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Interplay between Technological and Social Innovation

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Covers research on.the "Interplay between Technological and Social Innovation" in relation to the economic underpinnings of social innovation.

SIMPACT

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Interplay between Technological and Social Innovation

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ABSTRACT

The concept of innovation has become broader, across fields and across era, both in terms of 'means' and 'ends'. The mainstream literature emphasizes technological change as driver of economic change and performance. Looking beyond the mere technological and economic aspects, the concept of social innovation emphasizes social processes as 'means' and social purposes as 'ends'. We begin by discussing the difference between technological and social innovation, before proceeding further to investigate the interplay between technological innovation and social innovation. We will argue that Information and Communication Technologies (ICT) are used in social innovation in many ways and that more investments would be required to fully integrate technology into social innovation processes and phases. The co-evolution of technological and social innovation highlights the importance of policies in support of social innovators, innovation networks as well as technology and knowledge intensive inputs and outputs.

Contents

1 INTRODUCTION

Our understanding of innovation, its sources, processes and social and economic impacts has changed over time. The pace of innovation has affected and changed our lives, the way we work, produce, exchange and interact. For decades, the concept of innovation has been associated with technical changes and technological inventions leading to enhanced productivity and economic performance. While certain innovations have been beneficial for societal transformation, some have led to the deterioration of the environment and caused social exclusion. For instance, eco-innovations have been instrumental in protecting resources and improving the environment. Similarly, genome sequencing technology has revolutionized molecular biology and proven pivotal providing a wide array of medical treatments for genetic diseases. One should note that many solutions to economic, social and environmental problems can be achieved without aiming to maximize profits. A growing number of solutions are found on the periphery of the existing markets. Individuals and organizations can steer changes by using novel techniques, methods and processes that can best fit their needs and objectives.

In this paper we look at the interplay, interactions and interdependencies between technological and social innovations. The interplay between social and technological innovations takes place with as a result of learning and collaborative schemes that seek to enhance synergies and lessen potential conflicts by using a variety of drivers to overcome barriers to social transformation. More importantly, the interplay of social and technological innovations underpins the co-evolution of social and technical changes that can, in turn, accelerate social achievement.

This paper aims to highlight the transformative role of information and communication technologies as well as the disruptive nature of the Internet as a general purpose technology. A particular emphasis is placed on the pivotal role of technological inputs and outputs through different development phases of social innovation. More importantly, our study sheds further light on how technological change is likely to affect the components, objectives and principles of social innovation presented and discussed in WP1 of the SIMPACT project. Within this frame of research, SIMPACT has defined social innovation as "*novel combination of ideas and distinct forms of collaboration that transcend established institutional contexts, with the effect of empowering and (re) engaging vulnerable groups either in the process of innovation or as a result of it*" (Rehfeld et al., 2015). In studying the drivers and impediments of social transformation, SIMPACT points to the importance of social innovation 'components' in conjunction with the pivotal role of social actors composed primarily of policy makers, social enterprises, entrepreneurs and institutions. Political, social, economic, cultural institutions provide a variety of incentives and resources with the objective of building human and social capabilities. While social innovation components investigate the role and interactions of actors *per se*, social innovation 'principles' examine the multiple dilemmas that result from choices and preferences for economic 'regulation' versus 'laissez-faire' when considering the outcome and impact of social innovations. This point is addressed when one considers the 'objectives' of social innovation in terms of societal and social achievements, in particular the problems of inclusion, empowerment, wellbeing and welfare at micro, meso and macro level.

2 SOURCES AND SCOPE OF INNOVATION

In the absence of a commonly agreed definition of social innovation, various strands of literature have pointed to differences and distinctions that are associated with different dimensions of innovation. (Rueede & Lurtz, 2012; Edwards-Schachter & Wallace, 2015; Benneworth et al., 2015). Social innovation may mean different things to different actors; firms, entrepreneurs, institutions and policymakers. Yet, social innovation, its evolution and trajectory cannot be dissociated from its objectives and contexts. Among the objectives, individual wellbeing and welfare systems constitute important levers for social transformation. Similarly, institutional and market contexts, regulatory and competitive market structures and measures have a direct bearing on the units of analysis such as for profit and non-profit organizations, firms, associations and cooperatives. Most studies of social

innovation point to the factors that, on the one hand affect products and services through ideas, actions and initiatives; practices, techniques, processes and routines, and on the other shape the (co)evolution of firms, organizations and institutions along with structures and policies; markets and networks. The primary objective of these studies consists of identifying the mechanisms through which social innovators can bring durable changes in cognitive frames, perceptions and expectations.

In the absence of a common framework of analysis, one may examine the sources and scope of different types of innovation and examine their cominatory effects over time. Differences in technological opportunities have been a driving force shaping the trajectory of technological change. The "supply push" view of technological progress highlights the fact that the opportunities for technological change are closely associated with the underlying science, stock and flow of knowledge. Broadly speaking, fours areas of the marketplace affect innovation: the appropriability of new ideas, the structure of the industry, the size of the market, investment in public knowledge and institutions. These factors are likely to affect social relations and set the stage for a continuous process of change, from technological change to economic growth and from economic growth to social change. The process is likely to continue as social factors can in turn affect the economic and market forces and ultimately reaching organizations, R&D and shape the innovation trajectory across fields and eras.

Howaldt et al. (2016: 34) state that the invention and diffusion of the steam engine, the computer or the smartphone *"should be regarded differently from the invention and social spread of a national system of healthcare provision, the concept of corporate social responsibility (CSR) or a system of micro financing"*. Yet, one should not forget that many recent social innovations in educational, healthcare and financial services have been closely associated with the advent of information and communication technologies, the development of hardware systems and software solutions and the growing pace of networks of users, intermediaries and investors. Ziegler et al. (2016: 5) explain how changes in urban water provision, sanitation and wastewater removal across European cities since the mid-19th century have been *"the vehicle for a leap forward in human progress […] the improved sanitation contributed to a 15-year increase in life expectancy in the four decades after 1880"*. Many of these changes have been brought about by combinatory effects of social reforms, improved understanding of diseases, engineering developments, and investments in infrastructure (Scheuerle et al., 2016). The use of new technologies that can help monitor water usage in numerous urban, suburban and rural zones have improved resource efficiency at regional and national levels and by the same token help protect the environment at local and global level. One can observe how technological improvements coupled with social innovation can lead to societal transformation and change.

Mulgan (2007) provides a list of major social innovations which have changed the world. Several of these innovations contain a high technology component, (i.e. Open University and distance learning using Linux software to build a knowledge exchange platform), other open source methods used to disseminate information (i.e. Wikipedia, Ohmynews) and provide services to patients including outpatient and medical services (i.e. NHS direct, Expert Patients Programme) and citizens (i.e. participatory economic and social services to numerous citizens).

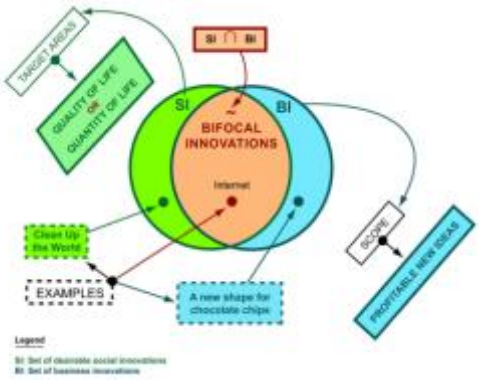
Other forms of social innovation have emanated from institutional changes and new social structures that have accelerate the process of social transformation (Hamalainen & Heiscala, 2007). Heiscala (2007) identifies five ideal types of innovation: technological, economic, regulative, normative and cultural innovations. Technological innovations provide novel ways to transform the material reality of our existence. Economic innovations highlight the methods and processes by which economic value is identified, created and appropriated. Regulative innovations focus on transformative effects of regulatory measures and environment. Equally important are normative and cultural innovations which challenge the established value systems and social norms as well as the existing cognitive and mental frames. According to this typology, regulative, normative and cultural innovations form the sphere of social innovations (Heiscala, 2007: 59). The idea of novelty and how one can adopt new and better ways of doing is

equally present in Schumpeter's (1934) writings on technological and social routines acquired through knowledge. In Schumpeter's words *"knowledge once acquired becomes as firmly rooted as a railway embankment in the earth. It sinks into the strata of subconsciousness, everything we think, feel or do often enough becomes automatic"* (Schumpeter, 1934: 84)

The technological and economic forces that shape and affect the social and organisational order are opposed by practices and routines that are deeply rooted in individual and collective habits. Schumpeter reminds us of the resistance to change: "*the very nature of fixed habits of thinking, their energy-saving function, is founded upon the fact that they have become sub-conscious, that they yield their results automatically and are proof against criticism and even against contradiction by individual facts. In the breast of one who wishes to do something new, the forces of habit raise up and bear witness against the embryonic project*" (Schumpeter, 1934: 84)

Technological innovation is often viewed as a driver of economic change and how is likely to generate numerous benefits. In contrast, social innovations emphasize the social impact caused by change; wellbeing, inclusion, quality of life and welfare. In this regard, technological innovations have a direct bearing on the day-to-day life of individuals as they are likely to affect people's quality of life and wellbeing. The point is highlighted in figure 1 whereby the conjoint effect of business innovation and social change sets the stage for a bifocal approach when assessing social and economic transformation.

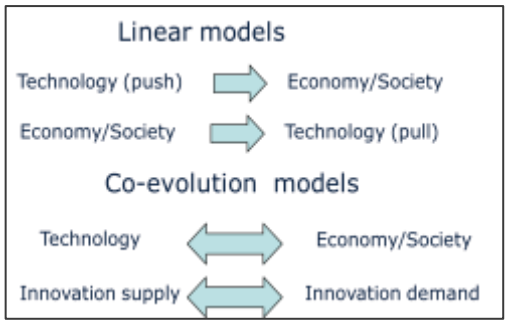
Figure 1. The relationship between business and social innovation



2.1 Technological Innovation Trajectory

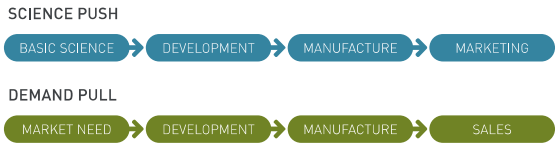
The conjoint effect of technological and social innovations can be traced through a (co)evolutionary process of change beginning with scientific findings, through development and manufacturing phases to market entry and commercialization phase. The co-evolutionary model of change emphasizes the circularity and causality paths between technological and socio-economic changes as well as supply and demand cycles of innovation as shown in figure 2.

Figure 2. Linear versus co-evolution models



The traditional linear model views innovation as a linear process, starting with scientific research and a R&D stage which encompasses new inventions, patent registration, prototyping, and leads to the development of new products and services to be followed by market entry, marketing and commercialization phases (see figure 3).

Figure 3. Linear models of Innovation



The supply-side model characterized by R&D push may or may not be associated with a demand and need pull creating a dual linear loop in technological change (see figure 4). One should note that the innovation feed-back loops are as much associated with scientific developments and technical improvements as driven by business opportunities that are brought about by explicit

social needs and market imperfections (see figure 4).

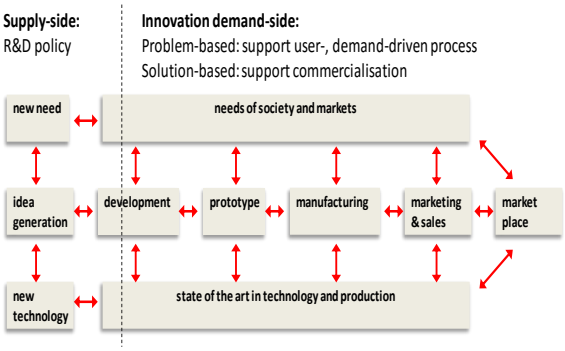


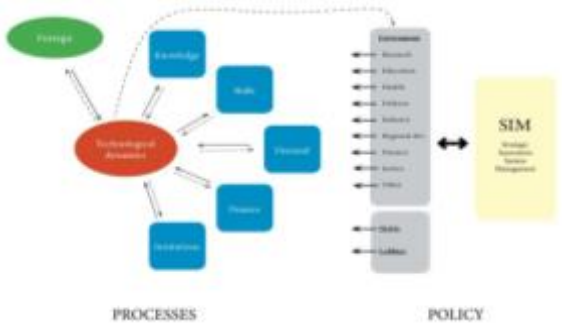
Figure 4. Innovation supply and demand

The evolutionary and institutional research corpus sheds further light on the linkage between the demande and supply of innovation within different market and institutional contexts. Lundvall (1992) provides an explanation of the evolutionary process of innovation reinforced by interactive learning between producers and users of knowledge. A distinction is made between different components and subsets: 'science, technology, innovation' versus 'learning by doing, using and interacting'.

Fagerberg (2014) underscores the importance of policy in supporting the innovation dynamics. Governments' social policies that address societal challenges spur demand for technological innovation. In particular, technology provides an efficient mechanism to serve challenges in the fields of environment, health, education and security. Governments may identify and develop distinct systems of innovation within different policy fields characterized by a distinct knowledge base, set of skills and innovation management system. Figure 5 provides an example of a national system of technological innovation for different policy fields promoted by governments and policy makers.

The information and communication technologies (ICT) provide a necessary support for overcoming a wide array of organizational, technical and social problems. A key characteristic of technological and ICT innovations resides in their ubiquitous and pervasive nature that can simultaneously affect individuals, networks, markets and organizations. Technological changes may prove to be disruptive affecting firms and organizations as well as social relationships.

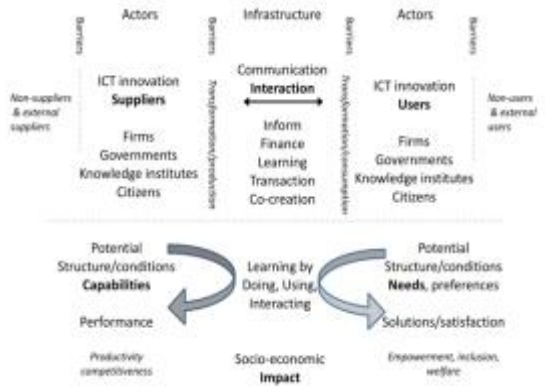
Figure 5. System of technological innovation



Source: Fagerberg 2013

Figure 6 portrays the link between the suppliers and users of innovation (i.e. firm, government, citizens) who set up and support the innovation infrastructure through collective. Governments, firms, knowledge institutes and citizens appear and interact on both the demand and supply side of innovation. This constitutes a quadruple-helix organization in which learning capabilities are enhanced by doing, using and interacting with the other actors. Users and suppliers of innovation operate through ICT platforms designed to support complex networks of users, intermediaries and investors. The interaction mechanisms include not only economic and financial transactions, but also support financing and investing in learning and collaborative schemes and mechanisms such as regulation and standardization. This approach has the merit of supporting and empowering citizens who wish to participate actively in transforming the society.

Figure 6. Suppliers **and users of innovation**



2.2 Actors, Networks and Social Innovation: The SIMPACT Approach

The SIMPACT project's primary emphasis on social inclusion and economic empowerment highlights the importance of collaborative schemes to transcend the established market and institutional contexts.

The reference to vulnerable and marginalized groups and their needs which are not met by the existing market and institutional settings calls for a reorganization of social ties as well as (re)orchestration of resources at micro and macro levels. This implies the creation and development of a wide array of networks (i.e. users, producers, social workers, citizens) with the intention of creating and sustaining closer ties among the stakeholders. In this regard, information and communication technologies constitute the cornerstone of social innovation networks.

SIMPACT's proposed framework seeks to extend the innovation cycle through an integrative model at micro, meso and macro level by investigating the multilevel dimensions of social ties that result from coordinated and collective actions. Rehfeld et al. (2015: 44) pinpoint the importance of the co-evolution of stakeholders whose interactions lead to dynamic and mutually beneficial cooperation. SIMPACT's emphasis on the interplay and coevolution of actors implies a high degree of embeddedness between social, economic, cultural and political spheres. The growing embeddedness of economic and social activities raises the question of technology as a mediating force that accelerates social and economic ties.

The Actor-Network Theory (ANT) sheds further light on the social transformation operated through weak and strong social ties. The Actor-Network Theory early roots go back to ethnographic studies that focused on scientific production in science laboratories (Callon et Law, 1989; Latour, 1987; Law & Hassard, 1999; Latour, 2005). As such, it provides a particularly useful approach for identifying and analyzing the role of social innovators in creating and promoting social events and changes. This, in turn, has a direct bearing on the institutional and behavioral patterns. For instance, Muhammad Yunus's (2003) idea of requesting social collateral was an important attempt to uphold and strengthen social ties among the unbanked borrowers. The key characteristic of social collateral resides in the borrowers' ability to overcome the collateral barrier requested by the traditional banking system. Similarly, the relational materiality of social ties has been instrumental in crowdfunding ventures where financial risk is among lenders and the entrepreneurs

SIMPACT provides a large pool of evidence-based studies that demonstrate the diverse trajectories and antagonistic business models of social innovation. In this report we focus on the SI business models that have been shaped by the information and communication technologies. These cases vary in scope and scale of operation, but highlight the areas that have been overshadowed by market mechanisms but neglected when considering societal effects and incentives on the marginalized groups, vulnerable communities and the youth (i.e. environment and green transportation, health and educational services).

2.3 Differences & Similarities between Social and Technological Innovations

Despite the multilevel links between technological and social innovations one should be emphasize the differences and commonalities that characterize both types of innovation.

A major difference between social and technological innovation resides in the fact that social innovations are manifested by changes in social practice whereas technological innovations are associated with the use of technological artefacts (Howaldt et al., 2015). Since the use of technology is value neutral, its use does not guarantee the

production of social value. On the other hand, technological and social innovations are driven by supply and demand forces that operate under market uncertainty. As such, the social impact of technological change cannot be foreseen since social innovations are not mediated by market prices that determine the exchange value. It should be noted that new technologies cannot evaluated ex-ante in scientific labs and clinical trials before entering the market. Unlike laboratory testing a new drug, social innovations cannot be subjected to prior trial and testing. The diversity of social, economic, cultural and institutional contexts implies that social innovation trajectories are spatially and temporally bounded.

Frenken (2016) argues that in the case of traditional technologies one is brought to *"examine the effectiveness of a technology as well as all its side effects and wider economic, environmental and social impact".* In the case of the sharing economy the process is reversed since organizations launch a new platform first before the normative debate on regulation can begin. The reversed impact assessment is also characteristic for social innovations.

As a social phenomenon, the pace and direction of social innovation are closely associated with the dynamics of social relations. According to Lowe (1992) technological change is portrayed as an *"autonomous process deterministically driven by scientific advance and with social and environmental effects analytically separate from, rather than integral to, the process".* Lowe (1992: 8) goes further to underline that the divide between scientific research and technical advancement *"needs to be overcome if social and environmental factors are to be incorporated in the design, execution and regulation of ... technology."* Yet, the problems arising from new scientific developments can be parodied by what the UK Commission on Social Sciences (2003: 29) describes in these terms: "*we have invented this, now find a market for it' or 'we have invented this but it has a few unfortunate side effects. How do we get people to accept it?*"

The process of social innovation is similar to that of a system of innovation where the creation and diffusion of value is as much determined by knowledge as collective learning of producers and users (Lundvall, 1992; Vargo et al., 2008). Social innovation differs from service innovation in so far as incentives, empowerment dynamics and diffusion process are concerned. Windrum et al. (2016) point to three differences as follows:

1. Service innovations may induce well-being, but they are incentivized by expected profits whereas social innovations are incentivized by value created for the society.

2. Social innovations seek to empower individuals and respond to the needs of marginalized groups whereas commercial services are largely driven by desires based on prices, income and preferences.

3. Social innovators are often in favor of fast diffusion of their solutions to underserved populations, while commercial service innovators try to appropriate the solution, since fast imitation and diffusion could undermine rent and economic return for the innovator. A good example is provided by the development and utilization of license for using a software application as opposed to the use of open source applications. It should be noted that strategic niche management constitutes a concerted effort to develop protected spaces for certain technological applications. It differs from a 'technology-push' approach that underlies the promotion of a new technology through learning, adaptation and adoption policy

2.4 Social and Technological Co-Evolution

Social innovation trajectories are characterized by the co-evolution of actors, networks and policies. We make use of a concept of coevolution to describe how components and sub-systems interact and influence each other, resulting in complex dynamics and identifiable patterns. More specifically, co-evolution is a special type of interdependency between evolutionary processes whereby process A influences but not determines processes B and C, which in turn influence but not determine process A, although A, B and C change irreversibly. It should be noted that the different units present in the evolutionary process enjoy relative autonomy throughout their development phase. *(*Kemp et al., 2007*).* Rip and Kemp (1998: 390) defines co-evolution as *"the multi-actor processes of technical and social adaptation in which problems and conflicts are gradually overcome"*. A co-evolutionary view purports to system feedbacks and is premised on

the idea that there are cause-and-effect-loops across different scales and systems, with effects becoming causes of other developments. An example of a cause-and-effect loop is the use of cars, which facilitates travel and contributes to urban sprawl. This, in turn, increases the demand for cars creating thus creating the need for building more highways.

The literature on social change highlights the importance of co-evolution of supply and demand for technology, products and users (Nelson & Winter, 1982); technology, industry structure and institutions (Nelson, 1994), market, technology and society and ecology (Rip & Kemp, 1998). Co-evolution occurs when two evolutionary processes *of "variation-selection-retention"* are interlinked. Co-evolution may also be viewed as the development of partially independent and interlinked subsystems with some degree of autonomy.

3 INTERPLAY BETWEEN SOCIAL AND TECHNOLOGICAL INNOVATION

In this section we discuss different forms of interaction between technological and social innovation with a particular emphasis on the role of information and communication technologies (ICT) in shaping and driving social innovation.

The growth of ICT innovations has had a twofold effect. Technological innovations have accelerated the emergence and diffusion of new solutions to existing social problems on the one hand, while they have increased inequality among the marginalised population (e.g. those who are excluded from the digital society) on the other. This, in turn, calls for a closer scrutiny of the interplay of social and technological innovations to overcome social exclusion that results from the absence of access to a wide array of IT driven services. Many social needs emanted from the growing utilization of digital networks and applications. This is the case of various public and private services (e.g. government support programs, private sector service applications).

3.1 ICT as Source of Empowerment

Bria (2012) disusses two different models of the Internet in the future: an open and decentralised model versus a centralised model. A decentralized model refers to the Internet as an ecosystem that fosters grassroots digital social innovation, supports entrepreneurial initiatives and enhances empwower_ment by bestowing power to the people. This model highlights the digital innovations, applications and networks that can effectively fight social deprivations and respond to social needs. The alternative model refers to a monopolistic and centralised model in which the information hubs are controlled by a few and the information is channelled through networks which do not address social needs (Fransman, 2015).

ICT can empower citizens and marginalised targetgroups in various ways. Education and training are important ways to increase capabilities, gain autonomy and indentity, change perception and develop social relationships. For instance, YouTube and Wikipedia tutorials constitute an important source for empowerment. Similarly, Massive Open Online Courses (Moocs) provide access to relevant, high-level and up-to-date education and training (Avigdor & Wintjes, 2015). ICT can be used for collecting, storing and sharing data used by vulnerable communities including the youth, single parent households, elderly and economically poor populations.

It should be noted that some IT applications and ICT-innovations are specifically designed to support socially innovative intiativies. The example is provided by *D-CENT* (Decentralised Citizens ENgagement Technologies) that brings together European *"citizen-led organisations that have transformed democracy in the past years".* More specifically, D-CENT provides assistance by "*developing the next generation of open source, distributed, and privacy-aware tools for direct democracy and economic empowerment"*[1]. D-CENT applications and analytical tools can be used by cities, organisations and governments to support open source developers, social movement and democracy activists. D-CENT tools can also be used by different organisations to develop and improve stronger social ties by implementing and diffusing applications that empower citizens. Citizens can obtain real-time notifications about matters of importance; propose solutions and work collectively on a variety of local topics (see figure 6).

[1] http://dcentproject.eu/

Figure 6. Decentralised Citizens Engagement Technologies and Tools

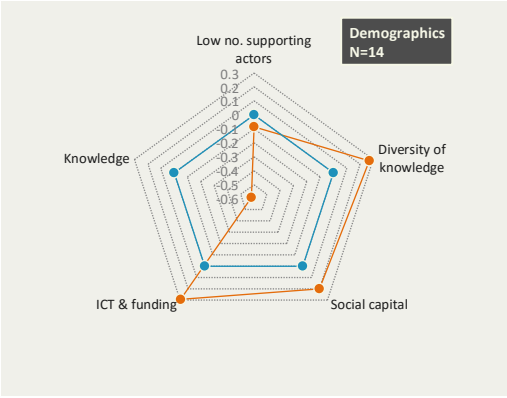
D-CENT builds community-based solutions from political and social experiments such as 'Decidim', a digital platform for participation used by the City of Barcelona, Open Ministry crowdsourcing site in Finland; the e-democracy website Better Reykjavik in Iceland; the Spanish political movement Podemos and the municipal citizen coalitions Comù in Barcelona, and Ahora in Madrid.

D-CENT tools are used to build a democratic, open and transparent communities in an effort to enhance social participation and political engagement.

3.2 Technology Inputs to Social Innovation

ICT applications can be used as inputs to the social innovation process as described in SIMPACT case studies (Rehfeld et al., 2015; Testriep et al., 2015; Wintjes et al., 2016). The reports point to the existance of a strong correlation between the use of ICT and the funding of socially innovative projects. The relationship is particularly strong when studying the theme of demographic change and unemployment. ICT investments cover areas ranging from automation to survey and evaluation techniques that are used to facilitate the interaction with the underserved and marginalised communities.

Figure 7 SI Input Profiles and Factor Scores



The analysis of 55 case studies shows that investments in new technologies constitute an important input to the social innvoation process at local level compared with SI initatives at a national level. This means that social innovators manage to scale out from one location to many new locations when ICT capabilities are expanded to reap the network effects (Wintjes at al., 2016; i.e., Grannies Finest and VoorleesExpress)[2] [3].

Social innovations may be accomplished where technology is used to remove redundancy and cost. Referred to as frugal innovation, optimization can make the process of social innovation simpler and more sustainable (Radjou et al., 2012). Technology-intensive solutions to social problems can be replaced by the combinatory effects of individual and collective capabilities. Examples include innovations in rural areas where farmers can use a mobile phone to regulate their irrigation pumps[4]. The example of 'Discovering hands' shows how the scale and scope of operation can be significantly improved through the frugal use of technology.

'Discovering hands' addresses the problem of women who suffer from breast cancer suffering from breast cancer as well as the unemployement problems encountered by disabled individuals 'Discovering hands' proposes a low-cost breast examination method to women by training blind people to accomplish the examination manually. The physical examination is facilitated through manual palpation and sensitive touch that all[5]ows visually impaired persons to detect smaller. Moreover, manual examinations and palpations cost less compared with more expensive machine-operated mammography. In Germany the insurance covers only a small portion of the expenses limited to manual examinations. A less technologically invasive method has the merit of creating closer ties between individuals and in particuliar blind people.

2 See also: https://www.grannysfinest.com/

3 http://voorleesexpress.nl/

4 http://www.e-agriculture.org/news/nano-ganesh-offers-remote-control-solution-rural-farmers

5 http://www.bmw-stiftung.de/en/impact-session-discovering-hands

3.3 Social Innovation and Digital Inclusion

Several SIMPACT cases deal with the problem of inclusion in a growing digital environment. For instance, access to the Internet is a key factor in ensuring digital inclusion of the marginalized individuals and communities Kaletka and Pelka (2015) note that social innovators can effectively create *"collaborative spaces for digital inclusion by creating community-based, intergenerational learning content".*

Other SIMPACT cases address the problem of social inclusion by providing technical training to elderly people. For instance, SeniorNett aims to prevent the ageing population with no or little computer litteracy from being digitally excluded [6]. SeniorNett offers IT training to senior citizens in Norway, by building traning centers and offering support to volunteers and members of Seniornett. Similarly, the Hungary based Skool teaches young women to acquire computer literacy so that they can work in what may be viewed as the male-dominated IT profession and engage more effectively in a variety of economic ventures[7].

3.4 ICT-Enabled Innovation and Social Policy

As seen in section 3.1 and 3.2 ICTs enable and support citizens, social enterprises and non-profit organizations. The EU Joint Research Centre IPTS privides a mapping of ICT-enabled social innovations which are aimed at improving public social services and welfare system while enhancing individual and collective wellbeing [8]. ICT-enabled social innovations provide new and better answers to social protection system challenges and needs. ICT can further strengthen collaboration and foster cooperation within public and private spheres (Misuraca et al., 2015).

3.5 ICT-Usage in Social Innovation

New technologies are embodied in a wide array of products and services that shape the life of those who are live and work in local neighborhoods, cities and regions. Neighborhood assistance encompasses a wide array of individual and collective activities and services (i.e. repair, child care, gardening, teaching, transportation). These platforms are built around a collaborative model known as 'Collective Awareness Platforms for Sustainability and Social Innovation' (CAPS)[9].

WEpods is a slow speed city vehicle that runs at speed of 15 to 25 km/hour on dedicated tracks over a distance of 2.5 kilometers. The operation is subsidized by local government through a subsidy of 135.000€. The self-driving bus uses automated driving technology help local inhabitants to cope with the mobility problem on the city periphery (see figure 8).

Figure 8. WePod Automated City Bus

Another example is *Filisia,* an organisation that designs and develops ICT-based interfaces that provide creative therapy for rehabilitation of children with disabilities[10]. Similarly, *Giraff* is an ICT application similar to Skype which enables the elderly to liver more independently and securely through a conversation and virtual visit platform.[11]

PatientsLikeMe is an online research platform for over 400 000 patients with serious illnesses who

6 See also info in english at: https://joinup.ec.europa.eu/community/epractice/case/seniornett-norge-clubs

7 http://skool.org.hu/en/

8 https://ec.europa.eu/jrc/en/iesi

9 https://ec.europa.eu/digital-single-market/en/collective-awareness

10 http://filisia-interfaces.com/

11 http://www.giraff.org/

can meet other patients with similar clinical symptoms, share their experience and use the platform to obtain patient-reported outcomes and test results.[12] Similar platforms use ICT for on-line coaching, counceling and therapy from peers and professional experts.for patients with similar patterns and problems.

Megafonen is a grassroots organization that focuses on problems encountered by the youth in Stockholm's suburbs. *Megafonen* is an amplifier for the youth who are invited to contribute to the vibrance and resilience of their communities.

Peerby is another plarform based in Amsterdam. *Peerby* succeed in raising $2.2 million in 2016 from 1051 crowdfunders operating through *OnePlanetCrowd.com.* The money will be invested in infrastructure development and international expansion of a new business model named Peerby Go.[13]

GitHub provides a fast, flexible, and collaborative development process for user who wish to build personal projects through open source technologies.

Table 1 provides an overview of the ICT usage in different socially innovative community-base projects.

Used as multipropose solutions, ICT applications can monitor and evaluate social innovation business models. Web-based technologies reinforce social relations and enhance social capabilities by bringing social innovation intermediaries (i.e. social entrepreneurs, policy makers) together. The interplay between social and technological innovations tend tobecome more complex as technology changes through different phases of social innovation.

12 https://www.patientslikeme.com/

13 http://press.peerby.com/125333-startup-peerby-raises-2-2-million-from-users

Table 1. Overview of examples of ICT usage in social innovation

Source and scope of ICT	SI cases which use ICT to advance the solution
Training: teach vulnerable communities new skills	Skool*, SeniorNett*
Teaching: Do-it-yourself DIY) online education and training	Wikipedia, YouTube tutorials; MOOCs (Massive Open Online Course), www.mooc-list.com, www.github.com
Infrastructure building: help social inclusion via technology and network building	SeniorNett
Context and content building: create an exhange & intranetplatform for intermerdiairies & supporters	Mothers of Rotterdam*, Voorlees Express*
Communciation network platform: online coaching and advice	PatientsLikeMe, Ehealthforum.com
Management and Empowerment: hands-on and do-it-yourself approach	DIY spaces and communities are developed using open hardware and software solutions
Product and service development: New Products and services	Giraff (self-driving bus for elderly people); Filisia (robot driven Skype interface) **
Development of Peer-to-Peer (P2P) sites	Konnectid, NL voor elkaar, WeHelpen**
Fundraising through crowds: Financing community-based and other social projects	PeerBy* (crowdsourcing fund)
Application development: data collection and treatment for social inclusion	Citizens science (citizens use sensors to monitor polution), PatientsLikeMe** (medical survey-data along with test results
Monitoring and evaluating: software application for social impact assessment	Home Administration Humanitas** uses software to monitor and train vulnerable people improving their personal administration
Community networking: promotion of SI practice	Megafonen**, D-cent, Ashoka
Marketing of socially produced goods	Grannies Finest*

* SIMPACT cases

** Cases presented in section 4

4 SELECTED CASE STUDIES

4.1 ICT-Enabeled Peer-to-Peer Platforms

A closer look at three cases that follow depicts how citizens are brought to meet, exchange and transact through ICT and how the latter can be used to accelerate social inclusion. Technology has been used to organize –C-to-C, B-to-C and B-to-B transactions. The use of technology has also expanded the sharing and collaborative economy. The sharing economy is likely to expand when buyers and sellers show willingness to temporarily grant access to under-utilized physical assets (Frenken 2016).

4.2 Konnektid

It all started in 2013 when Michel Visser (a former actor) heard a conversation in the tram about job application rejections. What could possibly go wrong in a job search, Michel asked himself? Knowing his skills Michle could have taught them how to present themselves, make the good arguments to win the job offer. Relevant knowledge is easily accessible once the right toos are made available. Visser's idea therefore consiste of creating a platformso that people could share their experiences and knowledge on a variety of topics instead of being locked up and excluded from other potential sources of knowledge and know-how that can be easily and freely shared. With Konnectid one could use a wellspring of social capital by enabling people to interact and learn from each other. The creation of a platform using ICT-tools made the source of knowledge visible and made it accessible to user communities organized locally in neighborhoods and more widely at national and regional level.

Konnektid was the first demand-based platform in the Netherlands where people could share skills and knowledge. With a brand new website in 2014, a large network of knowledge sharers, and a 'proof of concept' in the Netherlands, Miche Visser planned a pan-European rollout. The expansion plan included a paid premium membership for freelancers and the self-employed to offer cources in exchange for monetary remuneration.

Resources and Business Strategy

Konnektid business strategy relied on the development of a software application for their online platform. The initial idea was reinforced by observing other networks and accelerator programs, including Impact Hub Amsterdam. Impact Hub provides access to the knowledge, content and talent of many entrepreneurs. The initial funding came from local funds, donations and subsidies from organisations such as Stichting DOEN (providing an intial financil funding of 35.000€) and an EC subsidy pioneering programs. By 2014 Konnekit had managed to raise over 100.000€ through the crowdfunding platform *Oneplanetcrowd*[14]. Konnekit also benefitted from the Dutch tax-deduction scheme (WBSO) for innovation and R&D.

As a P2P platform, Konnektid's sought to enable users to have access to professional information and knowledge databases on the basis of reciprocity of skills valuable users and neighbours who are willing to share their skills for free. As for the business model Konnekit sought to generate revenue via corporate services such as organization of events as well as inviting professional teachers to get involved in a building a large client base in return for a fee while asking for a subscription fee from small businesses.

Use of ICT

In 2012 Michel met with Simone Potenza from Italy, and asked him to become a partner and Chief Technology Officer of Konnekit. With a background in software engineering, Simone was in charge of designing and developing Konnekit's website. A beta version was launched in 2013 to check if people showed interest. Konnektid was officially launced in 2014 including a variety of search, retrieval and storage tools. The new site offered both free and by subscription tools for professional training by sharing knowledge and providing skills to potential users.

Konnektid was the first demand-based education platform in the Netherlands. The site collects information the users by asking them to share their knowledge and skills. This initiates free peer-to-peer learning in local neighbourhoods. A premium membership for freelancers is also available to promote B2C sales model for teachers, educators and traniners. Users can communicate via the traditional social media (i.e. Facebook, Twitter, Google) prior to and after connecting through Konnekit. A personal Konnektid page is used to diffuse information throughout the community within a distance of 5 Km and a maximum of 100 member users who can then search for a particular skill and respond to users' requests.

4.3 NL voor Elkaar

NLvoorelkaar (formerly Zorgvoorelkaar), an electronic auction platform for providing assisting the Netherland's ageing population in the Netherlands was founded was founded by two social entrepenreurs in 2010. The venture came as a response to the need of retirees and ageing populations which could no longer be satisfied by the welfare regime. NL voor elkaar founders, Patrick and Mathijs Huis in 't Veld wanted to find a satisfactory solution to pressing healthcare and safety issues. With a growing population, ranging from 65 to 85 years old, many of the solutions provided the current welfare regime could no longer be afforded and properly implemented by the State due to their ever-increasing costs of healthcare. Like the Netherlands, many EU member countries have been considering a gradual shift from toward a more participatory and sustainable social model where the cost of healthcare would remain under control with no reduction in healthcare services. NL vor elkaar advocated a more caring society in which individuals would be encouraged to provide mutual assistance and care to each another in the absence of an affordable health care system. A participatory society would require citizens to do more for themselves and for others. Given the current cuts in

[14] https://www.oneplanetcrowd.com/nl/project/80537/description

healthcare expenses, the society would need more volunteers who engage in social work. According to NLvoorelkaar an additional 40 million hours of volunteering per year would be needed to compensate for the cuts in public health care services. The key aspect of NLvoorelkaar model resides in bringing care givers and takers together by building strong social ties and sustainable personal relationships. The range of services offered by volunteers has continued to expand over time in most European countries.

Resources and Business Strategy

NLvoorElkaar is the biggest volunteering online marketplace in the Netherlands with more than 20,000 registered volunteers. Since its inception, NLvoorElkaar network has brought more than 40,000 volunteers together. More than 30 municipalities are currently using the platform to bring volunteers to cooperate in a variety of social fields.

NLvoorElkaar volunteering marketplace has been designed to create greatest impact at the local level. The infrastructure (referred to as Impact Methodiek) incorporates local social networks including voluntary and neighbourhood initiatives and organizations, (i.e., Wet Maatschappelijke Ondersteuning, WMO). Nearly 30% of all the volunteers registered at NLvoorElkaar are first time volunteers aged less than 40 years old. The network has created 3 times more volunteers and 6 times more demand compared with other volunteering platforms in the Netherlands. The response rate to public request for help reaches 40% on average.

Use of ICT

The advantages of using the 'Impact Methodiek' are multiple and include a preference for local management of content and data concerning local volunteers (Vrijwilligersvacaturebank). A local project manager is appointed for each mission in cooperation with local neighbourhoods and municipalities. Cooperation among all parties involved is the key to a successful implementation of the initiative.

Equally important is the safety of the persons involved in each transaction. NLvoorElkaar has implemented safety feautres to ensure that all proposed matches trough NLvoorElkaar are safe and reliable. With the help of users NLvoorElkaar has created the necessary guidelines for reliable matching to ensure security and privacy through a cross-reference system.

Social impact

With more than 5.5 million volunteers in the Netherlands with each offering 2 hours of their time, nearly 1 billion hours of volunteering work can be provided in servie to local communities. An estimated of 200 million hours of volunteering work do not find an opening in local communities. Since October 2015, NLvoorElkaar has about 1 million hours of volunteering help. Over 150.000 offer and demand messages have channelled through NLvoor-Elkaar online platform.

The platform reduces the dependence on the existing paid health care services while improving individual wellbeing by providing assistance to the ageing populations where they live at home and in their communities.

4.4 WeHelpen

WeHelpen is a social cooperative which brings together patients, caretakers and volunteers in the Netherlands. The cooperative was co-funded in 2012 by Martin van Rijn, a former pension fund executive (PGGM) and later the Secretary for Health, Welfare and Sport and Arjan in 't Veld, the founder of Bureau 50, a marketing and communication consultancy firm and Maaike Schnabel, founder of The Caretakers. WeHelpen is a large coalition of organizations including Achmea, Menzis and VitaValley, that seeks to improve conditions under which care givers and takers are brought to work and interact with other stakeholders.

The formation of a 'think tank' composed of a health insurance organization, 'CZ' and a Dutch commercial bank, 'Rabobank' was aimed to provide assistance to a growing retiree population. The 'Nieuwe Oude Dag' initiative as it was labelled by its founders, relied on an online platform connecting volunteers, service providers and users.

WeHelpen places emphasis on reciprocity, trust and online reputation as the necessary ingredients of its business and organizational model. This would unlock the hidden human and social capacities,

strengthen social ties and bring much needed support to the ageing population through volunteering, offering and sharing. WeHelpen makes it easier for people to connect to each other as well as volunteers who can make use of the WeHelpen database to provide mutual assistance to care givers and takers.

Resources and Business Strategy

By creating a national platform for healthcare volunteers, with more thatn 100 member organizations and 20.000 registered accounts, WeHelpen has been successful in extending the resource base for the healthcare industry in the Netherlands. Most members are connected to different grassroots organizations, helping to create and sustain a local social fabrique in response to the existing system shortcomings.

WeHelpen operates as a non-profit organization with the objective of bringing multiple stakeholders together, sharing their experience and providing assitance to the community members. The organization relies on the growing number of its members to increase its subscription-based revenue model and by the same token, reduce its operational costs.

Use of ICT

WeHelpen operates an an online platform, using a knowledge base and toolkit where members' best practice of members are shared. WeHelpen's plarform is connected to the municipalities' databases and uses the application tools and control protocols to collect and store feedback, assess members' activities and diffuse information throughtout the network. In addition, WeHelpen members can have access to activity reports of each locality, neighborhood and region in the Netherlands.

Social impact

It is particularly important to measure the social impact of solidarity measures supported by We-Helpen. VitaValley in cooperation with Groningen University is assessing WeHelpen's model and its impat on a public and private firms and organizations which operate in oth for profit and non-profit sectors such as housing, education and health. The impact measurement is based on a social return on investment (SROI) model which maps out the added value of WeHelpen initiatives and support programs to economic activities and development at local and regional level in the Netherlands.

WeHelpen's future goal consists of creating a sustainable community based on members trust and reciprocity. This calls for a more indepth analysis of the motivations of caregivers and caretakers and the mechanisms that can stimulate initiatives in support of community wellbeing and global welfare.

4.5 Digital Social Innovation (DSI) and the SIMPACT Framework

The above selected cases, Konnekit, NLvoor-Elkaar and WeHelpen are characterized by the existence of a strong IT backbone and network infrastructure to support community-based activities. All three cases were initiated in the Netherlands, a country known for its ICT literacy and IT-driven activities, advanced social and protection system and a high GDP per capita of it population. In addition, the cases comply with the definition of social innovation provided by SIMPACT where fighting poverty and vulnerability and creating the conditions for greater social inclusion consitute the main objectives of any economic system. Social inclusion is facilated by the appropriate use of technology and in particular the design, development and implementation of ICT-infrastructure and knowledge driven networks.

The relationship between technological innovation and social performance resembles a two-way street. The flow of information and social change move in both directions with both technology and social change providing the environment and resources for further social innovation. The phenomonon has been particularly notable in the case of the United States, where the emergence of the world's largest computer network, the Internet, has usherd successive waves of economic and social change within firms, organizations and the economy. The growth of multifactor productivity and the gains resulting from weighted average of several inputs have been at the origin of macroeconomic performance. The emergence of the Internet and World Wide Web

comprise a General Purpose Technology (GPT) whose conjoint use have paved the way for changes within the social, cultural and economic spheres as witnessed by new relationships, transactions and exchanges in the society. Investments in software engineering aim to introduce and improve an array of applications that affect human relationships. The advent of digital technology, the development IT applications and Application Program Interfaces (API) have deepened and broadened social ties, business relationships, and community links. For instance, the replacement of paper notes and letters with electronic email have accelerated the formation of business communities and facilitated the emergence of social and professional networks. Similarly, the growing use of ICT applications has led to the development of new forms of collaboration and business models. Technology affects all sectors and organizations, (i.e. for profit and nonprofit organizations, charities and cooperatives) and transforms social relationships by transforming the process of value creation and sharing.

The cases presented in this document (Konnekit, NLvoorElkaar, WeHelpen) show the transformative power of technology by empowering and (re)engaging spatially discriminated and socially excluded communities. The shift toward a sharing economy is indicative of the communities' potential to create and strengthen social ties.

The introduction of labor flexibility (i.e., part-time and temporary workers, self-employed and freelancers) has been accompanied by the development of ICT-enabled job search platforms.[15] The same is true for volunteers who propose their services through online peer-to-peer platforms. One should be reminded that the use of digital technology can be an effective mechanism for reducing the transaction costs of searching resources and bringing stakeholders together. The growing interest in IT-driven innovations, demonstrates the importance of technological inputs (i.e., scientific knowledge) and outputs (i.e., new knowledge, transformative innovation) in ensuring social change and enhancing individual wellbeing and economic welfare.

Despite its difficult epistemology, knwoledge exploration and exploitation are facilitated by advances in technology, implementation of new infrastructures and development of networks. The evolutionary approach to technological knowledge combines the evolutionary epistemology pioneered in computer sciences studies (Campbell-Kelly & Aspray, 1996) with notions of cultural and social evolution that treats knowledge as a stock and flow of information through time (Dosi & Nelson, 1994; Nelson, 1994). Governments invest in technological innovation and research, specially in the pre-competitive phase of technological change, while leaving the development of commercial applications up to the private firms. In the case of enabling technologies; the government can increase public investments to promote social innovation throughout ist different diffusion stages. Since governments do not need to worry about the appropriability problem, they can promote the use and diffusion of SI enabling technologies, open-source and open-architechture applications. As such, technology can be used to provide solutions to a variety of social problems that result from digital exclusion, spatial segregation and social discrimination.

Government policies in support of technology valorisation and R&D activities (i.e., R&D tax deductions, IT investment incentives including hardware and software investments) can address market failures in supporting social goals. SIMPACT meta-analysis of SI and business case studies under distinct welfare regimes shed further light on the importance of ICT overcome the challenges when coping with unemployment, migration, demographic change, gender, education and poverty (Debref et al. 2015; Terstriep et al. 2015).

The above cases constitute the *par excellence* example of peer-to-peer (P2P) sharing economy, also referred to as collaborative and consumption economy. Konnektid, NLvoorElkaar and WeHelpen participate in a socio-economic system built around the sharing of technological and human resources. While each organization is characterized by a distinct business model, all three platforms have attempted to develop a variety of tools to ensure the creation and distribution of new services that can be shared by the largest number of users. As noted by Metcalf's law, the value of the network increases

15 http://www.eurofound.europa.eu/observatories/eurwork/articles/industrial-relations/self-employed-people-without-employees-seek-place-in-social-partner-consultation

exponentially as more users join (linearly) the network. Similarly, by sharing information, goods and services, community members can enhance the network value for businesses, individuals and the community at large.

It is noteworthy that the revenue flowing through the collaborative economy was estimated at 3,5 billions dollars with an average annual growth rate of 25% over the decade. At this rate, the sharing economy emerges as a disruptive economic force which has a direct bearing on social relationships and social innovation trajectories. For most part social changes are closely associated with disruptive innovations that begin on the fringe and reach the core of network activity. A notable example is provided by the healthcare sector where the creation of walk-in clinics, affordable insurance and cutting-edge care which consists of moving from tertiary to quaternary care by adopting cutting-edge training programs for nurses (Christensen et al., 2006). The task is accomplished by what Christensen et al (Christensen et al., 2006: 2) describe as as catalytic innovators who create systemic social change through replication and scaling.

Table 4.1 provides a deeper understanding of the SIMPACT's defintion of social innovation by emphasizing its components, objectives and principles (Rehfeld et al., 2015). The analysis of Konnektid, NLvoorElkaar, WeHelpen show the mechanisms by which P2P platforms can help bring together service providers, users and intermediaries thus creating new resources and business models. The implementation of ICT infrastructures is of paramount importance when coping with social, economic and political challenges that are posed by social exclusion resulting from unemployment, migration, gender inequality and demographic change (see the report on the meta-analysis of social innovation with a special reference to different European welfare regimes, Debref et al., 2015).

Table 4.1. Overview of case studies with a special reference to SIMPACT Components-Objectives-Principles framework

Economic underpinnings	Konnektid	NL voor elkaar	WeHelpen
	www.konnektid.com	www.nlvoorelkaar.nl	www.cooperatiewehelpen.nl
Objectives of Social Innovation			
Challenges/needs addressed	Provide a platform to connect those who desire to share their passion, skills, knowledge. The site primarily focuses on individual teaching skills (i.e. languages, arts, …)	On-line matching of supply and demand of volunteers to support vulnerable communities. Needs are multiple and address different forms of exclusion: language, transport, computer, migrant-support, cooking, home-improvement, administration, business activities.	On-line matching for local elderly support; interaction between actors providing and funding care; unlock hidden human capacity in society for elderly care
Expected outcome / impact	Create closer ties between people incommunities and neighbourhoods through specific peer-to-peer relationships	Voluntary support to vulnerable people: increase social contacts/cohesion, longer independent living, reduce loneliness and increase inclusion	New community emerge as a result of sustainable relationships between individuals and groups through healthcare assistance
Community Objectives	Create an understanding of specific needs and provide the opportunity to community members to develop their social, business and entrepreneurial skills	Improve and sustain social activities of vulnerable; Reduce the dependence on existing paid services	People over 50 who desire to make themselves useful as volunteers to the elderly and ageing population
Government Objectives	Enhance social inclusion, empowerment and economic integration. Subsidies are provided by public-private funding organizations such as Stichting DOEN in Holland	Reduce costs of the welfare; Increase volunteering by integrating different care and assistance systems	Reduce healthcare cost for the elderly and make the system more sustainable by involving volunteers
Principles of Social Innovation SI & TI Process			
Top-down/ bottom-up dynamics	Top-down technology enables a bottom-up process of interaction between supply and demand of skills provided by users and facilitators	Technology driven founders with a strong social drive and mission; hardly any interaction between the social innovator and the users	Top down initiative; merger of three previous intiatives, including high-level people of large organisations as initiators
Trust, relationship & knowledge development	Participants organize events and conference to establish closer ties	Log in through social media to build trust in peer-peer relations	Reciprocity, trust and online reputation are considered as a central element in dealing with social problems
Efficiency versus effectiveness Social inclusion Economic integration Sustainability Criteria	Depends on volunteers' knowledge and skills: everybody has some knowledge or passion to share: increases social and economic use and integration outside a work environment	Fully depending on (effective and efficient involvement of) volunteers	Efficieny and effectiveness is viewed from a public-private actor-network perspective. The success depends on volunteering and social engagement.
Business Model & Funding	Free peer-to-peer use; Evolving business model. Generats revenue via paid services	Depends on increase and efficient use of volunteers, and the public interest/ support for doing this. Municipalities benefit	The cooperative organisation is creating a 'saving model, instead of an earning model'.

Economic underpinnings	Konnektid	NL voor elkaar	WeHelpen
Governance: IT governance Steering Social Innovation	Technology provides access to knowledge based sytems and networks.	Web-based matching platform, local support for the socially excludes elderly	Large care organisations dominate; attention is paid to empowering the the vulnerable and ageing communities.
Scaling	Internationalization is possible. Scaling out to commercial use (paid cources)	Expansion through European networks is envisaged.	National level, scaled-out to many municipalities.
Components			
Actors: The founders of Konnektid, NLvoorElkaar, WeHelpen are IT driven entrepreneurs and in some cases ICT experts. Policy makers play a pivotal role in supporting stakeholders and networks through financial and infrastructure support.			
Resources: In addition to saavy entrepreneurs and IT experts, the development of networks and participation of crowds are mong important levers during the take-off stage as well as subsequent cycles.			
Infrastrcuture: ICT standards, open source software applications constitute the cornerstones of a sustainable social innovation business model.			

5 POLICY PERSPECTIVES AND CONCLUDING REMARKS

Traditionally public policy is organised hierarchically in separated policy domains, often refered to as policy silos with each domain pursuing a separate set of objectives, rules, policies, networks, and routines. Public organizations who design and implement public policy compete for a wide array of economic, social and political resources. Policies which promote technological innovation tend to emphasize the interplay between technological change and economic performance (e.g. science-industry relations) where technological innovations are described in terms economic outcomes. Technical innovations are embedded in a dense and established institutional setting, while social innovations emerge with new ideas that tend to go beyond the existing insitutional configuration. Public support for social innovation often originates from public and social policy domains such as demand for social safety nets, health-care, education, housing. Public funds cannot be allocated to experimenting and generating new policies but are rather used for the provision of targeted public services. As shown by SIMPACT case studies (Debref et al., 2015; Terstriep et al., 2015) the linkage between technological innovation and social innovation tend to be overlooked. This paper highlights how the interplay between ICT innovation and social innovation can reinforce the (co)evolution of actors (i.e., social entrepreneurs, firms, foundations, intermediaries), improve the allocation of resources (i.e., economic, social and political) and institutions (i.e., market, welfare regime).

Since neither entrepreneurs in markets, nor policy makers in governments can predict the future, both markets and governments can fail when searching and selecting the optimal choice and outcome. Scientists, citizens, public and private organization may also fail when they engage on a scientific, social technological and economic path. Innovations and policies tend to be uncertain, non-linear and path dependent and their trajectory cannot be dissociated from individual and collective learning experiences and practices. Uncertainty leads to creating a distinct ex-ante and ex-post rationale for each action and policy.

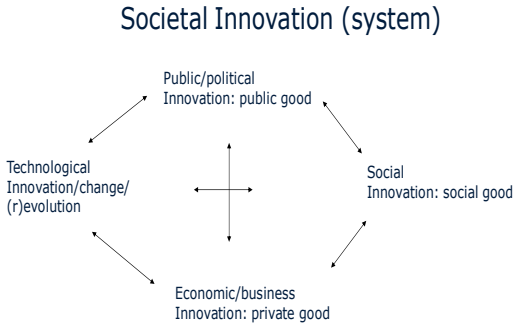
Since ICT innovations tend to emerge and diffuse fast, timing, agility and adaptability are crucial elements in determining the social innovation trajectory. Setting new standards, updating regulations, reconfiguring institutions can therefore help improve the chances of success when thinking, designing and implementing social innovations.

ICT innovation and social innovation policies should be addressed in such a way as to maintain

and reinforce the linkage with other policy fields. Social innovation policies must account for multiple modes of innovation including research, needs and technological driven innovation. Policy makers should not favor a single mode of innovation.

Building and extending on Lundvalls' innovation theory, we posit that multiple sources and uses of technological knowledge should be envisaged in conjunction with social innovators, social innovation intermediaries and beneficiaries. Figure 5.1 portrays the dynamics that result from the interplay of social and technological innovation. One should note the (co)evolution of political, economic, social and business spheres that shape the production of public, private and social goods and services

Figure 5.1. Social and Technological Innovation Dynamics



We will conclude by emphasizing that the concept of innovation has broadened and deepened over time. Innovation can no longer be limited to a link between technological change and productivity. Whereas technical inventions can be viewed as technological 'breakthroughs' in science, innovations can be seen as 'breakthroughs' in markets and societies. As an additional source of disruptive variety, SI brings new combinations of social, economic and public/political resources and capabilities, which may create more economic growth (and social benefits) than previous combinations.

By integrating the social and technological dimensions, one can observe a wider systemic view of the social change: In this study, we have emphasized the interplay between social and technological innovation as a two-way street. While most of the traffic goes from advacements in technology to economic growth, there is a growing flow of social innovations that affect technological progress, productivity and performance. Moreover, the invasive nature of technology and ICT innovations has a direct bearing on public policies. In particular, public innovation policies that seek to empower and (re)engage vulnerable people need to transcend the existing institutional and market contexts and provide a systemic integration of different dimensions of innovation. When studying country innovation policies, one needs to move beyond the R&D policy, science-industry interaction, triple helix approach to innovation, policy silos and market driven stimuli to reach a more systemic view of innovation with emphasis on the simultaneous economic and social effects of innovation.

A systemic view of innovation policy should go beyond a sheer R&D policy and consider the incentives and mechanisms that can promote novel ideas and experiments with the purpose fostering social innovation. For many years innovation policy has focused on supporting linkages between science, technology and industry. This needs to be further broadened to include technology users within both public and private sectors. Similarly, one needs to go beyond a triple-helix innovation policy where industry, university and government are brought to cooperate and assess the role of actors form the civil society including the NGOs and third sector organizations. In addition, a systemic view of innovation should not only focus on the economic impact of innovation, but rather on the social levers that transform the society by empowering individuals and communities through inclusive growth. Equally important is imperative of avoiding policy silos that result from the development of exclusive domains and unrestrained oversight of the public administration, ministries, agencies, local government officers and civil servants. Finally, a systemic innovation policy must go beyond market instituted innovation mechanisms by considering a wide array of nonmarket factors that can promote and sustain social innovation trajectories. In this regard, a mere lowering of transaction costs may not be a sufficient condition for scaling up and diffusing social innovation. A systemic policy innovation, should aim at fostering behavioral through experimentation and organization of hackatons, 'bankatons', 'living-labs', 'bootcamps', digital platforms and social and cultural events that can

reduce social discrimination, spatial exclusion and economic inequality all of which are conducive to greater social realizations and human achievements.

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