic actors leading to the realisation of solutions in external real-world settings as sustainability outcomes (Melnick, 2016). The capacity of universities to redesign themselves so as to transform as organisations is thus interdependent on their competencies of response to complex sustainability challenges. Such responses involve the implementation of inter and trans-disciplinary research about how to tackle sustainability challenges. How the communities behind these post-normal types of research organise themselves is the next major theme in my conclusions.

10.1.2.4 EPISTEMIC COMMUNITIES: EMERGENCE OF TRANSFORMATIVE KNOWLEDGE NETWORKS FOR SUSTAINABILITY OUTCOMES

The term epistemic communities encompasses trans-institutional networks such as the Global Consortium for Sustainability Outcomes. Such sustainability knowledge networks are a promising development. They are designed to be lean and agile, without too many members, with a clear focus on the sharing and delivery of sustainability solutions and outcomes of research and education at member institutions to geographical, social and physical locations that are most in need of such solutions. Their cultures are experimental, pragmatic, high stakes and collaborative. This includes the application of action-based research techniques that avoid a prescriptive implementation of policy that negates the affected communities' capacity to articulate their own problem situation alongside sustainability scientists in co-research teams. Different scalar examples of these occurring were seen at the extra-organisational scale with LU's innovation incubator, then ASU's cooperative project with LU in Albania. At a higher level still, representing a possible 'scaling' of the complex-adaptive knowledge enterprise model pioneered at ASU, was the exemplar seen in Hong Kong of the Hong Kong Sustainable Campus Consortium.

The results of the inquiry of HKUST also yielded some useful unexpected lessons for the *savoir-faire* behind embedded research within organisations. The staff at HKUST Sustainability Unit, and high-level interviewees there, provided invaluable learning, feedback and suggestion for the research, no doubt rooted in their own competencies in trans-disciplinary sustainability. The lesson from this is there is still a gap in perception and practice of the kind of research required to comprehend and assist organisational member's cognition of organisational transformation for sustainability. High uncertainty and high stakes present in such research on how these transformations take place at universities justifies exploration, creativity and innovation in the very research methods themselves, whose design and incentivisation seems often to go against (as David Mole related in our interview) the kind of inter/trans-disciplinary, post-normal problem-solving strategy required to embed sustainability in universities, and thus shift mind-sets towards a more positive and less critical mode in the academic paradigm.

The identification of the GCSO network common to all three case studies (UM was under consideration according to key actors at ASU and HKUST) moreover corresponds to the findings in Keeler et al. (2016). They interestingly state that to “*recognize the unique conditions of a particular place, such as problem features and solution capabilities, and adopt solutions developed at other places around the world is promising for addressing sustainability problems. It accelerates experiential learning of engaged academic-change-agents through sharing their cognition of problem-owner’s situations, as well as successful solutions, and contextual considerations*” (Keeler et al., 2016). I, therefore, conclude that utilising international knowledge networks for accelerating research and learning in transformational sustainability science is a helpful external driver for universities as well as a platform through which to better leverage their own impact. This seems to be supported by the work of Trencher et al. on effective responses to complex sustainability challenges, which also points to the pivotal role of students in multi-stakeholder partnerships towards cocreation of transformational knowledge and sustainability experiments (2016).

Finally, a common property, or pattern of behaviour was shown in the case studies, which highlights the importance of actor’s actions propagating across scales, and that being a determining factor in seeking to navigate transformations towards sustainability. One key element of success seems then to be the scalar ‘bandwidth’ and awareness of change-agents of leverage points. Bradbury’s work with the *Natural Step*, a Swedish start-up begun by proactive sustainability scientists, helps to back-up this observation (Bradbury, 2001). Her work connected organisational development/transformation for sustainability with action research. She did this using structuration theory (Giddens, 1984), a metatheory used to design the ID-tool, to link practices at the micro-interpersonal level with the macro-institutionalised structures they populate, share and seek to change for the better. She states this approach allows “*potent leverage points for change*” to become visible. From the experience of this research across four cases, this observation is strongly supported, and I would encourage bolder research concentrations on the leverage points of system change and transformation.

Future Case-Studies

Had this PhD project had access to further human and financial resources, we would have gladly pursued case study research representing other global regions like the Asia-Pacific/Australasia, South America and Africa. For the purpose of building the organisational rapport desired to collect meaningful data and experiences from the case study actors, in the original plan, 2-3 months at each site are recommended to allow the potential for more action-oriented research to be applied, which itself works on a spectrum towards the researcher participating in the change as well as researching it (Bradbury-Huang, 2010). Eventually, due to time constraints, issues arising from misconceptions regarding action research (Bradbury-Huang, 2010), and feasibility concerns relating to the lack of capacity, a 6-8 week field work period was possible in my case studies. Due to further time and organisational limitations, a 15-20-day field work period was strongly recommended, leaving the researcher to execute the data collection and organisational coverage targets within that timeframe. This led to my view in retrospect that responsibility for action-oriented research ought to be shared and distributed across the initiators of the project (both academic and non-academic stakeholders included) from the outset. The PhD candidate should be wholly involved

in the original design⁴ of any such project that aims to build on this one by continuing embedded case studies of organisational transformations for sustainability.

10.1.3 EPISTEMOLOGY AND PRAXIS OF (ACTION RESEARCH) SYSTEMS TRANSFORMATION

10.1.3.1 CHALLENGE-BASED REFLECTIONS FOR INSIDER ACTION RESEARCHERS

During this project, I found that modes of action research, as taught, understood and practiced, can be usefully woven together to best understand how effective organisational transformation takes hold and propagates. I showed known links between action research and organisational transformation in *Chapter 2*. Strands of action research – and their differing qualities – were also explored and clarified to open up discussion and inform good reflexive practice. From the experience of doing insider action research work in a university, and the accounts rendered meaningful by this work, a pragmatic understanding of embedding sustainability in the university has emerged, where the outcomes and indicators of transformation for sustainability appear as the student leaders, embedded sustainability champions, and the academics, administrative staff and leaders supporting them. As a means to distil the richness of learning and knowledge, the outcomes of what I learned with the coresearch team has been organised into various points which are intentionally left open for future research and current stakeholders of transformations towards sustainability to complement.

10.1.3.1.1 *Focus and Intentions of the Researcher and the System*

The success of internal efforts to effect transformational change for sustainability within the university system appears more successful outside of Maastricht than inside the campus walls. The transformative agency experienced and practiced in this project, its inculcation in the community, and the innate core purpose of the Green Office can be equated to *“Empowering students and staff to act as effective change agents in the transformation of the university and in society at large... to cultivate among the ... community a sense of agency, as well as the competencies required for effective action for change.”* (UMGO, 2013b). The political transformation function of the Green Office from at least 2012 onwards is clearly communicated and written in their strategic documents and reports. It was on this mandate that the researcher entered UM and assumed the role of action researcher of and for the transformation of the university. Hence the assumption was made, incorrect in hindsight, that UM was engaged as a whole system in intended self-study. This was not the case.

An example of this research design assumption is the Living Lab project, originally proposed by earlier members of UMGO, ICIS, and rootAbility in 2013. This project's enactment with the coresearchers at the Green Office was made very difficult by opaque power structures and interest groups. On reflection, this can be explained using the matrix of the continuum along which the intended focus of both researcher and the system is shown in Coghlan and Brannick with axes showing the orientation of the researcher and the system to self-study in action and transformative change – Quadrant 3 to Quadrant 4 in *Figure 1* (2014, p. 123). When the system itself is not open

⁴ For example, the Maastricht University Green Office wrote and proposed this PhD project proposal to the Board in 2012-13, with the support of ICIS senior research staff who later recruited and supervised me from late 2013.

to learning about itself it becomes practically impossible to set up a transformative change experiment like the one depicted in the Living Laboratory phase of this project at its early stages. Much more realistic given the circumstances were the smaller-scale service-based Living labs that UMGO spearheaded, that including student thinktanks and research projects that worked for clients on real-world problems. This took place from the early 2010's onwards, and were fairly consistent as they did not directly challenge the way the whole system functioned (for example, various SBE thinktank projects with the Business Innovation and sustainable Development course, and the Maastricht University Journal of Sustainability Studies, or MUJoSS).

10.1.3.1.2 The role of subconscious bias in insider action research and the external case study research

The process of articulating the elements of intuition in the researcher's subconscious that may have led to the selection or prioritisation, or dialogical (two-way) conversation, with one actor or another was difficult. This line of retrospective inquiry was nonetheless managed using the insider research, which justifies more constructivist research paradigms in action. The encapsulated experiences – where the researcher is seen as a conduit for the voices of the stakeholders - are of their concerted, implicit or purposeful efforts to shift and eventually transform their own organisation to attain a stronger or deeper level of sustainability; despite this being defined differently, an objective of the interviews was to see how key actors defined sustainability and if this had any bearing in the eventual outcomes of their efforts. Thus, the focus on the direct human experience of the stakeholders was given some interpretative primacy, whilst using the documentation to corroborate their accounts. Many of the documents included previous research or consultations focussed on more specific aspects of the sustainability strategy, embedding sustainability curricula in education, or research demonstration of the university's whole-institution portfolio. These, having been shared by various actors interviewed, or found in the exploration of university website archives, are collected accounts of the university's performance from analytic or interpretative inquiries.

In another vein, the categories used in the analysis are limited to extent that they are subjective rubrics with which to diagnose and interpret qualitative socio-organisational data. In that sense they do not objectively exist in the data; they are better descriptors of often underlying or hidden talents, assets, and competencies that are intangible to the extent they have to be employed to become clear. They are also the result of how the researcher has observed and analysed all the patterns of behaviour in this project to delineate causal mechanisms underlying how pioneering universities achieve transformative structural design, and the objective to contribute knowledge to the administrative science of structural transformation of public research universities.

Figure 1: Coghlan and Brannick's matrix depicting the focus of the researcher and the system, own adaptations made according to the use of their action research practice in this project: to differentiate between the researcher and the system in and on which the action research is taking place, where intended goals between each may overlap or be in opposition to each other (Coghlan & Brannick, 2014, p. 123). (OD: Organisational Development). As this adaptation shows, I, as researcher was with a group who were engaged in self-study, however, I, and the project designers incorrectly assumed at the start that the system and management would be open to intended self-study and learning in action, which was the source of much tension and mismatched expectations. Future research in this area should therefore pay good heed to applying this matrix!

10.1.3.1.3 Appreciative Inquiry in the ICIS-GO PhD Project

It was via the observation of the repeated audits of UMGO during this project that appreciative inquiry arose as a more suitable means of evaluating and enhancing transformative capacity of change-agents; rooted in a language of possibility that pursues alternatives in organisational design and governance, rather than one of deficit (Cooperrider & Srivastva, 1987; Ludema et al., 2001) that can hinder innovation for sustainability by this thesis's investigation. Ludema and Fry (2008) position the rationale of appreciative inquiry against traditional approaches of organisational development following problem diagnosis and feedback which 'suck the energy for change right out of the system'. Cooperrider and Srivastva (1987) found that the "very idea of intervention" should be let go of, instead framing it as inquiry into organisational life, given especially that the diagnostic questions asked by the researchers may have "unexpected impact on the human system" they try to understand and help (Ludema & Fry, 2008). This was certainly the case experienced and observed with this project, where well-meaning inquiries into the university appear to have backfired with negative consequences for teams working for transformation to sustainability, and for having inadvertently trod on the toes of key stakeholders or possible advocates. Thus,

appreciative inquiry was found to be one promising solution to complex and systemic problems experienced by sustainability scientists, practitioners and change-agents⁵ as subjects of this inquiry. It was also directly practiced in co-inquiry with the GO in 2017, as well as other related stakeholders – as outlined in *Chapter 9*.

Overall, this project can be best understood as having one foot in the student-driven Green Office model, and one foot in ICIS/MSI, the Maastricht research institute of sustainability science and policy. Whereas the action inquiry took (and arguably continues to take) place in the context of the living organisational system, this thesis represents the academic outcomes generated by UMGO and ICIS together. That is to say, it was the experience of the Green Office's efforts to activate and navigate positive change towards sustainability from *within* UM from 2010-2013 that produced the outcome of the PhD project proposal, which key academic actors at ICIS then refined and posted. This is seen, in itself, as a knowledge innovation for sustainability. The ICIS-GO PhD is in this sense unusual as it was not entirely generated by the candidate or situated within an existing research project. The project had two roots: one staff-driven, one student-driven; the latter attempting change towards sustainability in their surrounding university system, whether this means the research of transformative change, or iterative cycles of action and reflection in doing it.

The orientation for this inquiry was to understand and therefore learn how to navigate organisational transformation for sustainability, from *within*, from the standpoint of a living inquiry as formulated by Wicks, Reason, and Bradbury (2008). The research trajectory, from its design to its implementation, was passed on from UMGO and ICIS to the researcher. Expected outcomes were knowledge regarding the nature of organisational/structural transformation of universities towards sustainability (as the object of the inquiry). This involved a reflection of the current state of the art of sustainability as lived and practiced within the university, and an iterative process of diagnosing, planning, acting and evaluating problems experienced with change-agents. As such this approach also influenced the methods employed, as there is an interconnected quality to the object, subjects and methods underlying this PhD; the object is organisational transformation of universities, and how this is 'done' by champions, leaders and change-agents within universities who are themselves 'subjects' in the research. Although, organisational transformation (for sustainability) did not appear to be a durable phenomenon itself. This complexity can be understood and reconciled through action research, which sees the researcher, and the group within which she or he is embedded, as *part of* the research undertaken.

The approach was twofold: one, action research was undertaken as an orientation to answer the research questions, to reflect on problem and solution definitions, as well as to see the effectiveness of action research in this context; two, a series of embedded insider case studies were undertaken in order to learn from, evaluate and interpret how these universities effectively navigate their organisational transformation towards sustainability. These two threads in the research both relied upon and informed each other, thanks to a reflexive process of personal, group, and experiential learning. I

⁵ *The hallmarks of action inquiry were detected at ASU, transforming itself into a university-scale prototype initiated by the shared mutual design implementation in 2002 (Crow, 2004).*

revive praxis, a philosophical concept natural to the human condition as described and introduced by Hannah Arendt, to encapsulate this process. I sincerely believe that praxis in the context of transformative sustainability work may be able to propagate new ways of knowing, innovation and imagination, through creating language and space for possibility that leverages pathways of sustainability transformation for humanity at various levels of social organisation.

Post-script

The sheer size and scope and depth of the dataset of the UM case led to the inevitable situation where a sizeable amount of meaningful learning has had to be excluded from the academic thesis. To remedy this, and truly do justice to the experiences and narrative generated by the dozens and dozens of actors involved and invoked in this research, I propose to release a more narrative version of the story, and indeed it will need to be such; an action research story that will hopefully have the kind of impact to different readers that the researcher feels responsible to disclose and share.

10.1.3.2 UNDERSTANDING AND LIVING THROUGH TRANSFORMATIONS FOR SUSTAINABILITY AT SCALE

I can conclude this project by underlying the many meaningful insights produced regarding the multiscale nature of organisational transformation towards sustainability. There appears to be different kinds of transformations for sustainability which are lived and practiced, whether deliberately or contingently, and the patterns of how these propagate and co-inform themselves echo across scales much like fractals do. It even occurred to me in the first case study that transformation of some kind was becoming more inevitable the more ecological thresholds and planetary boundaries we infringed. I understood that a transformation of organised human systems will have to occur, whether or not of their own volition: that is, through active navigation and stewardship, or through abrupt, traumatic and unpredictable transformation, where the latter has severe negative social, economic and environmental consequences (see *Figures 2 and 3, Section 10.3.2*). Applying the heuristic of sustainability competencies to this wicked problem, an anticipatory competency would allow agents to be better able to envisage the multiple possible, probable and desired pathways of transformation that lie before them. This observation is backed up by the emerging literature on transformations for sustainability, sustainable development, or socio-ecological versus economic and political systemic change. Notwithstanding other examples - of which it is certain there are many - these diverse transformation pathways can be positively aligned with the SDGs: to reduce inequality and youth unemployment, mitigate deleterious air, water and soil pollution, and educate students to better meet the wicked sustainability problems of the coming century with measures for increasing resilience, good governance and effective management of socio-ecological systems. Accordingly, the 2019 Sustainable Development Report by the Sustainable Development Solutions Network (another notable epistemic community for transformative sustainability) presented six systems transformations underpinned by the principles of leaving no one behind, and that circularity and decoupling that would be necessary to achieve the UN's Sustainable Development Goals (SDGs) (J. Sachs et al., 2019, p. 3):

- Education, Gender and Inequality: SDGs 1, 5, 7-10, 12-15, 17
- Health, Wellbeing and Demography: SDGs 1, 2, 3, 4, 5, 8, 10
- Energy Decarbonisation and Sustainable Industry: SDGs 1-16
- Sustainable Food, Land, Water and Oceans: SDGs 1-3, 5, 6, 8, 10-15
- Sustainable Cities and Communities: SDGs 1-16
- Digital Revolution for Sustainable Development: SDGs 1-4, 7-13, 17

The nature of the differences between types of organisational transformation may be similar to the typology of Sachs et al., however, they may depend on the intrinsic contexts and conditions under which they take place, as well as the specific pathways mapped out. The last point, regarding to what extent transformations for sustainability are actually mapped produces another degree of variance: that pathways are not navigated means that transformations become haphazard or contingent, or worst still for constituents in the transformation, abrupt and traumatic *because* they were not effectively navigated sooner.

Yet, paradoxically, at the same time, pathways of decisions taken by actors, once associated across social scales and perspectives, present interwoven, unpredictable and even serendipitous relationships with other systems. Observing, understanding and acting upon this web of interdependence seems to be where the unique capacity of the university now lies, viewing themselves as essential nodes in a web of socio-ecological systems, where their own sustainability depends on that of their surroundings. This conclusion denotes the vision of a university acting as a steward for its regional environment, along a pathway of transformation or development towards sustainability grounded in self-knowing. I would thus reposition the ideal-pragmatic role of the university in society as that of stewardship. Stewardship of the health and wellbeing of socio-ecological systems and wise navigators (and therein, societal facilitators and interpreters) of systems transformations to sustainability. Thus, the emergent competencies of universities to positively impact, and be impacted by, their regions through joint sustainability stewardship may be enhanced. In this organisational model, the university has agency in the planned change process, but is neither the sole navigator nor the principle voice of authority, instead convening, facilitating and stewarding transformation; rather than taking power through agency, they engender shared power in plural and appreciative *sustainability praxis* of their surroundings. In this way, the university, and its actors represent an external identity of civic responsibility, systems thinking, anticipation, and other competencies outlined in previous studies (Baker-Shelley et al., 2017; Wiek et al., 2011). Learning how to navigate these pathways might further amplify their potential for creating and propagating sustainable ways-of-life, whilst adding a more positive quality in the societal impact of their surroundings.

Seeing this repositioning of the university in terms of philosophy of science, it denotes a shift from knowledge for knowledge's sake, to different ways of 'knowing' (whether indigenous, constructivist, positivist, systemic, artistic or pure scientific). This concept of knowledge-for-society would aim to build trust in science and scientists by practicing and leading by example to (dialogically) communicate, interpret and implement said knowledge for societal groups who are most in need, or who most suffer from

cumulative colonial generational dysfunction that has renders them without the means to sustain themselves in balance with living systems. I root this notion, articulated from my findings, as praxis for sustainability, based on, amongst others, Benessia et al. (2012), *hybridizing sustainability: towards a new praxis for the present human predicament*. In the lenses I operated to interpret and make sense of the deeper meaning in my study, I found their study in particular corroborates the findings in the field at the transformative case universities, in very different contexts globally. Their description for the rubrics for integrated sustainability praxis when utilised by universities, is pertinent to quote to show how this new way of doing research and knowledge for societal transformation to sustainability. In their terms, sustainability praxis is a:

“new pragmatic defining space, articulated through a plurality of epistemologies, languages, styles of research, experiences, and actions, all coming from a global civil society and defining a variety of epistemic and normative stances and methods. ... sustainability is fruitfully hybridized with artistic research and practice... These hybrids can work as encouragements to abandon modern divides and pitfalls and engage in a new kind of collective diagnos[is] and praxis for our present” [predicament] (Benessia et al., 2012).

In the context of sustainability education, Evans (2011) in her PhD dissertation on *Living and Learning Sustainability: Pedagogy and Praxis in Sustainability Education* also supports this positioning (Evans, 2011). It is on this basis that I venture to position this thesis away from the notion of knowledge production. If knowledge can and is being produced and consumed, then this might tend towards imbuing all ideas with ownership consumerist, capitalistic notions that render meaning and learning itself to bite-sized cartesian chunks and units. As the predominant logic of economic systems ventures into the realm of the ownership of the mind, a (dis-)possession, and (further) dislocation of social and intellectual capital occurs, in the sense of the label a producer must put on such goods. This would appear to fall under an epistemology of possession, instead of the epistemology of practice, as argued in *Chapter 2*, and rooted in Cook and Seely Brown's (1999) 'Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing' (which also inspired the title of the thesis: *Dancing on the Shoulders of Giants*). They bridge the epistemologies of possession and practice, aligning their distinction between knowledge and knowing with pragmatism, which “takes a primary concern not with ‘knowledge’, which is seen as abstract and static, but with ‘knowing,’ which is understood as part of concrete, dynamic human *action*” (Cook & Seely Brown, 1999). The notions portended earlier, of *savoir-quoi* (knowing what) and *savoir comment* (knowing how) are further supported by Moky (2002) in his distinction between beliefs about the natural worlds, and techniques; the *episteme* and the *techné*. These positions are also used in Crow and Dabars (2015a, p. 238) to justify epistemologically-oriented organisational theories.

I would round off the value of what was learnt here by emphasising what has been added to the social sciences, and somewhat revisiting the epistemological development of *Chapter 2*. Much as Bradbury did with her Natural Step study, and I have already outlined the relevance of her action research of 2001 earlier, I would insert my addition using structuration theory's structure and agency by crystallising its implications for transformative sustainability science. I would conclude that not only structure and agency, but power and process all play strong fundamental and interplaying roles in

the theory of organisational transformation for sustainability. The lessons learnt from UM, and HKUST, ASU and Lüneburg contribute to a better understanding of how organisational transformation for sustainability takes place, and whether and how it may be navigated by certain associations of university actors across scale, scope and scenery. We can draw from the empirics an addition to a well-known theory in social science. By connecting these findings with Giddens's structuration theory of structure and agency, the understanding of the roles of power - whether top-down, contingent, opportunistic or distributed - and process - in terms of the action-oriented long-game of change management, organisational learning, development and transformation towards sustainability (see *Chapter 2, Chapter 9*) - has been usefully enhanced. Without being able to research and 'play' along into and along with the game - as action research and constructivism allow, providing a rigorous reflexive basis for - we cannot understand which constitution of competencies and qualities which actors use to strive for transformation using their agency and processes of change, nor what drives the balance of power which structure provides the playground for. Moreover, without an understanding of the power and interests at play, too, as Foucault may have observed, we are consigned to navigating the transformation blind, unaware of the obstacles and existing arrangements that can hamper traction and amplify inertia. In the sociology of this, I conclude that the researcher must not only regard structure and agency, but power and process too.

Having now decidedly stepped into discussion-territory, this finalises the actual conclusions on what was done in this work. Now we can move into sharper research, practice, policy and action-oriented recommendations.

10.2 TAILORED RECOMMENDATIONS

This section is based on the process of reflexive evaluation that ran throughout the project. This continuous reflection has led to the following tailored recommendations for the various actors who invested in, hosted, participated, and are implicated in this research, beginning with the experience of doing action research in your own university.

INTRODUCTION

As recently as 2012, experienced internal change-agents on the academic rota highlighted that the sustainability in higher education movement, despite marked progress in operational optimisation, climate commitments and environmental and/or sustainability education, has overlooked, or “paid limited attention to engendering deep cultural change among university stakeholders” (Marans & Shriberg, 2012). A culture of sustainability, as defined by Marans et al. (2010), is where: *“Individuals are aware of major environmental (and social/ economic) challenges, are behaving in sustainable ways, and are committed to a sustainable lifestyle for both the present and the future”* (Marans et al., 2010).

In *Chapter 3*, the paradox in higher education became a prominent part of understanding what exactly organisational transformation towards sustainability entails: that the university does not exhibit many characteristics of a learning organisation complicates calls for the academic organisation to become a learning and an ‘unlearning’ organisation (Levin & Greenwood, 2001; Senge, 2006). Universities are organisations *of* learning, yet they struggle to set up structures to promote their own organisational learning (Stephens et al., 2008). That this situation persists in a climate of self-congratulatory fervour for shallower leverage points, ‘low-hanging fruit’, and rudimentary sustainability corresponds with some aspects of the diagnosis of the cases studies. The paradigm shift in culture recommended by Marans and Shriberg (2012) points towards that which has been lacking: the intellectual (fusion of disciplines), social and in particular the structural changes necessary can be framed using W. C. Clark et al. (2004). They put forward several “broadly recognised principles” characterising the new research paradigm underling sustainability assessment, shared by the epistemic communities studied in this research which they referred to as *‘people working within diverging networks in the field of sustainability sciences’*:

- *Inter- and transdisciplinary research*
- *Co-production of knowledge*
- *Co-evolution of a complex system and its environment*
- *Learning-by-doing and doing-by-learning*
- *System innovation rather than system optimisation* (W. C. Clark et al., 2004).

Moving towards the tailored recommendations for UM, the Temozón Retreat on Institutions for Sustainable Research and Education called this new paradigm *co-evolution, co-production, and co-learning* which seems very much in line with UM’s Community at the CORE philosophy. This is also why, despite a complex signature diagnosed in depth in the previous chapter, that I *still* describe UM as a *transformative community at the CORE*.

At UM, the pathway studied may have been effective on its own terms, but resilient or holistic transformation it was not, which leaves room for improvement, and some strong reasons to learn from the recent past. Discard dysfunctional behaviours, bad leadership habits, as well as a tempting discourse of bottom-up agency rooted in victimisation and fear, and adopt more effective, appreciative and compassionate approaches. With such a holistic and bold approach, the UM community can succeed in activating and effectuating a fundamental change in the equilibrium state, breaking the cycle of conservatism and ineffective governance on sustainability seen in the behaviour of the organisation. This could still hold the potential to launch UM on its course of organisational transformation, enabling it to reach its goals for science, society and sustainability, whilst overcoming crises in a manner which truly embodies its aspirations to be a (transformative) community at the core.

The following section outlines my recommendations for boldly and holistically applying 'green lights' to unlock UM's transformative potential, where UM students, staff and other stakeholders develop the assets unearthed as a result of the sensemaking of the ID-tool and the meaning generated in the insider action research part of the project.

10.2.1 SPECIFIC RECOMMENDATIONS FOR UM

FROM FAILED LIVING LAB TO A CITY-CAMPUS TESTBED⁶ FOR SUSTAINABILITY TRANSFORMATION

The case study and action research findings have served to develop experiments and recommendations that circumscribe a reconceptualisation and redesign of UM as a purposeful, responsive-anticipatory, complex knowledge enterprise, according to its own intrinsic logic and context-specific conditions; a city-campus test bed for organisational transformation for sustainability. Thus, a comprehensive and holistic approach is recommended when it comes to sustainability projects, research, education and operations in and around UM, particularly between the university, other HEIs, the municipality, the Province and the Brightlands campuses. This has already been mentioned in 2015 and all that is required is more effective and holistic management of the sustainability portfolio. These may include decarbonisation strategies for university buildings integrated into innovative student research courses, and key internship partnerships between educational programmes and waste, energy and city management policy offices at the municipal level. Praxis is the key political function of this testbed, guaranteeing and ensuring a balance between top-heavy institutional, organisational, or individual power structures and vested interests.

1. Internal Executive Training in Sustainability Competencies and Transformative Leadership

It is clear from years of observations that upper levels could do with more support with specialised sustainability and change management know-how and competencies to make effective executive decisions on UM's sustainability portfolio. Yet the potential for sustainability competence training for transformation clearly exists as untapped in the UM community knowledge stock. Have members of the Executive Board, Management team and Board of Deans undertake an executive training program in

⁶ *The concepts of 'living', 'campus', 'learning' and/or 'city lab' or 'laboratory' are elements to the City-Campus testbed, yet in the term 'test-bed' it is hoped the core ideas of collective intelligence, appreciative inquiry and experimentation are conveyed.*

sustainability management, governance and policy. As increasing numbers of this university's own students have to study sustainability in some shape or form, this is not as controversial as it seems, and is in fact fair and logical given the obvious benefits of saving future time and resources, including their own and others underneath them who are impacted by their decisions. The executive training itself can be given internally by UMIO-SSF, MSI (formerly ICIS), UNU-MERIT and other relevant partners. This way, the clear expertise that exists intrinsic to UM can be put to good use without having to incur unnecessarily large fees, or traumatic loss of trust and morale from hiring in external consultants.

This recommendation points to specific actions UM can take:

Suggested Establishment: 'Global Sustainability Transformation Competence Centre'.

Recommended Actor Constitution: EDLAB hosts, MSI, Taskforce, UNI-MERIT, UMIO/SSF, UMGO (if able to ringfence and maintain autonomy).

Suggested Functions:

- Houses, curates and develops all new and old sustainability courses performed over the years in formal, nonformal and informal ways.
- Provides training in sustainability science, sustainable development and climate change from a truly global perspective, south and north in equal measure (balancing indigenous, local praxis and knowledge, with scientific institutional knowledge), to students, middle managers, programme managers, leaders from within and outside UM in the local, regional and international spheres. However, the local economy is prioritised in the sense of access and inclusivity to higher learning.
- Primarily an adult/youth, vocational education centre, focussed on preparing leaders for navigating systems transformation for sustainability.
- Applications assessed on motivation, purpose, and aptitude for (sustainability competence) potential, where substantive assets must be in the track records and characters of the individuals and groups applying.

This vision also lends itself to the idea of having a core training manual for sustainability science and practice, organisational development and transformation, therapeutic innovation, and systems thinking.

2. Make Maastricht SDG-Fit

Enhance the capacity of UM research and education to generate societal impact and public awareness on sustainability by actively connecting to local SDG networks: Build from the SDG Mapping project of 2018, and the Act for Global Goals initiatives with key local partners like Zuyd University, Mondiaal Maastricht, Klimaat Actie Netwerk and the Municipality of Maastricht. An example of the positive potential that exists in the Maastricht ecosystem of organisations and civil society is the launch of the Maastricht Platform for Community-Engaged Research which holds potential for the development of assets-based community development for sustainability through practice and action research and inquiry. UM should try to holding participatory and democratic discussions with the community and should make explicit the need for

practices to be shared and co-created according to action research.

3. Clarify, Substantiate and Enhance the Roles, Recruitment and Resources of UM Taskforce Sustainable 2030

The Taskforce, as observed in this research up to 2019, is vague in terms of what its roles are, not only to outsiders, but to its own staff as well. It appears understaffed, overburdened and unable to realistically perform its function effectively. Clearly define what it is. Is it an official department, central office, coalition, consortium, temporary organisational configuration, or all the above? As part of the organisational development of the Taskforce itself (as that is what must take place for UM to actually fulfil its practical and moral sustainability obligations), ensure that internal recruitment and training is undertaken to considerably improve the human resources dedicated to the taskforce and all administrative and governance staff on sustainability. This recruitment and selection procedure would be rigorous and transparent, prioritised per merit, and internal unless an external is more qualified as a sustainability professional. This has been done effectively in the private and public sectors elsewhere. UM has other interconnected, centralised offices. It is only logical, therefore to enhance and ensure the one for sustainability too and hire graduates and existing academic and administrative staff from across faculties as ambassadors, managers and researchers to populate it. Look to this research projects' detailed case-studies at LU, ASU and HKUST, as well as elsewhere in the Green Office Movement and other higher education institutions for examples.

4. Codesign novel transdisciplinary sustainability configurations

Design and implement complementary transdisciplinary configurations for sustainability in conjunction with fusing intellectual disciplines and defragmenting the institutional structure and governance (e.g. Data Science, AI, Circular Economy, look to the ASU case-study as an example). Make them transparent and understandable for the general university and city population. Can anyone clearly define what Brightlands is for example? Or the precise relationship between the executive arms of UM like UMIO-SSF and SBE, or even the final decision-making authority on matters concerning faculty-level sustainability policy (management team, board of deans, executive board)? Brightlands has a lot of potential, as the emergent codings of transdisciplinary practice for sustainability showed in my analysis. Streamline and make more connections there with active student groups, start-ups, civil society and NGOs all working on various aspects of sustainability and climate action. That way UM can truly have an impact on its region that increases holistic sustainability performance and innovations for socio-ecological (and circular economic) sustainability.

5. Inculcate a healthy culture of organisational learning and development for sustainability

As was the recommendation of the participants of the 2018 SDG symposium: *“Due to its fragmented structure, many sustainability initiatives happen in parallel. Increasing disclosure, demonstration, and organisational learning should make it easier for different initiatives to collaborate and hence increase their impact”* (UMGO et al., 2018b, p. 3).

Be open and deliberate in self-study in action and defragment the institution and disciplinary siloes. Construct and encourage conversations about new possibilities

proposed in an appreciative inquiry and follow through with a vocabulary of possibility in language. This language is initially used by intrapreneurs and change-makers who challenge sub-optimal organisational practices before it begins to inspire and change commonly held presumptions about the capacity for innovation. Unconditional positive questions will help to spark hope, imagination, creativity a discovery of new pathways to establish a collective and shared vision, mission and values for Maastricht University's sustainability. This process could also build on the success of expansion beyond Maastricht into UM's presence in the region in Venlo and amongst Brightlands. An 'integrative public leadership' approach might be applied by integrating people, resources, and organisations across various boundaries to tackle complex public problems and achieve the common good in light of various sustainability outcomes targeted by stakeholders (Crosby & Bryson, 2014). This should involve a shift from critical to appreciative inquiry; a focus on assets and structural leverage points; a realisation of the redundancy of ancient and tribal disciplinary divides.

6. Remediate the Relationship and Rebuild Trust with Student Sustainability Organisations

A likely scenario, and the recommended one in fact, is to uncouple UMGO's dependence from UM in terms of decision-making rights, as its inherently political function is unable to function under the current conditions without external support; collaboration with other rising student climate and sustainability movements, organisations, and open-minded NGOs is recommended. It is only a matter of time, and of feet on the ground, before the calls for action and the questions and calls for accountability from students, staff and citizens alike, become so strong not be ignored any longer. In this eventuality, is it not more the case that UM will be forced to conduct an abrupt turn-around, a veritable transformation, once enough pressure develops publicly, which the evidence shows it has been reluctant to confront? It seems logical that the only way it could actually stand by its sustainability claims would be to make it so that the only way the university works is *because everyone knows how it works*. We might characterise this as an evidence-based transparency transformation driven by impulses from the student and staff groups who retain the lessons and memory; who remembered how things have actually transpired, rather than the established narrative.

The Sustainable UM2030 Programme Team is therefore strongly advised to perform search conferences with UMGO and associated student sustainability organisations (for example the Climate Action Network, Students4Climate, Fossil Free and Precious Plastic), as well as faculty and administrative stakeholders based on their interest and influence, as a means of participatory democracy to repair the damage that has been caused since 2017.

7. Improve tenure-track incentivisation according to the case study exemplars

UM should focus on increasing the incentivisation of interdisciplinary and even transdisciplinary research positions, with key professorial appointments in sustainability-relevant arrays of disciplines. This will unlock the potential I identified in the lower-levels of the institution with students and junior researchers who would better enact the competencies of transformation and sustainability that they learn. Look particularly to ASU where a third 'practice' component beyond the core activities of research and education for academic staff is circumscribed and earmarked into hiring procedures.

The ratio seen at ASU in 2016 according to Carr-Kelman was approximately 40-40-20 in respective order across each of the work domains of research, education and practice. Practice includes precisely those kinds of activities actors had to previously do in their free-time, for example, in mentoring and facilitating grass-roots student-driven sustainability transformation efforts. At LU particularly, where the first instance of this kind of behaviour was observed, the conclusion was drawn that these informal teams of students, staff and professors formed coalitions that created strategic trajectory for proposals and changes. Without these teams, it is not clear that the organisational transformation towards sustainability would have been effective, in terms of whole-institutional change or in terms of how it was navigated.

8. Crystallise a Transformation Strategy by unearthing and developing competencies with the ID-tool

Towards a positive and therapeutic prescription for UM, it helps to recapitulate on the ID-Tool. As presented in Chapter 8, the ID-Tool can also be used to spot the underlying assets (and meaning) that is intrinsically present in the organisation, which could bring about – necessitate, effectuate and guide – the desired transformation. If this is indeed the case, and we can interpret the interconnectivity of the UM action strategy as a representation of *potential* pathways to enact its transformation, then there are several ways to explore how it can unfold. One would be to look at how it might act as a heuristic, or guideline to assist actors operating within organisations exemplified by UM. That is, how might the holistic action strategy, in their hands, assist sustainability actors in their various roles, to come together, to necessitate organisational transformation. Leading on from this, these actors are then able to form structured workable and sensical steps, built from the context-dependant nature of their organisational surroundings. Third, the action strategy's substance – the latent positive attributes and behaviours identified by the tool – may until the point of manifestation be unknown to the actors themselves. They may not know the value and patterns of what they are already doing, because they cannot see the wood for the trees. The ideas, methods and practices which they already may be applying in their work - having been structured/woven into an action strategy by the ID-tool - helps them circumscribe and therefore better understand their own psycho-social/cognitive toolkit of assets (green lights) for transformation.

10.2.2 SPECIFIC RECOMMENDATIONS FOR THE GREEN OFFICE

The conditions for successful innovation of sustainability solutions internal to a university, the capacity for hands-on training of students, and their practice of intrapreneurship and transformative agency, are essential pre-determinants of an effective Green Office at Maastricht University in the post-2020 agenda. In essence, I recommend a significant and profound evolution and redesign of UMGO, as well as the Green Office Model, after 10 years of operation, that also revisits the first principles of this model's philosophy: transformation.

Ring-fence the autonomy and decision-making power of the Green Office and make sure that either:

1. The Green Office as currently exists in 2019/2020 subscribes, and

is able to work according, to the commonly and formally circumscribed Green Office Model principles. This will inevitably involve bottom-up organisational changes to counter the top-heavy changes of recent years.

2. If 1 cannot be achieved or guaranteed by the Executive Board, the conclusion can be drawn that the Green Office model is no longer applicable, viable or appropriate within UM under the current conditions. Therefore, the student unit currently referred to as the Green Office is more accurately called a student support or assistance team. One cannot have one's cake and eat it; UM Taskforce 2030 goes on in its current form, only without the Green Office title, as it seems these two models of governance for sustainability are incompatible.

Re-establish the Oldest Green Office as an Independent Foundation or Social Enterprise

Another option to pursue in conjunction with 1 or 2 is to set up an external foundation or social enterprise called Maastricht City Green Office which could function, for example under the banner of Maastricht for Climate, or of SDG House, and is better able to perform its intended intrapreneurial functions for creating sustainability outcomes. This also ensures the ringfencing referred to above if this cannot be achieved internally to UM in the current structure. Examples are already present in the Green Office Movement of setting up independent foundation arms and in city authorities, like at the VU Amsterdam, Gemeente Amsterdam and in Turin, Italy.

Reinvigorate Integrated Thinking and Reporting in UM!

Together with the Taskforce, implement an institution-wide program of integrated reporting, whereby the existing UM annual report is prepared according to an effective internal management, monitoring an assessment of ESG issues material *not only* to the agenda of the university but to its societal stakeholders too. This shall help to alleviate the lack of transparency, drastically improve the collation and subsequent disclosure of sustainability information and avoid accusations of greenwashing.

10.2.3 POLICY RECOMMENDATIONS FOR UNIVERSITIES AS STEWARDS OF SYSTEMIC TRANSFORMATION

Placing universities in a proactive role, at the heart of a global context of political, social and ecological deterioration and inter-connectivity, I share the following recommendations based on my research. These recommendations can also serve as principles and arguments intended for researchers, practitioners, managers, directors, change-agents, or sustainability champions, in positions where they can positively influence the policy and leadership of universities, and the wider societal networks they are built into.

1. *Polymaking for sustainability transformations should focus on developing and inculcating organisational learning, competencies of stewardship and navigation for societal and ecological good.*

Navigation of transformation for sustainability should be considered as a cross-cutting imperative for polymaking, and the actors behind policy development for sustainability transformation. This requires balance, rootedness (as in space for bottom-up informed policy via praxis), empathy, diligence and patience. One must avoid recent examples

like the *gilets jaunes*' in France, and the Dutch farmers' strikes in the Hague.

2. *Teaching and training (and equal access to this) are our drivers of change and transformation.*

The role that needs to be carved out and taught and trained to current, as well as aspiring policymakers, is that of a pathfinder/navigator. Like in orienteering, she has to manage the route-planning, setting and keeping the bearings and other indicators that will affect the group's progress towards its destination. And – as in military orienteering - the navigator can only make the group go as fast as its slowest members. Otherwise people get and feel left behind, and the transformation is left atomistic and incomplete, inchoate and exclusive.

3. *Competencies of Stewardship and Navigation of Transformation*

- ❖ Embed social and environmental responsibility into the ethos of public research universities. Help them adapt to the task environment and macro-societal drivers of the 21st century.
- ❖ Employ an adaptive 'knowledge enterprise' approach.
- ❖ Improve their student retention rates and teaching quality, core/applied research and the triple bottom-line.
- ❖ Shed light on the returns of investment for a university that does well by doing good, 'walks the talk': adopting the role of a change-agent for positive societal transformation.
- ❖ Circumnavigate barriers to University transformations for sustainability, for example political agency, access to information, opaqueness of procedure, practice and financial/extra-financial information.

4. *Action research pathways of transformation towards sustainability.*

Applying the line of action research that "moves beyond the limitations of the critical effort", appreciative inquiry - linked in the findings of practices employed at all case studies - was found to have many similar elements to assets-based community development for example. With roots in appreciative inquiry, we can see the potential power and benefits this approach would have in terms of recommendations for driving transformation towards a collective vision for a more self-organising system at the public research university (Cooperrider & Srivastva, 1987; Ludema et al., 2001; Mathie & Cunningham, 2003). We also saw common rubrics emerge with respect to the experimental organisation and culture, associated with positive organisational psychology, strategic trajectory, liaison and learning, as well as transformative change-agency with top-down redesign and transformative leadership, and effective intrapreneurship from the bottom-up.

To this end, more work needs to be done to improve and make insider action research more credible, salient and legitimate within the academic community, especially at the

macro-level, and from the perspective of societal, cultural and regional relationships with universities. This needs to be inclusive of the public to raise their awareness of the positive impact the sciences can have, as well as develop better methods and tools for the effective communication of science; we must not overlook the essential role the public can play as co-researchers and partners in research and education at universities.

5. An Interpretative-Diagnostic Tool to Support Agents and Leaders of Transformation

This research has produced an interpretative-diagnostic tool capable of supporting leadership in higher education institutions with the challenge and mission to transform systems for sustainability. Its rubrics of organisational transformation help standardise comparison of environmental-social-governance performance in similar cultural and regional contexts, where students, academics, researchers and practitioners co-create knowledge in a republic of stakeholders. The notion that organisational transformation is actually rooted in personal transformation is supported by the three scales presented and the interconnectivity and dynamic interactions between them as shown in numerous studies (Bradbury, 2001; Giddens, 1984; Reason & Bradbury, 2001a; Stacey, 2001; Turnpenney et al., 2008). This seems pertinent for driving existing or potentially new forms of internal and external action-based policy to influence university behaviour along different pathways and manifestations of sustainability (Beynaghi et al., 2016), engendering a broad palate of outcomes from participatory action research on transformations towards sustainability.

Yet, it is unfortunate and perhaps necessary to understand that, once we add the experience of related insider action research on our own institution, universities are unlikely - through heuristic bias, fear or uncertainty - to actively or explicitly support insider projects that aim to generate knowledge about how they function as organisations. In spite of this, an action inquiry was nonetheless maintained for more than five years and the application of the tool yielded invaluable insights. In terms of the tool's utility in the Higher Education sector, university leadership and student and staff sustainability transformation agents should be allowed flexibility across the five perspectives of the ID-tool, and three scales, so that they prioritise efforts that seem most cogent to their perspective. These possible points of engagement can be termed as 'entry points' for transformation. This is where a certain dilemma arises, because it might seem that a specific priority can be chosen, but the ID-tool aims to clarify that everything is interconnected rather than isolated.

10.3 DISCUSSION

This last section finishes the thesis with limitations, reflections on longitudinal research in organisations, avenues for future research, and eventually zooms out to the bigger picture of transformations towards sustainability, according to increasing scales of reflection on the transformative action turn in scientific organisations, whether public or private research and education institutions, and the philosophy and nature of science itself by dint of that.

10.3.1 TOWARDS A TRANSFORMATIVE ACTION TURN

'Action researchers seek to take knowledge production beyond the gate-keeping of professional knowledge makers'. In that sense, as Bradbury-Huang (2010) states, action research represents a transformative orientation to knowledge cocreation. More recently, this has developed into a call for Action Research for Transformation (ART) in support of a more sustainable world (Bradbury et al., 2019). With respect to how we 'do' science in our own universities this can be called a 'transformative action turn'. This section therefore crystallises recommendations for action researchers whether researching their own organisations or as embedded in a coresearch team elsewhere. The recommendations are directed towards action inquiry into transformative sustainability praxis. This reflects on what was learnt from my experience of doing action research in and for Maastricht University, facilitating efforts, failing, leveraging and listening to staff and students, as well as attempts at doing so within other large organisations who want to undergo transformation at some level.

Sustainability Praxis in Your Own Organisation

From my 1st person experience, and the 2nd person experience with UMGO of doing action research in organisational transformation for sustainability in and for my own organisation, organisational, and more tentatively, societal transformation begins with personal transformation. Personal transformation through an appreciative yet confronting inquiry into your own life, where boundaries between personal and professional dissolve. How a university recognises its sustainability problems and adapts and embeds them into its institutional governance, can also be framed as a process of awakening – the process more specifically described by the German word for 'unfolding', *Entfaltung* - that starts at the individual level of self-realisation.

Many of the tangible systemic rubrics closely resemble forms of action research being used to achieve transformative change towards sustainability of the subjects' surrounding university, and concomitantly their societal and ecological systems. A notion to explain this, and the objectives contained within the practice of it, is put forward as *sustainability praxis*. This is specific to change-agency within complex, slow-moving organisations like universities that builds on Arendt's conception of praxis and integrates the objectives of sustainability praction and action research. We can see the subjects of this study, the actors (who are often composed of informal teams of volunteer professors, administrative staff and student professionals) as undertaking *sustainability praxis*. This expands the realm of transformational sustainability science so that it, and its change-agents are not as constrained by reductionist dualism that objectifies organisational life. This excess of objectivity may preclude an open inquiry taking place into how organisational systems work and how they can therefore move

towards enabling social-ecological wellbeing.

One remedy therefore, would be to revive the ancient notion that Arendt interpreted into the totalitarian banality of post-war society, into an epoch with all too familiar patterns. To create the transformative political space we need, praxis enables us to propagate new ways of knowing, innovation and imagination, through creating language for possibility that leverages pathways of sustainability transformation for humanity at various levels of social organisation.

The Transformative Action Inquiry

As introduced in the challenges of doing insider action research within universities on their organisational transformation for sustainability, insider action researchers can struggle with methodological problems that the practice of sustainability science in the post-normal arena generates, resulting in scales of action inquiry (1st, 2nd, 3rd person) not being seen as ‘work’ by some members of the social sciences community. As experienced in this project concerning activities with the Green Office and across UM, these engagements can be perceived as superfluous, over-involved and unnecessary to the core activities of the researcher. However, from the first- and second-person inquiries of this research, they were all crucial to understanding how intrapreneurship, transformative agency, systems thinking and praxis operate as drivers of transformation towards sustainability, as well as how an action research inquiry can create *Möglichkeitsräume*⁷ to develop novel solutions to sustainability challenges.

More generally, the role of the researcher in performing action research on an organisation, from within, whilst one is an active member, has remained seldom understood, and is contentious in academic consensus. *Scientivism* does not seem to be attributed credibility in practice; on the contrary, it is often discouraged, perhaps out of understandable concern. To repeat, the biggest challenges of ‘insider academic research’ (or research that puts academia *itself* under the microscope) outlined by Brannick and Coghlan (2007) are access, preunderstanding, role duality, and managing organisational politics.

Combining with the prior challenges of insider academic research, using action research in the search for solutions to universities’ unsustainability, one might argue that when the researcher is required to approach an organisation as an outsider and become an insider to perform the research (say, by agreeing to undertake a PhD project with action research and open innovation in its design proposal), that an individual’s membership becomes more unclear to herself as well as to other people in the social context. This is a very difficult and contentious issue to solve as different paradigms are incommensurable; to quote Horgan’s interview of Thomas Kuhn in 1991 (2012):

“Most scientists yield to a new paradigm reluctantly. They often do not understand it, and they have no objective rules by which to judge it. Different paradigms have no common standard for comparison... Proponents of different paradigms can argue forever without resolving their basic differences because they invest different terms - motion, particle, space, time – with different

⁷ From the German, ‘possibility space’, bolstered in practice by Leuphana University’s referral to itself as “Universität als möglichkeitsraum”.

meanings. The conversion of scientists is thus both a subjective and political process. It may involve sudden, intuitive understanding ... Yet scientists often adopt a paradigm simply because it is backed by others with strong reputations or by the majority of the community” (Horgan 2012).

The consequences of maintaining a situation of resistance to self-study in action, limiting plurality and participation in the governance, agency and leadership of sustainability experiments in universities are significant. Business-as-usual will likely not assist and empower the navigational capacity of public research universities in the long-term. Society’s demands grow louder and larger, as university’s narrative of referring to themselves moves from ‘ivory towers’ to fragile and transparent ‘glass-houses’. Yet, “society at large requires approaches to knowledge creation and application to help organizations become environments for continuous learning and ongoing adaptation to highly dynamic political, economic and social [as well as ecological] conditions” (Levin & Greenwood, 2001). Building on this, university social research disciplines, departments and faculties (have been said) to segregate method from application, reflection from praxis. These “prestigious departments of the social sciences and humanities are proudly and aggressively boundary conscious” and “they feel they must seek recognition as ‘real’ academic disciplines by privileging theory over practice, concept over action” (Levin & Greenwood, 2001).

It is thus argued that approaches to action research are very much in need of being further developed and accepted within universities. It also appears that action research is not nearly as trained, taught and encouraged as it could be. Young researchers, who analytically challenge sub-optimal practices of their own institutions, are often perceived as being overly ambitious, idealistic, stubborn, or naïve when they align themselves with an intention to make positive changes take effect during their project with participants and beneficiaries, and when they use action inquiry to integrate the learning in their personal and professional lives, through a trial and error approach, within a safe campus environment. This has to do with the hierarchy, filiopietism, and mutual unintelligibility present in the design of the university. Yet such qualities are necessary for sustainability solutions to be shared and actualised sufficiently to keep pace with the rate of increase and complexity of sustainability problems we see at a global level. It is apt to mention Carl Jung’s notion of enantiodromia, that puts this discussion into perspective and to revisit the argument for why universities need to proactively transform themselves towards sustainability. Enantiodromia is the phenomenon where the superabundance of any force inevitably produces its opposite, as Jung explained drawing on Heraclitus. This governing principle has been applied to natural cycles and to psychological development. Hence, superabundance and preponderance of an un-responsive, closed, and static institutional system, that isolates agents from each other, atomises responsibility, using methodological starting points of negation, will inevitably articulate the conditions for its own demise in terms of external perturbations like digital, ecological and social transformation (or internal disruption from intrapreneurs, transformation agents).

Educational and organisational innovation that suits the needs of society and the students themselves is clearly necessary. Brittleness of organisational models and practice is insufficient to stand the test of the complex challenges of the 21st century;

students educated in teaching methods that are similarly outdated risk succumbing to socio-economic, climatic or technological disruption like artificial intelligence and automation. This action research education would require training in the capacity for self-reflection, self and group-level observation and facilitation, recorded in a rigorous, insightful and understandable manner. It seems to make sense, then, that in researching the capacity for self-diagnosis in the very academic system which underwrites and undergirds our institutions of science, one ought to recognise the psychological barriers too of the individuals who comprise said system:

“The little research that has been done by scientists on scientists shows that it isn’t uncommon for scientists to operate as advocates rather than impartial judges, especially in the social sciences, in which there is greater ambiguity than in the physical sciences.” (Mlodinow, 2013, p. 205)

This is pertinent, as any research on an organisational transformation at universities includes the notion of how scientists themselves personally transform, and the social (and sustainability) sciences arguably have the greatest capacity to understand human beings and their aggregate behaviour. The aspirational goal in action research would then be cognitive change of individuals and groups towards transformative change-agency *of, in* and *amongst* their institutional environment. Ways forward for academic organisations thus emerge through undertaking action research, as by disambiguating and defragmenting themselves, university administrators, professors, scholars and researchers, can move away from autopoietic⁸ academic activity that validates mental models which reinforce barriers to praxis, and knowledge production processes driven by academic career struggles rather than sustainability and the public good. Positively, sustainability centres and institutes have been a crucial centre-ground, through which other parts of the universities can be investigated for improvement. Consequently, the duration of field work needed is recommended at a minimum of several months so as to build the necessary relationships, trust and coverage in the case organisation. Second, there should be a diligent, responsible and dynamic research team. Future work should not attempt to do this solo or with fewer than three active research partners.

10.3.2 EXPLORING LONGITUDINAL ORGANISATIONAL RESEARCH

In the constructivist, post-normal and pragmatic philosophies of science, all we have at our disposal are the manifestations of structural properties of an organisation at its ‘surface’. Thus, the logic applied in this PhD is that any explanation of organisational processes and people that drive transformation towards sustainability “requires careful attention to the connection of surface and deep structure” (Pentland, 1999). Discussion and reflection on the limitations of this action inquiry and the thesis itself is warranted with respect to its attempt to make sense of and diagnose the phenomenon of organisational transformation for sustainability. This section, therefore, focusses on longitudinal research from the literature on organisational and management science. It aims to exemplify the advantages and risks of longitudinal studies in organisational research and to reflect and discuss the nature of organisational transformation for sustainability from root disciplines, as was the intention behind the insider case study of UM.

⁸ From the Greek, meaning *self – creation/production/fabrication, auto, automaton, without thought, meaning or Being.*

Van de Ven and Huber (1990) state that studies of organisational change tend to focus on questions of two variations: first, those that inquire into the antecedents or consequences of changes in organisational forms or administrative practices, and second, those that inquire into how organisational change emerges, develops, grows or terminates over time. They observe a growing interest in studying the second question concerned with 'how' of organisational change which is the avenue this project took. They also provide a good description of the limitations and challenges to doing longitudinal organisational research. They emphasise the problems that need to be addressed in longitudinal field research include *"questions of how to deal with time, site selection, choices about data collection and degrees of involvement, the importance of clarifying research outputs, audience, and presentation, and finally handling the problems of complexity and simplicity associated with longitudinal comparative studies on change. As a consequence, the mobilization of ongoing support and participation in a longitudinal field study requires researchers to develop an extensive set of craft skills. The sheer labor intensity required to observe an organizational change process over time limits a researcher's capabilities to study more than a few cases at a time... authors report that over time data mount astronomically and are beyond the information processing capacity of even a trained human mind"* (van de Ven & Huber, 1990)

Moreover, a detailed exchange occurred between the host of the third case study and the researcher on what the independent and dependent variables were in this project. The researcher reflected on this and eventually found the methodology and constructivist framing of the project made this difficult and not necessary as Barnett and Carroll (1995) observed: *"Although in principle every researcher would agree that independent and dependent variables must be logically unrelated, in practice the lines sometimes get blurred"* (p.225). They also observed that empirical evidence on organisational change and on issues of its process and its content is *"fragmentary and occasionally contradictory. Models that consider both process and content show the greatest potential for resolving this situation. Such models can be used to test social science theories as well as to evaluate programs of organizational change promulgated by consultants and practitioners. Basic organizational theory would be enhanced by greater attention to organizational change"* (Barnett & Carroll, 1995). This explains how the program of organisational change promulgated from 'above' and 'outside' by the consultant from 2016-2018 at UM was validly evaluated, and how indeed this research was even capable of doing that since the design of the ID-Tool considered both process and context in order to resolve the situation of empirical evidence on process and content questions being fragmentary and occasionally contradictory (as the observation of UM over time has shown).

To reflect on the success and orientation of this research through the frame of organisational innovation is also useful insofar as many aspects of the empirical data included instances of innovation at various scales of the university, and that the model formulated and tested in this project also operated at multiple scales through five perspectival lenses. This is supported by Damanpour's meta-analysis of effects of determinants and moderators in organisational innovation (1991) as this study picked up this study's recommendations for future research: *"Future research need not replicate the results for strong and significant determinants of innovation... Instead, empirical research should consider more than one dimension of innovation and include variables representing different categories, such as the individual, organizational, and environmental"*: The ID-tool's micro-, meso- and

macro-levels are designed in this regard, following the structural transformation pattern observed in a dozen or so previously unrelated studies as shown in *Chapter 3*. Damanpour's meta-analysis not only supports this project's epistemological choices, but also the empirical outcome from the UM analysis which showed the need for defragmentation to realise the untapped potential contained in the abundant assets and attributes shown by the actors and groups studied:

"Truly innovative organizations create a climate conducive to innovation in all their parts, not only in segregated units. To capture their characteristics, therefore, I suggest that future studies of organizational innovation be based on a comprehensive list of innovations related to all parts of an organization rather than on a partial list related to few parts" (Damanpour, 1991, p. 584). Damanpour goes on to emphasises the need *"for expanding the scope of organizational innovation research to include evaluation of the consequences of innovation. Such studies, however, should be longitudinal and multidimensional and will require substantial resources and collaborative efforts among researchers conducting complementary research projects"* (1991). It is hoped that were future research in this direction and that of this PhD project ever be conducted that this warning be heeded; significant supervision, resources and collaborative efforts are preferential as a study of this type is exceedingly demanding. This should have been better clarified at the start of the process.

This study's intrinsic-extrinsic logic is in part derived from the field of organisational ecology, as applied in Haveman (1992), who began to apply ecological theory positing that organizational change is limited by strong inertial pressures. The understanding of organisational transformation was also subsequently shaped by this logic. Its occurrence is herein proposed to be of an increased order of likelihood and magnitude should it occur in response to dramatic external conditions, which each of three external cases support is the case. Notably, Haveman went on to propose that organisational change may benefit organisational performance and survival chances if it occurs in response to dramatic restructuring of environmental conditions and if it builds on established routines and competencies. Neither of these criteria were fulfilled in the case of the UM structural changes seen in the period studied. Engines of punctuational change were also discussed by Haveman (1992) including technological change, political turmoil, macro-economic change, and legal change. This can be seen in conjunction with Romanelli and Tushman's theory and empirical testing of organisational transformation as punctuated equilibrium (1994), which is moreover reflected in the framing of social entrepreneurs and transformative agents challenging sub-optimal practices (*SES3.1*)(Westley et al., 2013) and/or shifting the sub-optimal equilibrium for constituents suffering from the negative impact of the sub-optimal conditions in a social system (Martin & Osberg, 2015).

March and Sutton (1997) suggested that the persistence of the pattern *"of inferring causal order from the correlations generated by organisational histories, particularly when these correlations may be implicit in the measurement procedures used"* is partially due to the context of organisational research, which this research proposes can be resolved, or at least reconciled with action research approaches (as discussed in *Chapter 2*). March and Sutton (1997) also posited that *"organisational researchers live in two worlds. The first demands and rewards speculations about how to improve performance. The second demands and*

rewards adherence to rigorous standards of scholarship". For organisational transformation and pragmatic action research of sustainability performance, this also demands living in a third world, where a pragmatist approach is applied to reflexivity required of such researcher; where one *"questions the values, background assumptions, and normative orientations shaping sustainability research [itself].. particularly in the context of transdisciplinary research which aims to integrate knowledge from various scientific and societal bodies of knowledge."* (Popa et al., 2015). Derived from these studies, and the experience of the project, there is certainly the need for the maintenance of a certain tension in scholarship as well as a consciousness of its ambivalences.

Finally, Vogl, Zartler, Schmidt, and Rieder (2018) review the potential of qualitative longitudinal research stating that longitudinal research can (a) detect changes over time, and (b) explore the processes associated with change or stability as well as (c) interpret the perspective of the person experiencing that change.. Gathering data consisting in individual narratives and sense-making of processes is the key element of QLR (qualitative longitudinal research), whilst it can also capture critical moments of change and transitions.

AVENUES FOR TRANSFORMATION DIAGNOSTICS

I suggest that researchers wishing to use, develop and apply my work might try and investigate whether significant episodes in organisational transformations towards sustainability can be recorded over time, with a consistent application of the ID-Tool tangibly mapping out the trajectory of the pathway of transformation. My attempts, in the end, could not in be included in the synthesis due to time constraints and the sheer size and complexity of the data sets (I definitely walked into the snowballing issue as well). Future research may therefore focus on this in terms of the systemic circuitry mentioned above with respect to organisational diagnostics. Key questions may then be which criteria support the selection of significant major episodes in the organisational transformation for sustainability at a studied case, and whether this can be done by looking at their associations and linkages. The sequence of events, the pivotal actors behind these events (i.e. frequency of mentioned names in interviews and documentation), and, furthermore, the relationship and association between categories that arises can allow us to explain how organisational transformations for sustainability have happened in the contexts studied. The question indeed remains if there are lessons we can draw from the success and failure of certain action strategies/pathways that allow us to evaluate conditions at another university. Are conditions ameliorative, conducive, commensurate, or ripe for a transformation for sustainability to take place? What if the conclusion is that they are not ripe enough at the prime university because a test-bed mentality does not exist to a sufficient extent, or that leadership, managers and board-level actors are either unwilling or unable to listen and learn from their 'juniors' - in most cases the very staff and students that seek to identify, understand and improve sub-optimal practices; the intrapreneurs, entrepreneurial professors, and change-makers. All these issues may be accounted for in the variance across and within cases according to the stakeholders most interested and influential in navigating the pathway of organisational transformation.

Future work may also focus on the potentially complex fractal nature of transformations at scale, especially in light of the critical planetary thresholds now being crossed by humanity that risk perilous slide into various degrees of an uninhabitable Earth. How do transformations playing out at different scales potentially play into each other? Do structural and behavioural qualities of the agents (whether individual, group, organisation, region, culture) at the chosen scale being observed replicate, amplify, cancel out, interfere and superimpose upon each other? There is a growing body of work that supports this conclusion, that, for example, focus on how pathways of positive ecological and societal transformation may be propagated, how these align with necessary adaptation and mitigation to the climate emergency, and how these inter-relate with digital transformations concerning artificial intelligence, machine learning, Big data and the internet of things, as well as urban transformations to sustainability.

Figure 2: Stockholm Resilience Centre theory of how cities, and organisations within them, can adapt themselves along multiple possible 'pathways of development'. (Elmqvist et al., 2019a); Image Design: Azote©.

One study in particular focusses on urban transformation which is particularly interesting in light of the recommended Maastricht City-Campus testbed for sustainability transformation put forth above. A recent Stockholm Resilience Centre article on *sustainability and resilience for transformation in the urban century* helps to explain organisational and urban transformation towards sustainability in the context of policy-making, urban planning and urban sustainability research (Elmqvist et al., 2019b). The diagram maps out the interlinkages between: Sustainability, for example, the performance of a city to achieve the Sustainable Development Goals, CO2 emission reduction, renewable energy transition, social justice, and reduction of air pollution – y-axis in Figure 2 & 3; Resilience, shown by the orange 'cylinders' of adaptability around the pathways at a specific moment in time (see Figure 3 below) which describes the systems' ability to absorb and adapt to disruptions; Transformations, seen as the pathways taken, or different scenarios and trajectories of how the system changes over

time – shown by the blue arrows.

Figure 3: Transformation logic: Avoid traumatic, abrupt transformation (figure, 'b' bottom) through a guided or directed transformation/adaptation (top figure, 'a').

The development of intrinsic competencies for systemic change might enable guided transformation to this end, as abrupt transformation can engender negative outcomes in the citizenry.

10.3.3 THE TRANSFORMATION IMPERATIVE FOR HIGHER EDUCATION

Despite the obvious challenges to the kinds of research I discuss in the preceding passages, these turbulent times do require interpreters, facilitators, stewards and advocates for more sustainable ways of life. This is the moral case for the university and the community of public intellectuals. Universities, like most other organisations in the early 21st century, are subject to macro-level, societal, ecological and technological pressures such as anthropogenic climate change, environmental refugees and mass migration, political polarisation, misinformation, and digital transformation, including

artificial intelligence (AI) and blockchain for example. These pressures both necessitate and threaten university administrative systems to adapt at various rates and depths of organisational and social change. To consistently deliver research and education that furthers the frontiers of scientific and societal knowledge, it is wiser for them to anticipate these larger pressures and develop their pathways of transformation towards sustainability intrinsically. This way, they can generate resilience and adaptability as socio-ecological systems, which is pertinent given the increasingly prevalent role of the university in the community at the local, regional, national and even global levels.

Building on the principle of equifinality, pathways of transformation are not absolute but part of an adaptive, iterative and self-reflexive organisational management system. In that sense this orientates and guides an organisation's socio-ecological stewardship of itself depending on its culture, geography, governance structure and power relationships (Velazquez et al., 2006; Westley et al., 2013). From meta-theoretical review of the literature, this thesis proposes several sustainability ethics for universities:

- Preservation of the rights of future generations to meet their own needs with the right use of knowledge, transdisciplinary research and technology, driven by a post-neo-liberal 21st century education.
- To play a role in transforming their surrounding communities and society if they too are to attain a greater depth of sustainability, applying knowledge of structural transformations in and of their surrounding societies. Being nested as a sub-system in society, their sustainability is also dependent on that of their social environment.
- In response to worsening crises of climate and capitalism alike, they have a moral obligation to provide, through education and research, the transformative change required of current modes of production and consumption that are still based on economic logics which continue to infringe and disrespect planetary boundaries.

The way public institutions are managed has been changing unprecedentedly. It is unclear what scenarios will manifest themselves; 'the wheel is still in spin' and paradigms change within our scientific communities as a result of external perturbation and crisis (Kuhn, 1996, p. 90). Once one paradigm of understanding a natural or social phenomenon ceases to be able to encapsulate what occurs accurately, another one is sought after; "paradigms provide scientists not only with a map but also with some of the direction essential for map-making" (Kuhn, 1996, p. 109). Ergo, predominant management and governance structures of universities, and how these differ from the models required to meet local, regional and global sustainability challenges progressing through the rest of this century, must remain a core trans-disciplinary research priority, both within and beyond the halls of academia.

Indeed, the stakes are very high. As Chomsky reflected in 2017, *"It is hard to find words to capture the fact that humans are facing the most important question in their history – whether organised human life will survive in anything like the form we know – and are answering it by accelerating the race to disaster"* (Chomsky & Polychroniou, 2017, p. 121).

I interpreted this as one of the many calls articulating that our imperative is stark and simply put: radical human transformation of the ecosphere has both necessitated and threatened an equally radical transformation of organised human life. The need to transform ourselves as a species is both our greatest threat and greatest opportunity. Once we progress from this premise, clarity emerges as to why we must change and organise from within, starting with ourselves as change-agents, as intrapreneurs, as cunning strategists, and as ecological lobbyists. Arguably, from such an individual and dyad-level root, the scale and scope of collective power and influence in the right circles could well move the needle on deep adaptation to the climate emergency. It seems correct that universities, like no other organisation, can actualise their potential to shift mindsets about modes of production and consumption that still do not respect planetary boundaries.

The complexity of PRU's as organisations, as well as the case for their transformative change in response to global sustainability crises like climate change, biodiversity loss and plastic pollution can be explained by Bakhtin's theory of dialogic communication: interdependent and dialogical communications undergird and influence PRU's relationship with actors within them as well as their external regional environments (Bakhtin, 2006). In complex organisations, these communications form intrinsic logics, and the organisation's competency of response to extrinsic drivers and pressures. These are in turn influenced by dominant institutional architecture, governance regimes, fragmented and siloed disciplinary cultures, and market-driven interests. Negative surpluses of these aspects stifle the emergence of socio-technical innovation as well as the appropriate responses to complex sustainability challenges (Baker-Shelley et al., 2017; Westley et al., 2011; Westley et al., 2013).

Ostensibly factual statements communicated by universities about their own sustainability actions are intertwined with moral judgements on their behaviour from society: this behoves the university to act as a steward for society, in a rigorous, pragmatic and innovative advocacy for transformational change towards sustainability, nested within their regional environments. Encouragingly, pertinent to this endeavour, my research observed pioneering pushes for organisational transformation at various universities worldwide. This appears to represent a disruptive innovation in global higher education. The systemic interdependence between universities and their environment is very clear once we observe their need to demonstrate societal relevance and to implement their research outcomes according to global transnational calls like the UN's SDG's (EAUC & ACTS, 2018; UN General Assembly, 2015). The intent to trigger transformations towards sustainability in the localities around universities arguably fits with the co-responsibility for the privilege of learning and knowledge mastery that they provide to students and researchers. What the actual capacity is of universities to trigger pathways of transformation for sustainability in their regions is an inquiry I urge everyone engaged or affected by the university to work towards finding out and amplifying.

10.3.4 EXPLORING LEVERAGE POINTS TO EFFECTUATE TRANSFORMATION

The term *omwenteling* does not directly translate from the Dutch, but implies a whole rotation or systemic shift in a system around a certain pivot. The closest (pseudo)-

synonym would be flipping academia on its head, as was exemplified by the ASU transformation signature. As I begin to tie off this thesis, I imagine that what is fundamentally required at this stage of history, within this climate emergency and chaotic geopolitical uncertainty, is an institutional transformation of how we govern and manage our organisations of higher learning. This transformation has both pragmatic and moral roots. Pragmatic in the sense that any *omwenteling*, revolution or rotation, must have its entry points and leverage points for transformation; moral in the sense I explore further below.

First, I will openly discuss the great potential I see in research and professional management and governance that focusses on leverage points for transformation. According to the epistemological stance of this thesis set out in *Chapter 2*, like Meadows (1999) and Abson et al. (2017), systems thinking - especially the leverage points framework on places to intervene in a system - is a crucial lens through which to see how organisational transformation for sustainability can take hold, be navigated and propagate. The system in question in this case is the organisational-social construct of the university and “is bounded and defined by the subjective interests and pre-analytic assumptions of the researcher” (Abson et al., 2017). This explains the inclusion of more experiential and inductive findings in the previous chapters that complements the diagnostic tool’s outputs. The aim was to be less prescriptive, and more appreciative of the underlying quality and holistic characteristics that arose from the intrinsic logic of the organisation and its members: its organisational chemistry.

It is precisely this aspect of organisational chemistry that remains mysterious to me after my research. Is it actually the case that organisational change is rather more unplanned and contingent to existing circumstances and preconditions, converse to what we infer from Porras and Silvas (1991), for example, that organisational transformation can be planned? Or is it more the case that organisational transformation is effectuated before it is navigated according to certain theories of entrepreneurial behaviour (Sarasvathy, 2009)? Navigation is arguably qualitatively different from planning it – one does not plan the weather or the climate, but one can certainly navigate through one’s own agency within it. Or is it even more profoundly about madly letting go of your own paradigm which so ‘sweetly shapes your own worldview’ as Donella Meadows eloquently observed? Whether and how leverage points can be identified, evaluated for their effectiveness, and used to effectuate, produce or propagate organisational transformation for sustainability will also need to be established. Much more work is needed and fast, if we are to collectively, intelligently, and wisely deal with our current climate, ecological and social emergencies. All these questions will need to be tackled by current and future researchers and practitioners if we are really to get to the bottom of systems transformation of organised human life towards more sustainable, thrivable and circular future worlds.

Secondly, I want to reiterate (as I have repeatedly throughout this thesis) the moral imperative so beautifully and powerfully articulated by youth movements such as Fridays for Future, catalysed by Greta Thunberg’s words and actions. The preceding cases, theoretical review, and philosophical exploration of the transformative sustainability of public research universities yields undeniably strong arguments, whether moral,

ecological, societal or political, for substantive reconceptualisation of how universities are managed, governed and cocreated by their own citizens. Why universities must undergo organisational transformations – more commensurate to the needs of our society in the twenty-first century – is growing beyond doubt and disdain, into a difficult acceptance of their role as principal agents of positive change towards broader social transformation. The bottom-line: universities, like no other organisation, can shift mind-sets about modes of production and consumption that still do not respect planetary boundaries. In my view, they are also obliged to do so.

There is a twin logic that megatrends of innovation, governance, digital transformation and sustainability pressure universities, and rapidly changing environments necessitate equally profound developmental and transformative responses from them. The trouble is that this focus on external circumstance creates a paradox whereby internal bodies and networks of sustainability knowledge and expertise are overlooked in the struggle to ‘see and be seen’. In order for universities to make progress towards their sustainable development goals, and thus better leverage the knowledge they generate into sustainability outcomes for their environments, they have to navigate these transformative processes effectively from a place of intrinsic holism and cohesion of organisational thought and decision-making rather reactivity. Planned change that makes organisations more purposefully-adaptive to environmental and societal shifts can be navigated by unified theories of organisational transformation for sustainability (Edwards, 2010; Porras & Silvers, 1991). Three important metatheoretical lenses, the developmental, internal-external and learning lenses presented by Edwards (2009, 2010), are pertinent to navigating these paradoxes of organisational sustainability and learning at public research universities in turbulent environments, and the transformational imperatives that arise from them. Hence my focus on pioneering public research universities in this work; I hypothesised that they would behave differently under such pressures.

I intended to use this research of transformative patterns of organisational behaviour to fill this knowledge and implementation gap with the development and design of an interpretative-diagnostic (ID) tool that adapts to the system it encapsulates. This was, crucially, a collaborative experiment with the participants of the studied cases, as well as the co-research team at ICIS and the UMGO; insights and feedback from interviewees and stakeholders were incorporated along the way in an evaluative and experimental learning process across institutions, and between themselves and their societies (Luederitz et al., 2016). It is sincerely hoped that the substance, meaning, experience and the findings of this action research shows how universities can effectively navigate their own organisational transformations for sustainability.

This is very much connected to the need we have for universities to intelligently inform and educate against misinformation and decades-long public relations lobbying and campaigning that have undermined climate action. These are formidable barriers to transformative sustainability. Universities can remedy this, and have the responsibility to effectively communicate science in public and policy discourse. This means, in turn, countering gross dis-information, mis-information and (I will say this) propaganda by standing firm in open understanding for all sides to host discursive and productive

conversations, and to call out biases that do not work in the interests of society at large, nor the pursuit of applied or pure scientific inquiry. In line with these core and redefined institutional design aspirations, universities that make claims about sustainability (much like the legal obligations towards companies that make food claims on their products) now have to walk this talk and stand behind their students and staff who engage with systemic change. These people do not stand inertly on the shoulders of giants: they 'dance' with the science of change and sustainability in their actions; it is thus rather a co-generative dance on the shoulders of these giants.

With realised agency and transformative leadership intertwined, we must return to core first principles governing the systems we seek to change, regardless of how uncomfortable. Uproot and unlearn, in order to redesign and regenerate; know and appreciate what the system actually is before pursuing ambitious change initiatives. Avoid reactive or fashionable approaches to change management without a thorough evaluation of the substance or implications of the proposed approach, and experiment accordingly. This application of the scientific method on scientific institutions themselves befits the lofty endeavours these institutions of learning preoccupy themselves with.

*Alexander R. W. Baker-Friesen
September 2020*

AFTERWORD: AN ETHIC OF THERAPEUTIC TRANSFORMATION

Should we transform? Can we transform? Will we transform?

These are all important questions for an organisation like a university to ask itself (as a community) before it invests the significant time, energy, and resources to actually undertake that transformation. Whether these questions are sincerely answered in the affirmative, and necessarily reflected on at a micro, meso, and even macro-level, will affect the depth, breadth and success of the organisational transformation for sustainability. This brings us to another necessary question that the leaders of the university must ask themselves; are we actually ready to transform? If that is indeed what they, and their constituents, employees and students want, and whether they also know what to expect from the process of transformation, are all things which should be managed and internally consulted without haste or towards the end of appearance and reputation. This is an intimate and intrinsic process which must be undertaken in as holistic and therapeutic a manner as possible. Harm can be done, and distrust, disaffection and demoralisation sown if due care and competence is not dedicated to the challenge.

I am sure it has become clear throughout this work, that as a transformative sustainability professional aware of the stakes and time pressures at play in our field, I do not suffer charlatans or greenwashing lightly. It is a shame that the same cultures of leadership seem to affect universities as in many a corporation, government agency or thinktank; yet, this is the world as it stands now, and we must tackle it as it is if we are to stand a chance of actually shifting the needle enough to avert the more catastrophic (and morally unacceptable) global heating scenarios that scientific collaborations like the IPCC have been warning of. I have learnt that students and young people, working in and around the areas I have come into contact with these last seven years, are deadly serious about making it part of their life's work to somehow remediate and regenerate the dust that they have inherited from their elders (to borrow the term from Nick Brandt's artistic exhibition of the same name). History will judge how we manage this project of systemic change. All of us engaged in working towards the necessarily radical vision of a more sustainable, equitable and thrivable world for the most vulnerable, and for the most colonised, implicitly subscribe to transformation as stakeholders in this future desired state.

In all the conversations that took place in my research, it soon became clear to me that almost everyone I spoke to profoundly understood that this project of transformation was a multigenerational endeavour that they themselves might not even benefit from. As I unlearn my own bias, I see more and more that this connects with the moral of being a good ancestor (see Layla F. Saad or Roman Krznaric). Indeed, the most common definition of sustainability I heard went in the direction of inter- and intra-generational justice. If that kind of justice is something we can all agree on, then must we not also examine the social, historical, and even ecological legacy of our colonial and extractive civilisation during its exponential, unfettered and unhinged trajectory of the last centuries? Is it not necessary to unlearn dysfunctional patterns, before we march forward in our naïve attempt to learn new ones? This unhinged trajectory, in my view, has been correctly termed the great acceleration by the international geosphere biosphere programme. There is no better time than now to truly begin, from the roots up, the project of great transformation that lies before us. I place universities at the heart of navigating this civilisation-scale revolution. For me, sustainability was never

an actualised state but the outcome of the transformation we have barely begun. I have now said plenty about why I think that, and how they can do this, using detailed interdisciplinary sustainability science case studies and a pragmatic-insider action research journey. What I have learnt from these different signatures of transformative universities, and the change-agents within them, is that we should be bold and holistic in our approach and work ethic; that we need not hesitate from engaging with the world as it is, even if that means calling into question the very systems that the university of the early 21st century has derived its own power and legitimacy to operate from.

It is our culture's aversion to pain, the fear of confrontation with the discomfort of reality, that obfuscates our collective ability to change it in accord with the evidence. The negative psycho-social and organisational impacts derived from this are clear. Let's do something about that, shall we? We can and must do better. *Vouloir c'est pouvoir.*

*"We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.
Through the unknown, remembered gate
When the last of earth left to discover
Is that which was the beginning;
At the source of the longest river
The voice of the hidden waterfall
And the children in the apple-tree
Not known, because not looked for
But heard, half-heard, in the stillness
Between two waves of the sea."*

T.S. Eliot, *Four Quartets*, 1943

*"To suffer woes which Hope thinks infinite;
To forgive wrongs darker than death or night;
To defy Power, which seems omnipotent;
To love, and bear; to hope, till Hope creates,
From its own wreck, the thing it contemplates;"*

Percy Bysshe Shelley, *Prometheus Unbound*,
1820

CHAPTER 11.

BACK-CASTING
POST-SCRIPT
BIBLIOGRAPHY

BACK-CASTING: ORIGINAL DESIGN OF THE ICIS-GO PROJECT

The following is the PhD summary as in the first proposal to which I applied in 2013. The full proposal is provided in the appendices for transparency so that it is clear that there was an institutional ownership of this project, in both UM and the Green Office Movement. This excerpt is considered relevant to the reader for understanding how the project began:

Original ICIS-GO PhD Proposal, Autumn 2013

Title of the proposal

A Sustainable University: organisational transformation

Summary of the proposed research

This research will contribute to our knowledge of a structural transformation of public institutions towards sustainability, and shed light on the extent to which sustainability initiatives (e.g. the Maastricht University Green Office) add value to university governance and beyond (spill over effects on society, corporations, and other public institutions). Maastricht University as a whole and the Green Office in particular would be embedded in the research process as a living laboratory for organisational change. Other higher education institutes (HEI) and best practices in sustainable transformations in other sectors will be studied along with UM and with that knowledge experiments and pilots will be set up at UM.

Research topic

How do organisations manage their structural transformation towards sustainability? As companies increasingly deal with this issue in the form of CSR-reports, higher education institutions (HEI) only recently discovered the significance of striving for a governance structure that enables to achieve sustainable development. Higher education institutions hold a crucial responsibility and role in this context as they function as role models, educators and researchers. However, in the current university practice only few HEIs excel in meeting this challenge as they often lack a systematic approach that supports the sustainability implementation process (Jenssen, 2012).

Transformation towards sustainable development requires a vision and goals (van Zeijl-Rozema, 2011). Since 2008 Maastricht University has fulfilled this requirement through its sustainability mission as well as sustainability goals. However, according to Jenssen (2012), not only the management of a HEI should be committed to sustainability, but also in a participatory approach the whole university community should be involved and mobilised. A sustainability group or committee can facilitate this process on the organisational level.

Since September 2010, there is such a group at Maastricht University in the form of the Maastricht University Green Office. The Green Office acts as the sustainability hub and change agency of Maastricht University, initiated and run by students in cooperation with responsible staff members and embedded within the department of General and technical Services. By bringing together a vibrant sustainability community with university faculty and administration, the Green Office implements and supports a variety of sustainability projects, as well as the university's sustainability policy. After two years of operations the project has proven to be a huge success and is now a fully integrated and well-respected university department. The Green Office can be seen in terms of institutional entrepreneurship: actors who "work and push for the transformation of existing institutional structures and beliefs" (Tappeser & Meyer, 2012). Tappeser and Meyer (2012) state that especially those actors that are embedded in multiple institutional contexts are able to envision alternatives and become institutional entrepreneurs.

Those stakeholders (whether persons or groups) create of boundary arrangements¹ (Hoppe, 2005, 2010) and thereby can function as tempered radicals (Meyerson & Tompkins, 2007) in the sense that they are able to find legitimacy in different worlds and thus have the capacity of bringing these worlds together (Hegger, van Zeijl-Rozema, & Dieperink, 2012).

Given the limited amount of empirical research on organisational change of HEIs towards sustainable development, and the lack of a systematic approach towards sustainability implementation at HEIs, there is a lot to be gained from inquiring into the functioning of the Green Office in establishing a sustainable Maastricht University. Not only will this help in improving the effectiveness of the Green Office, but it will also give insight in possible pathways towards sustainable higher education institutions.

A change towards a sustainable organisation can be seen as a process of organisational change. However, most organisational change initiatives are largely confined to the boundaries of the organisation. In contrast, sustainability is part of a broader societal agenda that extends beyond the organisation (Bertels et al., 2010b). This implies that levers for change could be found outside the organisation (supply chain, key stakeholders, alumni). Therefore, an open approach such as open innovation² seems suitable. The concept originates from the business world. For a university, as a knowledge creator and knowledge sharer, this means that knowledge within and outside the organisation needs to be identified and mobilised in such a way that benefits are mutual and numerous. Organisational change towards sustainability therefore requires investigation and involvement of a broad network of professional organisations and experts. This leads us to the following research question: 'How can organisational transformation and innovation towards sustainability at HEIs be achieved?'

Case studies (UM and other HEIs):

1. What approaches to change exist towards sustainable HEIs?
2. Are success requirements in the fields of salience/credibility/legitimacy met by the various efforts at HEIs
3. What is the role of institutional entrepreneurship/tempered radicals/boundary objects in organisational change towards SD in each of these case studies?
4. Which levers for change can be identified (e.g. the extent of stakeholder participation or supply chain management) (within/outside the HEI) in order to bring about organisational change towards SD in each of these case studies?
5. What is the effectiveness of the studied pathways in bringing about structural organisational change in their specific context? Is it possible to draw generic lessons from these different paths?

The case study findings serve to develop experiments for a structurally sustainable Maastricht University: the Living Laboratory for organisational transformation:

6. What are weak/strong points and the critical factors of the Green Office in bringing about organisational change towards SD?
7. Which mix of internal and external levers for change towards sustainability is

1 "Boundary arrangements occur when the world of science and politics meet. "The simultaneous practices of demarcation and coordination together form boundary arrangements. They are systematized versions of how actors conceive of the division of labour between science and politics, conceptions or discourses that can be mobilized in boundary work." (Hoppe, 2005)

2 "Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough et al., 2006).

best suited for Maastricht University?

8. What steps are needed to transform MU structurally into a sustainable organisation?

Approach/Proposed research plan

The research can be divided into two parts: case study research and the Living Laboratory. Each of these parts comes with its own research methodology. The case study research addresses research questions 1-5 and aims at developing knowledge about different approaches for transformation towards a sustainable HEI at Maastricht University and two or three other HEIs. Some research has been done already about sustainability at Leuphana University at Lüneburg and Santa Cruz University in the USA³. The intention is to study the approaches observed in the case studies and in literature, and to examine best practices from other sectors (e.g. business, industry) towards sustainability within their specific context, but also to compare them and to draw generic conclusions that can be applied elsewhere. The Living Laboratory concerns the transformation of Maastricht University towards a sustainable HEI and follows an action research approach. Action research builds on the philosophical tradition of Pragmatism, i.e. the notion that knowledge is based on observing the consequences of intentional action. Moreover, its participatory mode follows a democratic approach to knowledge production, with the researcher being actively involved in intentional change processes and rendering research subjects to co-researchers (Heiskanen & Rask, 2008). It aims to facilitate social learning and the development of novel, scientifically sound yet practicable knowledge by involving relevant stakeholders, including the researcher, in multiple cycles of planning, action, observation and reflection - see e.g. (Waterman et al., 2001). The Living Lab uses the information collected through the case study research, but simultaneously experiments with the findings through actions at Maastricht University. Thus, the generic knowledge gained in the different case studies is immediately tested and made relevant for structural organisational change in the Living Lab.

Methods that will be used in addition in the Living Laboratory:

Action research involving active participation of the PhD in selected projects of the Green Office.

Focus groups with actors will be organised to reflect on how transformation is taking place and with what results. In the projects, the PhD researcher will provide advice based on the results of the case study research on how to improve the transformation towards a sustainable HEI.

Knowledge utilisation

This research will contribute to our knowledge of a structural transformation of public institutions towards sustainability, and shed light on the extent to which sustainability initiatives (e.g. the Maastricht University Green Office) add value to university governance and beyond (spill over effects on society, corporations, and other public institutions). Maastricht University as whole and the Green Office in particular would be embedded in the research process as a living laboratory for organisational change. In this way, cutting edge research on sustainability governance and organisational transformation could be combined with a major move towards a more sustainable, innovative and, in terms of its organisational structure pioneering and possibly standard-setting Maastricht University.

³ My addition to the original: the research was performed by Valentin Tappeser, a founding member of the UM Green Office, between 2010-12, who also studied at Santa Cruz on his UCM exchange semester and completed his capstone on Institutional transformation and change-agents in sustainability governance in higher education. Although this study created an interesting pathway for this PhD research to pick up on, there are nonetheless some key differences in methodology and perspective. See Tappeser (2012) for the full capstone that some elements of this project built on.

POST-SCRIPT

A TESTAMENT TO THE LIVED EXPERIENCES OF OUR TRANSFORMATIVE ACTION INQUIRY

For those not so well-versed in the social and organisational sciences, this thesis has presented an admittedly bewildering array of theories, perspectives, practices, angles, empirical findings and interpretations on the nature and practice of organisational transformation for sustainability in universities. This is indeed quite a lot to take in, and probably (as I was warned by one of my interviewees at HKUST) too broad for one thesis to tackle. This was not my intention. My intention was to create a targeted and impactful overview. I felt compelled to provide further theory to explain the direction I wished to go in when encouraged to show what I meant. This is why my reference list and theoretical perspective coverage is high; in order to show my colleagues the patterns I could see, in as conclusive a way as possible. I wish I could have done this with fewer resources, yet there is something about how I do research, and about how I communicate with others, that prevents a palatable articulation of how I think.

In the attempt at going beyond a mere overview, I want to share the reasoning that went into the decision to pursue this scope of breadth, depth and temporal perspective - applying a useful heuristic framework a colleague and friend, Tim Strasser, has developed with which to view processes of transformative social change and innovation. I felt compelled by the high stakes, moral imperatives, and compounding kaleidoscopic complexity of the climate and ecological crises to push for a more comprehensive understanding of how we can manage the herculean task of transforming organisations, economies and societies from the inside-out. Not only did I feel compelled; I felt profoundly responsible for the impact, inclusion and implications of the research I was tasked with managing. One result of the imperative of the intergenerational ethic (and climate anxiety) in my work was the perception that I brought too much passion and emotion into it.

This Post-Script hence describes the lived experience that has been omitted subsequent to the failure to find a way to bring enough heart into the scientific institution so that it becomes meaningful and valuable for its actors. To the extent that organisational life in the university - as well as the change processes people experience in the quest for sustainability - is also about the emotional experiences of the people working and studying in the university, I would argue for more of a space in the academic thesis, as well as within the academy itself, to reflect on these rich and valuable lived experiences.

For understanding terms used in the analysis of the thesis, the aphorism to ‘walk the talk’ is business jargon that has become ubiquitous in recent years, and refers to an individual - usually in leadership - whose behaviour and day-to-day actions have to match the rhetorical aspirations they have for their colleagues and organisation. As society becomes ever more apathetic, cynical and misinformed, the need for leaders to ‘talk the walk’ has been increasing: “to be able to explain, in language that is unique to

their field and compelling to their colleagues and customers, why what they do matters” (Taylor, 2014); explaining the meaning and significance behind their vision, mission and values to citizens of their institution. This ‘talking the walk’ was observed in the language used by a significant proportion of the academic leadership, PhDs, academic staff and students at all cases; particularly in critique to how the university could improve its sustainability efforts, or the discrepancy between what the institution says it is doing in its strategic documents and public relations, and how it behaves according to what was seen and experienced. This line of inquiry came close to explaining the thread that I had pursued into the insider action research world. This thread also acts as the line of delimitation of what could (what was seen and could be corroborated) and could not (what was experienced) be included in the thesis.

In retrospect, and from my own perspective, I felt limited in presenting the learning trajectory over time that we followed as we attempted to dig deeper into transformative change towards sustainability from within Maastricht University. I understood the original ICIS-GO PhD proposal of 2013 as being designed to research the conditions necessary to navigate organisational transformation to sustainability. This led us to see how the power dynamics at play affected the functioning of people working to improve the sustainability performance of the university. From the point of view of the Green Office, there was a lack of responsibility and accountability for the actions and decisions that directly affected them as representatives for the wider student body. My observations and experiences at the time brought me together with the team psyche, into a perspective where we began to doubt and question our own accounts as a result of how we were treated and considered within the university. This developed into a complex shared psychological phenomenon which I later reflected was akin to a form of gaslighting, or scapegoating to put it less controversially. Although my use of the former word elicited shock - and I have had to retract this from the main thesis, as I have admittedly limited evidence that would be considered as scientific (I am no psychologist, and my handwritten journals perhaps do not count either) - I would nonetheless stand behind the perhaps more acceptable term of scapegoating.

With respect to the structural adjustment of the Green Office, the organisational design, governance and management of sustainability observed and experienced, I felt pushed to write about my concerns UM had been taking in that period. In an article triggered by a question from rootAbility regarding what effective governance models for sustainability in higher education looked like⁴, I could not help but feel the need to speak openly about our experience from the inside. I argued, in line with my research, that more transformative leadership could redesign institutions to allow for complex-adaptive properties to emerge in the mid-term, and that this kind of leadership opens the door to sustainability intrapreneurship (Baker-Shelley, 2017a). However emotionally involved I was with the Green Office at this time, this pattern of behaviour higher stakeholders exhibited - given the alignment between the literature researched, the interviews, and my experiences with UMGO since 2014 - raised questions about the motivation and sustainability competence behind certain decisions taken. In one instance, this included on the one hand asking internal sustainability

⁴ I was not sure whether the answer they expected was the Green Office model itself, and whether this was actually an effective mode of governance given what we were experiencing at that time.

experts and students (our team) to conduct research about how the SDGs apply to the university, whilst on the other undermining the ability and autonomy for us to do this properly in the first place.

It can be seen that funds for the UMGO were halved, and that funds were moved to the new structure, and that this caused a feeling of disappointment, disaffection and demoralisation at UMGO. An outsider might validly point out that any change is a painful process, and that change is part of sustainability. In response, I would of course agree. Transformation is painful. But can we not limit negative psycho-social impact through empathetic and intelligent leadership? The emphasis here is not on the stasis of the organisational form, as evidently this changes in transformation, but on the limitation of unnecessary and avoidable psychological stresses. To which the outsider or observer might reply that sometimes an intrapreneurial body such as UMGO eventually makes itself superfluous or needs to fulfil a different role than they began with. In transformation, existing organisations, regardless of how sympathetic they are, are not set in stone. Indeed, the Green Office as we knew it became superfluous and less necessary in the new constitution. I would say in response that all this is self-evident and that my question still carries: what about the ethics and responsible behaviour in the navigation and management of change? What about the centrality of the student experience in the university? What about the recognition for all those years of hard work and wasted energy? Is that not a moral and practical priority in the functioning of the university?

Autonomy, decision-making rights and transparency are at the heart of the design of the Green Office model - or more precisely, my experience and research suggests that these are fundamental conditions under which an effective Green Office may function to best contribute towards the transformative sustainability goals of the whole university. These conditions were quietly eroded for the last five years of the very first Green Office, and by dint of that, similar dynamics may threaten older, more institutionalised members of the Green Office movement as a whole. Now, at the time of writing, there are around 47 other green offices that officially exist, with a combined budget of more than €2 million per year, and more than 200 employees. With more about to be launched, this movement's political and ecological lobbying power as part of the wider youth movement for sustainability and climate action is indeed a force to be reckoned with (greenofficemovement, 2019). To say one has a student-driven staff-supported Green Office, whilst not allowing the essential conditions for one to operate, is, even in the most generous of terms, a reputational risk that leaves the universities that practice this behaviour open for a lot of criticism, severely weakening the bottom-up component that I conclude is necessary for universities to successfully transform towards sustainability.

The bottom-up power-dynamic I observe as being disproportionately underdeveloped should evidently be tempered by savvy, experienced and supportive academic and administrative staff. However, as my research bore witness to, it must not be watered down to the point of effectively neutering their implicit - and inherently human as Arendt would have said - ability to conduct praxis and utilise their intellects and political voices in the service of the wider community. Deny this, and you make the transition

away from the Green Office Model, and towards a group of student interns who may end up with little to no meaningful autonomy when it comes to innovating their own projects in line with the principles of the Green Office model. Not only this, one risks these students walking away embittered, disenfranchised and demoralised. This is a bad thing as should these graduates never again challenge the system they find themselves in due to their negative experiences in their formative years, we lose out on their possible future actions that may have moved the needle away from inhospitable Earth scenarios, and toward a holistic transformation of civilisation to relatively liveable, equitable and just equilibria. Do we not lead by example?

As one member of leadership remarked, to 'let them play in the sandpit' is no meaningful way to include the voices of the generations who are inheriting the current system, and have the unenviable task of clearing up for their progeny in turn. If we are ever to align our values with the intergenerational and intragenerational ethics at the heart of sustainable development, as Brundtland defined it, then the moral and political imperatives that are currently being cried out from the streets and the screens must be the last call for real transformative change. The old guard must change.

As I write this sentence, current discussions in the university council look into where key community sustainability leaders were overlooked in the external consultant's interviews, and whether the university council and UMGO were adequately included or informed with full information on this process. On this, I leave the interpretation of my earlier research accounts up to the reader. I will merely point the reader in the direction of recent written reports produced by the Climate Action Party, which goes in the direction of what I would have otherwise liked to have included here. What I will include is my final argument for including the negative lived experiences of organisational actors in research of this ilk.

My reading of events was that the executive's need to bring in external contacts to remedy the situation, without the consideration that their decision would have consequences on (and contradict) previous agreements, was unwise and short-sighted. The effective functioning of UMGO and this PhD research, as well as the psycho-social wellbeing of our coresearch team, was subsequently disrupted by this move as the whole team felt disregarded, demoralised and confused. In response to this observation regarding the negative impact of management decisions, observers might remark that there is a much bigger SustainableUM2030 programme than before this restructuring. What I can say in response is that yes this is true⁵. Perhaps it is going well now and I will not dispute how far things have come; my whole point is key opportunities were missed. UM's organisational structures and the leadership - which I observed as lacking sustainability competencies - defensively resisted or disregarded reasonable business cases or proposals for change. In the process, crucial years have been wasted. This led to unnecessary actions, the consequences of which may not have been widely felt so strongly, but were certainly felt by my coresearchers at UMGO,

⁵ John le Carré remarked in a *Guardian* interview late in his life that the truth is what you can get away with. Referring to another quote by Greg Egan, I imagine that it is more: "The truth is whatever you can't escape".

based on what I directly observed and experienced. The negative impact on all these future sustainability professionals marked them and without an authentic account, the collected lived experiences will remain unheard within the action science of the work. Whatever I say this will never be counted as evidence as it is 'only' lived experience. That is the only differentiation I will now make. It was never about my personal emotions. It was always about the lived experiences I observed and internalised.

This is down to the hierarchical nature of the system under inquiry, coupled with the refusal to explore the unconscious (and, indeed, conscious) bias that all people possess. Many in the university consider their positions as pure, free and objective, rather than biased, imperfect and subjective; participants in the organisation they inhabit. That is all I ever expected. A little logic, self-awareness and reflection, and a little less ego. I was asked why the fact that this change hurt and was a shock to the student green officers was anything special. That things were not handled in an elegant way does not necessarily mean that it was a bad development, I was informed. Indeed, but I would still like to finish with this question posed to me. Why is the less prominent role of the Green Office (and the pain experienced) a bad development? My being asked this is the closest I can come to showing why my views were so radical in UM; the impact on the student green officers over the years was absolutely not a justified price through which organisational transformation could take place, and the interests at play seemed to take the other stance: all change is painful; they will get over it; this is too important for them; they will be gone in a year anyway; is it not bigger and better now?

It is against precisely this kind of banal faux-rational callousness that I shall always rail. I will argue that any navigation of change should be as therapeutic as possible - especially in the university, making sure one reduces negative mental health outcomes in students is a moral (and pragmatic) imperative. My ultimate reply is therefore addressed to the leadership who bears this mindset: the fact that you do not see why negative impact on the wellbeing of the teams of green officers and student change-agents I watched go through this as not necessarily a bad development - given what has come out the other end - is why I will no longer attempt to answer these questions outside of this post-script. That is the kernel of where my judgment and emotion comes from. It was always a reflection of the reality of their collected lived experiences as the Taskforce came to be. The student experience is after all that which is marketed most when universities present themselves.

To university leaders who set ambitious sustainability goals and targets: ask yourselves if you really want the kind of change required, and more importantly, if you and your institution is ready to embark on such a journey, as this is not at all easy. In my humble opinion, this evaluation of fitness for the journey ahead must be done sincerely before investing significant time and human resources, and especially before making a lot of noise about how green or sustainable you wish to be, or indeed, already are.

MY SUBJECTIVITY AND BIAS

I was subjective to the UMGO experience, and may have subsequently fallen into the trap of the victim-perpetrator-saviour dynamic. I admit I somewhat idealised their role as change-agents in the sustainability governance of UM as institutional entrepreneurs,

and somewhat demonised the role and conduct of the leadership, consultants and other 'higher-ups' in the period I directly researched as insider. I am well aware that my action research accounts can be interpreted as a victimisation of the Green Office. In my last years of composing these accounts, I tried to extract myself and the lived experiences I researched out from the victim-perpetrator dynamic; it is very hard not to then overlook their context. Be that as it may, I point to the experiences that were not recorded in this scientific thesis, or the dysfunctional behaviours which were kept under the surface in the years we were active in this project. More importantly, I primarily attempted to rebalance the slant towards assessing the Green Office in isolation from the rest of the institution, which become apparent as the scapegoating I later characterised took place. I leave interpretation of these tensions in the wording and tone I use to the reader. After untangling whether or not I could indeed rely on our own experiences as valid accounts, which the psychological manipulation of victims of scapegoating results in, I can see how this looks to both UM insiders, as well as to the objective reader. But I would argue that the analysis in *Chapter Nine* supports a different view: one that is all too often under-represented, and all the more difficult to handle and accept as valid due to its detail, subjectivity and nuance.

I have subsequently, throughout this humdinger of a year, tried to remove my own interpretations from the record. I have stated openly where the Green Office's and my own performance could have been better, for example, as being too radical or naïve to existing interests. The evidence nonetheless still speaks to a disregard for the student and junior researcher, and even sustainability expert voice within UM in the last decade - regardless of well-positioned research on change-agency and tempered radicalism coming from the founding UMGO team itself. Despite the fact that a lot of my evidence may be seen as unscientific and journalistic, I would argue that this could not have feasibly been collected in another way given the operating conditions I have outlined in the challenges to doing insider action research in *Chapter Two*. If I had not done it this way, these accounts would have remained unrecorded; under the surface, unknown, and less visible to the outside world. It is no coincidence that this kind of small-n, insider research was discovered as a prominent knowledge gap in the literature when I conducted my review in 2014-2015. In my reasoning, this was exactly what was demanded, and not just by academics, but by those who called for more activism in the role of being a scientist; otherwise known as Scientivism by my own Professor.

We can always look at the Green Office's performance, but who has really assessed the leadership's performance in as rigorous a fashion with the necessary access to information? I can easily say that, at one point, the Green Office were the beloved tempered radicals of the leadership and academics at UM, back in the good old days of 2010-2012, but why were this cohort so cherished, whilst latter ones so criticised? I can be seen as not being critical enough of the Green Office performance from 2014-2018, but I can also point at the evidence above that clearly shows how much criticism and pressure they were already under, which in my view was unbalanced and disproportionate. I can even look to some accounts of the Green Office in that period which show it was becoming too institutionalised, too much a part of the existing set-up to be able to legitimately provide an evidence-based critique, let alone intelligent sustainability solutions for the decision-makers of the university.

In the end, this is where I place a limit on what I can say based on the academic part of this project. I balance any perceived bias on my part with discussion centering on what the leadership did well regarding the management of sustainability, and what the Green Office could have done better. I must nonetheless state that this is superimposed on my initial analysis, over what we saw as a top-heavy, and opaque power dynamic. Regardless, in *Chapter Nine*, I proceeded to delimit to the normal scientific outputs of mine and the Green Office's co-research inside of UM from 2014-2019. This post-script is the injunction I attach to this that accords to the bodies of action research I studied and tried to practice.

Concluding remarks on the end of my formal role at UM in 2018

The final intervention that still aimed to install a Living Lab for sustainability transformation – the last act in my former role at UM - was the SDG-mapping project, continued from 2017 into 2019 in collaboration with UNU-MERIT, UMGO, and then Mondiaal Maastricht and CNME. As part of the SDG mapping project, I lobbied a key contact - Alan Atkisson - who had given my master's cohort a workshop on sustainability transformation in Uppsala in 2012 to help add legitimacy and impact to a planned SDG symposium in May 2018. The 'Make the SDGs Yours' symposium was pivotal in the narrative and progression of this project, with written and oral accounts from participants and organisers constituting highly significant parts of the evidence base set forth in the previous sections of *Chapter Nine*. It should also be considered the last red flag I witnessed in my formal role as the outcomes and lessons for UM from the community who took part in the workshop were disregarded. This theme of calls, advice, project proposals and much hard work seeming to fall on deaf ears, is only a part of what I could include, and characterises much of my experience and journaling that covers the period of 2014-2019. I have to admit, this SDG intervention also left me with a bitter taste in my mouth which may have affected how I have subsequently viewed the leadership. Nonetheless, I stand by the findings from the application of the diagnostic tool, as these appear to support the accounts given, minus the sentiments of those involved in the disorientating endeavour we navigated through.

Material based on the lived experiences of some core actors included in the action research shall be shared in a separate booklet which should give the reader a better account of what was omitted, in combination with the longer arc of the history and case of Maastricht University as an institution and culture; based Annemieke Klein's The Maastricht Experiment. This forms part of a larger narrative that followed me since before my employment at UM, so I could do justice to the hundreds of voices included in the transformative action inquiry as well as rely on previous academic research on the institution I studied.

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SUMMARY

OVERVIEW

This PhD thesis constitutes a systems-view of various theoretical, practical and epistemological perspectives that work towards a rigorous yet holistic understanding of how complex organisations like universities transform towards sustainability. In keeping with this systems view, organisational transformation for sustainability was found to manifest in various forms. These all necessitate a profound shift in the system's equilibrium, with teams and organisations working together as communities of inquiry, from silo-based to matrix-based ways of working, more 'in sync' with themselves and their external environments. Behind this insight, kaleidoscopic knowledge of how organisations transform - whether structural, organisational, societal and institutional - was essential to mine out of literature and experience. Thus, the kinds of transformation that universities can drive (whether deliberately or by happenstance) needs to be understood against this pluralistic manual whilst being rooted in the substance and experience of organisational life.

This action-rooted knowledge was (and still is being) generated from within and across multiple diverse contexts, making up only a modest proportion of the lived experiences and voices sampled in this research. The phenomena of organisational behaviour, development and transformation for sustainability that these voices speak to have been valuably examined through action research as a means to investigate, inquire into and invigorate the capacity for the systemic change we as sustainability professionals are willing into existence. This action inquiry has been unavoidably philosophical and profound, in keeping with ways of knowing that allow us to regenerate our damaged world and transform it for the better. We are all embedded in a brittle system. We can act with transformative agency to effectuate and therapeutically change small parts of it, like entrepreneurs embedded in existing organisations (*intrapreneurs*), only at a larger scale. The language and praxis of action research, mainly through the appreciative inquiry-based 'vocabulary of possibility', was gradually applied throughout the learning trajectory of the work to encourage positive transformative change in social and organisational systems in and around Maastricht University in particular. Generally - as well as specifically in the case of UM's sustainability actors and activists - this focus on the possibilities, assets, and potential (rather than deficits) in the system seems to have had an array of cross-fertilising benefits for constituents, members and participants. To help leaders direct universities as change agencies to redesign the economy and society in ways that correct our extractive patterns of behaviour, they can view universities as embedded in the broader system of 'institutional architecture'. This architecture may constrain or enable their ability to work towards strong sustainability outcomes. A burgeoning array of literature places universities in the centre of the transformations required for sustainable development; this work therefore focussed on the 'how' of this mission imperative set before them.

BOOK STRUCTURE

Part A of this thesis introduces the orientation for this inquiry: understanding how to navigate organisational transformation for sustainability from *within* the university as a

complex system.

Chapter 1 introduces and overviews the state and imperative of transformation for sustainability for universities by tracing out a vision for them in the rest of the 21st century regarding their design, management and governance. This vision of transformative universities shows that they have a clear role to focus on human and ecological wellbeing rather than material consumption and that they need not fear becoming participants in the core issues of sustainability.

Chapter 2 traces out how the action inquiry was employed as a reflexive and embedded evaluation of the current state of the art of sustainability as lived and practised within the university, according to an iterative action research approach of diagnosing, planning, acting and evaluating problems experienced together with change-agents in our own organisation (Coghlan & Brannick, 2014). In addition, a series of embedded insider case studies were undertaken in conjunction with this action research to learn from, evaluate and interpret how frontrunner universities effectively navigate their organisational transformation towards sustainability. These two threads in the study both relied upon and enforced each other, thanks to a reflexive process of personal, group, and experiential learning.

Chapter 3 reviews different theoretical perspectives, establishing core elements of organisational transformation for sustainability at universities. It was found that many universities lack tools to operationalise their aspirations to become more socially and environmentally responsible. Despite the abundance of sustainability management and performance assessment frameworks, what lacks is a systemic understanding of the deeper leverage points at the organisation's micro-, meso- and macro-levels. Relatedly, in reporting and communicating sustainability performance, practitioners appeared overwhelmed by the choice of different tools and approaches which making effective organisational sustainability decisions relies upon (Hespenheide & Koehler, 2012). Determining what information to disclose, to what scope of stakeholder universities are accountable to, and increasing societal pressures to disclose student and research project information makes the priority of resolving this problem very high. Furthermore, they are obliged to audit, measure and manage all their processes in a trustworthy and authentic manner. For this purpose, rubrics were designed for internal ESG evaluation (*CGS 4.2a*) and transparent ESG disclosure (*4.2b*) based on applying this sustainability accounting practice. Many vital insights were drawn from previous work gauging and accounting for sustainability in the Nordic mining sector and elsewhere (Baker-Shelley, 2013). On further investigation, it was also found that universities tend to lack the self-reflection and cognition of themselves as a whole to become learning organisations (e.g. Argyris and Schön (1996); Edwards (2009)) and, therefore, to undertake pathways of organisational development or organisational transformation.

Chapter 4 helps transition from the theory and methodology of the first chapters to the empirics and experiences of the international case studies in *Chapters 5-7*. It presents how this PhD research has been undertaken by weaving the twofold research approach of pragmatic-insider action research and external case studies into an integrated

research design composed of triangulated qualitative research methods. It also outlines how the analytical framework shown in *Chapter 3* was applied to the case-study data. Analysis began during and after the fieldwork from 2016-2017. In the analysis process, 33 categories were formed based on the analytical framework shown. Eventually, an interpretative-diagnostic tool for organisational transformation for sustainability was developed, forged both inductively (data-informed) and deductively (literature-formed) into a system of *tangible systemic rubrics*.

Part B presents three detailed case studies of outlying universities in three diverse global regions (*Chapters 5-7*). In each case, specific action strategies were detected that depict navigated pathways of organisational transformation for sustainability. The evidence for this claim consists of project and initiative success at achieving systemic change towards sustainability at various scales and the actions, initiatives, decisions and responses (relational dynamics and behavioural patterns) of the groups studied. In the case synthesis of *Chapter 8*, the cases were compared and contrasted with the outcome being that the detected action strategies are highlighted with *shared qualities and common patterns* across the cases, defined by the assets and competency-sets observed. These shared qualities and common patterns manifested as successfully leveraged points in the system of each case that demonstrably contributed to organisational transformation. Therefore, some of these rubrics could be postulated as 'green lights' of systemic change, otherwise known as tangible systemic rubrics. These rubrics can be further described as intrinsic competencies that help actors effectuate and navigate organisational transformation towards sustainability at various scales through the five perspectives presented in this research.

Part C builds on the lessons learnt in *Part B*'s three applications of the diagnostic tool - including the shared qualities and common patterns that map out the transformation pathways at each case. The insider action research case of Maastricht University from 2014-2019 applies the tool for the fourth and last time in this PhD. Whilst *Chapters 5 to 7* focus on three transformative university case studies, *Chapter 9* presents what could be learnt (academically) from almost a decade of undertaking and experimenting with systemic change for sustainability from different generations of inquiry and iterations of action research. This inquiry progressed with a succession of Green Office teams, sustainability scientists and practitioners in ICIS/MSI, UNU-MERIT, and the broader UM ecosystem of actors whilst bearing subtle silo-based power and interests in the current equilibrium as a structural barrier. The organisational diagnosis of Maastricht University, coupled with an array of options open to it for transformational change, is based on which of its assets align with the shared qualities from the case synthesis. In conjunction with this thesis, policy recommendations are provided to UM to help decision-makers and sustainability actors navigate the most beneficial pathway of transformation for sustainability.

Lastly, organisational transformation (for sustainability) did not appear to be a sustainable phenomenon in itself. It comes in a typology of bursts with 'rest' and consolidation periods required in between, as per established theories of governance and change in socio-ecological systems (e.g. Folke, Hahn, Olsson, & Norberg, 2005; Gunderson & Holling, 2002). I found action research a personally and socially powerful

way of understanding and reconciling this complexity: I situated myself with the group I was embedded in as *part of* the researched organisation, which bore necessarily uncomfortable lessons. In *Chapters Nine and Ten*, I reflect on how the actual findings differed from what was expected and what this means for practising pragmatic-insider action research within organisations. After that, I round off the thesis strongly emphasising competencies that universities and communities within and around them have at their disposal to transform towards sustainability. Despite everything, I hope and trust that it is possible to meet the challenges the rest of this century will set before us with these skills. Indeed, it is within this century that humanity's longer-term survival and scope of suffering will depend on its capacity for self-transformation in response to pandemic crises of climate and capitalism.

PROJECT BACKGROUND

The ICIS-GO PhD project was cogenerated by Maastricht University's (UM) Green Office (UMGO) and the Maastricht Sustainability Institute (formerly, ICIS). The purpose and experience of the Green Office to activate and navigate positive change towards sustainability from within UM in 2010-2013 produced the proposal for this PhD project, which key academic actors at ICIS then refined and posted. This is seen, in itself, as an innovation. The ICIS-GO PhD is unusual as it was not entirely generated by the candidate or situated within an existing research project. Instead, the project was rooted in two internal organisations; one staff-driven, one student-driven - the latter attempting transformative change towards sustainability in their surrounding university system, the former allowing the tools and rigour for the practical research of transformative change and iterative cycles of action and reflection in doing it. The project took place from December 2013 to December 2018, although some activities conducive to the insider action research at UM continued well into 2019.

SAMENVATTING

OVERZICHT¹

Deze PhD thesis tracht een systeemweergave te vormen van verscheidene theoretische, praktische en epistemologische perspectieven; deze perspectieven werken samen richting een rigoureuus maar holistisch begrip van hoe complexe organisaties, zoals universiteiten, veranderen op weg naar duurzaamheid. Gezien vanuit deze systeemweergave bleek organisationele verandering richting duurzaamheid vele verschillende vormen te hebben. Al deze veranderingen vereisen een diepgaande verschuiving binnen het equilibrium van het systeem, waarbij teams en organisaties samenwerken om onderzoeksgemeenschappen te vormen – minder in afgeschermd structuren maar meer als matrixstructuren – die meer 'in sync' zijn met zowel zichzelf als met externe systemen. Naast dit inzicht was de brede kennis over hoe organisaties transformeren, of dit nou structureel, organisationeel, gemeenschappelijk of institutioneel is, essentieel om de relevante literatuur en benodigde ervaring samen te brengen. De mogelijke manieren van transformatie die universiteiten kunnen doorvoeren (of dit nou met opzet of toevallig gebeurt) moeten worden begrepen met

1 Samuel Boerma Translation Services, T-Cross Media.

dit pluralistische handboek als achtergrond, waarbij alle aspecten hun fundatie vinden in het wezen en de ervaring van organisatorisch leven.

Deze kennis, met actieve deelneming als basis, kwam (en komt) voort uit verschillende diverse contexten, en geeft ook maar een bescheiden deel weer van ervaringen en opinies die aan dit onderzoek ten grondslag lagen. De onderdelen van organisatorisch gedrag, ontwikkeling en transformatie richting duurzaamheid waar deze ervaringen en opinies het over hebben zijn geanalyseerd (waardeanalyse) door middel van actieonderzoek, zodat de capaciteit voor systemische verandering die wij als ‘sustainability professionals’ in het leven roepen zowel onderzocht als geanalyseerd en opgestuwd kan worden. Dat dit onderzoek filosofisch en diepgravend van aard werd was onafwendbaar, aangezien dit past binnen de tradities van kennis vergaren die ons de mogelijkheid geven onze beschadigde leefwereld te doen herleven en in positieve zin te veranderen. We zijn onderdeel van een kwetsbaar systeem. We kunnen als bemiddelaars optreden, om zo op een therapeutische manier de verandering van kleine onderdelen te bewerkstelligen, zoals ondernemers binnen bestaande organisaties (*intrapreneurs*), alleen dan op grotere schaal. Het taalgebruik en de gewoonten van actieonderzoek, vooral vanwege het op hoor en wederhoor gebaseerde ‘vocabulair van mogelijkheden’, zijn stap voor stap toegepast tijdens het volledige leertraject om positieve, transformatieve verandering te stimuleren, zowel in sociale als in organisationele systemen in en rond de universiteit van Maastricht in het bijzonder. Over het algemeen – en in het bijzonder in het geval van de UM’s duurzaamheidsmedewerkers en activisten - lijkt deze focus op de mogelijkheden, voordelen, en potentie (in plaats van op de gebreken) binnen het systeem een verscheidenheid aan voordelen te hebben opgebracht voor de verschillende bestanddelen, leden en medewerkers. Om bestuurders te helpen universiteiten te laten functioneren als vertegenwoordigers van verandering, om te helpen de economie en de samenleving zo te hervormen dat we onze extractieve levensstijl corrigeren, kunnen zij universiteiten zien als onderdelen van een grotere, overkoepelende ‘institutionele structuur’. Deze structuur kan het werken richting duurzame oplossingen zowel hinderen als stimuleren. Een snel groeiend deel van de literatuur beschrijft universiteiten als centra van de vereiste transformatie voor duurzame ontwikkeling; dit werk is dan ook gefocust op de ‘hoe’-vraag binnen deze imperatieve missie waar universiteiten voor staan.

STRUCTUUR VAN HET BOEK

Deel A van deze thesis introduceert de oriëntatie nodig voor dit vraagstuk: het duiden van hoe men organisationele transformaties stuurt *vanuit* de universiteit als complex systeem.

Hoofdstuk 1 introduceert en belicht de staat van zijn, en het gebiedende aspect, van transformatie richting duurzaamheid voor universiteiten door een toekomstbeeld voor de rest van de 21ste eeuw te schetsen van hun design, management en bestuur. Deze visie van transformatieve universiteiten laat zien dat hun rol duidelijk is om te focussen op het welzijn van mens en natuur, in plaats van op materiële consumptie, en dat ze het deel uitmaken van *core issues* van duurzaamheid vooral niet moeten schuwen.

Hoofdstuk 2 zet uiteen hoe het actieonderzoek is gebruikt om een reflexieve en

inhoudelijke evaluatie te creëren van de huidige staat van duurzaamheid binnen de universiteit; dit gebeurde aan de hand van een iteratieve research-methode, waarin diagnostiek, planning, actie, en het evalueren van problemen samen met de medewerkers aan deze veranderingen binnen de organisatie centraal stonden (Coghlan & Brannick, 2014). Daarnaast zijn een aantal *case studies* met verschillende leden van universitaire organisaties ondernomen die aansloten op het actieonderzoek, om zo zowel te kunnen leren, evalueren als interpreteren hoe vooruitdenkende universiteiten op een effectieve manier richting geven aan organisationele transformatie richting duurzaamheid. Deze twee onderdelen van de studie bouwden zowel op elkaar voort als dat ze elkaar bevestigden, dit dankzij een reflexief en ervaringsgericht leerproces voor zowel individuen als groepen.

Hoofdstuk 3 bespreekt meerdere theoretische perspectieven, waarbij kernwaarden van organisationele transitie richting duurzaamheid in universiteiten uiteen worden gezet. Veel universiteiten blijken de middelen te missen om hun aspiraties vorm te geven als het aankomt op het nemen van meer verantwoordelijkheid op het gebied van duurzaamheid en sociale aanpak. Ondanks de overvloed aan theoretische kaders voor het beoordelen van duurzaamheidsmanagement en aanpak blijkt er een gebrek te zijn aan systemische kennis van de dieper liggende punten van invloed op zowel de micro-, meso-, als de macroniveaus van deze organisaties. Daarbij komt ook kijken dat rapporteurs bij het beoordelen en communiceren van de duurzaamheidsaanpak overweldigd lijken te worden door de hoeveelheid manieren en aanpakken waar effectieve organisationele duurzaamheid op gebaseerd is (Hespenheide & Koehler, 2012). Bepalen welke informatie moet worden gecommuniceerd, voor wat voor scope de universiteiten verantwoordelijk zijn, en de toenemende maatschappelijke druk om transparant om te gaan met informatie die betrekking heeft op studenten en onderzoeksprojecten zorgen er allemaal voor dat de prioriteit van het oplossen van dit vraagstuk zeer hoog ligt. Bovendien zijn zij verplicht om al hun processen te meten, verifiëren en managen, en wel op een betrouwbare en authentieke manier. Hiervoor werden rubrics ontworpen voor een interne ESG evaluatie (*CGS 4.2a*) en een transparante vorm van ESG publicatie (*4.2b*), gebaseerd op de correcte toepassing van duurzame boekhoudkundige praktijken, en als voorbeeld van andere rubrics die verder in dit hoofdstuk worden gepresenteerd. Veel van de vitale inzichten komen voort uit vorige werken waarin het ijken van- en rekening houden met duurzaamheid in de Noord-Europese mijnindustrie (gecombineerd met andere onderzoeken) beschreven staat (Baker-Shelley, 2013). Bij nader onderzoek kwam ook aan het licht dat universiteiten over het algemeen neigen naar een gebrek aan zelfreflectie en cognitie van het eigen systeem als geheel om actief lerende organisaties te worden (bijv. Argyris and Schön (1996) .

Hoofdstuk 4 maakt de transitie van de theorie en methodologie uit de eerste hoofdstukken naar de empirische kant en de ervaringen uit de internationale *case studies* die in *hoofdstukken 5-7* beschreven staan. Dit hoofdstuk toont hoe dit PhD-onderzoek is aangevlogen door de tweezijdige onderzoeks aanpak van het pragmatische *insider* actieonderzoek en de externe *case studies* samen te weven tot een geïntegreerd onderzoeksdesign, bestaande uit getrianguleerde, kwalitatieve onderzoeksmethoden. Het zet daarnaast uiteen hoe het analytische framework, zoals te zien in *hoofdstuk 3*, is

toegepast op de data van de *case studies*. Het analyseproces begon zowel tijdens als na het veldwerk van 2016-2017. In dit proces werden 33 categorieën gevormd, gebaseerd op het eerder getoonde analytische framework. Uiteindelijk is er een diagnostische interpretatie-tool voor organisationele transitie richting duurzaamheid ontwikkeld, die zowel op inductief (data-geïnformeerd) als deductief niveau (literatuur-geïnformeerd) omgesmeed is naar een systeem van tastbare *systemic rubrics*.

Deel B toont drie gedetailleerde *case studies* van uitzonderlijke universiteiten in drie verschillende delen van de wereld (*hoofdstuk 5-7*). In elk van deze drie gevallen werden er specifieke actiestrategieën ontdekt die duidelijk laten zien dat er bepaalde paden bewandeld zijn binnen een transformatie richting een duurzame organisatie. Het bewijs voor deze claim bestaat uit projecten en initiële successen tijdens het behalen van systemische, duurzame veranderingen in verschillende lagen van de organisatie, en daarbij is ook gekeken naar de acties, initiatieven, besluiten en reacties (relationele dynamieken en gedragspatronen) van de bestudeerde groepen. In de *case synthesis* van *hoofdstuk 8* worden deze casussen vergeleken en gecontrasteerd met de uitkomst dat de gevonden actiestrategieën gehighlight zijn door hun gedeelde kwaliteiten en overeenkomstige patronen, gedefinieerd door de geobserveerde voordelen en competentie-sets. Deze gedeelde kwaliteiten en overeenkomstige patronen uiteten zich als succesvol benutte punten in het systeem bij elke casus die demonstratief bijdroeg aan organisationele transformatie. Daarom zouden een aantal van deze rubrics gezien kunnen worden als ‘groen licht’ voor systemische verandering, ook wel bekend als tastbare systemische rubrics. Deze rubrics kunnen verder beschreven worden als intrinsieke competenties, die medewerkers helpen met het effectueren en navigeren van organisationele transformatie richting duurzaamheid op verschillende levels, en wel door middel van de vijf perspectieven die gepresenteerd worden in dit onderzoek.

Deel C bouwt voort op de geleerde lessen uit de drie toepassingen van de diagnostische tool in *Deel B* – inclusief de gedeelde kwaliteiten en overeenkomstige patronen die in ieder van deze gevallen de transformatieve paden uiteen zetten. Het *insider* actieonderzoek in het geval van de universiteit van Maastricht van 2014-2019 past deze tool voor de vierde, en laatste, keer toe in dit PhD-onderzoek. Terwijl *hoofdstuk 5 tot 7* de *case studies* van drie transformatieve universiteiten presenteert, toont *hoofdstuk 9* wat er (academisch gezien) geleerd kan worden van bijna een decennium van het uitvoeren van- en experimenteren met systemische verandering richting duurzaamheid vanuit verschillende generaties aan vraagstellers en iteraties van actieonderzoek. Dit onderzoek boekte vooruitgang met de hulp van een opeenvolging van teams van de *Green Office*, onderzoekers van duurzaamheid, uitvoerend wetenschappers in ICIS/MSI, UNU-MERIT, en het uitgebreide ecosysteem van actoren van de UvM, waarbij subtile, op een afscherm-gebaseerde, kracht en interesses in het huidige equilibrium als structurele barrière door allen werden gedragen. De organisationele diagnose van de universiteit van Maastricht, gecombineerd met een hoeveelheid aan mogelijkheden op het gebied van transformatieve verandering, is gebaseerd op welke van haar middelen in lijn zijn met de gedeelde kwaliteiten vanuit de onderzoekssynthese. Aanbevelingen op het gebied van beleid worden, in lijn met deze thesis, aangeboden aan de universiteit van Maastricht, om zo beleidsmakers en duurzaamheidsmedewerkers te helpen met het vinden van de meest vruchtbare paden om te volgen voor transformatie naar duurzaamheid.

Als laatste bleek organisationele transformatie (richting duurzaamheid) geen duurzaam fenomeen op zich te zijn. Het wordt gekarakteriseerd door uitbarstingen van onderneming, met ‘rust’- of consolidatie periodes als noodzakelijke momenten tussen deze uitbarstingen in, zoals te zien is in gevestigde theorieën over *governance* en verandering in socio-ecologische systemen (bijv. Folke, Hahn, Olsson, & Norberg, 2005; Gunderson & Holling, 2002). Persoonlijk vond ik actieonderzoek een effectieve manier, zowel op persoonlijk als sociaal gebied, om de complexiteit te begrijpen en me ermee te verzoenen; ik plaatste mijzelf in het midden van de groep waarvan ik deel uit maakte (waarbij beiden onderdeel waren van de onderzochte organisatie), waar oncomfortabele maar noodzakelijke lessen uit voortkwamen. In *hoofdstukken 9 en 10* reflecteer ik op in hoeverre de uiteindelijke resultaten verschilden van wat ik had verwacht, en wat dit betekent voor het uitvoeren van pragmatisch *insider* actieonderzoek binnen organisaties. Daarna rond ik deze thesis af met het benadrukken van competenties die aanwezig zijn binnen en rond universiteiten, en waarmee zij de transformatie richting duurzaamheid vorm kunnen geven. Ondanks alles hoop ik, en vertrouw ik erop, dat het mogelijk is om met deze *skills* de uitdagingen aan te gaan die de rest van deze eeuw nog voor ons in petto heeft. Het is namelijk zo dat binnen deze eeuw bepaalt wordt in hoeverre onze overleving kansrijk is op de lange termijn, en daarmee de hoeveelheid lijden die wij onszelf en onze omgeving aandoen. Dit alles zal neerkomen op onze capaciteit voor zelf-transformatie als antwoord op pandemische crises van het klimaat en het kapitalisme.

PROJECT ACHTERGROND

Het ICIS-GO PhD-onderzoek werd mede mogelijk gemaakt en gegenereerd door de *Green Office* van de universiteit van Maastricht (UMGO) en het *Maastricht Sustainability Institute* (voorheen ICIS). Het doel en de ervaring van de *Green Office* als het aankomt op het activeren en navigeren van positieve verandering richting duurzaamheid vanuit de UvM in 2010-2013 brachten het voorstel voor de PhD-onderzoek voort, waarna academische medewerkers met een sleutelrol deze bij ICIS verfijnden en opzetten. Dit, op zichzelf, wordt gezien als een innovatie. Het ICIS-GO PhD-onderzoek is ongebruikelijk, en werd ook niet volledig gegenereerd door de kandidaat of binnen een bestaand onderzoeksproject. In plaats daarvan was het project geworteld in twee interne organisaties: eentje gedreven door medewerkers, de ander gedreven door studenten – waarbij de tweede een poging deed om transformatieve verandering richting duurzaamheid vorm te geven binnen het universiteitssysteem waarin zij zich bevonden. Het eerste bood, door de uitvoering, zowel de *tools* en de nodige strengheid voor het praktische onderzoek naar transformatieve verandering als de iteratieve cycli van actie en reflectie. Dit project vond plaats van december 2013 tot december 2018, alhoewel sommige activiteiten die onderdeel vormden van het *insider* actieonderzoek binnen de UvM nog tot ver in 2019 doorgingen.

PROPOSITIONS

PROPOSITIONS FROM PART A

- 1. Radical human transformation of the ecosphere justifies an equally radical transformation of organised human life.*
- 2. There is a clear moral and pragmatic imperative for universities to navigate therapeutic transformations towards sustainability.*
- 3. Action research, as a vehicle and paradigm of inquiry, helps gauge and effectuate universities' organisational transformation for sustainability.*
- 4. An integrated metatheory of transformation allows a deeper appreciation of the rules of the game: integrate multiple theoretical lenses to diagnose and navigate the potential and type of systemic transformation required to meet the ends of sustainability.*
- 5. Deep-seated obstacles to organisational transformation are rooted in collective cognitive 'intelligence' or mental models embodied in the culture of how an institution works, i.e. simplifying heuristics and systematic biases, norms and value systems.*
- 6. With roots in how ecosystems work, the organisation-as-organism analogy is a helpful way to perceive interconnectivity and perform more comprehensive diagnoses of organisational-social environments; planned interventions can then be in greater accord with the reality of the system to limit the negative impact caused by dysfunctional and pathological management patterns.*
- 7. Organisational diagnostics should eventually require the same level of clinical experience and expertise as a doctor or therapist: a rigorous, systematic and holistic understanding of various pathologies and their diagnoses and prognoses from the standpoint of the organisation-organism analogy.*

PROPOSITIONS FROM PART B

- 8. Organisational transformation of a system for sustainability evolves it towards a state of higher resilience, responsiveness and purposefulness, in synchronicity with its socio-ecological surroundings, in bursts of rapid, discontinuous change that punctuate the initial dynamic equilibrium or system state.*
- 9. Rapid and discontinuous change over most or all domains of organisational activity is, over time, interspersed with relatively calmer periods of organisational development that are also important to build a foundation that avoids 'slipping back'.*
- 10. Small changes in strategies, structures, and power distributions often do not accumulate to produce organisational transformation. However, if consistently applied, ownership is shared and implementation is mediated in deliberation, they may culminate in long-term organisational development.*
- 11. Significant 'environmental' changes and chief executive officer succession are key opportunities or catalysts of organisational transformations, often knocked-on or triggered by a shock to the system from surrounding institutional and policy architecture.*

12. The case universities developed intrinsic capacities or competencies for systemic change and subsequently positively impacted the local socio-ecological system via their own transformation. Therefore, extrinsic impact from an organisational transformation to sustainability is interdependent with developing intrinsic competencies for systemic change.

13. It appears unlikely that a standard algorithmic blueprint of organisational transformation for sustainability would be helpful. By dint of their intrinsic nature, the development of competencies of systemic change in an organisation would not likely benefit from a prescriptive one-size-fits approach, at least, one that is not firmly rooted in the intrinsic logics of the organisations in question.

PROPOSITIONS FROM PART C

14. A public space for Arendtian praxis, open discursive dialogue, reconciliation and proper debate over meaningful intersectional issues of social, ecological, racial, and climate justice, is needed at the heart of the process of transformative sustainability in universities.

15. Longitudinal studies on the trajectories of organisational transformation are needed to make salient and verified conclusions about the dependent and independent variables for strong sustainability outcomes.

16. Universities that effectively navigate their pathways for sustainability transformation develop the capacity for self-diagnosis and learning: including awareness by actors of organisational system boundaries, the relationship between the organisation and its surrounding society and ecosystems, and its interdependency with them.

17. A Green Office Conditions Guarantee should be established based on the Green Office Model Guide, using its conditions and mandate as a legal contract to be signed upon forming any Green Office between the Green Officers and the University Management. These represent the rules of the game and a node in the organisation and governance structure that creates a good balance between bottom-up, middle-out and top-down: a list of conditions and principles circumscribing transformative agency for sustainability.

IMPACT

The action researcher cannot claim that every organisation can and will behave like the one studied, which was indeed very much what was observed in practice between the external three cases and the insider one of this project. However, as Coghlan and Brannick advise, you may focus on some significant factors, consideration of which is useful for other organisations; organisations that might be undergoing similar types of change processes. I thus move from this justification to a brief outline of the impacts of my PhD work.

Organisational and Social Impact

The organisational and social impact of this research has probably been most experienced by and within the community of students and staff who work on sustainability in Maastricht University, and the surrounding city outside of the university. Going deeper still, the research, by dint of its action inquiry, was co-researched with the Green Office of Maastricht University. They were impacted by this project in the sense that they participated in its early synthesis of and learnings about what organisational transformation for sustainability actually entails, and that they contributed towards from their own freshly learnt experiential and intellectual knowledge. They also enacted mutually agreed and discussed decisions, projects and initiatives that were either partly or wholly influenced by what the research uncovered as we progressed. There were also backfiring effects to our intervention and inquiries, as a result of unforeseen circumstances and unpredictable relational dynamics.

In essence, the impact of the work is seen in how I have facilitated youth groups, and contributed and advised recent calls for transformative change in and around UM and its institutional architecture, as I was completing the early manuscript revisions for this thesis in late 2019/2020, and after the first internal round of feedback in early 2020. I advised, guided and tried to act as an honest broker for the Maastricht for Climate consortium, which later became the Climate Action Party, whose goals were to orient a truer pathway to sustainability at UM by recognising and learning from the history and context of the preceding change agents I had worked alongside. The outcome was a transformation strategy for UM (of sorts) that formed the basis of the policy brief for UM – which completes the obligation of the project to produce policy recommendations. Without a history or catalogue of events and policies to go on, and without open access to key decisions taken and their effects, this research proved essential to their eventually successful efforts to be voted into the University Council and to table a report outlining their concerns regarding the last four years of sustainability policy at UM. In conjunction to the delivery of this thesis, inclusive workshops will take place to refine the findings, co-create know-how and transfer ownership.

UM Spotlight on sustainability

As this thesis was being completed, an actual community of inquiry formed of several different student organisations for sustainability, operating mostly independent from and in response to the university, approached me to advise them. This occurred during periods of negotiation and protest against UM's sustainability practices, in particular, the polemic centred on the choice to divest from fossil fuels in light of the pension body, ABP, being known to have investments in CO₂-emitting industries. Debates were proposed,

negotiated with UM, delayed, then eventually took place; participatory and open talks were recommended in order to seek a common and constructive path forwards for UM's sustainability actors into the 2020s.

Competencies for Systemic Transformation

Ultimately this thesis outlines a novel methodology for both researching and practicing transformation for sustainability from within the structures and constructs that the modern university institution makes manifest. It puts forward intrinsic competencies for systemic change at the individual, team, departmental and whole-organisational levels, that could be directly translated into practice via talks with bodies that aspire to codify, measure, track and have recognised the rubrics necessary to navigate transformations towards sustainability, thriving and circularity.

Employers, graduates, secondary school students, international organisations, and higher education broadly could all benefit from the further codification and translation of proven skills demonstrated by those researched in this project. The knowledge and know-how interwoven through this work presents an extensive body of other research that could work as a comprehensive scientific 'constitution' or 'codex' of change management for sustainability. By dint of the synthesis of at least five previously fragmented bodies of knowledge, it holistically encapsulates the organisational chemistry that makes sustainability transformation tick, what it is that actors actually do to effectuate, navigate and propagate transformations effectively in organisations, and how to look for these in complex organisations.

Inclusion of participants as coresearchers in the formulation of conclusions

Before the publication of the articles and outputs associated with this work, copies, drafts, working papers, and reports were circulated amongst the stakeholders and participants, in order to maintain authenticity as well as to garner a broad scope of accountability, feedback and validation of assumptions and conclusions. It is hoped that the exemplars and patterns provided in the preceding pages create meaningful interpretations and accounts for the readership of social and sustainability scientists, organisational researchers, managers and leaders, and sustainability professionals, whether in training or as experienced practitioners. The objective of this research, after all, was always impact towards the scaling and implementation of sustainability solutions in various global locations.

Ecological impacts

The positive ecological impacts of this research are not directly obvious in the sense that the coresearch team were a significant factor in affecting the overall ambition of the university's environmental sustainability policy. However, it can be reasonably claimed that the work of the author and the Green Office, coupled with the former environment and sustainability advisor at UM, supported the formulation of UM's environmental sustainability policy and its adaptation to more ambitious ends. For example, our efforts, overviewed in *Chapter 9 Section 9.2.2* focussed on, but are not exclusively limited to: E-waste, waste separation and management, general environmental awareness and literacy raising in the student and staff population.

ACKNOWLEDGEMENTS

It seems correct that when researching transformation up close, one goes through some kind of transformative process oneself. With this PhD project - although I knew it would be hard - I was not at all prepared for exactly how and to what extent that hardness would affect me. This work goes beyond my agency as an individual, and should be understood as an attempt at collective intelligence, representing the people whose experiences, insights and know-how I tried my best to encapsulate. To properly acknowledge the dozens of people who helped this project and its thesis reach its conclusion would be to include them as collaborators, codevelopers and coaches for the work. I believe that it is exactly because of all those I mention here, or reference above, (and those I unfortunately will forget to!) that I was in the end able to produce something which I could stand behind. Because of these people, I was finally able to put myself through the prism of positive transformation to achieve this doctoral thesis.

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'School Prayer' by Diane Ackerman

*"In the name of the daybreak
and the eyelids of morning
and the wayfaring moon
and the night when it departs,*

*I swear I will not dishonor
my soul with hatred,
but offer myself humbly
as a guardian of nature,
as a healer of misery,
as a messenger of wonder,
as an architect of peace.*

*In the name of the sun and its mirrors
and the day that embraces it
and the cloud veils drawn over it
and the uttermost night
and the male and the female
and the plants bursting with seed
and the crowning seasons
of the firefly and the apple,*

*I will honor all life
—wherever and in whatever form
it may dwell—on Earth my home,
and in the mansions of the stars."*

*From I Praise My Destroyer
(Vintage Books, 2000)*

ABOUT THE AUTHOR

Alexander Baker-Friesen (formally Baker-Shelley) is a transformative sustainability professional. As a leader, manager and amplifier, his mission is to connect, navigate and interweave the capacity for transformation towards a more thrivable world that achieves synchronicity with the natural environment.

In the decade since departing his home-land, he has lived, worked and studied in France, Italy, Sweden, and the Netherlands, and travelled extensively in Europe, South-east Asia and the US during his PhD. Now he manages and coordinates a new iteration of the Green Office model in Enschede, the Netherlands, called Green Hub Twente. He also runs a small transformation management company, Ozymandias Intelligence. Alex loves film, an eclectic mix of music, writing, reading, basketball, martial arts, and, before all, making time for his wife, dog and family. He hopes to write more fiction and non-fiction in the future.

Alex was born in Leytonstone, London, and spent his childhood moving around various towns in the English West Midlands and North-West with his younger brother as his mother followed her career as a care-home manager. His father, a former Greenpeace communications director, lives in Indonesia with an extended family he is very fond of. Alex considers himself (still) as both European and British.

Having left the University of Manchester with an honour's degree in Environmental Science in 2009, specialising in the science, politics and history of climate change, Alex was confronted with looking for work at the end of global financial crisis. With neither the network nor the money to pay for an expensive Master's degree, Alex left England in 2010 to work with an eco-horticulture business in the French Basque country. After mentoring from his Dutch boss, and picking up French, Alex discovered viable European master's tracks that were high quality and lower in cost. He taught English in North Italy, and left for Sweden to start a Masters of Sustainable Development at Uppsala University in 2011 (returning to Italy the following summer). After a year of scientific sustainability education, he took an internship at the International Centre for Integrated Assessment for Sustainable Development in Maastricht, where he later began his PhD project. The catalyst for his research career came in his practical studies on corporate responsibility and governance for sustainability in the Nordic mining sector, during his master thesis in 2013. Could one tell the difference between an organisation that was greenwashing for reputational and PR purposes, and those that were intrinsically motivated to adopt social and environmental responsibility? This question triggered him, both to take internships in this area, and eventually to begin the ICIS-Green Office PhD that this book elaborates on.