

The Regional Dilemma: report on how EU regions integrate RRI in territorial R&I Landscape Dissemination Level

Citation for published version (APA):

Moghadam-Saman, S., Coenen, L., Benneworth, P., Dijkstra, A. M., Wintjes, R., & Panori, A. (2020). *The Regional Dilemma: report on how EU regions integrate RRI in territorial R&I Landscape Dissemination Level*.

Document status and date:

Published: 01/01/2020

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

RRIZSCALE

Grant Agreement 872526

*Responsible Research and Innovation Ecosystems at Regional Scale
for Intelligent Cities, Transport and Energy*

D1.1: The Regional Dilemma: report on how EU regions integrate RRI in territorial R&I Landscape

Issued by:	Western Norway University of Applied Sciences (HVL)
Issue date:	30/09/2020
Due date:	30/09/2020
Work Package Leader:	Research and Innovation Management GmbH - RIM

Start date of project: 01 January 2020

Duration: 36 months

Document History		
Version	Date	Changes
1.0	30/09/2020	

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the EC Services)	
RE	Restricted to a group specified by the consortium (including the EC Services)	
CO	Confidential, only for members of the consortium (including the EC)	



MAIN AUTHORS

Name	Organisation
Saeed Moghadam-Saman, Lars M. A. Coenen, Paul Benneworth	HVL
Anne Dijkstra	UT
René Wintjes	UM
Natasha Panori	WR

QUALITY REVIEWERS

Name	Organisation
Katharina Fellnhofer	RIM
Chiara Buongiovanni	APRE

LEGAL NOTICE

The information and views set out in this report are those of the authors and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained therein.

© RRI2SCALE Consortium, 2020

Reproduction is authorised provided the source is acknowledged.



Table of Contents

1.	FRAMING RRI DISCUSSION AT THE REGIONAL SCALE.....	4
1.1	Introduction.....	4
1.2	The conceptualization of RRI and its regionalization	5
1.2.1	<i>The content of RRI</i>	<i>5</i>
1.2.2	<i>Regional development and regionality of RRI.....</i>	<i>7</i>
1.2.3	<i>Techno-moral scenarios as an example of regionally-applicable new RRI tools.....</i>	<i>9</i>
1.3	Regional innovation systems and strategies	10
1.3.1	<i>Regional innovation systems.....</i>	<i>10</i>
1.3.2	<i>Social control in the context of regional innovation strategy processes</i>	<i>10</i>
1.3.3	<i>Citizen participation in regional innovation strategy processes.....</i>	<i>11</i>
1.4	The societal-technical dilemma.....	12
1.5	Regional dilemmas	13
1.5.1	<i>RRI and entrepreneurial discovery processes.....</i>	<i>13</i>
1.5.2	<i>Inquiry areas to assess the current practice of RRI inclusion in regional developmental strategies</i>	<i>14</i>
2.	REVIEW OF THE CURRENT LANDSCAPE IN FOUR EUROPEAN REGIONS.....	15
2.1	Vestland, Norway	15
2.1.1	<i>Economic landscape of the region.....</i>	<i>15</i>
2.1.2	<i>Political governance at the region.....</i>	<i>4</i>
2.1.3	<i>Civic participation.....</i>	<i>3</i>
2.1.4	<i>Regional dilemmas.....</i>	<i>4</i>
2.2	Overijssel, The Netherlands	2
2.2.1	<i>Economic landscape of the region.....</i>	<i>2</i>
2.2.2	<i>Political governance at the region.....</i>	<i>5</i>
2.2.3	<i>Civic participation.....</i>	<i>3</i>
2.2.4	<i>Regional dilemmas.....</i>	<i>4</i>
2.3	Crete, Greece	2
2.3.1	<i>Economic landscape of the region.....</i>	<i>2</i>
2.3.2	<i>Political governance at the region.....</i>	<i>4</i>
2.3.3	<i>Civic participation.....</i>	<i>3</i>
2.3.4	<i>Regional dilemmas.....</i>	<i>4</i>
2.4	Galicia, Spain.....	2

2.4.1	<i>Economic landscape of the region</i>	2
2.4.2	<i>Political governance at the region</i>	4
2.4.3	<i>Civic participation</i>	3
2.4.4	<i>Regional dilemmas</i>	4
References for the section 1		2
Notes for the section 2.....		5

List of figures

Figure 1: Vestland county is one of Norway’s 11 counties (Source: Wikimedia Commons)	15
Figure 2: Photo is from Flåm, a village with 400 locals who receive as many as 10 000 visitors a day	Fehler! Textmarke nicht definiert.
Figure 3: Overijssel is one of The Netherlands’ 12 provinces (Source: Wikipedia)	2
Figure 4: Crete is one of Greece’s 13 administrative regions (Source: Wikipedia)	2
Figure 5: Galicia is one of Spain’s 17 Autonomous Communities (Source: Wikipedia)	2

List of tables

Table 1: Thematic areas of RRI literature (reproduced from Thapa, Iakovleva, and Foss, 2019)	7
Table 2: Priority areas of VRI program in Hordaland and Sogn og Fjordane counties	3
Table 3: Innovation support measures at the Overijssel region (reproduced from Scholten and Oxener, 2016)	3
Table 4: Innovation and regional development support measures at the Crete region	3
Table 5: Priority areas for the regional development of the Region of Galicia	3

1. Framing RRI discussion at the regional scale

1.1 Introduction

Since Responsible Research and Innovation (RRI) emerged mainly from the European Commission (Von Schomberg 2011), it can be argued that the concept has been designed and developed primarily in a policy rather than academic context. Specifically, since its implementation by the EC's Directorate-General for Research (DG Research) in 2014 as a cross-cutting action in the Horizon 2020 research and innovation programme, RRI has gained solid ground in EU policies. Notably, this has been manifested in many of the EC funded projects in recent years. At the same time, territorial development policies in Europe have mainly materialized through the instrument introduced by EC's Directorate-General for Regional and Urban Policy (DG Regio), namely that of Research and Innovation Strategies for Smart Specialisation (RIS3). While these two broad-based policy areas are being pursued in parallel, their potential for cross-fertilization has remained largely unaddressed (Fitjar, Benneworth, Asheim, 2019; Coenen and Morgan, 2020; Jakobsen, Fløysand, Overton, 2019; Uyarra, Ribeiro, Dale-Clough, 2019). The RRI2SCALE project aims at tackling this issue by embedding RRI as an element of the regional planning process. More specifically, RRI2SCALE focuses on three domains in a regional innovation context: intelligent cities, transport, energy. The selection of these domains has been purposeful, in that these are possibly the technologically determined domains that raise the most immediate concerns for citizens, which are inherently tied with their quality of life on a daily basis.

The notion of RRI emerged in the 2010s as the latest iteration of thinking concerning the challenge that the inherent uncertainty of innovation raises for exercising meaningful social control over that innovation. More specifically, the concern is a version of the Collingridge dilemma, in which by the time that citizens can understand the true ramifications of a technology for a society, then its parameters are so far determined that it becomes impossible for citizens to shape that technology to better meet their needs (Genus and Sterling, 2018). The precautionary principle for the introduction of new technologies reflects the same set of issues, but represents such a complete block to progress that it is reserved to only the most potentially impactful technologies (such as for genetically modified food).

Fitjar, Benneworth and Asheim (2019) trace back the introducing of societal considerations as governance norms into research and innovation policy to approaches such as Technology Assessment and Bioethics which were prominent in the 1980s. These approaches led to the establishment of the Ethical, Legal, and Social Implications (ELSI) framework around genetic and genomic research programs in the US in 1990 (Fitjar, Benneworth and Asheim, 2019). This was subsequently also reflected in the context of the 4th EU Framework Programme in 1994, when the Ethical, Legal and Social Aspects of Technology (ELSA) label was introduced for research funding concerning emerging sciences and technologies. This change of label from implications in ELSI to aspects in ELSA connotated a possibility for taking a more critical stance towards undesirable aspects of emerging technologies by involved researchers (Zwart, Landeweerd and van Rooij, 2014). The RRI perspective, then, complements the micro-level focus of research, innovation and knowledge production adopted in both ELSI and ELSA by incorporating meso- and macro-level studies of transformations and transitions, hence taking a broader socio-economic context into consideration (Zwart, Landeweerd and van Rooij, *ibid*).

Nevertheless, just like ELSA, the RRI framework attempts to steer between the powerlessness of the Collingridge dilemma and the progress-blocking of the precautionary principle. At the heart of RRI is a societal attuning mechanism, with researchers and stakeholders working in different ways to receive and pick up soft signals from society and incorporate them as early as possible into innovation processes. These “soft signals” are not easy to receive because of the Collingridge condition – until the technology is clear in its implications, it is hard to form a well-considered opinion of that technology that scientists and stakeholders can use to steer with. RRI places an emphasis on taking the time to hear various opinions, reflect on them, for the scientists and innovators to try to see the perspective of a range of users and other stakeholders, and then to include that in the scientific decision-making. Like all deliberative processes, the controlling condition is the quality of the reflection and consideration to be made, so RRI takes as long as is necessary to get the appropriate information to influence scientific decisions to attune R&I trajectories with societal wishes.

1.2 The conceptualization of RRI and its regionalization

1.2.1 The content of RRI

Reviewing the literature that has been conceptually defined and analyzed as RRI, Burget, Bardone and Pedaste (2017) found that the definition provided by Von Schomberg (2013) is the one most frequently referred to. He defines RRI as:

“a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society)” (Von Schomberg, 2013: 19).

In recent years, RRI has become increasingly addressed in academic literature (De Saille, 2015; Rip, 2014; Shelley-Egan et al., 2018). In fact, the number of publications on RRI took off specifically after 2013, when the account of published articles on the subject tripled in three years (Thapa, Iakovleva, and Foss, 2019). As mentioned above, the concept developed out of societal concerns for emerging technologies such as nanotechnology and implies changing roles and responsibilities for stakeholders and other actors involved in the technology development (cf. Rip, 2014). Despite that, Burget, Bardone and Pedaste (2017) argue that the concept is still in development.

Rip (2014, p.2) explored the position of RRI in what he terms “a historically evolving division of moral labour” as the roles and responsibilities of “actors and stakeholders in research and innovation” are articulated and developed. Accordingly, scientists can no longer leave it to others to consider social, ethical and political issues. It is clear that in an increasingly global context, scientists and citizens need to work together. Definitions of RRI emphasize the inclusion of all societal actors in the process of aligning research and innovation outcomes to the needs and expectations of society as shown in the definition given by Von Schomberg (2013). Hence, authors such as Shelley-Egan et al (2018) see RRI as a means of integrating society and research and innovation communities and they argue for studying the uptake of RRI in practice (see also Jakobsen et al., 2019).

The European Commission (EC) understands RRI as *“an inclusive approach to research and innovation, to ensure that societal actors work together during the whole research and innovation process. It aims to better align both the process and the outcomes of research and innovation, with*

the values, needs and expectations of European society” (European Commission, 2017). In practice that means, designing and implementing policy that will engage society in research and innovation developments; increase access to scientific results; ensure gender equality both in the research and innovation process and in the content; include the ethical dimension and promote formal and informal science education. These aims have been translated by the EU into six key areas where RRI can be put into action: governance, public engagement, open access, gender equality, ethics and science education.

A third, important and frequently used, definition of RRI is provided by Stilgoe et al (2013):

“Responsible innovation means taking care of the future through collective stewardship of science and innovation in the present”. According to Stilgoe et al (2013), RRI requires *anticipation, reflexivity, inclusion, and responsiveness*.

- Anticipation to prompt researchers and innovators to ask ‘What if?’ questions
- Reflexivity to hold a mirror up to one’s own activities, commitments and assumptions in the innovation process
- Inclusion of ‘new voices’ beyond the usual suspects in the innovation process, notably to include members of the wider public
- Responsiveness to changes in the shape and direction of innovation process that affect stakeholder and public values, as well as responsiveness to changing circumstances.

Together, the four dimensions contribute to “taking care of the future” (Stilgoe et al. 2013, 1570). Burget, Bardone and Pedaste (2017) proposed to add two further conceptual dimensions to these four, namely *sustainability* and *care*, and elaborate on them as new and emerging dimensions.

- Sustainability dimension deals chiefly with the resource-efficiency of techno-scientific innovations.
- Care dimension refers to a process by which the public domain is formed to perceive and act upon people’s high objectives.

All in all, these conceptual propositions mean that the intended and unintended impacts and consequences of research and innovation should be more thoroughly assessed. Researchers and innovators should explicitly reflect upon their research process, activities, and underlying assumptions.

The systematic literature review by Thapa, Iakovleva, and Foss (2019) identified four main thematic areas to categorize the conceptual academic papers published on RRI, including RRI drivers, RRI barriers, RRI tools, and RRI outcomes. The authors found out that among these four thematic areas, RRI tools have been most debated in the literature, followed by outcomes, and drivers. RRI barriers have received the least attention in the literature. Table 1 shows the topics discussed in the literature under each of these four broader thematic areas.

While sympathetic to the normative and ethical ideals of RRI, Coenen and Morgan (2020) argue that the trope of RRI remains limited in two ways. First, it primarily targets the design and framing of research and innovation processes and programmes but overlooks its implementation. RRI remains surprisingly silent about the capabilities and institutions needed to make it happen. Second, it tends to ‘black box’ those who are supposed to constitute the wider public and the new voices. They thus argue that despite its thoughtful guidelines, RRI remains a blanket approach, akin to a one-size-fits-all framework that is in need of grounding its global procedures to local circumstances.

1.2.2 *Regional development and regionality of RRI*

Societal relevance has drawn most attention about a decade ago as grand global societal challenges, such as climate change and inequality, and both the problems and solutions were mostly seen as global challenges that called for global governance. However, by now many studies have emphasised that both in terms of concrete problems and solutions the situation differs among regions, so one-size-fits-all solutions are not considered appropriate.

Global, EU and national policy makers operate in policy-field-silo's, and every ministry has different target-indicators to stress the specific purpose or impact they have in mind from research and innovation (e.g. publications for scientific excellence, business R&D investments for economic competitiveness). However, at regional level and in regional development strategies the relevant policy fields and purposes of innovation (e.g. profit, planet, people) come and work together as a more holistic package. In smart specialization strategies, techno-economic challenges are for instance often linked to specific regional societal challenges concerning energy, healthy aging, climate change.

Thapa, Iakovleva, and Foss (2019) conclude from their review of the RRI tools discussed in the RRI literature that despite those tools present different risk assessment approaches, but they fall short in articulating clear strategies for engagement of stakeholders and the general public. This is where, according to these authors, regional innovation studies can complement RRI.

A more elaborated approach for integrating RRI with regional innovation strategies is presented recently by Fitjar, Benneworth, and Asheim (2019). In their proposed unifying framework, the authors build on the six stages of the smart specialization process as identified in the EU's RIS3 Guide (Foray et al. 2012), and discuss how each of the four dimensions of RRI, as identified by Stilgoe et al. (2013) could be used to improve the responsibility of the process at each of those S3 stages. Hence a 6*4 matrix is presented in which anticipation, reflexivity, inclusion, and responsiveness are applied to each of the RIS3 stages, i.e. analysis, governance, vision, prioritisation, policy mix, and monitoring. Accordingly, the authors argue that the lack of attention to geography in RRI can be compensated by the embeddedness of RIS3 policies in regional processes, whereas the lack of attention to broader societal interests, which is manifest in RIS3, can be compensated by RRI policies' emphasis on innovators' responsibility to stakeholders. Nevertheless, the authors acknowledge that application of their proposed unifying framework would be subject to ordinary political and democratic processes in each region, and that further work is needed for identification of the ways in which regional RRI practices emerge (or do not) in different places.

Table 1: Thematic areas of RRI literature (reproduced from Thapa, Iakovleva, and Foss, 2019)

RRI drivers	RRI barriers	RRI tools	RRI outcomes
Pre-engagement	Principle-based decision-making	Walkshop approach	Lifecycle thinking
Public engagement	Asymmetrical power distribution	Engagement workshop	Attitude of prudence
Stakeholder engagement	Moral pluralism	Online platform/ Online knowledge sharing	Responsible attitude
Upstream engagement	Conflicting interests	Comprehensive and acceptability analysis	Goal oriented responsibility
Civil society engagement	Over inclusiveness	Social experimentation	Responsiveness
Transdisciplinary	Multiple values	Foresight	Alignment and harmony
	Level of perceived responsibility	Hermeneutic	Mutual understanding and respect
	Volitional evolution	Anticipation of risk	Trust
		Technology assessment	Sustainability impact
		Informed consent	Shared responsibility
		Governance (by experimentation)	Glocal sustainability
		Participatory appraisal	Consensus
		Socio-technical integration	Co-creation
		Design strategy	Quality of life
		Action research	Social progress
			Integrity
			Care

1.2.3 *Techno-moral scenarios as an example of regionally-applicable new RRI tools*

The fact that RRI has not been much discussed with respect to its applicability at the level of regional innovation and development implies that its arsenal of tools can also expand by adding some tools which are more fit for implementation at the level of regional stakeholders.

Techno-moral scenarios can be used as a tool to stimulate imagination, reflection, debate, education, and public engagement. Techno-moral scenarios highlight ‘soft’ impacts (Swierstra et al. 2009; Boenink et al. 2010). Techno-moral scenarios invite audiences to imagine and appraise ways in which technologies might change ideas, values and ideals. Techno-moral scenarios are useful for exploring and clarifying underlying reasons, beliefs, values and concerns of new technologies, and thereby, informing public debates about these technologies.

Reasons for exploring this techno-moral change, according to Swierstra et al. (2009) are the following. First, it is important to explore the emotions and controversies that technologies may bring. Second, they can deepen discussions about the desirability in future societies, so they embed social and moral contexts, and third, techno-moral change itself is part of modern society and thus techno-moral scenarios “provide citizens with valuable training to accept, and learn to deal with, this important feature of their existence” (p. 121).

According to the authors a techno-moral scenario can be constructed as a narrative with four stages. In the first stage – the status quo – the current state or discourse regarding the technology is described with existing moral routines in the area of the technology. In the second stage – novelty – what arguments proponents and opponents of the new technology will use for or against the technology are described in an imaginative way. The writer’s imagination is used for doing so. In the third stage – conflict – one or more elements of conflict are introduced. Finally, in the final stage – closure – possible outcomes are described. In this stage, the plausibility of the outcomes is not the first concern, however, all scenarios have to be plausible to a certain extent (Swierstra et al., 2009).

In all, if technological development will be guided in beneficial directions, the authors argue that moral change will highly likely happen at the same time. Scenarios are therefore a good way of exploring possible changes, they enhance moral learning. And, moral learning invites reflection, (self) criticism, dialogue and open exchange of ideas.

In addition, it is interesting to refer to Arnaldi (2018) who described, in detail, how ‘adapted’ techno-moral scenarios may specifically address the element of ‘responsibility’. In the article, the approach for doing so is described – this specifically, allows to include the public and other stakeholders in the creation of the scenarios and not only in discussions. A step-wise approach is given: 1) sketching the landscape; 2) generating controversies; 3) closure and responsibility regime – upon which four possible scenarios can be generated each focusing on other responsibilities related to fault, risk, safety and RRI.

1.3 Regional innovation systems and strategies

As Coenen et al. (2017) outline, the Regional Innovation Systems (RIS) approach has been developed in close interaction with policymaking and used widely as a framework for the design, implementation and evaluation of innovation-based regional policies in a variety of countries and regions. Well-known examples are the European Commission-funded RIS/RITTS initiatives (Landabaso and Mouton 2002), regional policies of VINNOVA, Sweden's Governmental Innovation System Agency (Coenen and Moodysson 2009) and the Norwegian VRI programme (Policies for Regional R&D and Innovation) funded by the Norwegian Research Council (Asheim 2012).

The most recent review of scholarly investigations of the RIS identified four clusters in the literature on the RIS approach: regional knowledge systems; regional institutional systems; regional research and development systems; and regional network systems (Fernandes et al., 2020). This finding in itself points to the research field's potential for further growth through exploring the interrelations between e.g. regional knowledge systems and regional institutional systems, with a potential for exploitation by RRI oriented strategies.

1.3.1 Regional innovation systems

The concept of regional innovation systems (RIS) which has been in use for nearly three decades now, has been argued to aid in more efficient and effective managing of national innovation systems through its potential for nurturing different sector-based innovation systems in different regions (Chung, 2002). Considering the work by Cooke (1992) as the inception of debating RIS, it is evident that the concept of regulation was seen, from the origin of the construct, as a tool for proactive support of industry in keeping competitiveness through rapid institutional reactions. Further attempts in explaining the social and institutional conditions of competitiveness at the regional scale have resulted in the emergence of concepts like 'industrial district' (Becatinni, 1992), 'learning region' (Morgan, 1997; Florida, 1995), and 'innovative milieu' (Crevoisier, 2004; Maillat, 1998).

The core argument of RIS is that "firm-specific competencies and learning processes can lead to regional competitive advantages if they are based on localized capabilities such as specialized resources, skills, institutions and share of common social and cultural values" (Maskell and Malmberg, 1999, cited by Doloreux and Parto, 2004). Hence, it is arguable that RIS literature is not in contradiction to the RRI perspective, and is in fact particularly useful to combine research excellence and societal relevance at the regional level.

However, in the past the innovation systems framework was mostly applied in a techno-economic paradigm, emphasizing the importance of science for technological change and economic purposes (e.g. Lundval referred to economically useful knowledge), limiting the interactions in focus to those between universities and firms, and many have returned to a linear view e.g. by focussing on spin-offs from universities, and hence, not representing a quadruple helix inclusion yet.

1.3.2 Social control in the context of regional innovation strategy processes

A key issue arises for RRI2SCALE precisely because the majority of regional innovation strategy making takes place within extremely time-constrained environments, and is driven with the end goal of producing a strategy within a particular time frame. It is instructive to go back to the very first Regional Technology Plans produced in the late 1980s as part of an experimental European programme, in 11 European regions. The RTP programme involved mapping the supply and demand of technology in a region, and preparing strategies to help better bridge between that supply and

demand, what Cooke (2005) would later distinguish between the knowledge producers such as universities and laboratories, and the knowledge exploiters such as innovative businesses and public sector/ civil society innovators. Gathering information about supply and demand was an incredibly demanding process because the value of knowledge is extremely uncertain and it is hard to know what kind of knowledge is held in a particular activity.

As the RTP approach became expanded through a range of larger programmes (RIS, RITTS and RISI, reflecting more a turf war between European directorates than any real material difference in focus), a standard approach emerged for developing regional innovation strategies (OECD, 2011). In this process, regions would undertake a first mapping exercise, then consult with key regional stakeholders, then undertake a peer learning exercise internationally, produce a first draft, consult again locally and then finalise the strategy. The basis for participation in these processes tended to be reserved to those actors who were clearly active in regional innovation, knowledge producers, knowledge exploiters and those involved in technology bridging activities (such as regional technology centres). Even where citizens were potentially involved in strategies, they tended to have weaker voices than those who were actively involved in technology development and innovation, who would serve as beneficiaries; citizens' involvement in the resulting programmes tended to be restricted to public information activities and engagement with schools.

A second change in the scope of the regional innovation strategies came as a result of increasing economic pressure, firstly as a result of policy concerns regarding declining European competitiveness (the Lisbon Agenda) and then as a result of the Global Financial Crisis. This increased the pressure on policy-makers to prioritise economic growth and job creation, and innovation became entangled in this broader economic pressure. Although there was an acknowledgement that social inclusion and sustainable development were long term policy priorities, the crisis necessitated that the focus on innovation and research had to be on creating economic growth. All innovation policies were therefore confronted with the question of how they would contribute to economic growth, and this became visible in the way that new policies were developed.

1.3.3 Citizen participation in regional innovation strategy processes

Until recently, despite the efforts being made by regional authorities to actively and effectively engage citizens throughout their RIS3 strategy design, citizens participation has proven to be very low. This might be due to several reasons.

First, citizens might have not been trained to understand strategy design processes not because they are not able to understand, but because they were not involved from the beginning at that type of activities.

Second, citizens might not be able to grasp the regional perspective of policy design, given that they are not getting enough information about the vision of their region, and the fact that they were not part of the regional vision definition.

Third, regional authorities might not have found effective ways to engage stakeholders, not in terms of activities, but mostly in terms of communication of their expectations, overall mission, and role of citizens in this process.

A systems approach will indicate that there is no one single actor in any system who can arrive at a good understanding of the future, the innovator, the firm, the citizen nor the city, and so there is a need to make sense of and shape the future together in these systems. Each group of actors in this

regional system may need a different methodological approach to be actively involved, not only in terms of increased willingness to join, but also in terms of getting a thorough understanding of the problem and think of potential drawbacks and solutions.

Although significant process has been made in methodological terms to involve businesses throughout RIS design, using continuous *entrepreneurial discovery process* (EDP), we are still missing a similar methodological framework to systematically involve citizens. Instead of having fragmented inputs coming from citizens it is essential to engage them in a way that their inputs make sense and are part of a broader methodological process.

1.4 The societal-technical dilemma

Recognition and political discussion of a dilemmalike situation between technical progress and human welfare dates back at least to the formulation of *sociotechnical systems* in 1950s. This was primarily a new approach to work organizations, trying to find a solution for the *joint optimization* of the social and technical systems involved in those organizations (Trist, 1981). It was consequently realized that socio-technical studies need to consider three broad and interrelated levels, including primary work systems (at the level of subsystems in an organization), whole organization systems (including entities such as plants, corporations and public agencies), and macrosocial systems (such as industrial sectors, or infrastructures of the built environment). Emery and Trist (1960) used the term socio-technical systems to refer to any of such systems involving interaction between humans, machines, and the environmental aspects of work systems. The goal of such a system would be to avoid suboptimal functioning of the overall socio-technical system due to unilateral optimization of the technical or social subsystem.

In parallel to these theoretical developments, the studies of research and innovation as a policymaking field also took off more explicitly since the late 1950s with initial concentration on the firm level. This field, better known now as *innovation studies*, also later expanded with more concentration on the interorganizational linkages, an evolution which can be referred to as the move from “for company” models to “for economy” models (Meissner and Kotsemir, 2016). These broader models with focus on interorganizational aspects of research and innovation came to be known as *innovation system* models and have analysed framework conditions at different macrosocial levels such as national, regional, or sectoral level.

Arguing that innovation systems models often neglect the user side of innovation, scholars such as Geels (2004) have advocated for seeing and analysing innovation systems as socio-technical systems. Geels further argued that adopting the framework of socio-technical systems allows to establish a link between innovation studies and cultural studies, the latter being a crucial aspect in understanding the demand side of innovations in terms of their adoption in various markets. He then distinguishes between three types of rules (institutions) which are used for the purpose of coordination between the actors within socio-technical systems, namely regulative, normative, and cognitive rules. The regulative rules encompass formal laws and governance systems with legal legitimacy. The normative rules, then, refer to values duties and authority systems with moral legitimacy. Cognitive rules include beliefs, jargons of language, and knowledge paradigms with cultural legitimacy.

This advantage of socio-technical systems is also emphasized by Coenen and López (2010) where they systematically compare sectoral systems of innovation, technological innovation systems, and socio-technical systems. The authors base their comparison of these three highly influential systems

approaches to innovation on five analytical dimensions, namely system boundaries, actors and networks, institutions, knowledge, and dynamics. The authors argue that a coherent and consistent approach towards institutional frameworks is somewhat of a weak spot in SSI and TIS analyses. This is because the focus often goes to the impact of single institutions analysed in an ad-hoc way, and therefore “the influence of institutions on sectoral and technological innovation systems can be regarded as contextual rather than structural. Those institutions that are often pointed out mainly belong to the regulative and cognitive domains: codes, standards and regulation for products and technologies. In comparison normative institutions receive less attention.” (Coenen and López, 2010: 16). Socio-technical systems approach is but perceived as free from such a shortcoming due to its broad approach to institutions (covering regulative, normative and cognitive rules).

It can be said that the RRI2SCALE project aims at comprehending whether and how the research and innovation systems at the level of regions in European countries are – and can be - governed in a way that meets the implications stemming from the above-mentioned three different types of rules (institutions) within the context of those regions. More specifically, it is aimed to assess such governance structures (or *policy regimes*, to use Geels’ terminology) around innovations in three large technical systems (LTS) in those regions, namely those of transport, energy infrastructure, and smart cities. In order to do that, and before proceeding to a mapping of the current landscape in four exemplary regions, and after having elaborated on two key constructs, namely responsible research and innovation and regional innovation strategies, we elaborate on the third key construct, i.e. regional dilemmas (which point to the necessity of integrating the former two constructs).

1.5 Regional dilemmas

1.5.1 RRI and entrepreneurial discovery processes

The policy pressures stemming from the need for improving the competitiveness of European economies as well as the one from the Global Financial Crisis (GFC) profoundly affected the development of what was intended to be a new approach to innovation policy, the creation of smart specialisation strategies using an entrepreneurial discovery process. In 2007, many European regions had created innovation strategies but tended to take a sectoral focus on sectors with perceived high growth potential, something which as a general economic characteristic led many regions to choose a selection of a limited number of sectors (ICTs, nanotech, renewable energy, biotech). The EDP approach sought to bring together a wide range of knowledge actors in a region, and to encourage them to think creatively about what existing resources they had and how they could be creatively combined into new fields that would be unique to the region, a process of “smart specialisation”, in which regions would develop strategies to support regionally unique sectors to develop innovation capacity. The intention was that these smart specialisation strategies from 2014 would therefore represent unique territorial innovation capacities that would strengthen Europe as a whole.

However, in its implementation these two pressures combined and had a very exclusionary effect on the capacity for genuine reflection in the formulation of regional innovation policies. The response to the GFC saw the Commission take a tightly controlling role over the programmes for 2014, and made having an smart specialisation strategy in place an *ex ante* condition for the receipt of European structural funds. This created an incredible time pressure on creating something that would be acceptable, and reduced any possibility in the regions for genuinely wide-scale consultations and reflections to shape those innovation strategies. The best that was achievable was

that existing partners would undertake some kind of EDP and identify future promising strategies. The time pressure and the importance of delivering something acceptable effectively squeezed out any potential for meaningful citizen participation in these strategies

The fundamental point here is that whilst it is possible to include citizen voices in regional innovation strategy discussions, in practice it is very difficult to achieve engagement in a meaningful way. It is not simply enough to argue that there is a need to switch from a triple helix of industry, universities and government to a quadruple helix also involving civil society partners (Caryannis & Campbell, 2009). Involving civil society partners is extremely difficult because they are a diffuse partner – a company can be said to have a single set of interests, and it may be able to have an employee represent those interests at a strategy planning session. Likewise, government and universities have mechanisms for articulating those interests (even if the idea that universities as diffuse knowledge communities genuinely have singular institutional interests is something under increasing criticism). There may be some civil society organisations (NGOs) that are big enough (and have enough resources) to participate (in a structural way) in formal representation activities, but these are often organised around issues and do not reflect the range of opinions and values necessary to meaningfully shape innovation strategies.

So, citizens are not often listened to in discussions around innovation strategies that can ultimately lead to developments that people disagree with. We are now starting to see widescale public opposition to the introduction of particular kinds of renewable energy solutions, choices that make sense from a rational economic decision-making logic, but which fail to take into account human needs, and the fact that human values and norms do show local variation. We can foresee that the widespread introduction of robots into elderly care provision is likewise an consequence of promoting innovation in *domotica* without being able to reflect on what people think about the experience of elderly health care. Regional strategy processes are well-meaning but it is very difficult to allow them the space to receive, process and reflect on these varied and weak citizen signals.

1.5.2 Inquiry areas to assess the current practice of RRI inclusion in regional developmental strategies

In order to dig into the governance structures and practices at the regional level which have the potential for reflecting upon the (weak) citizen signals and institutional (i.e. rules-, norms-, and values-related) implications for research and innovation activities, we aim to approach the following inquiry areas:

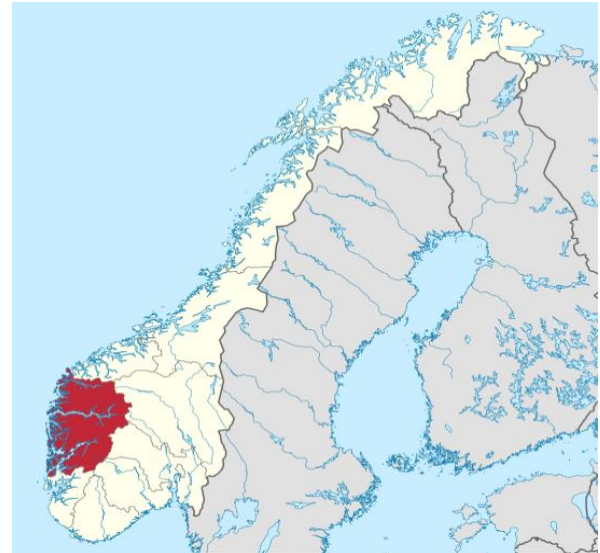
- 1) how regional authorities deal with RRI in territorial policy, research and innovation design;
- 2) what are the technology assessment networks in place that shape innovation trajectories and ensure RRI;
- 3) the entrepreneurial discovery networks and regional innovation coalitions that produce regional innovation strategies;
- 4) the governance mechanisms used to monitor technologies already implemented in the regional contexts to drive economic development and if and how weak societal signals are identified and used; and
- 5) the extent each region addresses MoRRI indicators, i.e. the six key areas where RRI can be put into action: governance, public engagement, open access, gender equality, ethics and science education.

2. Review of the current landscape in four European regions

2.1 Vestland, Norway

Vestland county is located in the western coast of Norway (see Figure 1) and was created in January 2020 when the two former counties of Hordaland and Sogn og Fjordane merged. The merger was a result of the Norwegian government's decision in 2017, based on which the number of counties in Norway was reduced from 19 to 11 as of the beginning of the year 2020. The Vestland County's total population exceeds 636,000ⁱ which makes it the third most populated county in the country, inhabiting close to 12% of the country's population. The Vestland County's administrative centre and the largest municipality is Bergen, which is the second most populated city in Norway, having about 284,000 inhabitantsⁱⁱ.

Figure 1: Vestland county is one of Norway's 11 counties (Source: Wikimedia Commons)



2.1.1 Economic landscape of the region

Historically, the economy of communities in the west coast of Norway has been mainly reliant on fishing and foreign trade, and the industries serving this sector (e.g. shipbuilding). The city of Bergen has been playing specially a prominent role, exemplified by its involvement in the Hanseatic League of commercial towns in Europe until the mid-eighteenth century. As a consequent, maritime services have also been traditionally a key sector for the economy of this region. During the last fifty years, however, the economic history of Norway in general and western counties of Norway in particular has been largely impacted by the establishment and development of petroleum industry and the industries serving this sector.

As of the year 2019, the main employment business sectors in the regions have been the followingsⁱⁱⁱ:

- health and social services (with more than 69,000 workers);
- wholesale and retail trade, and repair of motor vehicles (with more than 36,000 workers);
- manufacturing industry (with more than 28,000 workers);
- education (with more than 28,000 workers);
- construction (with more than 28,000 workers);
- technical services and real estate management (with more than 19,000 workers).

In terms of value added, however, the manufacturing industry and construction sectors follow the health and social care sector as the biggest contributors to the region's economy in 2018^{iv}. If taken by the contribution to exports from the region, then, the main commodities in 2019 included the fuel substances (with more than 43 billion NOK) and fish (with close to 18 billion NOK)^v.

As the greening of the economy is a priority for the region, and given the ramifications of the oil price crash in 2014, diversification of the economy has become a top concern for the region's economy. This has pushed innovation up in the agenda of policymakers, which is also reflected in the County Council's mandate and committees (see the next section on political governance at the region). The innovation performance of the region has improved during the last decade according to the Regional Innovation Scoreboard 2019^{vi}. The Scoreboard categorizes Vestland County as a *Strong + Innovator*, highlighting the region's strong performance in 'innovative SMEs collaborating' and 'lifelong learning' compared to the other regions in EU, and its strength in 'design applications' compared to the other regions in Norway.

Regional Innovation Policy and Strategy

This section aims to identify the main stakeholders in developing the innovation policy / strategy in the region and the entities targeted by those policy / strategy, thereby uncovering the *entrepreneurial discovery networks* and regional innovation coalitions. Also it is aimed to assess whether such policy / strategy is defined within a "narrow" growth / competitiveness paradigm or has broader scope.

Norway has had a 'cluster program' (Norwegian Innovation Clusters) since 2002 when Arena program was implemented at the national level. The objective of this program has been to strengthen the capability of regional business environments for innovation and value creation through a stronger and more dynamic interaction between business actors, knowledge providers (R&D and education) and the public sector. In 2006, the program Norwegian Centres of Expertise (NCE) was established based on cluster theory with the aim of strengthening the industrial clusters through public intervention. As of 2014, the program Global Centers of Expertise (GCE) has also been implemented. In 2019, the program Arena Pro was also established to meet the desire for changes in the cluster program, as well as suggestions for improvements that emerged in an evaluation of the program made in 2017. Arena is a three-year program, Arena Pro is a five-year program and GCE is a 10-year program. NCE was also a 10-year program, but it is currently no longer a program, but a brand name that clusters can qualify for.

In the Vestland region (and the two former regions of Hordaland and Sogn og Fjordane that now constitute Vestland) under the Arena program, two clusters are formed around hydrogen technology and ocean technology (maritime pollution and waste). Under the NCE program, four clusters are formed around energy efficiency in maritime activities, seafood innovation, fintech, and media (visualization technology). And under the GCE program, a cluster has been formed around innovative ocean technologies. Except the Arena-funded cluster on ocean technology (located in the north of the county) and NCE-funded cluster on energy efficient maritime activities (located in the south of the county), the rest of the clusters are based in Bergen^{vii}.

Furthermore, two regional policy initiatives in Norway are deemed as providing a background for the implementation of smart specialisation strategies^{viii}. These include the Tools for Regional R&D and Innovation (VRI) and the Program on Research-based Regional Innovation (FORREGION). The initial timeframe of the VRI initiative was ten years (2007- 2017). VRI program aimed at giving regions more autonomy in designing targeted innovation policy mixes. The FORREGION program builds on and further expands the framework developed by the VRI program, and the timeframe of this program is 2017- 2026. Since 2007, the year Norwegian regions have worked systematically with VRI and FORREGION programs, the two former counties of Hordaland and Sogn og Fjordane also identified a number of prioritised areas for research and innovation. Nevertheless, changes have

also taken place based on the continuous evaluation of the priorities and achievements. Table 2 shows the two regions' identified priority areas during the implementation of the VRI program, and their follow up program MobiFORSK (the themes shown in *italics* are transversal themes)^{ix}.

Table 2: Priority areas of VRI program in Hordaland and Sogn og Fjordane counties

Hordaland				Sogn og Fjordane			
VRI 1 (2007-2010)	VRI 2 (2011-2013)	VRI 3 (2014-2016)	MobiFOR SK* (2017-2019)	VRI 1 (2007-2010)	VRI 2 (2011-2013)	VRI 3 (2014-2016)	MobiFO RSK (2017-2019)
Tourism	Industries prioritized in regional research strategy	Industries prioritized in regional research strategy	Sustainable growth within the bioeconomy	Tourism	Marine industries	Tourism	Tourism
Marine industries	Emerging / immature clusters that could developed using R&D / VRI	Emerging / immature clusters that could developed using R&D / VRI	Technology development through cross-industry connections	Marine industries	Renewable energy	Food industry	Seafood industry
Maritime industries		Companies where one can make a difference, also outside the focus area	<i>Competence mediation</i>	Renewable energy	<i>Industry-independent competence brokerage</i>	Energy	Energy
Energy		<i>Transfer of knowledge and tech. between business areas</i>	<i>Dialogue meeting</i>	<i>Change management</i>		ICT technology	Renewable energy
<i>Business-oriented competence</i>			<i>Mobility</i>			<i>Mobility</i>	Sustainable agriculture
<i>Entrepreneurship</i>							ICT technology
<i>Innovation and internationalization</i>							<i>Mobility</i>

* MobilFORSK is the continuation of VRI program within the frameworks of FORREGION program

In the year 2020 after the merger of the two counties, the MobiFORSK program has continued at the level of Vestland county. MobiFORSK is one of the pillars of FORREGION program which is considered as the continuation of VRI program.

Sörvik and Midtkandal (2016)^x compared VRI program with the RIS3 in terms of the priority setting processes and the respective governance mechanisms. In case of the VRI, as they explain, the governance relies on regional partnerships in the form of “triple helix consortia consisting of the county authorities, the regional innovation agency, business associations, labour unions, research institutions, higher education institutions, and other relevant actors, e.g. regional level state representatives” (p. 163). The contractual partner with the Research Council of Norway, however, is the county authority. These Partnerships set up a steering committee with the task of designing and directing the regional VRI program. Hence, these steering committees are central in the selection of the region’s priority areas, which have had to be reviewed every three years.

Pointing to the similarities and differences between the priority selection process within VRI program and that of RIS3, Sörvik and Midtkandal (*ibid*) conclude that the growth of agglomerations for sake of enhancing spill-over effects and developing of new lead markets, which is central to the *entrepreneurial discovery process* (EDP) in the RIS3, is not articulated equally strong within the VRI program. Nevertheless, the case of VRI in Hordaland clearly shows an evolution towards such a spill-over-oriented approach, as we move from the first VRI towards the last one (MobiFORSK). This is specifically manifest in the MobiFORSK priorities which emphasize cross-industry connections, and shift towards bioeconomy which benefits several of the sectors within the region. Within the VRI program of Sogn og Fjordane, however, adoption of such an approach is less visible as the priority sectors have mostly persisted over the consecutive cycles.

2.1.2 Political governance at the region

Public voters elect representatives to the county and municipal councils in Norway according to the country’s Representation of the People Act. The election period for the municipal council and the county council is four years, and are held midway through a four-year Parliament (Stortinget) period. The mandates of Vestland County Council are in the areas of^{xi}:

- upper secondary education, adult education;
- culture, tourism, arts, sports and outdoor activities;
- dental care;
- county roads and public transport;
- environmental issues;
- business planning, regional development and innovation.

The council in Vestland is divided into five standing committees and an executive board. The standing committees include 1) Infrastructure and roads, 2) Transport and mobility, 3) Economic development, natural resources and innovation, 4) Education and skills, and 5) Culture, sports and inclusion. Each of these committees are headed by a ‘Regional Director’ (Fylkesdirektør) and divided into sections dedicated to individual activity areas of the committee.

Vestland County Council is made of 65 elected members, and after the last local elections held in Norway in September 2019, the following parties gained the highest number of members in the county council: Labour Party (14 members), Conservative Party (12 members), and Centre Party (10 members). The governing coalition is formed by the Centre party, the Green party, the Christian democrats, the Labour party, the Socialist left party and the Left party. The Centre party has the county mayor while the vice mayor is from the Green party. Their political platform underlines a decentralised region. Other priorities for economic development of the region include^{xii} supporting research, innovation and clusters; using skills from petroleum industry to facilitate the greening of the economy; emission free energy resources; natural resources (forestry and hydroelectric power); fisheries, aquaculture and marine sector; locally produced food and agriculture; fiber for all; new technologies' leading role; and the county council's role in public procurement.

Strategic plans and policies on smart city, energy and transport

In order to inquire on the presence of technology assessment networks that shape innovation trajectories and ensure RRI, or more generally, on the governance mechanisms used to monitor technologies already implemented in the regional contexts to drive economic development, we focus on the three specific areas of smart city, energy and transport.

The Vestland County's proposal for the region's development plan 2020-2024^{xiii} has set the vision of "innovative and sustainable" county as its vision for the region, and points to ten challenges for the region. These challenges include climate change; balanced land- and natural resource use; good transport connection and smart mobility; green competitiveness; digitalization of society; relevant competence and knowledge; attractive places and good local environment; an innovative, professional and voluntary cultural life; an equal society; and youth wellbeing and belonging.

Accordingly, the proposal of the development plan points to the need for regional plans in a dozen areas, including need for a *regional transport plan* and *regional plan for power generation*. While there is no explicit referral to a plan for smart cities or smart region, under the title of the *regional plan for innovation and business development*, the document mentions a need for developing "a platform for holistic collaboration on innovation and smart and sustainable cities and communities" (p. 33).

Nevertheless, the development plan proposal points to a number of existing regional plans implementation of which need to be continued, including those related to wind power, small power plants, transport plan for Bergen area, and transport plan for Haugalandet (the southernmost coastal region in the county). When it comes to the existing regional transport plan of the county, however, the document proposes it to be revised, a suggestion which it makes also regarding the existing regional plan for innovation and business development^{xiv}.

The regional plans are defined in a participatory mode, an approach which has been used by the Vestland County Council for long time. Networks and partnerships are normally organized in forums dedicated to different policy areas, such as education, business development, transport, etc. These forums are led and financed by the County Council but all participants take part in shaping the mandate, tasks and the strategic direction.

While the issue of smart cities is less clearly addressed at the County level, at the municipal level, even though Bergen Municipality does not have its own "smart city strategy", but it has been specifically engaged in efforts aiming at transforming the city into an *energy-smart city*. This has included participation in "Cities of the Future" (Framtidens Byer) initiative which was a collaboration

between the Norwegian state and 13 largest cities and towns in Norway in the years 2008 – 2014, with the aim of reducing greenhouse gas emissions. The most important effect appears to be the establishment of several successful networks between not only the 13 cities but also essential actors such as industry, NGOs, and academia.

Also when in 2015 Bergen Municipality adopted a strategic plan for 2030^{xv}, it emphasized transition towards a “climate-smart” society. Since 2016, Bergen city has been one of the cities participating in the Norwegian Smart Cities network, which is a platform for sharing ideas and best practices on smart city solutions in Norway. In 2019 a *national roadmap for smart and sustainable cities and communities in Norway*^{xvi} was launched, which is also used by Bergen Municipality as a guidebook. The Roadmap emphasizes, in its definition of smart city, on the centrality of people, stating that “smart cities and communities focus on people, while using new technology, innovative methods, collaboration and co-creation to become more sustainable, attractive, productive and resilient.” (p. 4). Accordingly, the Roadmap indicates eight principles for smart cities in Norway to help local and regional authorities in prioritising focal areas and direction for their smart city initiatives; 1) place people in the centre, 2) consider the bigger picture, 3) prioritise climate and environment, 4) promote inclusion and co-creation, 5) focus on next generation business, 6) share and use open data, 7) develop competencies and embrace change, and 8) act local, think global.

2.1.3 Civic participation

Norway is considered as a leading country in the league of democratically governed countries. Democracy Index^{xvii} has ranked Norway as the country with highest quality of democracy in the world for several years. The voter turnout at the last municipal and county council elections was 64.8%. This figure shows an increase of 4.8 percentage points in participation compared to the previous local elections in 2015. Citizen’s interaction with public governance in Norway is generally considered as being high, and political initiatives are often made available for public consultation. A study by Neira et al. (2010)^{xviii} using data from four of European Social Survey rounds showed that Norwegian regions stand out among the European regions in terms of citizens’ active membership in political or other action groups, indicating a high level of social capital in the Norwegian regions.

The level of trust in governing authorities in Norway is known to be high, and the openness of political forums and processes have largely fuelled this level of trust. The Norwegian Ministry of Local Government and Modernization launched in the year 2014 a national guide for public participation in regional planning^{xix}. It encompasses principles and recommendations for facilitating public participation, and envisages 70 expedient methods and techniques for that purpose.

In the Vestland county, the committee meetings are open to the attendance of citizens. The county council’s primary point of contact are municipalities, while in some specific areas like tourism, interaction with trade unions are more common. The level of administrative freedom is high in Vestland.

The level of interaction between citizens and universities has been increasing during the last decade. For instance, since the year 2013, in a collaboration between the University of Bergen and NORCE Norwegian Research Centre (formerly, UNI Rokkan Centre), The Norwegian Citizen Panel runs three times per year in the form of a web-based survey to inquire on Norwegians’ opinions toward important societal matters. The Panel particularly examines the citizens’ opinions in the following six areas; 1) Basic research on political behavior and democracy, 2) Climate and

environment, 3) Migration, extremism and diversity, 4) Public health, 5) Political Communication and 6) Territorial democracy and reforms.

RRI in territorial policy, research and innovation design

In order to gain an understanding on how the regional authorities deal with RRI in territorial policy, research and innovation design, we investigate whether there is any formal reference in the regional innovation strategy to responsible innovation and / or citizen engagement. The practice of developing the regional innovation strategies, as manifested in VRI and MobiFORSK programs, clearly represent a triple helix collaboration between the academic, business, and public sectors. There is no explicit referral to the involvement of civic society in the development, implementation or appraisal of these programs. Nevertheless, moving from the region’s priority areas to the municipal level, one can notice involvement of civic society organizations in the dialogues related to the development of smart city activities. Accordingly, it can be hypothesized that the current state of affairs are more prone to the consolidation of RRI practices at the municipal level rather than the regional level.

2.1.4 Regional dilemmas

Despite the openness of Norwegian society and the highly participatory mode of governance in the country, controversial issues have emerged in the political landscape of the Vestland county mainly due to the citizen’s concerns about the natural resources and environmental aspects, as well as some aspects related to the living standards.

While tourism is seen as one of the industries for the diversification of the country’s economy, a perception among the public about ‘over-tourism’ has been growing, so much so that “people pollution” became a topic in the 2019 local elections for the first time. This is a crucial political topic for the county as

around 70% of Norway’s cruise traffic calls at ports in Vestland.



Figure 2: Photo is from Flåm, a village with 400 locals who receive as many as 10 000 visitors a day

This issue becomes further challenging when considering that it is estimated that the number of cruise tourists to Western Norway will increase by about 50% until the year 2040^{xx}. Furthermore,

concerns have been raised regarding the emissions from cruise ships while these are at the quay, as this causes both air and water pollution. In 2016 the four county councils in Western Norway adopted a joint cruise strategy for the region, «Cruise strategy for the Western Norway region 2016-2020» to address these challenges.

Concerns have been raised by citizens also regarding the construction and instalment of pylons for hydroelectric power, and windmills on land. These are apparent examples of dilemma between the move towards the renewable energies versus the citizens' concerns about their environmental landscape and habitat. In line with this, in June 2020 the Norwegian government announced^{xxi} plans (which it has proposed to the parliament) to tighten the rules for onshore wind power developments and to give more say to municipalities in approving new projects in this matter.

Further issues are linked to the population's concerns about the living standards. In the last local elections in 2019, the new party *People's Action No to More Road Tolls (FNB)* gained 6 seats in the Vestland County Council. This has created a dilemma situation regarding the environmental policies in the county linked to the road transport regulations. As a similar issue is gained high attention in Oslo and Stavanger, it can be expected that the solution would need decision-making and consensus at the national level, however.

2.2 Overijssel, The Netherlands

Overijssel province is located in the eastern part of the Netherlands (see Figure 3), and was one of the seven provinces which originally united and formed the Dutch Republic in the 16th century. The province became landlocked after the partial drainage of the IJsselmeer and the establishment of the neighbouring province of Flevoland in 1986. Currently, Overijssel has a population of more than 1,163,000^{xxii} which makes it the 6th most populated province among the twelve provinces in The Netherlands, inhabiting about 6.6% of the country's population. The capital city of Overijssel is Zwolle with nearly 128,000

residents. The largest city of Overijssel province, however, is Enschede (in Twente region) which is home to nearly 160,000 residents^{xxiii}.

Figure 2: Overijssel is one of The Netherlands' 12 provinces (Source: Wikipedia)



2.2.1 *Economic landscape of the region*

Industrial revolution in the Netherlands started by the mid-nineteenth century^{xxiv}. Before that, the Overijssel region was a rural society^{xxv}. The region along the river IJssel with the historic Hanseatic towns Kampen, Zwolle and Deventer remained more focused on service oriented sectors such as education, health and inland transportation (cf. Brouwer et al., 2006). The Twente region's cities of Enschede, Almelo and Hengelo together had formed one of the largest textiles producing region in Europe around the turn of the 19th to 20th century. However, the importance of textile industry for the region started to decline after the first world war (Bazen & Bijleveld, 2012). After the second world war, the national government policies have aimed to improve the competitiveness of the region through investment in university education and thereby, future innovativeness of the region's economy. The establishment of the University of Twente (UT) with a predominantly science and technology profile in 1964 was a crucial step in this direction. Metal manufacturing, which has been another traditional manufacturing industry in this region, has evolved into a metal/electronics industry, and provides good examples of the turn to high-tech in the region. Other notable industrial branches active currently in the province include plastics processing industry, food production, fine chemicals, transport / logistics and construction.

As of 2018 more than 628,000 individuals were employed in the Overijssel province^{xxvi}. The higher share of employment belonged in that year to the following sectors^{xxvii}:

- civil services (28.13%);
- retail and wholesale (22.74%).

These sectors are followed by the manufacturing industries, which employs about 80,000 workforce in the region.

According to the Statistics Office Netherlands (CBS), while Overijssel had had the lowest share of direct exports among the Dutch regions in 2018, chemical products (including polymer products) constituted the items with highest amount of export from this region in the year 2017^{xxviii}. But indirect exports – through supplier relations to companies in other regions – are substantial in the metal/electronics sectors.

The downturn of the textile manufacturing and the search for new employment opportunities industries led to a further diversification of the economy, especially in the region of Twente. The establishment of the University of Twente and the growth in technological domains of the Saxion University of Applied Sciences succeeded to have an effect on the innovation and entrepreneurship scene in the region, that specifically Twente region has become nationally and internationally recognized in the area of spin-off activities^{xxix}. The Regional Innovation Scoreboard 2019 categorizes Overijssel region as a *Strong Innovator*^{xxx}. Yet, the Regional Innovation Scoreboard points to the Overijssel region as having the lowest patent application per billion regional GDP among the Dutch regions. This implies that the region's strong position is apparently based on a tacit knowledge base and skilled craftsmanship.

Regional Innovation Policy and Strategy

The shift from generic policies for science, technology and innovation (STI) to more thematically-oriented STI policies in the Netherlands took place in 2003 when the Advisory Council for Science and Technology Policy (AWT) published the policy document *Backing Winners* (Wintjes, 2007^{xxxi}, cited by OECD, 2014)^{xxxii}. Based on this, key areas and technologies were selected for support at the national level. At the same time and also at the regional level, a 'Peaks in the Delta' program was introduced in 2004, which was jointly funded by the Ministry of Economic Affairs, the European Structural Funds and regional authorities, and focused on strengthening specific sectors and clusters at the regions. This program substantially increased the importance of the NUTS1 level in the innovation policies in the country, based on which the Eastern Netherlands provinces of Gelderland and Overijssel intensified their collaboration and also set up the East Netherlands Development Agency OostNL. This has led to the identification of three "peaks" in this part of the country, namely a Hightech Systems & Materials cluster in Overijssel (with knowledge base the University of Twente), a Food & Nutrition cluster (with the Wageningen University), and a Health cluster (with the Radboud Hospital and University in Nijmegen) in Gelderland^{xxxiii}. The focus areas identified under this program were largely influenced by the national choices for innovative macro-clusters (Wintjes, & Hollanders, 2012). In subsequent national programmes – such as the Top Sector Policy – the triangle of these three domains of Hightech Technology, Food & Nutrition and Health and the various crossovers between them are still the economic fundament for regional development and innovation policies in eastern Netherlands.

Concomitant with the Peaks program, in 2004 the Provincial Government of Overijssel set up the so-called Regional Innovation Platform Twente with participation of regional industry and higher education, thereby adopting a triple helix cooperation approach. The program developed by the platform identified five clusters as regional focus areas, namely medical devices, security, high tech systems & materials, agro-food, and innovation in the construction sector (Bazen & Bijleveld, 2012). This was followed by an evaluation, based on which *high-tech systems and materials* were chosen for branding Twente region as innovative hotspot, with specific application areas in health, security and sustainability.

Since 2010 the *Top Sector* policy has been adopted by the Dutch national government to stimulate cooperation between industry and knowledge institutes in nine key sectors for the country. These included agriculture and food, chemical, creative industries, energy, high tech systems and materials (HTSM), horticulture and raw materials, life science and health, logistics, and water. For Eastern Netherlands the focus of this strategy is on four of the above-mentioned national Top Sectors, namely HTSM, agro&food, health, and energy & environmental technology. Based on this,

since 2012 the Overijssel and Gelderland provinces have coordinated regional economic policy agendas and joint implementation agendas, such as the East Netherlands Development Agency (Oost NL). In the timeframe of the EFRD 2013-2020 Operational Programme, the four aforementioned sectors, i.e. health, high-tech systems and materials (such as micro/ nanotech), agri-food and energy have been their priority sectors for innovation activities, corresponding to the East Netherlands region’s first RIS3 strategy. Emphasizing firms taking the lead in ‘entrepreneurial discovery processes’, the two provinces aim to seize the potential of the synergies and crossovers between these domains such as med-tech, smart grids, bio-based economy and healthy aging. This approach clearly indicates adoption of strategies in line with the RIS3 approach.

The gradual strengthening of innovation and development policies at regional level has meant that the implementation of regional innovation policy has been shifted towards regional organisations such as Oost NL and a network of first-line innovation and entrepreneurship centres. Oost NL supports companies that are active in, or at the interface of, the four prioritized top sectors, and it does it on behalf of the public shareholders the provinces of Gelderland and Overijssel and the national Ministry of Economic Affairs and Climate Policy. While the two provinces have assumed the systemic responsibility for the regional innovation system the different regions within the Overijssel province each have their own economic agenda and economic board. In Overijssel there are three such regional constellations in the region Twente, the region Cleantech/ CityTriangle and the region Zwolle. They may even have their own investment funds and projects, projects, including the case of the University of Twente. Besides the economic boards, three innovation and entrepreneurship centres are key actors in these sub-provincial regions, namely the public funded foundations *Novel-T* (Twente), *Kennispoort* (‘knowledge gate’ in region Zwolle), and the Cleantech Development foundation. Table 3 presents the main innovation support measures implemented at the regional level in the Overijssel province.

Table 3: Innovation support measures at the Overijssel region (reproduced from Scholten and Oxener, 2016)

Measures at the provincial level	Measures at the sub-provincial regions
----------------------------------	--

Innovation Fund Overijssel (2013-now)	Horizon 2020 (2014-2020)	Interreg A (2014-2020)	EFRO OP-Oost (2014-2020)	Innovation Fund Twente (2013-2016)	Innovation Vouchers Twente (2013-2016)	NanoLab Vouchers (2013-now)	Twente Technology Fund (2010-now)
PPM Oost (on behalf of the Overijssel province) provides direct funding for business R&D and innovation + Supports knowledge transfer and cooperation between firms (incl. technology acquisition)	Oost NL (assisting the European Commission) provides direct funding for business R&D and innovation	Oost NL (assisting the European Commission) supports knowledge transfer and cooperation between firms (incl. technology acquisition)	Oost NL (assisting the European Commission) provides direct funding for business R&D and innovation + Supports knowledge transfer and cooperation between firms (incl. technology acquisition)	Regio Twente (on behalf of the PPM Oost) provides direct funding for business R&D and innovation + Supports knowledge transfer and cooperation between firms (incl. technology acquisition)	Open Innovation Centres and province of Overijssel support cluster development	NanoLab NL / MESA+ NanoLab Twente support fostering start-ups and gazelles + Organizational process and other non-R&D innovation + Promotion of science and education	Knowledge Park Twente support fostering start-ups and gazelles in high tech + Direct funding for business R&D and innovation

The regional assembly (parliament) of Overijssel (i.e. the ‘Provincial States’) has argued that the first RIS3 of the East Netherlands has paid off in terms of knowledge-intensive cluster formations in the Twente region and with seedlings elsewhere in the province. Nevertheless, it has been argued by Scholten and Oxener (2016) that despite the region’s innovation policies having a clear focus on HTSM, the implemented measures have adopted a rather broad scope. Furthermore, there has been ongoing discussion around the need of the province and regions for taking broader development strategies by incorporating societal challenges (including the issue of talent retention in the region) as well as the voice of citizens into development of economic agenda in the region^{xxxiv}. This may be seen as a regional reflection of the recent evolution in the Dutch national science and innovation policy towards mission-oriented programmes on major societal challenges.

The East Netherlands region has developed its existing RIS3 strategy further for the period of 2021-2027^{xxxv}. The need for mission-driven and transition-oriented direction in innovation policy have been acknowledged. Further following the synergy approach among the thematic focus areas of the region, the new RIS3 document points to three crossover themes that stem from the four themes of the previous RIS3 strategy. These include:

- Manufacturing and MaterialTech;
- Prevention and MedTech;
- Sustainability and FoodTech.

The new RIS3 document indicates both qualitative and quantitative monitoring approaches for the purpose of keeping the strategy a dynamic and adaptive one. It explains that the qualitative monitoring relies on continuous dialogue with regional stakeholders, which have also been part of the *entrepreneurial discovery process (EDP)* in drafting the new strategy. The document refers to the formation of a Mirror Group (Spiegelgroep) for this purpose, which represents implementation of *quadruple-helix* approach with participation of governments, education and knowledge institutions, social organizations and the business sector. This Mirror Group is deemed as having an important role in periodical review and adjustment of the RIS3 strategy. Concerning the quantitative monitoring of the strategy, the document refers to three methods, including 1) innovation indicators in all parts of the province, 2) relatedness model, and 3) efficient use of resources. The advises given by the Mirror Group of stakeholders are to be decided upon by the Provincial Executive Councils of Overijssel and Gelderland.

2.2.2 Political governance at the region

In the Netherlands, public voters elect representatives to the provincial parliaments – known as Provincial States - once every four years. The provincial elections are held one year after the municipal elections.

The mandates of Dutch provinces are in the areas of:

- spatial planning and water management;
- environment and energy;
- mobility and transport;
- regional economic development;
- cultural infrastructure and heritage;
- local democracy and governance;
- area development.

Furthermore, the winning parties in the Provincial States constitute the Provincial Executive Council, which together with the King's Commissioner act as the executive council of the province. The provincial organisation consists of a directorate and eight functional units. These units cover the above-mentioned lines of tasks.

The Overijssel provincial assembly has 47 members. The last provincial elections were held in the Netherlands in March 2019. The Overijssel's provincial assembly now hosts members from 12 parties. The highest votes were casted for the Christian Democratic Appeal (9 seats), Forum for Democracy (6 seats), and People's Party for Freedom and Democracy (6 seats). However, the governing coalition for the period 2019 - 2023 in the province is formed by the Christian Democratic, Liberal, and Labour parties. The coalition agreement is coined 'Samen bouwen aan Overijssel' (building Overijssel together), and outlines the political ambitions of the province in the following seven areas; 1) powerful economy, 2) good accessibility, 3) heat, drought and flooding, 4) energy transition, 5) attractive living and space, 6) vital rural area, and 7) living together in Overijssel.

Furthermore, Overijssel has its own socio-economic board^{xxxvi} (SER Overijssel) that advises the province on its socio-economic policy.

Strategic plans and policies on smart city, energy and transport

In order to analyse the presence of technology assessment networks that shape innovation trajectories and ensure RRI, or more generally, the governance mechanisms used to monitor technologies already implemented in the regional contexts to drive economic development, we focus on the three specific areas from RR12SCALE, i.e. those of smart city, energy and transport.

As indicated above, the provincial jurisdiction in the Netherlands covers the domains of environment and energy, mobility and transport, as well as urban and rural planning. Since 2008 the province of Overijssel has had a program on CO₂ emission reduction, named Energiepact. In addition to solar and wind energy bio-energy and geothermal heat are being promoted as a reliable renewable energy alternatives for the province, both due to regional availability. Raising the awareness of citizens and attracting collaboration of local, regional and national actors in the form of clusters or networks have been an integral part of the actions in the program (Hoppe et al., 2011)^{xxxvii}. Further shifting the strategic direction to active citizenship, local low-carbon energy initiatives (LLCEIs) have been formally included in the province's energy policy since 2011 (Warbroek and Hoppe, 2017)^{xxxviii}. Furthermore,

[...] by 2014, the program was revised, adding more attention to support of LLCEIs. Specific attention to LLCEIs in the formal revision of the policy framework arose from a resolution adopted in the provincial council [...]. When preparing the revised energy program, the province decided to involve external stakeholders, much like the neo-corporate structure of the Netherlands which emphasizes bargaining, collaboration and consensus-building with societal stakeholders and interest groups, also known as the Dutch governance school (Warbroek and Hoppe, 2017, p. 12).

The current strategy, named New Energy Overijssel 2017-2023^{xxxix} was adopted by the Provincial State of Overijssel in 2017, and aims to secure 20% of the energy requirements of the region through new energy sources, including wind, solar, geothermal and biomass. While the "core partners" in designing the program include public sector and business entities, the program has pledged further involvement of knowledge institutions and housing associations in the implementation and adaptation of the program, and points to the important role of citizens, companies and civil society organizations in reaching the set targets. Support for municipal and community-based renewable energy initiatives is priority in the programme. The latest addition to the energy domain is the drafting of Regional Energy Strategies as a result of the national Climate Agreement, summing up CO₂ emissions avoided. But the proof of the pudding is in the eating. Now that rather technical plans have to be established by the democratic bodies involved, the call for civic consultation is growing.

As a densely populated small country with multiple claims on land use, area planning is well developed in the Netherlands. Like the other provinces, Overijssel regularly revises a Spatial Vision / Environmental Plan including traffic and mobility as part of its spatial area planning. The latest version dates from 2015. Mobility and accessibility of the territory deals with four types of transportation, namely car traffic, public transport, bicycle traffic, and freight transportation (through water, rail and road). It also makes a distinction between the accessibility of urban areas and the countryside in the planning. Regulations based upon the plan are updated on an annual basis reflecting covering new Provincial State decisions and changes in national and European legislation. Every year, the proposed annual update is made available to the general public for inspection in a certain period, which means everybody can read it and provide a feedback during that period. The

viewers can also see who and when has made any changes to the Spatial Vision, when inspecting the draft of the updated Vision^{xi}.

The provincial level of government has not explicitly addressed the issue of smart city. Digitisation of daily life is a trend which affects multiple policy domains. Both the cities of Zwolle and Enschede conducted already experiments related to smart city practices^{xii}. These have included, for instance, initiatives on smart data and smart mobility (in Zwolle) and open data and smart energy (in Enschede). In 2016, the municipality of Zwolle was voted the “smartest city” in the Netherlands by Slimste Binnenstad, a platform for the Smart Cities initiative in the Netherlands.

In 2017, the National Smart City Strategy of the Netherlands was published^{xiii}. The document outlines five pillars for the implementation of the strategy including:

- safe, standardised digital infrastructure;
- public-private partnership with room to experiment;
- new models of governance, integral and in collaboration with citizens;
- education and employability;
- regional collaboration in which cities operate as a network.

Accordingly, the document points to the optimal use of triple / quadruple helix interactions (under the second pillar) with further emphasis on citizen participation, and the responsibility that the government has in this respect (under the third pillar). While primarily the five largest cities in the Netherlands (known as the G5) have been tasked to adopt the National Smart City Strategy, the group of 32 middle to large size Dutch towns (known as the G32) have also asked for the government’s support to implement the strategy. From Overijssel, the cities of Almelo, Hengelo, Enschede, and Zwolle are among the G32. The Smart City strategy is now part of the current Digital Government Programme at national level.

2.2.3 *Civic participation*

The Netherlands is considered as a democratically governed country. In 2019, the Democracy Index ranked the Netherlands as the 11th country in the world in terms of the quality of democracy. The voter turnout in the last provincial elections in 2019 was 57.9%. This figure shows an increase of 10.1 percentage points in participation compared to the previous provincial elections in 2015. Following a speech by the Dutch King Willem-Alexander in 2013^{xiii}, in which he used the term ‘participation society’ as a society in which citizens assume more responsibility for their well-being and the society in general, this term has been widely discussed by scholars, politicians, journalists and others in debating the role of citizens in the Dutch welfare system.

Using data from European Social Survey, Schmeets and Te Riele (2014)^{xiv} show that the Netherlands closely follows the Nordic countries in terms of social trust, while in terms of trust in parliament and politicians also ranks very high. They also show that despite differences between education level groups and religious groups in the Dutch society, the voter turnout and the volunteering activities have remained high in the country. Nevertheless, citizen involvement at the provincial level is lower than the sub-provincial regional level, reflecting a gap between the daily living and working environment and the representation in democratic assemblies.

Nevertheless, when it comes to research and innovation policies in the region, issues have not been seen by citizens as their issues (cf. Ahoba-Sam et al., 2018). In recent years some attempts have been made, specifically by the universities to include citizens and other stakeholders in the

processes of research and development. Notably, in an effort to address societal challenges through establishing a link between society and technology, University of Twente established a so-called DesignLab, in which educational staff and students co-work with citizens on specific themes. The main research themes of the DesignLab include participation and inclusion, human-robot collaboration, personalized care, art and science interaction, and smart, responsible and resilient societies. In another pilot on citizen science, the TopFit Citizenlab was established by the University of Twente in order to involve citizens in the research and data collection and analysis related to healthcare, with the overall aim of increasing the Dutch citizens healthy for five years longer. The TopFit Citizenlab has already resulted in the formation of some new coalitions of health, food and tech expertise and new business development and scale ups. Currently, experts from more than 80 companies and 150 researchers and health professionals are designing roadmaps for four mission driven programmes on diabetes, cardiovascular disease, movement disorders and renal diseases^{xlv}.

RRI in territorial policy, research and innovation design

In order to gain an understanding on how the regional authorities deal with RRI in territorial policy, research and innovation design, we investigate whether there is any formal reference in the regional innovation strategy to responsible innovation and / or citizen engagement. The latest edition of the RIS3 strategy in the Overijssel and Gelderland clearly refers to the involvement of civic society organizations as one of the participants in the quadruple helix partnership. The so-called Mirror Group for the next Operational Programme will be able to periodically provide advice and give feedback on the development and implementation of the RIS3 strategy.

Furthermore, both the Spatial Vision and the open data initiatives related to the smart city activities indicate awareness of and openness to the involvement of citizens in the drafting of regional- and municipal area developmental plans. These possibilities still seem new and rather unknown to the general public, but in combination with the current dialogue in the Dutch society around transition from the classical welfare state to “participation society”, they can provide a fertile ground for the cultivation of RRI practices in the province of Overijssel.

2.2.4 Regional dilemmas

The Sustainable Development Goals (SDGs) have increasingly gained a prominent place in the Overijssel policy making. The province of Overijssel follows the Dutch government's objective that the Dutch economy should be circular by 2050, and has developed a regional transition agenda for six sectors, namely the construction industry, infrastructure, manufacturing industry, plastics, biomass and food, and consumer goods. The transition agenda set for the province and its regions recognizes that in addition to the technological aspect of the transition, it also needs new business models as well as social innovations. Reconciling the environmental, social, and economic goals for meeting the ambitions of the transition agenda poses challenges. For instance, in the construction industry, these can include^{xlvi}:

- reconciling the long-term common interest and social relevance in the whole life cycle of buildings with short term individual financial benefits;
- guaranteeing a solid, comfortable and sustainable building for the user while at the same time closing the material cycles;
- reusing building components, products and materials offering high quality with the lowest environmental impact possible.

Another issue frequently popping up in political debates in the region relates to the over-emphasis and expectations on high-tech in regional and provincial economic policy. The adoption power of regional businesses with respect to ever expanding high-tech is called into question in the Twente region. There is also doubt among some political parties in the provincial assembly on the fact that provinces should heavily co-invest to get their 'share' in national innovation programmes. Also, social aspects of economic development are underrepresented in the programmes and governance structures (Ahoba-Sam et al., 2018). As an example, at the Twente Board, which sets the economic development agenda for the Twente region, out of ten members, only one of them is a representative from a social welfare organization. Yet, the creation of new jobs by high-tech start-up and scaleup firms also benefits the economic restructuring of Twente and it helps reducing brain drain of the talents from the region. "Over the past couple of decades, Twente has struggled to keep university graduates within the region. It has been mentioned that Twente lacks a vibrant social life and is short of cultural events compared to other parts of the Netherlands, which makes it vulnerable for the leave of well-educated people who look for a vibrant, vivid social and cultural environment." (Ahoba-Sam et al., 2018, p. 43).

Another aspect prone for the rising of regional dilemmas is related to the contextual (societal) preconditions for the RRI practices. EC's MoRRI project has generally characterized^{xlvii} The Netherlands as a country performing above average in terms of RRI dimensions, specifically in the areas related to inclusivity and co-creation of research and innovation with civil society. Nevertheless, the country is reported as having low performance on gender equality and status as well as the open access status. While this national profile might not necessarily reflect the situation at the level of provinces and regions, it provides a hint about the potential areas for further attention within the process of research, innovation and developmental strategies in the region.

2.3 Crete, Greece

Crete region is located in the southern part of the Greek territory (see Figure 4) and constitutes, in addition to some smaller islands

and islets, Greece's largest island, Crete, which has been continuously part of the Greek territory for more than a century now (since

1913). The current administrative region of Crete was established in 1987. The region has a population of about 635,000^{xlviii} inhabitants, making it the 5th most populated region in the country, inhabiting about 6% of the country's population. Its capital and largest city is Heraklion which has more than 157,000 residents^{xlix}.

Figure 3: Crete is one of Greece's 13 administrative regions (Source: Wikipedia)



2.3.1 Economic landscape of the region

Crete's economy has been historically based on agriculture, cattle breeding and international trade (Petraikos, 2000)ⁱ. During the last half a century, the economy of Crete has changed from largely relying on those traditional sectors of its economy to getting significantly benefited from tourism and related services. Given the region's rich history and cultural heritage, and its geographical position in the Mediterranean Sea which has provided it opportunity to play an important role in the international and intercontinental trade, as well as its climate and natural resources, the growth of tourism industry in the region can be seen as a natural advantage. In terms of the economic performance, by the turn of the 21st century Crete became Greece's most successful region outside the metropolitan areas of Athens and Thessaloniki (Ioannides and Petraikos, 2000)ⁱⁱ. Over the period of 2000 – 2016, Crete was the region with highest productivity growth in the country (with 0.5% annual growth of GDP per worker in PPP terms)ⁱⁱⁱ. Besides the increasing importance of tourism industry for the region in the recent decades, since 2012 the Greek government has resumed its offshore oil and gas exploration activities in the Ionian Sea, south and west of the Crete coasts. By some estimates the gas reserves off the Crete coast are so vast that can potentially turn it to one of Europe's gas hubsⁱⁱⁱⁱ. In 2018 an international consortium was awarded concessions for exploring and exploiting offshore blocks southwest and west of Crete.

In recent years Crete region has one of the lowest unemployment rates in the country^{lv}. The most important sectors for the regional economy have been^{lv}:

- tourism and trade (35.4% of employment);
- the rural economy (19.4% of employment).

Also taken the value-added contribution to the economy of the region, tourism and trade sector lead is leading with 35% share, followed by real estate with approximately 10% share, agriculture with 9% share, and process manufacturing and energy also with 9% share (George & Georgios, 2017). In terms of the exports of goods, food and beverage sector makes the largest contribution as it comprises more than half of the export value in the region, followed by the chemical and plastic products (George & Georgios, *ibid*).

While Greece is categorized as a moderate innovator in the European context^{lvi}, Crete is seen as an innovation hub in Greece, and its innovation indicator has reached in recent years to the European average. Crete island is deemed as the only region of Greece having comprehensive research and technological development activities, apart from the two big cities of Greece. Considering more established sectors of the economy, a study by Nikolaidis and Bakouros (2009)^{lvii} has showed that

companies active in new forms of tourism do relatively better in terms of innovation performance and sales growth, compared to agriculture or food and beverages sector. A study conducted for EC's DG Research and Innovation has suggested that Crete qualifies to be recognized as *Pocket of Excellence* region within Greece^{lviii}.

Regional Innovation Scoreboard 2019 categorizes Crete region as a *Strong - Innovator*^{lix}. This has materialized due to the increasing number of SMEs that are attracting research funds from public resources, the development and marketing of new innovative products, and co-operation between SMEs in knowledge-intensive organisations.

Regional Innovation Policy and Strategy

The first ideas on creating innovation networks in Crete stemmed from the results of European projects such as RITTS^{lx} Crete project (1997-2000), InnoRegio (1998-2002), and CRete INNOvative Region - CRINNO (2003-2005) (Nikolaidis & Bakouros, 2009). These aimed at improving the regional innovation strategies, and the first one resulted in creation of a Regional Innovation Council in the region. The latter one (CRINNO) specifically took a sectoral approach and focused on the sectors of tourism, handicrafts, and business services^{lxi}. The partners in that project included the local authorities, the research centres of Crete and the entrepreneurs' associations in the region. This was followed by the FP7 programming period (2007-2013), during which research and innovation activities were given low priority in the Operational Programme, under the priority axis Digital Convergence and Entrepreneurship^{lxii}. The objectives specified for this OP also referred to tourism and business services, besides aiming to support the research institutions in the region. During this programming period, there was no regional governance system concerning research, and innovation policy, as these issues were handled at the central government level.

At the same time, ERDF co-funded the Regional Innovation Pole of Crete, an initiative that was introduced in 2007 with the aim of improving the competitiveness of the region through cooperation between local universities, businesses, and chamber of commerce within three fields of science and technology, namely i) information society, ii) biotechnology and iii) medical technology. In general, the views on the achievements of the Regional Innovation Pole contradict, but there has been a dominant view of the failure of the project to build a basis for long-term support of innovation activities (DG REGIO, 2012).

Starting from 2012, the RIS3 for Crete has emphasized for the region to become a 'dynamic' and 'sustainable' region. The 'dynamic' aspect emphasizes an integrated strategy to exit the economic crisis with investments on and enhancement of the dynamic sectors of the regional economy. Accordingly, the regional priorities for smart specialisation strategy of Crete^{lxiii} within 2014-2020 period have been set around four complexes:

- The agro-food complex (cultivation / husbandry, processing / preparation and handling / marketing of agricultural products);
- The cultural-tourism complex (attraction, welcome, hospitality, transportation, food, entertainment, promotion of the cultural resources, museums);
- The environmental complex (energy saving, renewable energy, rational use of natural resources of Crete with emphasis on water and climate change);
- The knowledge complex (research and technology produced by research and academic institutions of Crete in nanotechnology, biomedicine, biology, microelectronics, materials, information technology).

The ‘sustainable’ aspect emphasizes the economic, environmental and social sustainability, with the latter dimension emphasizing inclusive development and combating poverty in the region.

At the same time, Crete Operational programme for 2014-2020 period had thematic priorities with the following themes as the top ones respectively; 1) environmental protection and resource efficiency; 2) social inclusion; and 3) network infrastructures in transport and energy^{lxiv}. Table 4 summarizes the sectors supported by Crete Region’s RIS3 and its predecessor EU Operational Programmes in Crete region since the year 2000, and compares them with the Structural Funds categories funded during the last two programming periods.

Table 4: Innovation and regional development support measures at the Crete region

Research, innovation and economic policies			Structural Funds ^{lxv}	
CRINNO (ERDF – FP6) (2003-2005)	Competitive-ness FP7 (2007-2013)	RIS3 (2014-2020)	Structural Funds (2007-2013)	Structural Funds (2014-2020)
<ul style="list-style-type: none"> - Tourism - Handicraft - Business services 	<ul style="list-style-type: none"> - Tourism - Research institutions - Business services 	<ul style="list-style-type: none"> - Cultural tourism complex - Agro-food complex - Knowledge complex - Environmental complex 	<ul style="list-style-type: none"> - Other investment in firms - Regional / local roads - Education infrastructure - Integrated projects for urban and rural regeneration - Water / wastewater treatment 	<ul style="list-style-type: none"> - Water / wastewater treatment - Other reconstructed or improved road (motorway, national, regional or local) - Energy efficiency renovation of public infrastructure, demonstration projects and supporting measures - Protection, development and promotion of public cultural and heritage assets

As can be noticed from the comparison of the sectors prioritised by research and innovation policies with the most funded categories through regional development measures of Structural Funds, it can be argued that RIS3 priorities have been reflected in SF budgets particularly in case of the Culture and Tourism complex and the Environmental complex (see also Reid et al., 2015).

Crete’s RIS3 strategy document divides the governance structure of the strategy into two levels, namely headquarter level and executional level. The headquarter level comprises the administrative bodies of the region, i.e. the regional governor and the regional council. These bodies are responsible for policy development and decision making on research and innovation in the region. This level also includes the Regional Research and Innovation Council of Crete (RRIC), which has been created in 2014 for the purpose of supporting the Regional authorities with the implementation of research, innovation, and technological development strategies. RRIC is composed seven members, including three academics or researchers, one representative of the research institutions of the region, and three other members from local authorities, productive institutions and

entrepreneurial sector. The executional level, then, comprises programme management institutions as well as a coordination body for monitoring the implementation of the strategy. This coordination body, which is an independent department of the Region, is tasked with coordination of entrepreneurial discovery process (EDP) in the four innovation platforms corresponding to the four priority areas of the RIS3 strategy in the region. The consultations related to EDP at each of the innovation platforms use the views of chambers, sectoral entrepreneurial institutions, enterprises, research institutions and individual experts in three stages:

- 1) Processing of branches linked to each priority complex and mapping their value chains and cooperation structures;
- 2) Assessment of technological and entrepreneurial potential; and
- 3) Organising the consultation procedure.

According to the RIS3 document of Crete, the working group which was established for the design of the RIS3 strategy in 2012 included representatives of the Region, research and educational institutions and entrepreneurs from the Crete region. This working group then produced the RIS plan of Crete and conducted consultations with various stakeholders, including EU experts, research institutions, public administration representatives, the Regional Governor, entrepreneurial networks, members of the Regional Council and Regional Association of Municipalities of Crete, and innovative companies based in the Region. At the end, the Strategy has been opened for public online consultation, which led to responses mainly from the likes of above-mentioned institutions. Accordingly, civic society and general public seem to have played no noticeable role in the development of the Strategy.

2.3.2 *Political governance at the region*

A major administrative reform in Greece took place in 2010^{lxvi}, based on which Decentralized Administrations were created by the start of 2011. This resulted in the Decentralized Administration of Crete becoming one of the seven of such administrative regions in Greece which have agencies of national administration^{lxvii}. The reform also reduced the number of self-governing regions in the country from 51 prefectures to 13 regions^{lxviii}. While until 2014 the local elections in Greece were held once every four years, since then it has been set to be held once every five years. The last local elections, hence, was held in 2019.

The main issues with which the regional council and regional governor deal include^{lxix};

- infrastructures and energy efficiency;
- investments;
- enhancement of the universities and institutions of research, innovation and knowledge;
- upgrading of the maritime and air transport system;
- social infrastructure;
- enhancement of tourism services;
- promotion of cultural heritage and interconnection with the society and local economy;
- primary sector (agro-alimentation).

There are four regional vice governors and even thematical vice governors^{lxx} in the Regional Council. The thematic vice governorates include those of internal operations; internal audit; spatial planning and environmental policy; forests and agricultural affairs; civil protection; education; and civil defense.

In the last local elections held in May 2019, candidates for the conservative New Democracy party, which emphasizes tax reductions and attracting investments, won in 12 of the country's 13 regions. Crete was the only region where the conservative New Democracy did not win the local elections, as the incumbent Panhellenic Socialist Movement, a social democratic party, retained the highest votes in the region^{lxxi}.

The Crete Regional Council consists of 51 members, and following the 2019 elections, 31 seats were won by the incumbent ruling party of Panhellenic Socialist Movement, a party which emphasizes independence from foreign influence. Together with the Regional Governor, among other things, the Council is responsible for policy development on research and innovation in the Region, while being assisted in this by the Regional Research and Innovation Council (which was established in 2014 and has seven members, as indicated before).

An important competency of the Regional Governor is presidency of the Regional Development Fund of Crete (RDFC). RDFC was established in 1998 with the objective of managing public sector's funding, and currently is managed by a board of directors which is formed by decision of the Regional Governor for a five-year term.

Strategic plans and policies on smart city, energy and transport

In order to inquire on the presence of technology assessment networks that shape innovation trajectories and ensure RRI, or more generally, on the governance mechanisms used to monitor technologies already implemented in the regional contexts to drive economic development, we focus on the three specific areas of smart city, energy and transport.

In 2019 Greece adopted a National Energy and Climate Plan^{lxxii} (NECP) towards 2030, which it hopes to help it in transitioning to a climate neutral economy by 2050. The NECP has set the objective for renewable energy sources to have a minimum share of 35% in the gross final energy consumption by 2030. The NECP specifies that the electrical systems of Aegean islands, including that of Crete, will be interconnected to the National Interconnected System during the period 2020-2030.

In line with this national plan as well as the European energy policies, the Region of Crete has adopted, as the first Greek region, an integrated Regional Energy Planning (Manasaki et al., 2016)^{lxxiii}. This approach "examines the current energy needs, considers and evaluates all the possible sources of electricity production and their participation in the energy mix up to 2050." (Manasaki et al., *ibid*, p. 1). In 2015 the Region of Crete contracted National Technical University of Athens to conduct a study with the aim of developing Energy Strategy for the Region of Crete. The result was presented in 2016^{lxxiv}, and identifies a series of alternative scenarios regarding the energy system of Crete until 2050. It has been shown that the region can eventually reduce its CO₂ emission level by 80% till that year (compared to 2005)^{lxxv}.

A key actor in developing and implementation of this plan is the Regional Energy Agency of Crete (REAC) which was established in 1994 by the Region of Crete and the European Commission, operates under the RDFC (see previous section). REAC puts emphasis on 'participatory energy and climate regional planning' in its activities, and most recently has been involved in the establishment of a road map and an action plan for the clean energy transition of the island of Crete. Generally, the Regional Energy Agency of Crete: 1) designs and implements energy and climate policies, particularly on renewable energy sources, sustainable transport and energy efficiency; 2) helps

attract investments and deploy pilot projects; and 3) runs awareness-raising and dissemination campaigns.

Also, when it comes to regional strategy in the area of transportation, Crete relies mainly on the national strategies. The National Transport Strategy of Greece was adopted in 2017 with a horizon of twenty years (2017-2037). In July 2019 the Crete Regional Council's Committee on Spatial Planning and Environmental Policy approved^{lxxxvi} a Strategic Environmental Impact Study concerning the National Strategy Transport Plan^{lxxxvii}.

Earlier, the Region of Crete has taken sustainable urban transport measures in cooperation with companies and local NGOs with the purpose of development and awareness raising in the field of cycling. It has also worked with local municipalities to increase the use of biofuels in public transport^{lxxxviii}. The Region of Crete has also participated, through its Regional Energy Agency, in the Covenant capaCITY project (2011-2014) co-funded by the Intelligent Energy Europe programme of the European Commission. The project aimed at developing more Sustainable Energy Communities across Europe, and transport sector was one of the main target sectors.

When it comes to the smart city strategies and policies, the strategic documents at the regional level do not indicate being attentive to the subject. Nevertheless, the topic has attracted attention of the policymakers at the municipal level in the country. A recent study by Alexopoulos et al. (2018)^{lxxxix} identified five top cities in Greece in terms of implementing smart city actions, none of which belong to the Crete region. Despite this finding, the capital city of the Crete region, Heraklion, had convened its first Smart City Committee in the year 2011^{lxxx}, concomitant with the Municipality's participation in the Covenant CapaCITY project. This was followed by the formation of the second Smart City Committee by City Council's decision in 2015. This Committee, which succeeded to complete Heraklion's Smart City Strategy in 2016^{lxxxxi}, included representation and participation from the city's institutions including research and education, business sector, urban transportation sector, representatives of political parties in the City Council, and some individual experts. Heraklion City's portal^{lxxxii} for Smart City considers citizens' participation in the smart city actions as a challenging task, but also elaborates on the following solutions; digital social inclusion and participation, connection of households to the internet, introduction of smart mobile devices, social media, and living lab (Cretan and South Aegean Living Lab).

2.3.3 Civic participation

Greece is considered as a democratically governed country, and Democracy Index has ranked the country as the 39th country in the world in terms of the quality of democracy in the year 2019^{lxxxiii}. Among the considered dimensions, the functioning of the government receives the lowest score, followed by the political participation. Nevertheless, the voter turnout in the last regional elections in the Crete region has been more than 65%^{lxxxiv}, according to the statistics by the Greek Ministry of Interior.

It has been argued that efforts aiming at transforming innovative and developmental activities in Greece from top-down to bottom-up approach, often result in involvement of stakeholders (like local associations or NGOs) but not individual citizens^{lxxxv}. Using data from the European Social Survey, Sotiropoulos and Bourikos (2014)^{lxxxvi} argue that Greeks join professional associations rather than other types of volunteerism and social activism. Also "in 2011, after the crisis had erupted, research showed that only 14 per cent of Greeks participated in voluntary activities". Sotiropoulos and Bourikos (ibid) discuss that these figures are low even in comparison with other Mediterranean

countries of Europe like Portugal and Italy. Nevertheless, their research argues that solidarity groups and networks and voluntary organizations' activities rose considerably compared to the past in order to cater for the citizens newly impoverished by the crisis.

Furthermore, there has been good examples of active citizenship in the region with the purpose of preserving natural and cultural heritage of the region. A notable example is the formation of a network of "active citizens" in 2011 for the monitoring of the state of wetlands in Crete island, as part of the World Wildlife Fund's program "Conservation of Greek island wetlands"^{lxxxvii}. The initiative aimed for local capacity building for the protection of the wetlands in the island. This project managed to attract and coordinate about 80 volunteers from all over Crete.

Another notable example relates to the emerging of bottom-up cultural activism initiatives in the region of Crete during the last decade due to the rising concerns about the adverse impacts of mass tourism for the region (Nikolopoulou, 2019)^{lxxxviii}. These initiatives have attracted large number of citizens in their local events and has in some cases led to changes in the city's landscape.

RRI in territorial policy, research and innovation design

In order to gain an understanding on how the regional authorities deal with RRI in territorial policy, research and innovation design, we investigate whether there is any formal reference in the regional innovation strategy to responsible innovation and / or citizen engagement. The described process of development of the RIS3 strategy for the region clearly indicates a late-stage opening of the process to wider public consultation. Furthermore, the examples of policymaking process around energy, transportation, as well as smart city, paint an image of reactionary (reactive) citizenship concerning the engagement in the policy design. This picture also fits with the aforementioned scholarly opinions on the non-popularity of co-creation concept in the country in general.

Nevertheless, there is clear signs of attention to sustainability dimensions in the policymaking practices at the regional and municipal level, such as environmental impact assessment of transportation strategies and plans, or commitment to the identification and implementation of sustainable energy policies. Accordingly, it can be argued that RRI approach has, within the current landscape, higher potential for being embedded within multiple-stakeholder, triple helix (eco)systems, even though there are signs of increasing attention and expression of interest from the grass-roots activities and civil society.

2.3.4 Regional dilemmas

As indicated above, mass tourism to the Crete region has resulted in a number of grass-roots initiatives in the last decade, which follow the cause of defending public space and urban cultural heritage in the region (Nikolopoulou, 2019). On the other hand, cultural tourism has gained such an importance for the region that it constitutes one of the four pillars in the region's RIS3 strategy. Hence, it can be argued that mass tourism is increasingly turning into a regional dilemma for Crete's socio-economic development.

Additionally, low innovation capacities in the traditional sectors of the region's economy are deemed as weaknesses^{lxxxix} in the Crete region, which can create a dilemma in the path to the economic development of the region. More specifically, family based enterprises which are prevalent in the

primary sector in the region, are deemed as low innovative enterprises. Since agro-food complex is one of the pillars of the region's current RIS3 programme, the upgrading of products and the innovativeness of this sector is a priority for the region. An important aspect of this issue is related to the sustainability of agro-food sector in the region, as the conventional cultivation methods usually entail environmental pollution and loss of profits. A recently concluded project^{xc} tried to deal with this aspect in Crete, with special focus on two main products of Crete, i.e. wine and olive oil.

Another aspect prone for the rising of regional dilemmas is related to the contextual (societal) preconditions for the RRI practices. EC's MoRRI project has characterized Greece as a country performing below average in terms of all RRI dimensions, with the exception of open access status and ethics in research funding organizations. Saitakis (2013) has highlighted 'low level of morale within the research community' as a threat for the regional research and innovation programmes in Crete, however. On the other hand, a promising change in the Region of Crete regarding the RRI dimensions has taken place recently, when in the year 2020 the Regional Council of Crete formed the Regional Committee for Gender Equality. This Committee had its first meeting in July 2020^{xci}, which kicked off the preparation of the Regional Action Plan for Equality, as well as its networking with the Municipal Equality Committees and local bodies.

2.4 Galicia, Spain

Galicia region is located in the northwest of Spain (see Figure 5) and is one of Spain's 17 autonomous communities since the country's transition to democracy during mid-1970s, but the region's Statute of Autonomy was ratified in 1981. The region's population is about 2,700,000^{xcii} which makes it the 5th most populated community in the country. While no metropolitan area dominates the region, the

coastal city of Vigo is the most populated city of the region with about 294,000 inhabitants. The political capital of the region, however, is the city of Santiago de Compostela with about 97,000 inhabitants^{xciii}.

Figure 4: Galicia is one of Spain's 17 Autonomous Communities (Source: Wikipedia)



2.4.1 Economic landscape of the region

The Galician economy was an agrarian economy until the first third of the 20th century, the epoch by which a secondary sector was consolidated by the maritime complex (Álvarez, 2010)^{xciv}. Until the early 1980s, the Galician economy was dominated by the agricultural and fishing sectors, although the car industry was also established since the end of 1950s. During the last three decades, Galicia has more visibly developed into an industrialized region (Hannum, 2020)^{xcv}. Indeed, after joining the EU, the investment in the development of Galician economy and infrastructure has grown considerably. Food, textiles and clothing have been the sectors which improved most during the 90s and 2000s (Cancelo et al., 2009)^{xcvi}. In fact fashion industry has become one of the flagship industries of the region, specifically due to the presence of the headquarters of one of the largest fashion retailers in the world. During the period of EC's FP7 programming period, then, the Region put emphasis on development of its R&D, information and communication technologies, and transport and energy (European Commission, 2019)^{xcvii}. Nevertheless, the region still has kept its prominence in the fishing sector and maintains the largest fishing fleet in Europe, and the Port of Vigo is the largest fishing port in Europe. About 50% of fishing vessels in Spain are registered in Galicia. When it concerns the automotive industry, about 17% of all vehicles made in Spain are manufactured in Galicia.

With unemployment rate of 11.76% in 2019^{xcviii}, Galicia fared better compared to the national unemployment rate. In terms of employment, the main sectors for the economy of Galicia are:

- services (59% of workforce);
- industry (30.3% of workforce);
- fisheries and agriculture (10.7% of workforce).

In terms of turnover and number of employees, the largest companies in Galicia belong to textile industry, car manufacturing, food processing and distribution, and wood processing^{xcix}. In terms of gross value added (GVA) in 2017 the tertiary sector accounted for 66.8% of the total, followed by secondary sector that contributed 27.4% and the primary sector that represented the remaining 5.8% (Eurostat, 2019, cited by Regional Innovation Monitor Plus)^c. Tourism and renewable energy (wind and hydraulic) have shown rapid growth in the recent years. Steen et al. (2016, p. 12)^{ci} report that “[i]n 2013, Galicia was the leading Spanish region in hydropower production and second to Castile and León in installed wind energy production. Galicia produces 103% of total renewable regional electricity demand, implying that it is a net exporter of RE.” Automotive industry in Galicia constitutes

the largest share in the country's car industry with 17% share, and its exports amounts to 32% of Galicia's total exports (Xunta de Galicia).

Regional Innovation Scoreboard characterized Galicia as *Moderate + Innovator* in 2019^{cii}. The region manages 40% of the innovative public procurement funds ranted in Spain^{ciii}. R&D milieu is expanding in the region, as it has made specific efforts in creating a network of technology centres. Some of the notable examples include Galician Automation Technology Centre, Galician Supercomputing Centre, CIS-Technology, Maritime Technology Centre, Centre for Timber Innovation and Services, and National Technical Centre for the Conservation of Fishing Products.

Regional Innovation Policy and Strategy

The first regional R&D plan in Galicia dates back to a three-year plan from 1999 which had a focus on infrastructures and basic research. Then, the innovation policies and plans during the 2000s strived for strengthening university-industry relations in the region (Borrás and Jordana, 2016)^{civ}. Until almost a decade ago, however, Galicia could be characterised as a “regions with no specialisation in knowledge activities” (Colombelli, Foddi et al. 2013)^{cv}.

In 2010, the Regional Minister of Economy and Industry introduced the Galician Plan for Research, Innovation, and Growth 2011-2015^{cv}. The Plan comprised 10 strategic axes from which the 8th Strategic axis defined Sector Programs within 11 thematic areas which in fact were selected in accordance with the key areas indicated by the 7th Framework Programme of the EU. The prioritised sectors were:

- health, food, agriculture, fishing, and biotechnology;
- information and communication technologies;
- nano-science;
- nanotechnology;
- materials and new production technologies;
- energy;
- the environment (including climactic change);
- transportation (including aeronautics);
- socio-economic sciences and the humanities;
- safety.

In addition to these themes, the sectors of *construction* and *tourism* were prioritised due to their crucial role in the region's economy. The Plan foresaw a change in the governance and evaluation model of R&D&I system in the region towards a more international, result-oriented and participatory approach. For this purpose, it called for creation of the Galician Agency of Innovation. Consequently, the Galician Innovation Agency (GAIN) was launched in 2012. Around this Agency, the governing structure of the RIS3 for the region was formed, which adopted a participative structure comprising representatives of the Regional government, the knowledge institutions, business sector as well as citizens. Indeed, social participation during policy design and implementation took place in the Galician research and innovation policy arena for the first time through the design and implementation of the region's RIS3 strategy (González-López, 2019)^{cvii}.

RIS3 strategy of the region was finalised by the Galician Innovation Agency for the period 2014-2020. The RIS3 added *sectoral innovation programmes* as a new instrument to the region's innovation support mechanisms. This was done after a systematic procedure of identification of three

overall challenges the region faces. These challenges include innovative management of natural and cultural resources; new industrial model based on competitiveness and knowledge; and new healthy lifestyle model based on active ageing of population.

Additionally, Galicia has developed a cross-border smart specialisation strategy with the North Portugal region (RIS3T) for the period 2015-2020. This was done after both regions passed their respective RIS3, and set up a joint work group for developing the cross-border RIS3T. Table 5 summarises the priority areas of the Structural Funds' OPs and the regional innovation strategies of Galicia over the past two decades.

Table 5: Priority areas for the regional development of the Region of Galicia

Structural Funds			Research and innovation policies		
ERDF (2000-2006)	ERDF (2007-2013)	ERDF (2014-2020)	Galician Plan for Research, Innovation, and Growth (2011-2015)	RIS3 (2014-2020)	RIS3T (2015-2020)
<ul style="list-style-type: none"> -Competitiveness and aid to the productive based of the economy -Knowledge-based society - Environment, natural landscape and water resources -Development of the human resources - Urban and local development - Transport and energy networks - Agriculture and rural development regeneration - Fishing and aquaculture -Technical assistance 	<ul style="list-style-type: none"> - Transport and energy - Environment, protection of natural resources - Development & entrepreneurial innovation - Local & urban regeneration - Development of knowledge-based economy - Social infrastructure -Technical assistance 	<ul style="list-style-type: none"> - Low-Carbon Economy - Research & Innovation -Competitiveness of SMEs - ICTs - Environmental Protection and Resource Efficiency - Social Inclusion - Educational & Vocational Training - Climate Change Adaptation and Risk Prevention - Technical assistance 	<ul style="list-style-type: none"> •Health, food, agriculture, fishing, and biotechnology; •Information and communication technologies; •Nano-science; •Nanotechnology •Materials and new production technologies; •Energy; •The environment (incl. climactic change); •Transportation (including aeronautics); •Socio-economic sciences and the humanities; •Safety; •Construction; •Tourism 	<ul style="list-style-type: none"> - Modernisation of Primary Sectors - Valorisation of Sea - Development of Aquaculture - Biomass & Marine Energies - Tourism & ICT - Diversification of Driving Sectors - Enhanced competitiveness through new industrial concepts - Knowledge-based economy through ICT & KETs - Development of Active Aging Sector - Food & Nutrition for healthy living 	<ul style="list-style-type: none"> •Use of energy from biomass and the sea; •Agro-bio/ food industry •Manufacturing industry / industry 4.0 •Mobility industries / aeronautics industry •Modernisation of tourism and creative industries by using ICTs. •Advanced solutions for healthy living and active aging

As indicated in the Table 5, the areas of environmental protection, agro-food sector as well as energy show the most persistence across different innovation and developmental strategies in the region. The relatively high number of priority areas in the innovation policy areas is a characteristic of the research and innovation programmes, which reflects the Region's ambition for diversification of its economic growth areas.

As mentioned, the development of RIS3 of the region is deemed the first innovation policy development in the region which included social participation. According to the RIS3 document of Galicia, the EDP for the design of the strategy started with diagnosis of the *innovation system* within the region. This approach included identification of regional assets and resources, including the productive systems, agents and infrastructures within the region's innovation ecosystem. This has been then followed by identification of the regional technological entrepreneurship dynamics, as advance indicators of future trends to be supported and guided. Consequently, the region's exclusive features within an international and interregional perspective has been analysed in order to identify the region's competitive advantages. A SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) has concluded this process. This process has been reflected upon by Working Groups in seven areas, one of which has been dedicated to *citizen participation*. Citizen consultation has taken place through plenary events called Forums which were organised throughout the strategy development process. During the citizen consultation event, the participating citizens reflected upon the results of the SWOT analysis by answering to the questionnaire developed for this purpose.

2.4.2 Political governance at the region

In accordance with the Spanish Constitution of 1978, the regional Autonomous Communities have their own three branches of government, i.e. the legislative, the executive and the judicial branch. Regional elections in Galicia to elect the parliament of the Autonomous Community are held once every four years, and the last one took place in July 2020. The regional parliament of Galicia has 75 seats. The four provinces constituting Galicia (i.e. A Coruña, Lugo, Ourense and Pontevedra) are allocated minimum of 10 initial seats each, with the remaining 35 seats getting distributed in proportion to the provinces' populations.

The Galician parliament appoints the President of the Autonomous Government from among its members. The autonomous government in Galicia – called Xunta de Galicia - is in charge of passing laws, budget and taxes in the region. This government consists of the following ministries: Presidency, Public Administration and Justice; Treasury; Environment, Territory and Housing; Infrastructures and Mobility; Economy, Employment and Industry; Education, Universities and Vocational Training; Culture and Tourism; Health; Social Policy; Rural Environment; and Ministry of the Sea.

Autonomous Communities in Spain, according to the country's constitution, can assume competences in the following areas:

- Organisation of regional government institutions;
- Changes in municipal boundaries;
- Public order;
- Planning, urbanism and housing;
- Public works of regional interest;
- Transports (Regional railway and road networks; Regional transport; ports and airports not engaged in commercial activities);

- Agriculture and forestry;
- Environment (protection);
- Water management;
- Inland fisheries, hunting and aquaculture;
- Festivals;
- Promotion of economic development within the frame of the national policy;
- Craftwork;
- Culture (museums, libraries and music conservatories of regional interest; cultural heritage; promotion of culture and of the regional language when relevant);
- Promotion of regional tourism;
- Promotion of sports and leisure activities;
- Social assistance;
- Health and hygiene;
- Development and implementation of state basis legislation on such matters as general regulation of economic activity, education, public health or environment;
- Execution of state legislation on matters such as labour legislation, administration of justice or intellectual and industrial property.

Following the last regional elections held in July 2020, the incumbent conservative People's Party (PP) retained its dominance in the regional parliament with 48 per cent of the vote and 41 seats, and the President from the party was reinstated. The PP's ideology is based on conservatism and neoliberalism.

Strategic plans and policies on smart city, energy and transport

In order to inquire on the presence of technology assessment networks that shape innovation trajectories and ensure RRI, or more generally, on the governance mechanisms used to monitor technologies already implemented in the regional contexts to drive economic development, we focus on the three specific areas of smart city, energy and transport.

As indicated earlier, Galicia is one of the leading regions in Spain in terms of adopting renewable energies. The RIS3 document of the Region has emphasized energy generation from renewable resources, specifically based on biomass from the agriculture and livestock subsectors, as well as from the marine renewable energy (such as wave energy, offshore wind power, algae for biofuels).

In 2005 Galicia approved the first Galician strategy to address climate change, which had focus on the reduction of Green House Gases, with policies specified for sectors of energy, industry, agriculture, etc. More recently, Xunta de Galicia had contracted three universities from the region to develop its Strategy for Circular Economy, which was published in the year 2019 and its plan spans the 2019-2030 period^{cviii}. The document identifies six priority resources to be subjected to actions towards circular economy, including water, energy, waste, food, soil and air. While the document recognizes the significance of the areas of energy and transport for achieving the aims of circular economy, it avoids analysing them as ones of its axes in order to avoid duplicating with the Galician Energy and Climate Change Strategy^{cix}. This latter Strategy was adopted in 2019 as the Government of Galicia's roadmap to achieve climate neutrality before 2050. In order to operationalise the Strategy, the Region also adopted in 2019 the Integrated Regional Energy and Climate Plan 2019-2023^{cx}. The Galician Energy and Climate Change Strategy has been approved by consensus of the different Galician stakeholders, including the relevant public administration entities, research

centres, economic and social entities, companies, environmental organisations, and the three Galician universities, among others. This has taken shape through formation of sector-specific Working Tables, each of which have included above-mentioned stakeholders. The mentioned sectors have included: industry and energy; agriculture, forestry and livestock; marine environment and fisheries; biodiversity and natural environment; mobility and transport; and territory and services. The document elaborates on the social dimension, governance, and awareness for the strategy in a dedicated chapter, with identifying three objectives;

- Focus on education and social awareness:
 - Through professional and academic training
 - Through actions aimed at promoting citizen awareness;
- Guarantee the commitment of the Galician Public Administration;
- Promoting climate governance.

While there seems to be no reference to smart city strategies in the strategic documents at the regional level, the bigger cities in the region have several years of experience in dealing with the subject. The City Council of Santiago de Compostela has been working on a strategy to address the smart city challenges, calling it SMARTiAGO^{cxii} initiative, since 2012. For this purpose, the City Council has involved different actors from the local, regional and national innovation ecosystem. Its main goal has been to implement a Smart City Roadmap aimed at placing Santiago de Compostela as reference point on how to address smart city challenges in heritage cities. SMARTiAGO strategy focused specifically on the areas of ICT, citizen security, efficiency, environment and health.

Since 2016, the city has been involved in the EU project Smarter Together^{cxiii} (2016-2021) as one of the Follower Cities. Based on this, in 2019 the Integrated Replication Strategy Santiago de Compostela^{cxiii} was published. In line with the Smarter Together project, the five thematic areas of co-created and replicable integrated smart solutions for Santiago de Compostela has included:

- Data management platform & smart services;
- Electric-renewable energy sources;
- Holistic refurbishment;
- E-mobility;
- Citizen & stakeholder engagement.

Concerning the aspect of citizen and stakeholder engagement, the document puts emphasis on implementing and piloting the concept of urban living lab in the city. It also outlines the current plans and actions which are aligned with smart city objectives, in the areas of data and urban data platform, smart and sustainable mobility, holistic refurbishment, as well as citizen involvement experiences (p. 17).

Also the City Council of Vigo has taken some actions with regards to smart city solutions. It adopted in the year 2014 a plan for intelligent parking system in the city^{cxiv}, and it has been undertaking mobility management system in the city, connecting vehicles and infrastructure towards the aim of smart mobility.

2.4.3 Civic participation

Spain is a democratically governed country, and Democracy Index^{cxv} has ranked the country as the 16th country in the world (together with Austria) in terms of the quality of democracy in the year 2019. Among the considered dimensions, the functioning of the government receives the lowest score,

followed by the political participation. At the regional level, the voter turnout in the last regional elections in Galicia in 2020 has been 58.9%, which was up over two percent compared to the last election.

In 2011 Spain joined the international initiative Open Government Partnership (OGP)^{cxvi} which “aims to secure concrete commitments from national and subnational governments to promote open government, empower citizens, fight corruption, and harness new technologies to strengthen governance.” (Wikipedia^{cxvii}). In 2017 the Autonomous Community of Galicia joined the Training Axis by participating in the commitment of Education in Open Government^{cxviii}.

Galicia is the first Spanish autonomous community to have its own Act on Social Economy, one of key dimensions of which is citizen empowerment (Bastida et al., 2020)^{cxix}. The first Galician Social Economy Strategy (2019–2021) has addressed four social economy organisations with the greatest potential for employment generation: cooperatives, labor societies, special employment centers, and employment enterprises (Bastida et al., 2020).

RRI in territorial policy, research and innovation design

In order to gain an understanding on how the regional authorities deal with RRI in territorial policy, research and innovation design, we investigate whether there is any formal reference in the regional innovation strategy to responsible innovation and / or citizen engagement. The described process of the development of RIS3 of the Region indicates a late-stage and rather ad-hoc involvement of citizens in the strategy development. In addition, and as a consequence of the previous point, it can be argued that the role of citizens has been considered to be more geared towards validation of the results (the SWOT analysis) rather than co-creation or co-design of the strategy in a more integrated participatory approach.

In a similar vein, the review of the strategic documents related to the areas of energy and transport, manifested mainly in the Region’s Energy and Climate Change Strategy, reflects an approach based on which the citizens are subject to promotional activities and awareness raising, but not explicitly defined as agents within the planning, design and evaluation of those strategies and programmes related to them. When it concerns the smart city practices and experiences, however, the municipal-level actions and plans provide an image of more participatory approaches in the governance of the innovative activities undertaken or planned.

Nevertheless, the recent engagements of the Regional Government in international initiatives promoting more participatory modes of governance worth to be seen as a promising development.

2.4.4 Regional dilemmas

Galicia has a sparse geographical distribution of population inhabiting a high number of small towns and villages. This had for long raised the cost of providing general economic services in the past. While some of these hindrances related to infrastructures (such as telecommunication and roads) have been resolved during the 1990s and 2000s, there has been failures in the achievements of investments such as EU structural funds (Faina et al., 2013)^{cxx}. Notably, “the predominance of public administration in EU funding programmes has led over time to dispense the contribution of private beneficiaries” (Faina et al., *ibid*, p. 83).

While Galician fishing industry represents more than half of the Spanish finishing sector, overfishing and water pollution have been highlighted as environmental challenges Galicia faces (Cámara and Santero-Sánchez, 2019)^{cxxi}. Furthermore, conflicts have been reported between recreational fishers and other stakeholders, specifically the commercial fishing sector (Pita et al., 2018)^{cxxii}. These are some of the issues in need of multi-stakeholder collaboration and consensus in the fishing sector which is of paramount importance to the region.

Following the increased reputation of the tourist attractions in the region in the recent decades, mass tourism is another challenge Galicia has been trying to address during the recent years. This has raised concerns related to environmental, economic and socio-cultural aspects in the region (Kunaeva, 2012)^{cxxiii}. For instance, the rise of rural tourism in the region has led to tensions due to the accelerated closure of small family farms, which in turn leads to de-population of farming lands, resulting in negative impacts on the landscape and ecology of the region (Álvarez and Cortes-Vazquez, 2020)^{cxxiv}.

EC's MoRRI project^{cxxv} has generally characterized Spain as a country performing above average in terms of half of RRI dimensions, and below average in terms of the other half. The performance of the country is reported as being specifically high in the areas related to on gender equality and status and open access status, but also in public engagement in assessment. Nevertheless, the country is reported as being among the countries with low performance on public engagement participation, ethics in research funding organizations, open access action and gender equality action.

Furthermore, since January 2017 Galicia has been represented by the Galician Innovation Agency in the European Interreg project RRI-MARIE^{cxxvi}. The aim of the project, which will continue till the end of 2021, has been to improve the regional public policy in support of adopting principles of responsible research and innovation in innovation activities within the priority sectors of the region's smart specialization strategy. Through this participation, the interregional comparison of Galicia's 'regional RRI maturity' with 7 other regions in Europe has resulted in the region being characterized as a modest one, overall. Taking the individual indicators of RRI maturity into consideration, the practice of RRI in the region has been assessed as modest in terms of public engagement, ethics, and governance, and moderate in terms of gender equality, science education, and open access.

References for the section 1

Arnaldi, S. (2018). Retooling Techno-Moral Scenarios. A Revisited Technique for Exploring Alternative Regimes of Responsibility for Human Enhancement. *NanoEthics*, 12 (3), pp. 283-300. doi:10.1007/s11569-018-0329-6

Asheim, B. (2012). The Changing Role of Learning Regions in the Globalizing Knowledge Economy: A Theoretical Re-examination. *Regional Studies*, 46, pp. 993-1004.

Beccatinni, G. (1992). Le district marshallien: une notion socio-économique. In G. Benko, A. Lipietz (Eds) *Les régions qui gagnent: districts et réseaux. Les nouveaux paradigmes de la géographie économique*. Paris: PUF.

Boenink, M., Swierstra, T., & Stermerding, D. (2010). Anticipating the interaction between technology and morality: A scenario study of experimenting with humans in bionanotechnology. *Studies in Ethics, Law, and Technology*, 4 (2). doi:10.2202/1941-6008.1098

Burget, M., Bardone, E. & Pedaste, M. (2017). Definitions and Conceptual Dimensions of Responsible Research and Innovation: A Literature Review. *Science and Engineering Ethics*, 23 (1), pp.1-19.

Caryannis, E. G. & Campbell, D. F. J. (2009). "Mode 3" and "quadruple helix": toward a 21st century fractal innovation ecosystem, *International Journal of Technology Management*, 46 (3/4), pp. 201-233.

Chung, S. (2002). Building a national innovation system through regional innovation systems. *Technovation*, 22 (8), pp. 485–491. [https://doi.org/10.1016/S0166-4972\(01\)00035-9](https://doi.org/10.1016/S0166-4972(01)00035-9)

Coenen, L., Asheim, B., Bugge, M. M., & Herstad, S. J. (2017). Advancing regional innovation systems: What does evolutionary economic geography bring to the policy table?. *Environment and Planning C: Politics and Space*, 35 (4), pp. 600-620.

Coenen, L., & López, F. J. D. (2010). Comparing systems approaches to innovation and technological change for sustainable and competitive economies: an explorative study into conceptual commonalities, differences and complementarities. *Journal of Cleaner Production*, 18 (12), pp. 1149-1160.

Coenen, L. & Moodysson, J. (2009). Putting constructed regional advantage into Swedish practice. *European Planning Studies*, 17, pp. 587–604.

Coenen, L. & Morgan, K. (2019). Evolving geographies of innovation: existing paradigms, critiques and possible alternatives, *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, DOI: 10.1080/00291951.2019.1692065

Cooke, P. (1992). Regional innovation systems: Competitive regulation in the new Europe. *Geoforum; Journal of Physical, Human, and Regional Geosciences*, 23 (3), pp. 365–382. [https://doi.org/10.1016/0016-7185\(92\)90048-9](https://doi.org/10.1016/0016-7185(92)90048-9)

Cooke, P. (2005). Regionally asymmetric knowledge capabilities and open innovation: exploring 'Globalisation 2' – a new model of industry organisation, *Research Policy*, 34, pp. 1128-1149.

Crevoisier, O. (2004). The Innovative Milieus Approach: Toward a Territorialized Understanding of the Economy?, *Economic Geography*, 80, pp. 367-379.

De Saille, S. (2015). Innovating innovation policy: the emergence of 'Responsible Research and Innovation'. *Journal of Responsible Innovation*, 2(2), pp. 152-168. doi:10.1080/23299460.2015.1045280

Dijkstra, A. M., Schuijff, M., Yin, L., & Mkansi, S. (2017). *RRI in China and South Africa: Cultural Adaptation Report* (Deliverable 3.3 NUCLEUS project). Retrieved from Enschede: https://issuu.com/nucleusrri/docs/d3.3_nucleus_cultural_adaptation_re

DST (Department of Science and Technology, 2019) *White Paper on Science, Technology and Innovation. Science, technology and innovation enabling inclusive and sustainable South African development in a changing world*. Retrieved from Pretoria: https://www.dst.gov.za/images/2019/DRAFT_WHITE_PAPER_low_resC.pdf

Doloreux, D. & Prto, S. (2004). *Regional Innovation Systems: A Critical Review*. Maastricht: MERIT.

Emery, F., & Trist, E. (1960). Socio-technical Systems. In C. W. Churchman & M. Verhulst (Eds.), *Management Sciences Models and Techniques. Proceedings of the sixth international Meeting of the Institute of Management Science* (pp. 83-97). London: Pergamon Press.

European Commission, (2019). Responsible Research & Innovation. Retrieved from <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation#Article>

Fernandes, C., Farinha, L., Ferreira, J. J., Asheim, B. T. & Rutten, R. (2020). Regional innovation systems: what can we learn from 25 years of scientific achievements? *Regional Studies*, DOI: 10.1080/00343404.2020.1782878

Fitjar, R. D., Benneworth, P., & Asheim, B. T. (2019). Towards regional responsible research and innovation? Integrating RRI and RIS3 in European innovation policy. *Science and Public Policy*, 46 (5), pp. 772–783. doi:10.1093/scipol/scz029

Florida, R. (1995). Toward the learning region. *Futures*, 27 (5), pp. 527–536.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33 (6-7), pp. 897-920.

Genus, A., & Stirling, A. (2018). Collingridge and the dilemma of control: Towards responsible and accountable innovation. *Research policy*, 47 (1), pp. 61-69.

Haworth, P. S. & Dijkstra, A. M. (2019). Putting responsible research and innovation into practice at a local level in South Africa. In P. Weingart, M. Joubert, & B. Falade (Eds.), *Science Communication in South Africa: Reflections on Current Issues* (pp. 45-72). Cape Town: African Minds.

Jakobsen, S. E., Fløysand, A. & Overton, J. (2019). Expanding the field of Responsible Research and Innovation (RRI) – from responsible research to responsible innovation, *European Planning Studies*, 27 (12), pp. 2329-2343, DOI: 10.1080/09654313.2019.1667617

Landbaso, M., & Mouton., B. (2002). Towards new regional innovation policies: 8 years of European experience through innovative actions. In Van Geenhuizen, M.; Gibson, D.; & Heitor, M. (Eds). *Regional development and conditions for innovation in the network society*, Lisbon: Quorum Books.

Maillat, D. (1998). Innovative milieux and new generations of regional policies. *Entrepreneurship & Regional Development*, 10 (1), pp. 1-16.

Maskell, P. & Malmberg, A. (1999). Localized Learning and industrial Competitiveness. *Cambridge Journal of Economics*, 23, pp. 167-185.

Meissner, D., & Kotsemir, M. (2016). Conceptualizing the innovation process towards the “active innovation paradigm” – trends and outlook. *Journal of Innovation and Entrepreneurship*, 5 (14), pp. 1-18.

- Morgan, K. (1997). The learning regions: institutions, innovation and regional renewal. *Regional Studies*, 31 (5), pp. 491-503.
- OECD (2011). *Regions and innovation policy*, Paris: Organisation for Economic Cooperation and Development.
<http://www.oecd.org/innovation/oecdreviewsofregionalinnovationregionsandinnovationpolicy.htm>
- Pawson, R. and Tilley, N. (1997). *Realistic Evaluation*. Sage Publications, London.
- Rip, A. (2014). The past and future of RRI. *Life Sciences, Society and Policy*, 10 (1), 17. doi:10.1186/s40504-014-0017-4
- Shelley-Egan, C., Bowman, D. M., & Robinson, D. K. R. (2018). Devices of Responsibility: Over a Decade of Responsible Research and Innovation Initiatives for Nanotechnologies. *Science and Engineering Ethics*, 24 (6), pp. 1719-1746. doi:10.1007/s11948-017-9978-z
- Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42 (9), pp. 1568-1580. doi:10.1016/j.respol.2013.05.008
- Swierstra, T., Stemerding, D., & Boenink, M. (2009). Exploring Techno-Moral Change: The Case of the Obesity Pill. In P. Sollie & M. Düwell (Eds.), *Evaluating New Technologies* (Vol. 3, pp. 119-138): Springer Science+Business Media B.V.
- Thapa, R. K., Iakovleva, T., & Foss, L. (2019). Responsible research and innovation: a systematic review of the literature and its applications to regional studies, *European Planning Studies*, 27 (12), pp. 2470-2490, DOI: 10.1080/09654313.2019.1625871
- Trist, E. (1981). *The evolution of socio-technical systems; a conceptual framework and action research program*, Occasional paper, no. 2, June, Ontario Quality of working Life Centre, Canada.
- Uyarra, E., Ribeiro, B. & Dale-Clough, L. (2019). Exploring the normative turn in regional innovation policy: responsibility and the quest for public value, *European Planning Studies*, 27 (12), pp. 2359-2375, DOI: 10.1080/09654313.2019.1609425
- Von Schomberg, R. (2011). *Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields*. Luxembourg: Publication Office of the European Union.
- Von Schomberg, R. (2013). A Vision of Responsible Research and Innovation. In R. Owen, J. Bessant, & M. Heintz (Eds.), *Responsible Innovation. Managing the responsible emergence of science and innovation in society* (pp. 51-74). Chichester: John Wiley & Sons, Ltd.
- Zwart, H., Landeweerd, L., & van Rooij, A. (2014). Adapt or perish? Assessing the recent shift in the European funding arena from 'ELSA' to 'RRI'. *Life Sciences, Society and Policy*, 10 (11), pp. 1–19. doi:10.1186/s40504-014-0011-x

Notes for the section 2

Notes for the section 2.1

- ⁱ Statistics Norway (Statistisk sentralbyrå) [Table: 06913: Population and population changes, by region, contents and year.](#)
- ⁱⁱ Statistics Norway (Statistisk sentralbyrå) [Table 06913: Population and population changes, by region, contents and year.](#)
- ⁱⁱⁱ Vestland County Council / Statistics Norway; Sysselsette <https://statistikk.igest.no/hf/>
- ^{iv} Vestland County Council / Statistics Norway; Eksport og verdiskaping <https://statistikk.igest.no/hf/>
- ^v Vestland County Council / Statistics Norway; Eksport og verdiskaping <https://statistikk.igest.no/hf/>
- ^{vi} European Commission: Regional Innovation Scoreboard 2019, Regional profiles for Norway <https://ec.europa.eu/docsroom/documents/35934>
- ^{vii} Innovation Norway, https://www.innovasjon Norge.no/no/subsites/forside/om_klyngeprogrammet/kart/
- ^{viii} As Norway is not an EU country, it has not been obliged to use the EU-formula 'smart specialisation strategies'. However, the policymaking tradition in the country is clearly related to the approach.
- ^{ix} Sources: Final report of the VRI program by the Norwegian Research Council (Forskingsrådet)
- ^x Sörvik, J. and Midtkandal, I (2016). Continuous priority setting – in the Norwegian VRI programme. In Kyriakou, D., Palazuelos Martínez, M., Periáñez-Forte, I., and Rainoldi, A. (Eds) *Governing Smart Specialisation*. 1st Edition. London: Routledge.
- ^{xi} Portal of Vestland County Council <https://www.vestlandfylke.no/politikk/politisk-organisering/fylkesordforar-og-fylkesvaraordforar/>
- ^{xii} A short introduction to Vestland County Council. Presentation by Clarke, K & Dixon, M. RRI2SCALE kick-off meeting 14th-15th January 2020, Rome.
- ^{xiii} Vestland County (2020), *Utviklingsplan for Vestland 2020-2014 – Regional planstrategi: Høringsforslag*
- ^{xiv} At the time of writing this report, the regional plan for innovation and business development is being revised by the County Council.
- ^{xv} Available from https://www.bergen.kommune.no/bk/multimedia/archive/00241/KPS_vedtatt_241910a.pdf
- ^{xvi} Available from https://doga.no/globalassets/pdf/smartby-veikart-19x23cm-eng-v1_delt.pdf
- ^{xvii} <https://www.eiu.com/topic/democracy-index>
- ^{xviii} Neira, I., Portela, M., and Vieira, E. (2010). Social capital and growth in European regions. *Regional and Sectoral Economic Studies*. 10 (2)
- ^{xix} <https://www.regjeringen.no/en/dokumenter/public-participation-in-planning/id2510931/>
- ^{xx} Walnum et al. (2019) *Sustainable cruises: Understanding and optimizing people, planet and profit – Summary and Synthesis Report*.
- ^{xxi} See for example <https://www.newsinenglish.no/2020/06/22/wind-power-set-to-blow-less-fiercely/>

Notes for the section 2.2

- ^{xxii} StatLine, Statistics Netherlands (CBS) <https://opendata.cbs.nl/statline/#/CBS/nl/dataset/37230ned/table>
- ^{xxiii} StatLine, Statistics Netherlands (CBS) <https://opendata.cbs.nl/statline/#/CBS/en/dataset/37259eng/table?ts=1600603056879>
- ^{xxiv} Brouwer, A., van Witteloostuijn, A. and Boone, C. (2006). The dynamics of economic performance and organizational diversity – An empirical study in Zwolle, the Netherlands, 1850-1914. Paper presented at the European Regional Science Association Conference Volos, Greece, August 30th - September 3rd, 2006.
- ^{xxv} Bazen, J. C. & Bijleveld, P. C. (2012). Re-structuring of a Dutch mono-industrial region; example of Twente. In *The social and economic problems of monotowns*. Opgehaald van <https://www.hbokennisbank.nl/record/853FB5C3-0BD6-4CA5-B0C0D2A87197F1C8>

^{xxvi} StatLine, Statistics Netherlands (CBS)

<https://opendata.cbs.nl/statline/#/CBS/en/dataset/84432ENG/table?ts=1586410350812>

^{xxvii} European Commission <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/overijssel>

^{xxviii} Statistics Netherlands (2019). Nederland: Handelsland - Export, investeringen & werkgelegenheid 2019

^{xxix} Benneworth, P., & Charles, D. (2005). University spin-off policies and economic development in less successful regions: Learning from two decades of policy practice. *European Planning Studies*, 13 (4), pp. 537-557. doi:10.1080/09654310500107175

^{xxx} European Commission: Regional Innovation Scoreboard 2019

<https://ec.europa.eu/growth/sites/growth/files/ris2019.pdf>

^{xxxi} Wintjes, R. (2007), Country Review: The Netherlands, Monitoring and Analysis of Policy and Public Financing Instruments Conducive to Higher Levels of R&D Investments – The “Policy Mix” Project, UNU-MERIT, Maastricht University.

^{xxxii} OECD (2014), OECD Reviews of Innovation Policy: Netherlands 2014, OECD Publishing. <http://dx.doi.org/10.1787/9789264213159-en>

^{xxxiii} Wintjes, R. & Hollanders, H. (2012) Regional Innovation Monitor: Regional Innovation Report Gelderland. Report prepared for DG Enterprise and Industry of the European Commission.

^{xxxiv} Ahoba-Sam et al. (2018). Higher Education Institutes and the Twente Board – Policy Report. RUNIN Project Working Paper #01/2019

^{xxxv} Slimme specialisatiestrategie (RIS3) Oost-Nederland 2021-2027 - Versie 1.0 https://www.technopolis-group.com/wp-content/uploads/2020/05/RIS3_Oost-Nederland_versie_1_0_DEF.pdf

^{xxxvi} There is Social and Economic Council (SER) at the national level in the Netherlands, which advises the government and parliament at national level. Four provinces, however, have their own SER organizations, including the province of Overijssel. Entrepreneurs and employees are also represented in these organizations.

^{xxxvii} Hoppe, T., Kooijman-van Dijk, A., and Arentsen, M. (2011). Governance of bio-energy: The case of Overijssel. In proceedings of the Resilience Societies Conference, IGS, University of Twente, Enschede, The Netherlands, 19-21 October 2011.

^{xxxviii} Warbroek, B., and Hoppe, T. (2017) Modes of governing and policy of local and regional governments supporting local low-carbon energy initiatives; Exploring the cases of the Dutch regions of Overijssel and Fryslan. *Sustainability*, 9, 75.

^{xxxix} Available from

https://www.overijssel.nl/publish/library/421/uitvoeringsprogramma_nieuwe_energie_overijssel_drempelvrij_def.pdf

^{xl} See <https://www.overijssel.nl/loket/ter-inzage-zienswijz/terinzagelegging/tiz-omgevingsvisie-verordening/>

^{xli} Sengers, F. (2016). Smart-Eco Cities in the Netherlands: Trends and City Profiles 2016. Exeter: University of Exeter (SMART-ECO Project).

^{xlii} Available from https://www.rug.nl/research/portal/files/42130042/NL_Smart_City_Strategie_.pdf

^{xliii} National Government [Rijksoverheid] (2013) King’s Speech [Troonrede]. Den Haag: Ministerie van Algemene Zaken.

^{xliv} Schmeets, H., & Te Riele, S. (2014). Declining social cohesion in The Netherlands? *Social Indicators Research*, 115 (2), pp. 791–812. doi:10.1007/s11205-013-0234-x.

^{xlv} See <https://www.topfit.life/mission-programmes/>

^{xlvi} de Bruijn, T. J. N. M., and Entrop, A. G. (2019). Developing a transition agenda towards a circular economy: the Dutch case of the province of Overijssel. IOP Conf. Ser.: *Earth Environ. Sci.* 297, 012012

^{xlvii} Monitoring the evolution and benefits of responsible research and innovation in Europe - Summarising insights from the MoRRI project. Available from http://www.guninetwork.org/files/final_report_morri.pdf

Notes for the section 2.3

^{xlviii} <https://www.citypopulation.de/en/greece/nuts/admin/>

^{xlix} <https://en.wikipedia.org/wiki/Heraklion>

^l George, M., & Georgios, M. M. (2017). The Expansion of the Contemporary Economic Role of Crete throughout Its Extensive History. *International Journal of Economics, Business and Management Studies*, 4 (1), pp. 17-37.

^{li} Ioannides, Y. M., & Petrakos, G. (2000). Regional disparities in Greece: The performance of Crete, Peloponnese and Thessaly, EIB Papers, ISSN 0257-7755, European Investment Bank (EIB), Luxembourg, Vol. 5, Iss. 1, pp. 30-58

^{lii} Source: Source: OECD Regional Database. <https://www.oecd.org/cfe/GREECE-Regions-and-Cities-2018.pdf>

^{liii} <https://www.euractiv.com/section/energy/news/greece-sits-on-huge-offshore-gas-reserve-study-says/>

^{liv} EURES labour market information

<https://ec.europa.eu/eures/main.jsp?catId=378&acro=lmi&mode=&recordLang=el&lang=el&parentId=&countryId=GR®ionId=GR4>

^{lv} See George & Georgios (2017)

^{lvi} See <https://ec.europa.eu/docsroom/documents/41877/attachments/1/translations/en/renditions/native>

^{lvii} Nikolaidis, Y. & Bakouros, I. (2009). Innovation penetration into a region with specific features: the case of Crete, Greece. *International Journal of Entrepreneurship and Innovation Management*, 9 (1), pp. 118-138.

^{lviii} Reid, A., Markianidou, P., & Evrigenis, A. (2015) Pockets of excellence with innovation potential – A study for the European Commission DG Research and Innovation, Unit A6 – RISE Team. Available from https://www.researchgate.net/publication/312526057_Pockets_of_excellence_with_innovation_potential

^{lix} Regional Innovation Scoreboard 2019, Regional profiles by country – Greece <https://ec.europa.eu/docsroom/documents/36285/attachments/1/translations/en/renditions/native>

^{lx} RITTS stands for Regional Innovation and Technology Transfer infrastructures and Strategies

^{lxi} https://archive.org/stream/RegionalInnovationExcellenceInGreece/RIEG_EN_Bezirtzoglou_djvu.txt

^{lxii} DG REGIO (2012). RIS3 Regional Assessment: Crete. Available from <https://www.urenio.org/wp-content/uploads/2013/04/RIS3-review-report-Crete-final-edited-2012.pdf>

^{lxiii} Management Authority of Crete Region (2015). Smart Specialisation Strategy of Crete Region – Abbreviated Text. Available from <http://ris3.crete.gov.gr/wp-content/uploads/2017/02/ris3-crete-region-en.pdf>

^{lxiv} https://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/greece/2014gr16m2op011

^{lxv} Reproduced from Reid et al. (2015)

^{lxvi} Known as Kallikratis Programme, its implementation started with the November 2010 local elections.

^{lxvii} Following the electoral victory of Syriza party in 2015, the new Minister for the Interior declared that the decentralized administrations would be abolished, and their competencies will be transferred to the regions. <https://www.kathimerini.gr/society/802297/katargisi-apokentromenon-dioikiseon/> (in Greek).

^{lxviii} https://en.wikipedia.org/wiki/Kallikratis_Plan

^{lxix} Adopted from the presentation of Eleni Stamataki from Region of Crete at the RRI2Scale project's consortium meeting in Rome, 14-15 January 2020

^{lxx} The administrative structure is available from

<http://www.apdkritis.gov.gr/el/%CE%B4%CE%B9%CE%BF%CE%B9%CE%BA%CE%B7%CF%84%CE%B9%CE%BA%CE%AE-%CE%B4%CE%BF%CE%BC%CE%AE>

^{lxxi} Crete's regional units of Chania and Heraklion have voted overwhelmingly and uninterruptedly for the left and center-left political parties in legislative elections in Greece since 1996.

^{lxxii} Available from https://ec.europa.eu/energy/sites/ener/files/el_final_necp_main_en.pdf

^{lxxiii} Manasaki, V., Apostolaki, M. & Golovanis, M. (2016). The region of Crete: An integrated and sustainable energy planning. Trivent Publishing.

^{lxxiv} <https://energypress.gr/news/sta-heria-tis-perifereias-i-meleti-toy-emp-gia-ton-energeiako-shediasmo-tis-kritis-os-2050>

^{lxxv} Marinos, N. (2018) Energy strategy of Crete: Potential expansion of renewable systems with interconnection. Master of Science Thesis, University of Strathclyde.

^{lxxvi} Approval was with the condition that the SMPE also consider the road projects proposed for inclusion in the Trans-European Transport Networks, as provided by the approved Regional Spatial Framework of the Region of Crete.

^{lxxvii} <https://www.kriti24.gr/kriti-egkrithike-i-stratigiki-meleti-gia-to-ethniko-stratigiko-schedio-metaforon/>

^{lxxviii} <https://civitas.eu/content/crete-region>

^{lxxix} Alexopoulos, C. et al. (2018) A taxonomy for analyzing smart cities developments in Greece. ICEGOV '18: Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance, April 2018, pp. 537-549 <https://doi.org/10.1145/3209415.3209471>

^{lxxx} https://urbact.eu/sites/default/files/282_Heraklion_Gpsummary.pdf

^{lxxxi} Available from <https://smartcity.heraklion.gr/wp-content/uploads/2017/06/HeraklionSmartCityStrategicPlan.pdf> (in Greek)

^{lxxxii} <https://smartcity.heraklion.gr/en/home/>

^{lxxxiii} <https://www.eiu.com/topic/democracy-index>

^{lxxxiv} See <https://ekloges.ypes.gr/current/p/home/en/regions/13/>

^{lxxxv} See for instance <https://cosie.turkuamk.fi/general/co-creation-in-greece-its-all-greek-to-me/>

^{lxxxvi} Sotiropoulos, D. A. & Bourikos, D. (2014). Economic crisis, social solidarity and the voluntary sector in Greece. *Journal of Power, Politics & Governance*, 2 (2), pp. 33-53.

^{lxxxvii} See https://medwet.org/wp-content/uploads/2016/11/WWF_LAYMANs_ENG.pdf

^{lxxxviii} Nikolopoulou, K. (2019). Grass-roots initiatives and bottom-up musealisation mechanisms in urban space: the case of Heraklion Crete. *Heritage*, 2 (3), pp. 1912-1926; <https://doi.org/10.3390/heritage2030116>

^{lxxxix} Adapted from Saitakis, A. (2013). Crete: towards a RIS3 strategy. Presentation at Smart Specialisation Platform. Heraklion, 26-27 September 2013.

^{xc} <https://www.futouris.org/en/news/crete-first-steps-towards-a-sustainable-food-destination/>

^{xci} See <https://www.ert.gr/perifereiakoi-stathmoi/iraklio/proti-synedriasi-tis-neas-epitropis-isotitas-kritis/>

Notes for the section 2.4

^{xcii} INE – National Statistics Institute of Spain <https://www.ine.es/jaxiT3/Datos.htm?t=2853#!tabs-tabla>

^{xciii} https://www.citypopulation.de/en/spain/galicia/a_coru%C3%B1a/15078_santiago_de_compostela/

^{xciv} Álvarez, L. A. (2010). The economy of Galicia, an overview C. 1750 – 2010. *Historia Contemporánea*, 42, pp. 15-65

^{xcv} Hannum, K. L. (2020). Sociolinguistic consequences of economic convergence in Galicia, Spain. *The Professional Geographer*, 72 (3), pp. 371-382.

^{xcvi} Cancelo, J. R., Faina, A., & Lopez-Rodriguez, J. (2009). Measuring the permanent impact of European Structural Funds on peripheral objective 1 regions: The case of Galicia. *European Planning Studies*, 17 (10), pp. 1535-1558.

^{xcvii} https://ec.europa.eu/regional_policy/en/atlas/programmes/2007-2013/spain/operational-programme-galicia

^{xcviii} INE – National Statistics Institute of Spain <https://www.ine.es/jaxiT3/Datos.htm?t=4966#!tabs-tabla>

^{xcix} <https://ec.europa.eu/eures/main.jsp?catId=450&acro=Imi&lang=en&countryId=ES®ionId=ES1&nuts2Code=ES11&nuts3Code=null®ionName=Galicia>

^c <https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/galicia>

^{ci} Steen, M., Faller, F., & Ullern, E. F. (2016). The role of regions in promoting sustainable energy with smart specialisation strategies. CENSES working paper 6/2016.

^{cii} Regional Innovation Scoreboard 2019; Available from <https://ec.europa.eu/growth/sites/growth/files/ris2019.pdf> 30/09/2020

- ciii <http://cetim.es/galicia-destaca-en-el-impulso-de-proyectos-promovidos-a-traves-de-la-compra-publica-innovadora/?lang=en>
- civ Borrás, S. & Jordana, J. (2016). When regional innovation policies meet policy rationales and evidence: A plea for policy analysis. *European Planning Studies*, 24 (12), pp. 2133-2153.
- cv Colombelli, A., M. Foddi and R. Paci (2013). Scientific Regions. In R. Capello and C. Lenzi. (Eds.) *Territorial Patterns of Innovation. An Inquiry on the Knowledge Economy of European Regions*. London, Routledge: 43-69.
- cvi Available from http://documentos.galiciainnovacion.es/PlanI2C/GALICIAN-PLAN-FOR-RIG_2011-2015.pdf
- cvii González-López, M. (2019). Understanding policy learning in regional innovation policies: lessons from the Galician case. *Innovation: The European Journal of Social Science Research*. 32 (1), pp. 104-118.
- cviii Available from https://ficheiros-web.xunta.gal/transparencia/informacion-publica/EGEC_cas.pdf
- cix Available from https://cambioclimatico.xunta.gal/c/document_library/get_file?folderId=86590&name=DLFE-54555.pdf (in Spanish)
- cx Available from https://cambioclimatico.xunta.gal/c/document_library/get_file?folderId=86590&name=DLFE-54456.pdf (in Spanish)
- cxii Portal of the initiative is available from <https://smartiago.santiagodecompostela.gal/es/smartiago/documentos>
- cxiii <https://www.smarter-together.eu/>
- cxiiii Available from <https://www.smarter-together.eu/file-download/download/public/1027>
- cxv See <https://hoxe.vigo.org/pdf/valedorcidadan/SmarCityCastellano.pdf>
- cxvi See <https://www.eiu.com/topic/democracy-index>
- cxvii <https://www.opengovpartnership.org/>
- cxviii https://en.wikipedia.org/wiki/Open_Government_Partnership
- cxix See Page 90 in the National Action Plan of Spain 2017-2019, available from https://transparencia.gob.es/transparencia/dam/jcr:7bcfaa1f-e2c0-482f-8913-12a45a8bc62e/SPA-ENG_III_Plan_OGP_v2018_vf.pdf
- cxix Bastida, M., Garcia, A. V., Marquez, M. C., & Blanco, A. O. (2020). Fostering the Sustainable Development Goals from an Ecosystem Conducive to the SE: The Galician's Case. *Sustainability*, 12 (2), 500 <https://doi.org/10.3390/su12020500>
- cxix Faíña, A., López-Rodríguez, J., Romero, I., Fernández-Serrano, J., and Montes-Solla, P. (2013). *Evaluation of the main achievements of cohesion policy programmes and projects over the longer term in 15 selected regions (from 1989-1993 programming period to the present). Case Study Andalucía*. University of A Coruña, University of Seville, London School of Economics and European Policies Research Centre of the University of Strathclyde.
- cxix Cámara, A. & Santero-Sánchez, R. (2019). Economic, Social, and Environmental Impact of a Sustainable Fisheries Model in Spain. *Sustainability*, 11 (6311), pp. 1-16
- cxix Pita, P., Hyder, K., Gomes, P., Pita, C., Rangel, M., Veiga, P., et al. (2018). Economic, social and ecological attributes of marine recreational fisheries in Galicia, Spain. *Fisheries Research*. 208, pp. 58–69. doi: 10.1016/j.fishres.2018.07.014
- cxix Kunaeva, M. (2012). Sustainable Tourism Management along the Camino de Santiago Pilgrimage Routes. Master's Thesis submitted to the Haaga-Halla University of Applied Sciences, Helsinki.
- cxix Álvarez, B.M.; Cortes-Vazquez, J.A. “May the Smoke Keep Coming Out the Fireplace”: Moral Connections between Rural Tourism and Socio-Ecological Resilience in the EUME Region, Galicia. *Sustainability* 2020, 12, 4602.
- cxix <http://morri-project.eu/reports/2018-03-14-short-draft-final-report-on-insights-from-monitoring-the-evolution-and-benefits-of-rri-in-europe>
- cxix Portal of the project is available from <https://www.interregeurope.eu/marie/>