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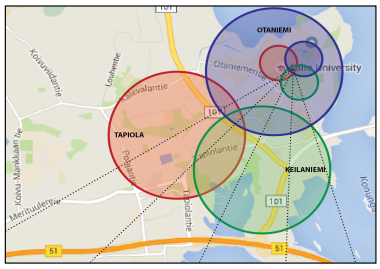

Image from Niemi et al. (2015)

Smart Cities and Regions

Welcome to the October 2015 issue of the *Technology Innovation Management Review*. This month's editorial theme is Smart Cities and Regions. We welcome your comments on the articles in this issue as well as suggestions for future article topics and issue themes.

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Overview

The *Technology Innovation Management Review* (TIM Review) provides insights about the issues and emerging trends relevant to launching and growing technology businesses. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed.

Our readers are looking for practical ideas they can apply within their own organizations. The TIM Review brings together diverse viewpoints – from academics, entrepreneurs, companies of all sizes, the public sector, the community sector, and others – to bridge the gap between theory and practice. In particular, we focus on the topics of technology and global entrepreneurship in small and large companies.

We welcome input from readers into upcoming themes. Please visit timreview.ca to suggest themes and nominate authors and guest editors.

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Contribute to the TIM Review in the following ways:

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Please contact the Editor if you have any questions or comments: timreview.ca/contact

About TIM

The TIM Review has international contributors and readers, and it is published in association with the Technology Innovation Management program (TIM; timprogram.ca), an international graduate program at Carleton University in Ottawa, Canada.

Editorial: Smart Cities and Regions

Chris McPhee, Editor-in-Chief

Taina Tukiainen, Seppo Leminen, and Mika Westerlund, Guest Editors

From the Editor-in-Chief

Welcome to the October 2015 issue of the *Technology Innovation Management Review*. The editorial theme of this issue is **Smart Cities and Regions**, and it is my pleasure welcome our three guest editors: **Taina Tukiainen**, Senior Researcher at Aalto University in Espoo, Finland, **Seppo Leminen**, Principal Lecturer at the Laurea University of Applied Sciences and Adjunct Professor in the School of Business at Aalto University in Finland, and **Mika Westerlund**, Associate Professor at Carleton University's Sprott School of Business in Ottawa, Canada.

In November, we celebrate our 100th issue with a look back at our first 100 issues and a look ahead to new frontiers and some of the key questions we seek to answer in our next 100 issues.

In December, we revisit the theme of Living Labs with guest editors **Seppo Leminen**, **Dimitri Schuurman**, **Mika Westerlund**, and **Eelko Huizingh**.

We hope you enjoy this issue of the TIM Review and will share your comments online. We welcome your submissions of articles on technology entrepreneurship, innovation management, and other topics relevant to launching and growing technology companies and solving practical problems in emerging domains. Please contact us (timreview.ca/contact) with potential article topics and submissions.

Chris McPhee
Editor-in-Chief

From the Guest Editors

We are pleased to introduce this issue of the TIM Review on the theme of **Smart Cities and Regions**. In this issue, we discuss how to make our regions and cities "smarter". In accordance with Renata Dameri (2013), we define a smart city (or region) as "a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development."

In Europe, three out of every four people live in cities today, and by 2050, it will be four out of every five, putting ever more pressure on the well-being of citizens and the environment (EEA, 2012; UN, 2010). The ongoing global trend toward urbanization has led increasing numbers of practitioners and researchers to look to the development of smart cities and regions as a way to overcome socio-economic challenges and improve quality of life through innovation. Indeed, Kjell Anders Nordström and Per Schlingmann (2015) identify cities – not nations – as the new powerhouses of innovation.

Carlos Moedas (2015), European Commissioner for Research, Science and Innovation, argues that part of the solution is user-driven innovation in cities, facilitated by open innovation ecosystems. Se Hyeong Kim (2013) points out that there are many definitions of open innovation ecosystem, and inspired by Kim's study, we define an open innovation ecosystem as: communities of providers, enablers, utilizers, users, and other stakeholders that practice open innovation within networks of cities and regions. With a strong local presence both digitally and physically, these ecosystems self-sustain based on new product or service innovations as well as social innovations. However, these local effects can be considered a bit more broadly. Extending this concept over a wider geographical area, a regional innovation ecosystem can be understood as "a set of interacting private and public interests, formal institutions and other organizations that function according to organiz-

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ational and institutional arrangements and relationships conducive to the generation, use and dissemination of knowledge (Doloreux & Parto, 2004). Thus, when considering how to increase "smartness", we consider the city or region to be the most appropriate scale of both study and action, allowing for some degree of local flexibility in terms of defining where a city ends and a region begins, and how far the reach of its institutions extends.

What we know about innovation suggests a set of benefits for utilizing specialization, innovation, ecosystems, platforms, living labs, learning, and new capability development for cities and regions of the future. Such research proposes to strengthen the innovation capacity of organizations, make innovation processes more effective, cut innovation costs by sharing resources, reduce market-based risk, and enhance sustainable solution development. In particular, organizations are opening their innovation activities. Opening innovation deserves more research attention in the context of smart cities, particularly to understand roles of innovators, policymakers, businesses, and users to accelerate the pace of innovation in cities and regions.

This issue of the TIM Review provides six theoretically and practically oriented articles for researchers, managers, and innovation developers, among others. The selected articles address "smart city" and "smart region" activities incorporating regional innovation ecosystems taking place today in Europe and introduce a variety of perspectives, frameworks, and categorizations of the phenomenon.

As a case example, we use Finland and the City of Espoo in the Helsinki region. In particular, the articles put forward six different perspectives on innovations in smart cities: smart specialization; regional innovation ecosystems; cities as collaborative innovation platforms; wicked problems and well-being; urban capabilities; and learning-driven development. We encourage readers to further consider these concepts as globally beneficial – to make our cities smarter and to connect citizens, businesses, the public and private sectors, and academia.

In the first article, **Markku Markkula**, President of the European Union Committee of the Regions (CoR), and **Hank Kune**, Director of Educore BV, ask what can make a "smart region" smarter. Using the Helsinki Region as a frontrunning example, they argue that the answer lies in i) the application of the European Union's research and innovation strategies for smart specialization (RIS3); ii) ecosystem orchestration; and iii) the active role that universities can play in enhancing regional innovation and the "smartness" of the region.

In the second article, we discuss the role of a city as an orchestrator for innovation. They take a business ecosystem, open innovation, and living lab view, and argue that cities should establish active dialogue between their citizens and private and public sector actors to co-create, develop, test, and offer service innovations that utilize diverse sets of platforms. While acknowledging that cities are platforms for simultaneous and divergent innovation initiatives, we identify four principal types of collaborative innovation.

In the third article, **Kaisa Oksanen**, Senior Specialist at the Prime Minister's Office, Finland, and **Antti Hautamäki**, Professor Emeritus at the University of Jyväskylä, Finland, elaborate the sustainable innovation concept, examining innovation ecosystems and their relevance in solving wicked problems. They argue that such problems require a special ecosystem where innovations emerge when different actors collaborate and co-create. World-class innovation ecosystems and hubs are built on deep cooperation among local, regional, national, and global actors. Ultimately, the success of sustainable innovation will positively impact the well-being of people and vice versa: sustainable well-being is an important source of innovation and growth.

In the fourth article, **Timo Hämäläinen**, Fellow in the Strategy Unit of Sitra, the Finnish Innovation Fund, elaborates the governance solutions to wicked problems from the perspective of cities and sustainable well-being. He argues that wicked problems stem from the gap between the complexity of the policy problem and the governance. This gap may partly be solved by active participation, interaction, and co-operation of different stakeholders. In addition, coordination by mutual adjustment and clear systemic direction, decentralization, diversity, and experimentation, and effective measures to overcome system rigidities and development bottlenecks are essential for the success. This article builds on the world-class knowledge of the Finnish welfare state, research, and well-being, and proposes that to be used as a starting point for solving the world's wicked policy problems.

The fifth article by **Renita Niemi**, **Eelis Rytkönen**, **Robert Eriksson**, and **Suvi Nenonen** explore spatial transformation using the framework of five urban capabilities – connect, change, communicate, collaborate, and control – which were initially introduced by John

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Worthington. Using a case study that examines smart specialization in the Helsinki Region, particularly the three districts of Espoo, including the Aalto University main campus, the business district of Keilaniemi; and the cultural, living, leisure, and retail district of Tapiola. They argue that lessons learned in a minor urban-area campus can be scaled to a large urban area, and they demonstrate that users of spaces have a need and will to collaborate, co-create, and impact their environments. With insights for decision makers and planners controlling the uses of space for grassroots initiatives, the article emphasizes the role of active citizen engagement and contribution and illustrates how these capabilities of user-orientated processes are important in today's smart cities.

In the sixth and final article, **Mervi Rajahonka**, **Toni Pienonen**, **Riikka Kuusisto**, and **Jari Handelberg**, discuss the importance of innovation orchestrators in facilitating innovation ecosystems. Through the sharing of their experiences with the INNOFOKUS project and the Change2020 programme, they emphasize the need for a process with continuous learning and participation that will create synergies between different development programs in a city or region and promote smart specialization. In addition, they identify collective learning, coordination, experimentation and agility as essential elements. An entrepreneurial mindset and new agile co-creation methods need to be applied in regional and city developments.

We hope that the diverse perspectives offered in these articles will help you better understand the phenomena of the smart city and will encourage you to help develop the concepts further.

Taina Tukiainen, Seppo Leminen, and Mika Westerlund
Guest editors

Acknowledgements and Further Reading

The articles in this issue have been selected and developed based on the authors' contributions to *Orchestrating Regional Innovation Ecosystems: Espoo Innovation Garden* (2015), Pia Lappalainen, Markku Markkula, and Hank Kune (Eds.), published by Aalto University in cooperation with Laurea University of Applied Sciences and Built Environment Innovations RYM Ltd.

References

Dameri, R. P. 2013. Searching for Smart City Definition: A Comprehensive Proposal. *International Journal of Computers & Technology,* 11(5): 2544–2551.

EEA. 2012. *Urban Adaptation to Climate Change in Europe: Challenges and Opportunities for Cities Together with Supportive National and European Policies.* Copenhagen: European Environment Agency.

Kim, S. H. 2013. *Open Innovation Ecosystem: Chez Panisse Case Study.* PhD dissertation from the University of California, Berkeley.

Moedas, C. 2015. *Launch of the Second European Capital of Innovation Award.* Brussels: European Commission, Committee of the Regions.

Nordström, K. A., & Schlingmann, P. 2015. *Urban Express.* Stockholm: Forum Förlag.

UN. 2010. *World Urbanization Prospects: Highlights.* New York: United Nations.

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Chris McPhee, Taina Tukiainen, Seppo Leminen, and Mika Westerlund

About the Editors

Chris McPhee is Editor-in-Chief of the *Technology Innovation Management Review*. He holds an MASc degree in Technology Innovation Management from Carleton University in Ottawa, Canada, and BScH and MSc degrees in Biology from Queen's University in Kingston, Canada. Chris has over 15 years of management, design, and content-development experience in Canada and Scotland, primarily in the science, health, and education sectors. As an advisor and editor, he helps entrepreneurs, executives, and researchers develop and express their ideas.

Taina Tukiainen is a Senior Researcher at Aalto University in Espoo, Finland, and she is a Cabinet Member of the President of the European Union Committee of the Regions (CoR). She has worked for over 20 years within industry and universities and for over 10 years at Nokia Corporation as a senior manager, and she has worked on various projects with international university and industry collaboration. She was, until 2014, Director of Digibusiness Finland. Her research interest is strategic research including innovation, technology management, and entrepreneurship. Taina's doctoral dissertation was *The Unexpected Benefits of Internal Corporate Ventures: An Empirical Examination of the Consequences of Investment in Corporate Ventures* (2004), and the topic of her latest book was *The Finnish Startups in Globally Evolving Ecosystems: Value for Finland* (2014). She has recently published papers in *Organization Science* and *MIT Sloan Management Review*.

Seppo Leminen holds positions as Principal Lecturer at the Laurea University of Applied Sciences and Adjunct Professor in the School of Business at Aalto University in Finland. He holds a doctoral degree in Marketing from the Hanken School of Economics and a licentiate degree in Information Technology from the Helsinki University of Technology, now the School of Electrical Engineering at Aalto University. His research and consulting interests include living labs, open innovation, value co-creation and capture with users, relationships, services and business models in marketing, particularly in Internet of Things (IoT), as well as management models in high-tech and service-intensive industries. Results from his research have been reported in *Industrial Marketing Management,* the *Journal of Technology and Engineering and Management, Management Decision,* the *International Journal of Technology Management,* the *International Journal of Technology Marketing,* the *International Journal of Product Development,* and the *Technology Innovation Management Review,* among many others.

Mika Westerlund, DSc (Econ), is an Associate Professor at Carleton University in Ottawa, Canada. He previously held positions as a Postdoctoral Scholar in the Haas School of Business at the University of California Berkeley and in the School of Economics at Aalto University in Helsinki, Finland. Mika earned his doctoral degree in Marketing from the Helsinki School of Economics in Finland. His current research interests include open and user innovation, the Internet of Things, business strategy, and management models in high-tech and service-intensive industries.

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Keywords: smart cities, smart regions, smart specialization, smart specialisation, regional innovation, open innovation, living labs, living laboratories, ecosystems, urban capabilities, sustainability, collaboration, innovation ecosystem, regional innovation

Making Smart Regions Smarter: Smart Specialization and the Role of Universities in Regional Innovation Ecosystems

Markku Markkula and Hank Kune

> *"When you come to a fork in the road, take it."*
>
> Yogi Berra (1925–2015)
> Baseball player, manager, and coach

What makes a "smart region" smarter? We argue that it is the active orchestration of the regional ecosystem around concepts such as knowledge co-creation and exploitation, opportunity exploration, and capacity building. Simply adding to the proliferation of software developers in the area, stimulating the activities of business clusters around information technology, and providing digitally enabled services for citizens is not enough to make a region smarter. Smartness is enhanced by a well-orchestrated regional innovation ecosystem with a strong "smart specialization strategy" that leverages the new societal roles played by universities. In this article, we describe the European Commission's program for research and innovation strategies for smart specialization (RIS3) and show how the Helsinki Region in Finland is using smart specialization, ecosystem orchestration, and the active role of universities to enhance regional innovation and the "smartness" of the region. These activities are discussed in the context of policy documents and strategy papers from regional, national, and European authorities, which illustrates some differences between papers and practice. This is work in progress, and based on early results, we draw initial conclusions about how putting policy into practice can make smart regions smarter.

Introduction

These days, the world is full of "smart cities" and "smart regions". They proliferate rapidly as new digital technologies are applied to enhance daily life. Smartness is "in", it is "cool", and the labels proliferate. Yet, this labelling often masks the real challenges of smart regions and smart citizens living in smart societies. How can we make so-called smart regions smarter? What do residents need to be able to survive, and thrive, in smart regions? What is the nature of smartness? Is it simply a matter of more software developers in the area, the activities of business clusters around information technology, and the provision of digitally enabled services for citizens? Or is there more to it?

The "smartness" of a region relates to its capacity to leverage its human, structural, and relational capital, and its ability to integrate diverse actors in the region's innovation practice. Leveraging regional strengths and capacities in relation to Europe's program for research and innovation strategies for smart specialization (RIS3) is essential. The contribution of universities, in their diverse roles, is especially important. In many countries, universities are taking an increasingly active role in regional development, and at the interface of universities, industry, public authorities and citizens – the major Quadruple Helix actors in the regional innovation ecosystem – concepts such as knowledge co-creation and exploitation, opportunity exploration, and capacity building have become important enablers of innovation. In this article, we argue that leveraging the new "third role" of universities is essential for maintaining smart and effective regional innovation ecosystems.

Smart specialization is Europe's transformation agenda for the next decade, and it requires a well-orchestrated regional ecosystem to work effectively. Within this constellation, notions of knowledge creation and the translation of knowledge into practice are becoming

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increasingly important and are taking new forms. Europe needs entrepreneurial and pioneering regions with practices that integrate top-down policy making with bottom-up self-renewal to create effective policy. Diverse European documents and policy papers attest to these needs (CoR, 2013). Smart specialization aims to support regions in addressing this challenge. In these regions, all societal partners need to work together, and joint learning is a cornerstone of this collaboration. Universities are an important instrument for codifying the lessons learned and helping other actors take the learning to the next level of practice. They are beginning to play this role in regional innovation ecosystems, making smart regions smarter and supporting diverse regional players in collaborating effectively. This is the context called for in diverse policy papers and strategy documents. In this article, we describe how this works in practice, focusing on the contributions universities make to smart regions, and using the experiences of Finland's Helsinki Region in creating and realizing its smart specialization process.

Moving Towards Smarter Regions

The notion of smart cities and regions is not new. Since the 1990s, cities and regions looked at ways to enhance quality of life through technology and often eagerly adapted the "smart" label to describe activities aimed at enhancing effective city management, economic development, and prestige. This "tools and technology approach" has produced some impressive results, but is now seen as flawed in several ways: it starts with technology rather than urban challenges, there is insufficient use or generation of evidence of what actually works to address real-world challenges, and there is little citizen engagement (NESTA, 2015).

In this article, we consider "smartness" to constitute the effective interplay and reciprocity of thinking capacity and technology in improving the quality of life in the region. Smartness is seen – at the level of "smart citizens" – as the ability to understand and use knowledge effectively *and* the capacity to use digital media to create added value in daily (working) life. Hardware and software alone are not the answer, and "smartness" in the more traditional sense of the word: the capacity (of individuals, organizations, and regions) to understand and process knowledge, create new knowledge, and translate this knowledge into practice. This capacity can and should be supported by information and communication technologies, but it resides first and foremost in people's ability to think and to apply thinking skills effectively. Universities, in their core capacity of facilitating learning, are essential for this approach to be effective.

Regions recognize that the role of universities and the importance of scientific research in tackling these challenges are increasing, but the question of how to quickly and effectively transform research knowledge into practical applications still poses a major concern. The region's ability to learn, the practice of organizational learning, and the ability to conduct research and innovation in multi-dimensional teams and networks are basic requirements of modern societies. This is part of what makes regions "smart". But, both the importance and the difficulty of learning increase significantly in larger regional innovation ecosystems (Lappalainen et al., 2015).

The interface of regional players in the regional innovation ecosystem – from business, government, universities, and civil society – is where the exploration and potential application of knowledge can most powerfully be exploited. Effective collaboration there determines how smart a region can be, and how to leverage its potential. It defines the quality and effectiveness of the regional innovation ecosystem. In many cases, this task is not easy, and effective collaborate of societal partners is often a serious challenge. In order to address this, the European Union has actively embraced the concept of regional research and innovation strategies based on smart specialization – the so-called research and innovation strategies for smart specialization (RIS3). RIS3 provides a regional policy framework and basis for innovation-driven growth. RIS3 must be seen as a process of *entrepreneurial discovery:* an interactive and innovative process in which market forces and the private sector together with universities discover and produce information about new activities, and the government assesses the outcomes and empowers those players most capable of realizing the potential (Foray et al., 2012). RIS3 are much more bottom-up than traditional industrial policies. In the next section, we ask: How does this strategy translate into practice?

Actors in the Ecosystem

International competitive edge is increasingly based on a shared intent of the key regional actors to turn an area into a significant innovation hub, and for selected themes, even an innovation frontrunner (Launonen & Viitanen, 2011). All innovation hubs, which are also innovation ecosystems, have four factors in common:

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1. They have globally valued special expertise and corporate activities based on this expertise.

2. They create new knowledge that is applied on a global scale.

3. The hub attracts international expertise, competence-driven business and investments.

4. They have companies of excellence that operate both locally and globally.

Collaboration forms are needed to define organizational aims and needs in the context of the ecosystem, and to describe what is required to enable the required quality to be delivered. These aims and criteria drive regional actors to apply their competence in regional projects. The general level of competence required from companies, universities, and societal operators must be identified for each effort. This effort also requires modernizing the triple helix concept, which was developed in the 1990s to emphasize the need for collaborative contributions by three actor groups: industry, government and other public-sector organizations, and universities (Etzkowitz & Ranga, 2011). Although discussions around a quadruple helix and even a quintuple helix have become more common in recent years, the reality of actual collaboration in many countries is still very much a work in progress, and in many regions, sometimes even triple helix collaboration is difficult to achieve.

Finland has a long tradition in co-creation and effectively implementing the triple helix model, and its citizens are traditionally actively engaged in public-sector processes. Quadruple helix thinking and operations are a natural means to speed up innovation in the Helsinki Region. This affinity with participative processes is clearly seen in the ecosystem-thinking model developed there (Lappalainen et al., 2015).

Even in Finland, modernizing the triple helix in RIS3 processes means *going one step further:* focusing on the regional innovation ecosystem and the use of ecosystem thinking to consider which actor groups are relevant in societal change processes. In the triple helix, industry operates as the locus of product development and production, government as the source of contractual relations that guarantee stable interactions and exchange, and the university as a source of new knowledge and technology. This is certainly the case in the Helsinki Region. The quadruple helix adds citizens to the mix: as end users of products and services, but also as contributors and co-creators of new knowledge from their own areas of expertise. Smart specialization strategies must be developed through an "entrepreneurial discovery process", in direct consultation with all ecosystem actors, including citizens (Foray et al., 2012). In this way, RIS3 become a bottom-up process of exploration and discovery.

Six principles underlying the triple helix have been elaborated, each bringing a specific exploration focus for orchestrating regional innovation ecosystems:

1. *Actors:* How does the cooperation between universities, industry, and public administration function in the region?

2. *Structures:* Structures, networks, research groups, and jointly steered organizations emerge at the interfaces of collaboration. What is their status?

3. *Premises:* What premises are available for physical, virtual, and social development?

4. *New organizations:* New actors often represent hybrids that integrate elements from different institutions, such as science parks and corporate and technology incubators. Have new actors emerged in the region?

5. *Knowledge and technology transfer and co-creation:* How do the different innovation, invention, and patent services within universities and research institutes, knowledge-intensive business services (KIBS), incubators, and investor organizations function?

6. *Policies:* Are new financing instruments, collaboration support, intellectual property right measures, and reforms, taxation or regulation in place?

These are excellent questions, but not all of the relevant actors are considered. Experience shows that the citizen is an equally important actor (Irvin & Stansbury, 2004).

The triple helix model is no longer enough in the context of smart specialization. For working in a quadruple helix context, we propose a seventh principle:

7. *Participation:* What role does the knowledge base and expertise of engaged citizens play in making the regional innovation ecosystem smarter?

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Each region, of course, has its own renewal needs and challenges when developing as an innovation ecosystem, but a complex mix of factors like these forms the basis of any regional innovation ecosystem. As the roles and responsibilities of these institutional spheres change, each – in its own way – has been focusing more than ever on the active engagement of citizens as innovation developers and users. The evolution of recent years can be described as a systemic change (Markkula, 2014). In the broad spirit of innovation at the basis of RIS3, significant flexibility, adaptation of processes, acquisition of new skills, and the potential re-distribution of power among organizations are required (Carayannis et al., 2012). These competences and mindsets can be learned, but not necessarily in the classrooms of traditional universities. Learning by doing and coached practice are relevant here, as are new forms of university curricula and diverse new notions of the modern university such as the "entrepreneurial university" (Etzkowitz et al., 2012) and the "civic university" (Goddard, 2009).

Changing Roles for Universities

The way universities function is changing, as different universities explore how to fill in their "third role". In pioneering regions across Europe, universities are becoming active players in their communities, contributing to the quality of life and regional well being, adding value to regional development processes, and anchoring the importance of knowledge in the regional innovation ecosystem. Ideally, this is a co-creation process producing regional services in collaboration with industry, public authorities, and citizens. In practice, the role of universities across Europe differs from region to region, but in the best instances, universities have an essential role in infusing the region with knowledge, resources, and co-creation and renewal capabilities. The universities and research centres operating actively within the Helsinki Region and Espoo Innovation Garden developments – especially Aalto University, Helsinki University, VTT Technical Research Centre of Finland, Laurea University of Applied Sciences, and Metropolia University of Applied Sciences – are good examples of this. Traditionally, universities play societal roles relating to disseminating knowledge, discovering new knowledge, and societal participation. The importance of the third role is expanding, and requires universities to rethink how this can most effectively be fulfilled. The smart specialization process development in the Helsinki Region offers an example of how this is possible.

In addition, universities have been required to play many new roles in recent years. The role of *knowledge-exchange platform provider* is of increasing importance. This role will include the following elements:

1. *Connection:* Connecting generations (students, lifelong learners, and reaching out to work more closely with primary and secondary schools in developing competences in discovery learning); connecting people to processes (encouraging engagement and active contribution to societal processes); connecting knowledge to processes (regional, social, and societal learning processes); and connecting ecosystem partners to each other;

2. *Knowledge:* Infusing the region with knowledge and understanding, and enhancing smartness and intelligence in the older senses of thinking and knowing.

3. *Learning:* Not simply curriculum-based, but learning from practice, learning in the ecosystem (and also about the ecosystem), and making this learning accessible throughout the ecosystem.

4. *Anticipating:* We need facilities to deal with problems and issues before they become acute. Most regional challenges of today (could) have been anticipated in the past and addressed earlier. Universities should maintain proactive foresight, fore-search, and early-warning facilities for the regions and the communities they serve.

5. *Generations of the future:* Helping young people to prepare for the opportunities of many possible futures as they are emerging: guiding, coaching, condition-creating, competence-enhancing, and capacity building.

The emerging third role of universities can be seen clearly in the RIS3 process development and strategy implementation in the Helsinki Region.

The European Union's Smart Specialization Platform breaks down the active regional contributions by universities into four areas:

1. *Business innovation:* closely linked, although not exclusively, to the research function of the university

2. *Human capital development:* linked to the teaching function

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3. *Community development:* linked to the public service role of universities

4. *Institutional capacity of the region:* the university contributes through engagement of its management and members in local civil society

Where these four domains are integrated, the university can be seen to be occupying a proactive and not just a passive role in the regional development process (Goddard, 2011).

The City of Espoo and Aalto University show how they operate in all four domains. In the Helsinki Region, Aalto University is a globally connected university, which acts as a "window on the region", bringing fresh ideas in and engaging in diverse activities that build and enhance the image and reputation of the region to the wider world. Universities, business communities, and other public sector authorities have demonstrated their commitment to the process by investing in their own development. The European Commission's guide, *Connecting Universities to Regional Growth* (Goddard, 2011), bridges three knowledge and policy domains – education, research, and innovation – which is the so-called "knowledge triangle" (Markkula, 2013).

Universities play a strategic role by pulling together all their know-how to create greater economic and social impact. There is much to learn from how regions integrate the potential of universities in their development processes, and how universities actively choose different ways to manage their resources for fulfilling their traditional roles as knowledge creators and disseminators, creating new opportunities for researchers, learners, and teachers. The traditional role of universities has given way to collaborative models recognizing the important third mission or third role of universities: civic engagement and societal participation to support communities in tackling diverse social and societal challenges (EUA, 2014).

In the Helsinki Region, three kinds of contribution characterize this new societal participation. The first contribution of universities is driven by a new understanding of *the importance of applying research in practice.* This contribution requires an active science–society dialogue in which universities, local government, non-governmental organizations (NGOs), industry, and citizens become aware of and alert to each other's needs and potential contributions. There are diverse experiments with this science–society dialogue in the Helsinki Region. On the one hand, regional development projects with specific challenges and problems are looking for answers, and relevant research into the potential solutions may well exist. Recognizing the importance of bridging the gap between science and society is an essential step in this process; it requires: "...a good understanding on both sides of what research there is, what issues are being discussed, and how relevant research can impact on local and regional issues" (CoR, 2013). This dialogue can lead to faster and more effective societal solutions. However, linking the world of research and science with the world of business and government often requires a kind of two-way mediating service; these worlds use different languages and often are not able to easily access and understand the language spoken in the other world, however relevant the message may be (CoR, 2013). This mediation service requires further development and active implementation, using all the resources of the "knowledge triangle" (i.e., research, education, and innovation activities), in order to further strengthen the societal role of universities.

All societal challenges have a strong local dimension, which can be of benefit when scientists become aware of the real issues and burning questions faced by their societal partner, and societal stakeholders understand what science and research can offer for understanding complicated and complex issues. Diverse target groups in different regional and cultural environments — scientists, civil servants, small and medium-sized businesses (SMEs), and students — need to be coached in understanding and actively complementing each other's perspectives, and in how to apply relevant ideas in practice. Universities can play a particularly crucial role here. In many ways, this coaching is an extension of what universities normally do with learners, and initiating and maintaining this science–society dialogue takes academics out into society and brings societal stakeholders into the university, enriching the urban experience of all parties.

The second contribution universities make in their societal participation role reflects *the importance of entrepreneurship and entrepreneurial discovery in feeding regional development.* The spirit of entrepreneurial discovery drives innovation in the regional ecosystem, creating conditions in which researchers, students, civil servants, and SMEs can all become more alert to promising opportunities, developing or discovering new ideas or opportunities for the purpose of creating value, be it economic, social, or even political. Entrepreneurial discovery is a mindset characterized by curiosity, creativity, courage, and direct practice, all applied in discovering how to act to improve quality of life. Entre-

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preneurial discovery means experimentation and risk taking, and it can also mean failing. It requires people and organizations to work together in ways that strengthen the ecosystem. The many examples of entrepreneurial discovery by students and researchers in Aalto and Espoo Innovation Garden illustrate the importance of this contribution (Markkula & Kune, 2015).

The third contribution of universities to smart specialization and smart regions relates to *the university's roles as knowledge creators and disseminators.* Universities educate people and prepare them for taking part in society, for actively engaging and contributing their talents and qualities to build smarter regions, and for understanding, adopting, and using the many innovative products and services these regions need in order to prosper. Smart regions need smart citizens – smart in the deeper sense of knowing things, having and showing intelligence, understanding and applying knowledge, and being able to think sharply and quickly in difficult situations. Open minds are a precondition for innovation. This view reflects the intention of education, be it primary, secondary, tertiary, or lifelong learning. Together, these three contributions to smart regions are a powerful expression of good governance in the 21st century (Markkula & Kune, 2015).

The Helsinki Region intends to fulfill its pioneering role as a leading global innovation hub, where the knowledge triangle – research, education, and innovation activities – is fully integrated in practice, and where both entrepreneurial discovery and startup mentality are visibly valuable in university–industry–government collaboration. This induced synergy helps achieve a far greater impact than ordinary development measures would allow (Markkula, 2013).

Smart Specialization in the Helsinki Region

As the leading national expertise cluster, the Helsinki Region is at the strategic core of Finland's international competitiveness. It is the economic heart of the small and open economy of Finland. The region consists of the Cities of Helsinki, Espoo, and Vantaa and 23 other municipalities around it. The main cities have a joint competitiveness programme, as well as different collaborative arrangements for water management and public transport and various informal networks as grounds for active co-operation (EKA, 2014).

The aim of the Helsinki Region's smart specialization strategy is to promote sustainable regional development. The vision is for the Helsinki Region to be international innovation hub by 2020, and to double its research and innovation activities. In addition, the working culture should be agile, networked, and proactive. To achieve this goal, more investments are needed from abroad, as well as a significant increase in labour immigration and a creative and versatile cultural platform developed in which business based on creative expertise strengthens the regional economic structure and employment (EKA, 2014). As a policy instrument, smart specialization is a continuous process, and the region recognizes that, in order to move towards achieving its vision, a flexible and adaptive approach to the implementation of its strategy is required. When successful, it can open up important opportunities for joining forces, matching roadmaps, and building more world-class clusters.

In the Helsinki Region, RIS3 process development was carried out step by step, using the S3 Platform guidebooks (Foray et al., 2012). The smart specialization strategy helps to focus the region on its key themes, endeavours, and partnerships. Research and innovation activities have been developed in collaboration platforms and promoted with policy and financing instruments. Success will be based on the new working culture, and the effect of orchestration concepts developed for mobilizing actors to operate in digitalized open innovation platforms. In Figure 1, we can see the five regional spearheads and how they interface with RIS3 priorities. This concept has been developed together with all regional stakeholders, including industry, universities, the region and its diverse cities, as well as with citizens. The most challenging tasks are to create the digitalized innovation platforms for collaboration and to motivate the actors in the region for this collaboration. Each of the five spearheads – at the bottom of the figure – consists of many activities orchestrated as a single synergic endeavour. In practice, one or several project portfolios will be formed for each spearhead theme.

University research plays an important role in each of these spearheads. The four-year regional development research program "Energizing Urban Ecosystems" – with Aalto University as a key partner – has raised awareness of the regional innovation ecosystem among regional actors (Markkula & Kune, 2013). The Aalto Camp for Societal Innovation (ACSI) has been used to support the networked cooperation between regional innovation hotspots in 2013, and in 2015 it will help define priorities for the "Smart Citizen" spearhead (2015). Early results can be seen in the diverse regional activities initiated around the five spearheads.

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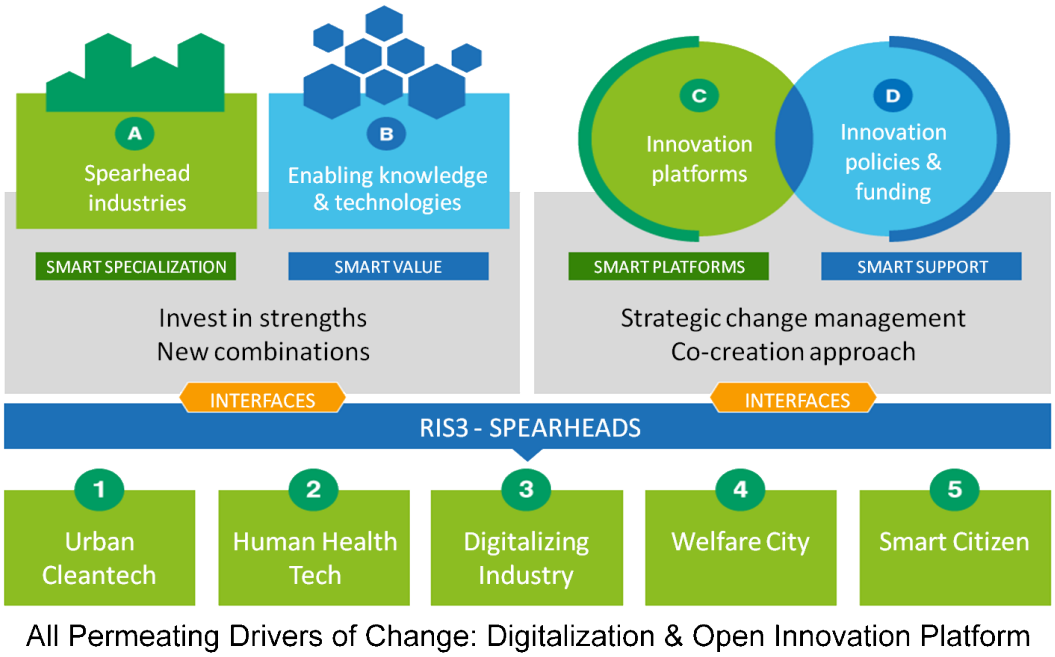

Figure 1. The concept of the Helsinki Region smart specialization strategy is an ongoing systemic process based on the orchestration of all the key innovation policy actors in the region. Reproduced from the Helsinki-Uusimaa Regional Council (2014).

Conclusions: Infusing the Region with Knowledge

Europe is facing grand societal challenges in an era of globalization and digitalization. Mere market forces alone cannot address these challenges adequately, and in many cases they actually exacerbate societal problems. A collaborative, co-creative approach involving all societal actors is required for realizing a regional policy that focuses on creating new opportunities for enhancing growth, competition, and quality of life in the region. This approach also includes new opportunities to involve universities as collaborators in reframing issues and seeking solutions. RIS3, as applied in the Helsinki Region, is an important driver for this effort.

Both official documents from European Commission and the Helsinki Region's experience stress the importance of societal capital for the renewal of regions. The European Union's smart specialization policy aims to address this challenge. In modernizing the triple helix and instituting ecosystem thinking, pioneering regions can better address societal challenges and apply excellence in science and industrial leadership in dealing with important issues. The direct involvement of stakeholders from industry, universities, and the public sector, and the engagement of citizens in co-creative work processes, is a prerequisite for the success of smart regions, and it is the key to translating the regional potential into better quality of life. Through their active roles in the creative translation of potential into practice, universities are essential for infusing the region with knowledge.

In order to thrive, regions require the development of attractive places to work and live – and an enabling factor is experimenting with the regional concept of innovation platforms to address their smart specialization spearheads. Universities can help regions make effective use of the diverse societal-dynamic models available for improving their development processes and their societal services. In the regional innovation ecosystem, all actors can use the research and innovation base of universities for producing services and other products that societies need. In this way, new avenues are opened for co-creating and inventing the future we desire.

A university's capacity to reach out to regional business and the community will fail if the region does not have sufficient capacity for in place innovation. This challenge is particularly acute in less favoured regions,

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where increasing the innovation capacity of the region is the only way to create the necessary preconditions for growth and success. In relatively prosperous regions, the reach-out is easier, but never a given; this role has to be proudly pursued and actively defended. Knowledge creation, dissemination, and use are essential for keeping regions smart. Joint learning is a cornerstone of the collaboration in the ecosystem, and – as is being shown in the Helsinki Region – universities have a key role to play in making smart regions smarter.

About the Authors

Markku Markkula is the President of the European Union Committee of the Regions (CoR), where he has been a member since 2010 and Rapporteur on several opinions related to topics such as Europe 2020, digitalization, single markets, as well as research and innovation. His experience includes memberships of several High Level Expert Groups, and he is a member of the EU Smart Specialisation Mirror Group. Markku works within Aalto University as the Advisor to Aalto Presidents, focusing on European Union strategy affairs. His previous work experience includes Directorship of the Lifelong Learning Institute Dipoli and the Secretary General of the International Association for Continuing Engineering Education IACEE. He is a former member of the Finnish Parliament (1995–2003). As an MP, his international role included the Presidency of EPTA Council (European Parliamentary Technology Assessment Network). In the Helsinki Region, he is the Board member of the Regional Council and the chair of the Steering Board, which makes decisions on the use of Structural Funds. He is a longstanding Espoo City Council member, as well as the chair of the City Planning Board.

Hank Kune is Director of Educore BV, Founding Partner and member of the governing board of the Future Center Alliance, and active member of the New Club of Paris, a global network organization working as agenda developer for knowledge societies, where his focus is on entrepreneurial initiatives and societal innovation coaching. Hank works with diverse corporate and government organizations in projects about societal innovation and renewal, with a special emphasis on hands-on problem solving in complex social, societal, and organizational situations.

References

Carayannis, E., Barth, T., & Campbell, D. 2012. The Quintuple Helix Innovation Model: Global Warming as a Challenge and Driver for Innovation. *Journal of Innovation and Entrepreneurship,* 1(2). http://dx.doi.org/10.1186/2192-5372-1-2

CoR (Committee of the Regions). 2013. Opinion of the Committee of the Regions on "Closing the Innovation Divide". *Official Journal of the European Union,* 56(C218): 12–21. http://dx.doi.org/10.3000/1977091X.C_2013.218.eng

EKA (Project Helsinki as Forerunner Area). 2014. *Helsinki Smart Region: Pioneering for Europe 2020,* 2nd Ed. Helsinki: EKA B Project / Helsinki-Uusimaa Regional Council.

Etzkowitz, H., & Ranga, M. 2011. "Spaces": A Triple Helix Governance Strategy for Regional Innovation. In A. Rickne, S. Laestadius, & H. Etzkowitz (Eds.), *Regional Innovation Systems: The Swedish Experience of Policy, Governance and Knowledge Dynamics.* London: Routledge.

Etzkowitz, H., Ranga, M., & Dzisah, J. 2012. Wither the University? The Novum Trivium and the Transition from Industrial to Knowledge Society. *Social Science Information,* 51(2): 143–164. http://dx.doi.org/10.1177/0539018412437099

EUA (European University Association). 2014. *The Role of Universities in Smart Specialisation Strategies: Report on Joint EUA-REGIO/JRC Smart Specialisation Platform Expert Workshop.* Brussels: EUA Publications.

Foray, D., Goddard, J., Beldarrain, X. G., Landabaso, M., McCann, P., Morgan, K., Nauwelaers, C., & Ortega-Argiles, R. 2012. *Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3).* Brussels: European Commission Smart Specialisation Platform.

Goddard, J. 2009. *Re-Inventing the Civic University.* London: Nesta.

Goddard, J. 2011. *Connecting Universities to Regional Growth: A Practical Guide.* Brussels: European Commission Smart Specialisation Platform.

Helsinki-Uusimaa Regional Council. 2014. *Smart Specialisation in the Helsinki-Uusimaa Region: Research and Innovation Strategy for Regional Development 2014–2020.* Helsinki: Helsinki-Uusimaa Regional Council.

Irvin, R., & Stansbury, J. 2004. Citizen Participation in Decision Making: Is it Worth the Effort? *Public Administration Review,* 64(1): 55–64. http://dx.doi.org/10.1111/j.1540-6210.2004.00346.x

Lappalainen, P., Markkula, M., & Kune, H. (Eds). 2015. *Orchestrating Regional Innovation Ecosystems: Espoo Innovation Garden.* Espoo: Aalto University in cooperation with Laurea University of Applied Sciences and Built Environment Innovations RYM Ltd.

Launonen, M., & Viitanen, J. 2011. *Hubconcepts: The Global Best Practice for Managing Innovation Ecosystems and Hubs.* Helsinki: Hubconcepts Inc.

Markkula, M. 2013. The Knowledge Triangle Renewing the University Culture. In P. Lappalainen & and M. Markkula (Eds.), *The Knowledge Triangle: Re-Inventing the Future: 11–31.* European Society for Engineering Education (SEFI), Aalto University, and Universitat Politecnica de Valencia.

Markkula, M. 2014. Renewing the Triple Helix in a Context of Smart Specialisation. *Helice,* 3(1).

Smart Specialization and the Role of Universities in Regional Innovation Ecosystems

Markku Markkula and Hank Kune

Markkula, M. & & Kune, H. 2015. Toward Smart Regions: Highlighting the Role of Universities. In Lappalainen, P., Markkula, M. & Kune, H. (Eds.) *Orchestrating Regional Innovation Ecosystems*. Aalto University in cooperation with Laurea University of Applied Sciences and Built Environment Innovations RYM Ltd.

Markkula, M., & Kune, H. 2013. Horizon 2020: Regional Innovation Ecosystems – From Theory to Practice. In *Open Innovation 2013*. Brussels: European Commission Directorate-General for Communications, Networks, Content and Technology.

Markkula, M., Miikki, L., & Pirttivaara, M. 2010. *Uudenmaan liiton strategian toinen aalto*. Helsinki: Helsinki-Uusimaa Regional Council.

Saunders, T., & Baeck, P. 2015. *Rethinking Smart Cities from the Ground Up*. London: Nesta.

Viitanen, J., Markkula, M., & Ripoll, C. R. 2013. Systemic Development of Regional Innovation Ecosystems – Modernizing the Triple Helix. In P. Lappalainen & and M. Markkula (Eds.), *The Knowledge Triangle: Re-Inventing the Future:* 101–116. European Society for Engineering Education (SEFI), Aalto University, and Universitat Politecnica de Valencia.

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Keywords: smart specialisation, smart specialization, societal innovation, triple helix, quadruple helix, role of universities, smart cities, smart regions, innovation, innovation ecosystems

Cities as Collaborative Innovation Platforms

Taina Tukiainen, Seppo Leminen, and Mika Westerlund

> *"The life of our city is rich in poetic and marvelous subjects. We are enveloped and steeped as though in an atmosphere of the marvelous; but we do not notice it."*
>
> Charles Baudelaire (1821–1867)
> Poet, essayist, and art critic

In this article, we focus on the role of a city as an orchestrator for innovation. We argue that cities should establish active dialogue with their citizens, and private and public sectors actors to co-create, develop, test, and offer service innovations that utilize diverse sets of platforms such as living labs. Our research contributes to the discussions of open and user innovations from the perspective of cities as communities that involve and integrate citizens and companies to collaborative innovation activities. While acknowledging that cities are platforms for simultaneous and divergent innovation initiatives, we identify four principal types of collaborative innovation. Cities serve as platforms for: i) improving everyday life; ii) conducting consumer and citizen experiments; iii) experimenting and implementing new technologies and services; and iv) creating new innovations and economies. Finally, we offer guidelines for fostering collaborative innovation activities between the public and private sectors.

Introduction

In developed nations, the high degree of urbanization has left governments, city planners, and economic development managers with the challenge of stimulating innovation to enable growth and improve the lives of their citizens. But, what is the best way to foster innovation in cities? Recently, researchers have sought to understand the roots of innovation and the positive role that business ecosystems and portfolio management can play in influencing the success of businesses and the cities in which they operate.

Tukiainen, Lindell, and Burström (2014) identify a business ecosystem as a combination or a set of companies (large and small) from different industries that aim to work with each other because they have complementary economic interests, knowledge, or capabilities that are usually based on technological or business interdependencies. The firms are loosely or tightly coupled in order to co-create value, but they are largely independent of geographical location. The firms sometimes compete and sometimes collaborate. Iansiti and Levien (2004) argue that an ecosystem should be understood as "a context where there is an ongoing interplay between actors taking on different roles as keystones, dominators, or niche players".

When focusing on cities, this study underlines that the key actors in most business ecosystems are the public sector, universities, and firms (both small and large), but also the citizens, which can be seen as users or customers. Typically, large firms are, or aim to be, platform leaders, whereas small firms mainly are usually perceived as partners or complementors even though they may grow to be platform leaders. The main actors and roles in business ecosystems are illustrated in Figure 1.

Vakkuri and colleagues take another stance and summarize, from the city's perspective, the three key challenges currently facing national ecosystems and the public sector (Vakkuri, 2009; Vakkuri et al., 2010). First, the public sector sustainability gap has increased and the competitiveness of cities has declined. Second, the operating principles of cities are based on bureaucratic administration and organizational silos. Third, there is an imbalance between the financial positions of cities and the costs they are facing: the demand for public services is greater than can be met by most cities.

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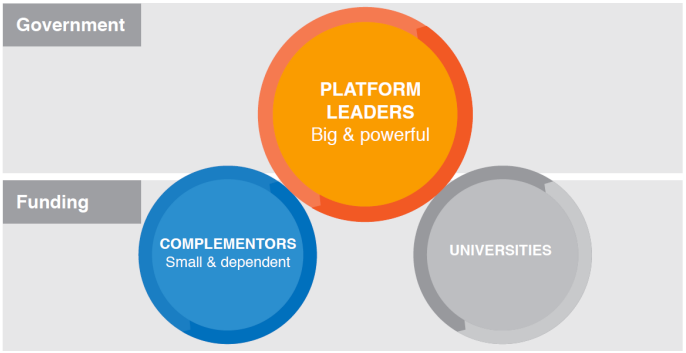

Figure 1. The key stakeholders in business ecosystems (modified from Tukiainen et al., 2014)

The governance of cities and their individual operational models are often stated to be bureaucratic in their administration and decision making rather than the administrative structures being customer-, action-, or process-based. Hence, administration and decision making are usually not interoperable with other cities or with companies. Such "siloed" governance and their solutions have been reported in many prior studies (Vakkuri et al., 2010). In particular, researchers have pointed to opportunities and roles of cities in accelerating open innovation platforms (Figure 2). The target is to open the data, share the knowledge, and encourage citizen participation and open innovation between all city stakeholders (Tukiainen & Sutinen, 2015).

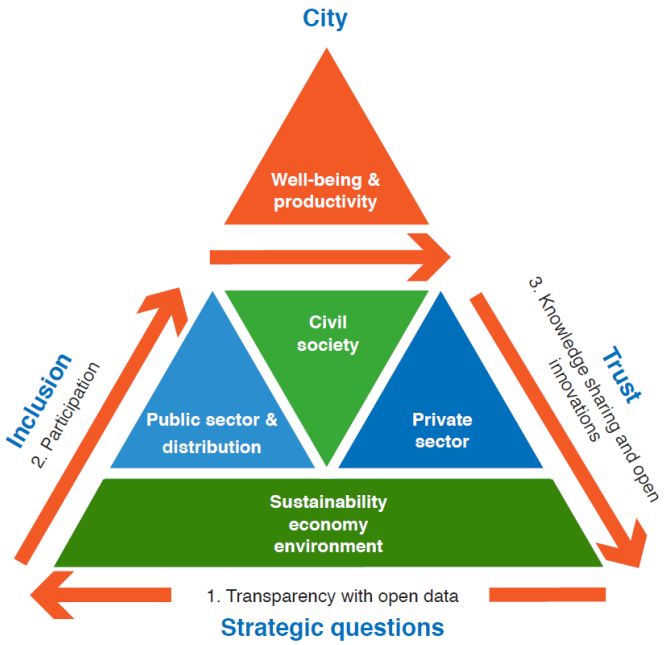

Figure 2. The model for the cities to accelerate open innovation (Tukiainen & Sutinen, 2015)

Thus, there are both obstacles and opportunities for cities to become both orchestrators of innovation and enablers for change. However, to realize dramatic change, cities need multidisciplinary capabilities and a critical number of cities must collaborate to make change real, particularly in the European context. Today, Europe is facing increased socio-economic challenges such as aging populations and economic stagnation, but it also boasts extraordinary social and market opportunities for emerging technologies. But, to take advantage of such opportunities requires an efficient and open European model of innovation to adopt these technologies – driven by the progressively popular paradigm of open innovation (cf. Chesbrough, 2003).

This article aims to understand cities as collaborative innovation platforms based on the living lab model, which seeks to engage citizens with industry and other stakeholders. First, we position cities as a part of a broader network and propose a model for understanding collaborative innovation in this municipal context. Next, we briefly describe our research approach. Then, we illustrate collaborative innovation with examples of open innovation platforms and multichannel development of services for citizens. Finally, we conclude by providing guidelines for collaborative innovation in cities.

Living Labs and Collaborative Innovation Platforms in Cities

A living lab is a modern concept but its roots can be traced back to Knight (1749), who was the first to apply the term "living laboratory". In the modern context, Westerlund and Leminen have defined living labs as: "physical regions or virtual realities, or interaction spaces, in which stakeholders form public-private-people partnerships (4Ps) of companies, public agencies, universities, users, and other stakeholders, all collaborating for creation, prototyping, validating, and testing of new technologies, services, products, and systems in real-life contexts" (Leminen, 2013; Westerlund & Leminen, 2011). Living labs are argued to offer a variety of benefits for stakeholders, including new business opportunities, more effective innovation processes, and savings in R&D costs.

Given that a living lab is by its definition a network, a single living lab network has multiple stakeholders (Feurstein et al., 2008). Moreover, researchers have categorized living labs by their driving stakeholders, labelling them as enabler-driven, provider-driven, utilizer-driven, and user-driven living labs (cf. Leminen et al., 2012). The characteristics of these four types of liv-

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ing labs differ, and they rely on different innovation mechanisms in terms of coordination and participation (Leminen, 2013). Finally, prior research suggests various constellations of living labs: a focal point, an intermediary, an innovation arena, and a platform (cf. Almirall & Wareham, 2008; Almirall & Wareham, 2011; Ballon et al., 2005; Kviselius et al., 2009; Lasher et al., 1991). The common aspect is that living labs strive to organize, coordinate, and manage innovation activities that differ by their goals, ambitions, and outcomes. For further introduction to the terminology, benefits, and classifications of living labs, see Leminen (2015).

Dutilleul, Birrer, and Mensink (2010) refer to the network of living labs as an innovation system, and this concept can be applied to cities. Indeed, the prior literature on living labs assumes and documents different forms of collaborative innovation in cities, and the current study suggests a conceptual model for understanding such collaborative innovations. The model identifies four forms of collaborative innovations in cities. First, we identify a city as a platform for grassroots improvement of everyday life and practices of citizens, including through self-employment. The second form considers a city as a platform for creative user experiments. Such experiments involve citizens and consumers as prosumers in grassroots creative activities within cities. For instance, Mulder (2012) discusses living labs in urban environments in terms of co-creation activity in Rotterdam in the Netherlands. Similarly, Leminen, Westerlund, Sánchez, and Serra (2014) document grassroots creative activities where users act as content creators, aggregators, and distributors at the Citilab Living Lab in Barcelona, Spain. Third, collaborative innovation suggests many activities involving experimenting with new technologies and services. For example, the Manchester Smart City initiative includes many experiments with digital technologies such the use of the Internet of Things in city lighting (Hillsdon, 2015). The fourth and final form of collaborative innovation in cities views a city as a platform for creating new business opportunities. Helsinki's efforts to open up public data is one example of a city stimulating innovation by creating new business opportunities (Meloni, 2013). Acknowledging the four types of innovations, Leminen and Westerlund (2015) identify four types of collaborative innovations in cities (Figure 3).

Given the variety of innovation activities in cities as labs, this study proposes that such forms call for different means and initiatives by different stakeholders, particularly when these initiatives are a part of an innovation ecosystem. This study also synthetizes various forms of collaborative innovations (Table 1) to develop guidelines for various forms of collaborative innovation in cities.

Research Design

This research was conducted within the Energizing Urban Ecosystems (EUE) research program, which brings together users with the Finnish construction and digital cluster stakeholders with city developers. The EUE program develops all-in-one solutions to build future city ecosystems that have been and will continue to be investigated, tested, and piloted during the years 2012–2016. The specific research reported here is an exploratory qualitative field study conducted in 2014 and 2015. The purpose of this research is to understand, discuss, and frame how a city may act as an orchestrator to facilitate multi-stakeholder developments. In addition to traditional qualitative research, the methods used include the following demonstrations and prototypes:

- Action research methods for engaging users in research design and processes, such as piloting, rapid prototyping, and testing; choice navigation and simulations; innovation camps, co-creation factories, and open innovation platforms

- Regional information and digital modelling for effective simulations, visualizations and lifecycle analyses of regional urban infrastructures and their functionalities

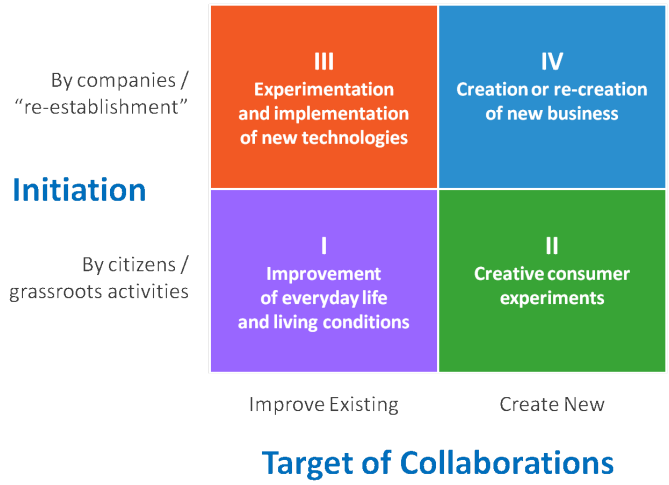

Figure 3. Collaborative innovation in cities (modified from Leminen & Westerlund, 2015)

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Table 1. Guidelines for cities participating in various forms of collaborative innovation (modified from Leminen & Westerlund, 2015)

Collaborative Innovation in Cities	Method of Participation	Innovation Outcomes
1. Improvement of everyday activities and living conditions	Support activities by offering tangible and intangible resources, such as tools and knowledge, rather than interfering or steering such activities. Citizens are committed to those activities for their own reasons.	Ideas and knowledge created by citizens and user communities in real-life contexts
2. Creative consumer experiments	Support activities by offering tangible and intangible resources, such as tools and knowledge, but be engaged in the creative activities to learn as such but also from novel collaborative forms	Information about the emerging needs and wishes of citizens and customers at the grassroots level, but also as a mechanism to learn novel forms of open collaboration
3. Experimentation and implementation of new technologies	Support the experiments and implementations by offering context, knowledge, and tools.	Validation of new ideas and prototypes of novel technologies
4. Creation or recreation of economic opportunities	Use the city as a platform for creating new ideas, where the plurality of stakeholders, knowledge, and ideas intersect. The city is a boundless source of ideas, but it is also a method of collaboration between and with systems and communities.	New business opportunities

- Solution co-development processes and tools in empirical settings, for example, learning-by-doing on various living lab sites, feasibility studies, and proof-of-concept studies of emerging product/service combinations

- An extensive literature review on ecosystems and living labs

We focused on understanding the city as a collaborative innovation platform and multichannel services development. As an example, we studied the Tapiola-Keilaniemi-Otaniemi and Matinkylä areas of Espoo. Finland. To collect the data, we used both action research and semi-structured interviews, in addition to consulting publicly available data. We conducted 30 semi-structured interviews in both private and public organizations. The interviewees represented diverse organizations and various individual roles and levels. All the interviews were carried out in face-to-face meetings and were audio-recorded for later transcription and analysis. The main unit of analysis was the activity used. The researchers coded the original data to identify and analyze the roles of the informants and critical events. In the next section, we will provide an empirical storyline defining how the city may act as an orchestrator.

Case Study: Espoo City

The Helsinki region of Finland, which includes Helsinki, Espoo, and Vantaa, is considered one of the most innovative regions in Europe (OECD, 2013). The heart of Espoo is in the Keilaniemi-Otaniemi-Tapiola area, which is the home of Aalto University, VTT Technical Research Centre of Finland, and the headquarters of companies such as Kone, Fortum, Neste Oil, Rovio, and Nixu, among many others. Startup Sauna is an accelerator for new ventures that also inspires a community of scientists and researchers. The area has a strong international character: more than 100 different nationalities are represented in the people that work, study, or live there. Espoo is an increasingly desirable area in which to live and work, and it provides a rich environment for experimentation.

Espoo Otaniemi is a pioneer in regional area modelling and multichannel services in the European Union. The

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City of Espoo orchestrates a network of platforms for the benefit of companies, organizations, citizens, and residents, as well as the city itself (Erkkilä, 2014). The individual platforms are orchestrated by local universities, and they bring together a broad variety of stakeholders for innovation and development. In particular, the Helsinki region and especially Espoo enables the four forms of collaborative innovations in a city context, in which living labs and other innovation environments serve as platforms for collaborative innovation. The resulting collaborative innovations include: i) events for self-employment in the Urban Mill and the Startup Sauna at Aalto University; ii) creative consumer experiments in cities with users and citizens as a part of living lab activities in Laurea Living Lab Networks (cf. Leminen, 2011); iii) experimenting and implementing technologies at Otasizzle or EIT ICT labs (cf. Tang et al., 2012); and iv) opening up data and processes in Espoo by the initiative of Helsinki region InfoShare (Erkkilä, 2014).

The Matinkylä Citizen Service Centre serves as another example that covers all four forms of collaborative innovations in cities. However, here, we concentrate on the third form of collaborative innovation in the Matinkylä urban area: the experimentation. Many cities are currently considering and experimenting with multi-use service centres, but the work is hindered by a lack of experience. For many years now, Espoo has excelled with the model of seven public citizen services hubs: Tapiola, Iso-Omena, Espoonlahti, Kivenlahti, Leppävaara, Kalajärvi and Vindängen. Now, the new arena in this further development is the Matinkylä public services marketplace, through which Espoo's Matinkylä district will place several city services under the same roof. Hosted within premises of the local shopping centre, the new spaces call for common guidelines and a joint understanding of service promises. Espoo's first pilot is the Matinkylä Citizen Service Centre, where the shopping centre is expanded to include services such as a library, a child health centre, a health clinic, a city service unit, and youth services. The new service centre is meant to enable greater understanding of the citizens' requirements regarding public services. The core idea is to merge together the spatial planning and digital service models. It also aims to find a common service promise and vision for the different providers. Plenty of groundwork has already been accomplished for the Matinkylä Citizen Service Centre. The core is a service centre process, which deals with waiting and queuing for services, service functionality, service accessibility and security issues, customer relationship building, and maintenance. The work so far has outlined the importance of the user experience and defining of different user groups such as seniors, youth, immigrants, and families with children.

This study also offers illustrative examples of the fourth form of collaborative innovation in cities, namely open innovation platform development. Digital technology and the opening up of public databases create new global business opportunities. The Energizing Urban Ecosystems (EUE) program is a pioneering project to demonstrate, prototype, implement, and experiment with innovative digital solutions and service concepts and to create an open innovation digital platform and multichannel services in Espoo. Through the research program in the region, a growing body of knowledge and practice is being developed for others to share, adapt, apply, and improve. Partners in the regional innovation ecosystem – universities, business, government, non-governmental organizations (NGOs), and citizens – are involved in an ongoing science–society dialogue, translating knowledge into practice and research into reality.

By continuing to ask questions about the role of innovation capital in regional well-being, about the importance of people, prototyping, and digitalization in development processes, and about ways of orchestrating a well-functioning innovation ecosystem, the region is using the provisional answers to drive its urban development processes. Espoo is also discovering new evidence-based answers to support the provision of services to its stakeholders and learning how to contribute to wellbeing in a world without borders.

As digitalization plays an important role in EUE activities, such activities create a digitalized testbed and platform for Espoo, which enables companies to develop, prototype, and test products, services, and solutions and support their transfer to global markets. The way of working includes interactive, user-centric, and open innovation, which are enabled by simulation and visualization in action research settings. The core activities include the demonstration, prototyping, and implementation of new urban designs and business-driven innovative solutions, as well as service concepts for the future. These solutions benefit from cutting-edge knowledge and technologies such as digitalization, information modelling, cloud computing, visualization, and virtual reality.

The regional data modelling and the development of virtual tools for effective communication and information sharing will be integrated into the processes of creating

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an open innovation demonstration platform. This platform materializes the conceptual models and improves the multi-dimensional urban development approach, which combines the physical and digital infrastructures at the city scale. One multichannel customer service example in Espoo comes from Elisa, the second-largest telecom operator in Finland (Figure 4). In order to achieve this outcome, new processes for city planning and management needed to be developed, communicated, and visualized in a proper, adequate, and transparent way. There was also a need for new operational models and service provision concepts for different user groups. The implementation of the new digitalization activities and integration of smart digitalization and urban design will be conducted in order for the Espoo to be the forerunner in the digital regional design and data models in European Union.

Design thinking is an integral part of this work. The methods adopted in service design, such as scenarios, storytelling, and prototyping, help decision makers see the changes in the operational environments of the future. It is a question of collecting the existing data and analyzing it in a new way to develop innovative and flexible city planning and service architectures. The focus is on customer-centric value models.

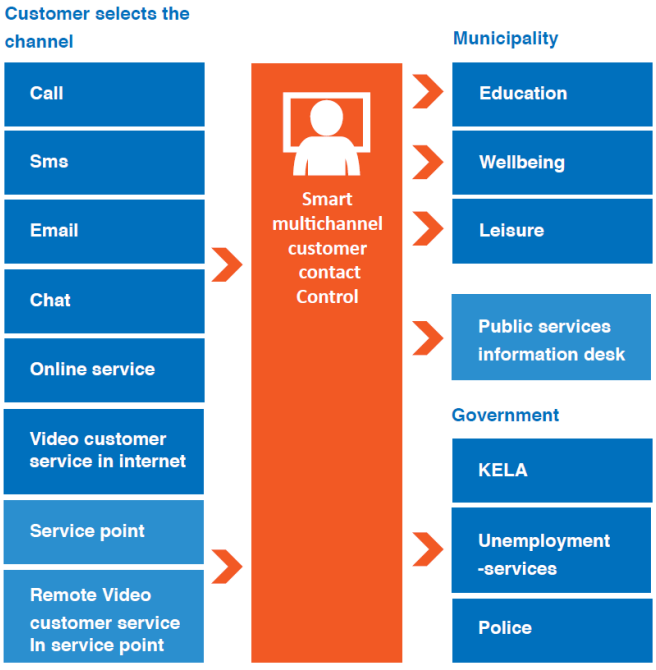

Figure 4. Multichannel customer services (Tukiainen & Sutinen, 2015)

In an open urban information platform model, the visualized data will be published using the latest version of a 4D urban information model. The first pilot includes the Tapiola, Otaniemi, and Keilaniemi districts of Espoo. The model include the current real-time data, as well as future plans for the year 2020. The work will be completed together with business partners such as Sito, Nokia , and Adminotech in close collaboration with the Finnish Geodetic Institute and Aalto University.

Conclusion

Cities should act as orchestrators that connect various parties to create and maintain sustainable ecosystems. This is the first step in cities becoming the drivers of innovation, with open data and empowerment of all stakeholders and citizens. In the future knowledge-intensive economy, new elements are required in sustainable ecosystems, including open innovation platforms, open data, citizen inclusion, empowerment, and crowdsourcing, thus utilizing a model of mixed crowdsourcing. As the examples in the Espoo case showed, cities with collaborative platforms and experimental projects with citizens and business ecosystems make a prominent and evolving form of open and user innovation. Previous studies argue the importance of networks that include many stakeholders and the importance of users in a broad variety of real-life contexts. This study shares this view but suggests that activities increasingly focus on the context of cities.

Moreover, the study underlines that these platforms and labs are an essential part of an innovation ecosystem in cities rather than being an isolated element of the ecosystem. They offer a mechanism to support collaboration with stakeholders and the emergence of innovation outcomes in cities. The outcomes range from improving everyday living conditions of citizens to systematic innovations. This study argues that a broad variety of collaborative innovation activities in different forms are found and take place in cities, as suggested by the examples in the case. When cities act as platforms, four forms of collaborative innovations are enabled: i) improving everyday activities and living conditions of citizens by the citizens, and fostering self-employment in cities; ii) creative consumer experiments; iii) experimenting and implementing new technologies; and iv) creating and re-creating new economic opportunities. This study calls for more research on cities as enablers, labs, or collaborative platforms.

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In particular, labs or platforms exist in the context of innovation ecosystems, and therefore, there are many questions for future research to investigate that arise from this context. First, what are the forms or systems in platforms and how are these related to business ecosystems? Second, what are the structures of innovation ecosystems in which platforms and living labs have an essential role? Third, how can innovation policy support the emergence of collaborative innovation in cities?

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References

Almirall, E., & Wareham, J. 2008. Living Labs and Open Innovation: Roles and Applicability. *The Electronic Journal for Virtual Organizations and Networks,* 10: 21–26.

Almirall, E., & Wareham, J. 2011. Living Labs: Arbiters of Mid- and Ground-Level Innovation. *Technology Analysis & Strategic Management,* 23(1): 87–102. http://dx.doi.org/10.1080/09537325.2011.537110

Ballon, P., Pierson, J., & Deleare, S. 2005. Test and Experimentation Platforms for Broadband Innovation: Examining European Practice. In *Proceedings of the 16th European Regional Conference, International Telecommunications Society,* Portugal, 4-6 September 2005.

Chesbrough, H. 2003. The Era of Open Innovation. *MIT Sloan Management Review,* 44(3): 35–41.

Dutilleul, B., Birrer, F. A. J., & Mensink, W. 2010. Unpacking European Living Labs: Analysing Innovation's Social Dimensions. *Central European Journal of Public Policy,* 4(1): 60–85.

Erkkilä, K. 2014. Espoo Is a Smart City through Collaboration. *Interdisciplinary Studies Journal,* 3(4):218–226.

Feurstein, K., Hesmer, K. A., Hribernik, K.D., & Schumacher, J. 2008. Living Labs: A New Development Strategy. In J. Schumacher & V.-P. Niitamo (Eds), *European Living Labs – A New Approach for Human Centric Regional Innovation:* 1–14. Berlin: Wissenschaftlicher Verlag Berlin.

Hillsdon, M. 2015. Manchester - The Smart City. *Manchester: A Certain Future,* February 23, 2015. Accessed October 1, 2015: http://macf.ontheplatform.org.uk/article/manchester-smart-city

Iansiti, M., & Levien, R. 2004. *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability.* Boston, MA: Harvard Business School Press

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Knight, T. 1749. *Reflections upon Catholicons, or Universal Medicines.* London: Printed for T. Osborne in Gray's-Inn.

Kviselius, N. Z., Andersson, P., Ozan, H., & Edenius, M. 2009. Living Labs as Tools for Open Innovation. *Communications and Strategies,* 74: 490–504.

Lasher, D. R., Ives, B., & Järvenpää, S. L. 1991. USAA-IBM Partnerships in Information Technology: Managing the Image Project. *MIS Quarterly,* 15(4): 551–565. http://dx.doi.org/10.2307/249458

Leminen, S. (Ed.) 2011. *Co-Creation with Users and Customers in Living Labs – Integrating Users and Customers in Companies' Business Processes.* Laurea Publications A76 61, Vantaa.

Leminen, S. 2013. Coordination and Participation in Living Lab Networks. *Technology Innovation Management Review,* 3(11): 5–14. http://timreview.ca/article/740

Leminen, S. 2015. Q&A. What Are Living Labs? *Technology Innovation Management Review,* 5(9): 29–35. http://timreview.ca/article/928

Leminen, S., & Westerlund, M. 2015. Cities as Labs: Towards Collaborative Innovation in Cities. In P. Lappalainen, M. Markkula, & H. Kune, H. (Eds.), *Orchestrating Regional Innovation Ecosystems Espoo Innovation Garden:* 167–175. Espoo: Otavan Kirjapaino Oy.

Leminen, S., Westerlund, M., & Nyström A.-G. 2012. Living Labs as Open Innovation Networks. *Technology Innovation Management Review,* 2(9): 6–11. http://timreview.ca/article/602

Leminen, S., Westerlund, M., Sánchez, L., & Serra, A. 2014. Users as Content Creator, Aggregator, and Distributor at Citilab Living Lab. In R. DeFillippi & P. Wikstrom (Eds.), *Business Innovation and Disruption in Film, Video and Photography.* Cheltenham, UK: Edward Elgar.

Meloni, V. 2013. A Transparent City. *Helsinki Quarterly,* 3: 16–25.

Mulder, I. 2012. Living Labbing the Rotterdam Way: Co-Creation as an Enabler for Urban Innovation. *Technology Innovation Management Review,* 2(9): 39–43. http://timreview.ca/article/607

OECD. 2013. *Regions and Innovation: Collaboration Across Borders.* OECD Reviews of Regional Innovation. Paris: OECD Publishing. http://dx.doi.org/10.1787/9789264205307-en

Tang, T., Wu, Z., Karhu, K., Hämäläinen, M., & Ji, Y. 2012. Internationally Distributed Living Labs and Digital Ecosystems for Fostering Local Innovations in Everyday Life. *Journal of Emerging Technologies in Web Intelligence,* 4(1): 106–115. http://dx.doi.org/10.4304/jetwi.4.1.106-115

Tukiainen, T., Lindell, M., & Burström, T. 2014. *Finnish Start-ups in Global Evolving Ecosystems: Value for Finland.* Helsinki: Hanken School of Economics and Tekes.

Tukiainen, T., Sutinen, P. 2015. Cities as Open Innovation Platforms for Business Ecosystems. In P. Lappalainen, M. Markkula, & H. Kune (Eds), *Orchestrating Regional Innovation Ecosystems: Espoo Innovation Garden:* 313–322. Espoo: Aalto University in cooperation with Laurea University of Applied Sciences and Built Environment Innovations RYM Ltd.

Vakkuri, J., Kallio, O., Tammi, J., Meklin, P., & Helin, H. 2010. *Matkalla kohti suuruuden ekonomiaa? Kunta- ja paikallistalouden lähtökohdat Paras-hankkeessa.* Paras-ARTTU-ohjelman tutkimuksia nro 3. Tampereen yliopisto. Suomen Kuntaliitto, Acta nro 218. Helsinki: Kuntatalon paino

Vakkuri, J. (Ed.) 2009. *Paras mahdollinen julkishallinto? Tehokkuuden tulkinnat.* Helsinki: Gaudeamus

Westerlund, M., & Leminen, S. 2011. Managing the Challenges of Becoming an Open Innovation Company: Experiences from Living Labs. *Technology Innovation Management Review,* 1(1): 9–25. http://timreview.ca/article/489

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Sustainable Innovation: A Competitive Advantage for Innovation Ecosystems

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> *"Yet in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs. We do not pretend that the process is easy or straightforward."*
>
> World Commission on Environment and Development
> In *Our Common Future* (1987)

In this article, we elaborate the emerging concept of sustainable innovation and analyze the relevance of innovation as a means to solve wicked problems and enhancing sustainable well-being. We also examine the changing conditions for innovation creation: building global knowledge hubs and local innovation ecosystems. As a result, the drivers of innovation and opportunities to utilize the untapped innovation potential of people outside traditional innovation contexts are expanded and diversified. Ultimately, the success of sustainable innovation constitutes its impact on the well-being of people and vice versa: sustainable well-being is an important source of innovation and growth. The article adds to the conceptual development of sustainable innovation and its motivation, which lies in combining competitiveness, the well-being of people, and inclusive solutions.

Introduction

Both national innovation systems and regional developers are struggling to meet the demands of the constantly changing global competitive environment. Countries, regions, and cities all over the world undergo major structural changes as the economy shifts from manufacturing towards services and as waves of socio-technical development shape the innovation landscape. To manage the structural change and to support innovations as efficiently as possible, local innovation environments need to be developed and strengthened. This article aims to stimulate discussion and provide new perspectives on innovation.

In this article, we posit solving wicked problems and generating sustainable well-being as prerequisites for innovation and as sources of competitive advantage for innovation and knowledge ecosystems. The changing drivers of innovation provide the sparks needed for new policies and processes worldwide to tap undiscovered innovation potential. Because innovation is often associated with problem solving, the special innovation challenges of today are related to wicked problems: those challenges in life and society that are particularly complex, multi-faceted, and that require creative approaches. One common type of wicked problem relates to sustainable development. The World Commission on Environment and Development (WCED, 1987) defines sustainable development as: "development which meets the need of the present without compromising the ability of future generation to meet their needs". Sustainable innovation, building on sustainable development, on corporate sustainability, and on systems thinking, can help us understand and solve complex and serious problems. Sustainable innovations emerge all over the world in eco-innovation business, in design, in peer-to-peer practices, in policy-making, and in sustainable lifestyles changes, but the concept needs systemic clarification. This article aims to elaborate the concept appropriately.

An Ecosystem Perspective on Innovation

Innovation tends to cluster in certain sectors or areas, which grow faster and often require structural changes (Fagerberg, 2006). Similarly regional development is shifting towards large clusters, cities, and metropolitan

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areas, and most of the value creation, R&D activities, and patenting take place in global level innovation hubs (Kao, 2007; Kim & Short, 2008). Creative hubs in the global economy produce considerable value for global value networks. They are well known and attract talent, firms, and investments (Florida & Gulden, 2005). They are capable of reinventing themselves in the changing environment. In them, we can find a dynamic innovation ecosystem where innovations emerge when different actors collaborate (Kao, 2009). Previously, we have argued that innovations require a special ecosystem that has top-level universities and research institutions, sufficient financing and a local market, skilled labour force, specialization, and cooperation among companies and global networking (Hautamäki & Oksanen, 2012; Oksanen & Hautamäki, 2014). Based on this view, there is a need to build up world-class innovation hubs that combine high quality of life and excellent business possibilities. This goal is achieved through intensive cooperation among local, regional, and national actors. The forces and resources must be gathered around local strengths and recombined into new industries. However, in reality, relatively few regions have exhibited this kind of renewal capability (Etzkowitz & Klofsten, 2005).

The term "innovation ecosystem" refers to a dynamic, interactive network that breeds innovation. In practice, the term can refer to local hubs, global networks, or technology platforms (Moore, 2006). It has roots in industry and business clusters (Estrin, 2009; Porter, 1998), in the conceptual evolvement of innovation (e.g., Chesbrough, 2003; von Hippel, 2005), and in the Triple Helix approach to regional development and national innovation systems (Etzkowitz & Leydesdorff, 2000). In many studies, the emphasis has been on local and regional ecosystems and their development. The ecosystem approach emphasizes the position and roles of local and public actors in developing the innovation activity. For new firm creation, the hub-based innovation ecosystem led by a single firm has become the most prominent context given the numerous benefits associated with hub membership such as access to established markets, branding and reputational advantages, and access to intellectual property and technical know-how (Nambisan & Baron, 2012).

An innovation ecosystem is a network of relationships through which information and talent flow through systems of sustained value co-creation. The systems approach has been used to describe the multifaceted nature of innovation at various levels – national, regional, technological, and sectors – and to describe the processes by which research capabilities build knowledge and then transfer the knowledge to support business development in the context of the Triple Helix of business, government, and academic interaction (Etzkowitz & Leydesdorff, 2000). The ecosystem metaphor also enriches the systems model with value and culture. The transformation of an ecosystem is characterized by a continual realignment of synergistic relationships of people, knowledge, and resources for both incremental and transformational value co-creation. Through relationships, value co-creation networks evolve from mutually beneficial relationships between people, companies, and investment organizations. A related definition of an innovation ecosystem is given by Estrin (2009): in her view, the innovation ecosystem is made up of communities of people with various types of expertise and skill sets.

Sustainable Innovation and Wicked Problems

Sustainable development has economic, environmental, and social dimensions (Harris et al., 2001). We call the emerging concept "sustainable innovation". Wicked problems (see Rittel & Webber, 1984) are complex issues where the solution requires extensive cooperation and many actors, but when managed successfully, the solutions provide a means to tap into a significant, long-term innovation potential. The role of innovation in solving great challenges such as climate change or water scarcity is indeed becoming increasingly important (Kao, 2007). Similarly the business models are changing together with innovation (Carlson & Wilmot, 2006). Pioneering entrepreneurs introduce new products and services, expand the range of global knowledge networks, and most importantly, challenge established business and innovation interests with new approaches (Auerswald, 2012). What is important for the solutions is the systemic nature of wicked problems. Therefore, sustainable innovations are holistic and avoid partial optimization. Solving wicked problems through innovation further enhances the need for new capabilities, because innovation is not grounded in convention, but it challenges the existing mindsets and ways of operating. Both innovation and wicked problems have to be dealt with in a context of uncertainty and risk, and both require collective actions (van Bueren et al., 2003).

In recent decades, wicked problems have been a hot topic with scholars and practitioners from different disciplines (Weber & Khademian, 2008). Given that public organizations, companies, non-governmental organizations, and citizens are all interested in creating solu-

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tions to wicked problems, more efficient identification of problems and more collaborative approaches to creating solutions are needed. Similarly, innovations are often produced through co-creation among diverse individuals and groups, not by institutions alone. Problem solvers often possess conflicting views of the problem, of solution methods, and of the legitimacy of possible solutions (Wexler, 2009). Thus, we argue that the best solutions are created when all stakeholders are able to find their role within the problem-solving network; this requires an inclusive approach to innovation. Ideation and discussions should take place in shared arenas, where organizations together with opinion leaders and other central figures guide the innovation processes and meaning creation (see Luoma-aho & Vos, 2010). Finally, we argue for inclusive innovation policy. It starts from the principle that all people should have the opportunity to develop their skills and look for creative solutions to the challenges they see as important.

Sustainable innovation takes sustainable well-being and sustainable development as the basic values, leaving economic growth with instrumental value. It also shifts the dominance and focus in the discussion from a national level to both local and global levels when the basic field of innovation activity is the innovation ecosystem and not the national innovation system.

Innovation is described as a lifecycle ranging from concept to practice (Crossan & Apaydin, 2010; Narayanan, 2001). There are four elements in the lifecycle of innovation: idea, invention, implementation, and impact. We call this approach the 4i model of innovation (Hautamäki & Oksanen, 2012). What keep the 4i circle moving are the flow of ideas and the ongoing identification of wicked problems. In innovation practices, much emphasis is laid on the organizations' capability to gather ideas, to network, and to collaborate (McLean, 2005; Medina et al., 2005). However, ideation and networks do not produce innovation without motivation. Wicked problems are an important motivational source because, ultimately, innovation provides a solution to a problem worth solving. This point is often overlooked when discussing creativity or idea generation. Pure ideation rarely creates successful products; it takes a real, persistent problem, a genuine need that requires resolution.

Innovation creates new practices and leads to changes in the structures of organizations and in the actions of people. The impact stage is often ignored in innovation research, because innovation is considered ready when it is implemented. In addition, there is the general assumption that innovations are always useful, valuable, and good in nature. These qualities are impossible to verify without considering the impacts of innovation. Innovation could be a success economically, but socially a disaster, because of its impact on social practices, as in the case of excessive marketing of infant formula in developing countries (Sethi, 1994). However, the goodness of innovation has not been widely studied. Some researchers have pointed out that it is possible that innovation is harmful or uneconomical from the point of view of an individual or a social system (Rogers, 2003; Rogers & Schoemaker, 1971), but the given nature of innovation needs further investigating (Simula, 2012). One driver for innovation has been sustainable development. Nidumolu, Prahalad, and Rangaswami (2009) have argued that there is no alternative to sustainable development, and the principle has challenged companies to develop products and services for new clean-tech markets, for better control over the lifecycles of products and services, for the use of recycled materials, for energy efficiency, and for improved quality of life. There are also more and more consumers who take sustainability as an important factor in their consumer intent and behaviour, which has increased sustainability marketing (Belz & Peattie, 2010).

Sustainable innovation has roots in sustainable development, and it is based on ethically, socially, economically, and environmentally sustainable principles. Similar principles can be seen in eco-innovation (Boons & Lüdeke-Freund, 2013; Hall & Clark, 2003; Rennings, 2000), in frugal innovation and engineering (Bhatti & Ventresca, 2012), in jugaad innovation (Radjou et al., 2012), and in the rise of the shared-value mindset (Porter & Kramer, 2011), but the wider concept of sustainable innovation needs to be thoroughly elaborated.

In business, innovation has been motivated by the need to create superior competitiveness in the marketplace. Traditionally, this has been accomplished through two basic strategies: cutting costs or creating products superior to those of competitors (i.e., cost leadership or differentiation strategies; see Porter, 1980). Sustainable innovation, however, offers a third competitive strategy: to create products or processes with market-desirable features, such as durability, locality, or material and energy efficiency. Innovations that contribute to a reduction of environmental burdens or to other specified ecological targets are often called eco-innovations, but the theoretical and methodological framework is diffuse (Rennings, 2000).

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Because consumers are demanding sustainable products and services and are willing to pay more for them, the market for sustainable innovation is growing. Sustainable innovation assists customers and citizens in managing their lifestyles by enabling them to live happier lives in ways that support sustainable development. Sustainable innovation provides the foundation for future business; it does not simply reflect ethical responsibility. The tasks that sustainable innovation is geared towards – the wicked problems – have global significance.

In summary, sustainable innovation has three defining characteristics: i) it contributes to sustainable well-being, ii) it is systemic, and iii) it is inclusive. Each characteristic is described in greater detail in the subsections that follow.

1. It contributes to sustainable well-being

Sustainable innovations are evaluated according to their impact on sustainable well-being. We elaborated the concepts of sustainable well-being and innovation when studying the competitive advantages of the Helsinki metropolitan region with the Demos Helsinki think tank (Alanen et al., 2010). Our argument is that the well-being of people creates competitive advantage for regions and cities, not vice versa.

The three basic elements of sustainable well-being are quality of life (including happiness), a sustainable economy and balanced relationship with the nature (sustainable development). These are modern aspects of the Aristotelian good life (see also Castells & Himanen, 2014). It is important to emphasize the difference between this new concept of sustainable well-being and traditional welfare. The welfare refers to objective well-being such as health and economic security, whereas sustainable well-being is related also to the subjective experience of well-being. The other difference is that well-being is an active concept and contains the capability to act in society (Sen, 1999). Traditional welfare means compensating for handicaps and it is a passive concept. In our analysis of the competiveness of the Helsinki metropolitan region, we state that the sustainable well-being of citizens is the real competitive advantage of the region. In practice, the approach of sustainable well-being can actualize, for example, in the design of physical living environments, which shapes the complexity, sociability, and ecological footprint of everyday life. Another example is the planning of individual houses and commuting choices, to which innovative policy incentives can play a particularly important role in both sustainable household choices and business development in the transition phase to a more sustainable socio-economic model, when green housing and traffic solutions do not have similar scale economies as the established solutions (Hämäläinen, 2013). Examples of such innovations include the hybrid car incentive scheme in the United Kingdom and the solar power feed-in tariff in Germany (Hämäläinen, 2013).

2. It is systemic

An innovation or its impact is difficult to predict, although favourable conditions can be created to encourage its emergence. Leaders at national, regional, and organizational levels are often challenged by this reality because establishing such conditions typically requires long-term, widespread, and systemic changes (e.g., Geels & Schot, 2007). Similarly, solving wicked problems in a sustainable way requires a systemic view.

We face systemic change and systemic innovations in many challenges and wicked problems of the modern society: energy issues, transportation systems, health caresystems, reforms in agriculture, and waste systems, to name but a few. Systemic innovations are related to changes in socio-technical systems and are often described as leaps or transitions. Systemic innovations are related not only to technological change but also to societal and cultural changes: changes in user contexts and symbolic meanings. In addition, systemic innovation often forms the core of national innovation strategies. The acceptance of the system is affected by the general values of society and the development of national and international trends, such as awareness of climate change and sustainable development. As a whole, systemic innovation includes changes in the market, consumer behaviour, politics, and culture (Geels, 2010; Geels & Schot, 2007). The systemic collaboration model developed in the Netherlands, referred to as "transition management", has been widely used to remove obstacles to sustainable transformation, for example, by guiding the transformation of transport and energy systems so that they become sustainable in an all-encompassing sense (Elzen et al., 2004). Another example, the smart grid, has potential to lead to interesting future practices; the smart grid emerges at the intersection of the Internet and energy management. It uses digital technology to manage the generation, transmission, and distribution of power from all types of sources along with consumer demand (Nidumolu et al., 2009).

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3. It is inclusive

In the first decade of the 21st century, innovation researchers emphasized networked, open, and diverse forms of innovation (e.g., Chesbrough, 2003; von Hippel, 2005). Similarly, in the past few years, the World Bank, the Organisation for Economic Co-operation and Development (OECD), and many other development agencies and national governments all over the world have promoted and launched inclusive innovation approaches and actions such as skill development and financial support for small enterprises. Inclusive innovation implies that all individuals should have the opportunity to use their potential to seek creative solutions to the challenges they deem important. A background for this argument is the notion that the most important resources of innovation are creative, skilled people, both in the workplace and in everyday life. Inclusive innovation could be summarized by the principle "innovation for all". This means not only that all people must have some opportunities to innovate but also that innovation must serve and benefit all people.

Inclusive innovation supports collective wisdom and the crowdsourcing of problems (Surowiecki, 2004; Weinberger, 2011). This kind of development and other forms of mass collaboration have a deep impact on economies, businesses, and governments. In a deeper sense, sustainable and inclusive innovation promotes new forms of democracy, where citizens have the right and the opportunity to be creative and to contribute to improvements in services, products, and the structure of public organizations such as municipalities, schools, and hospitals (Benkler, 2006; von Hippel, 2005).

Conclusions

Innovation ecosystems are like natural ecosystems, consisting of specialized, diverse entities that "feed off, support and interact with each other" (Bahrami & Evans, 2000). They sit within much larger environments that include municipalities, governmental organizations, legislation, and regulation. This context presupposes a cross-functional cooperation between all partners and shareholders (Hautamäki, 2006). Especially important is the cooperation between firms, universities, venture capitalists, and other financiers, municipalities, and citizens.

In a global economy, human resources tend to cluster into attractive knowledge hubs. The major reason for clustering is that concentration of talents accelerates creativity and innovation (Florida, 2002; Saxenian, 2006). Richard Florida's creative class theses have been criticised widely (e.g., Peck, 2010), but it is important to understand that definitions of creativity and innovativeness are very broad. In this article, we argue that, although knowledge hubs have many success factors, an increasingly important factor is the capability to solve wicked problems. We have also argued that producing human-centred solutions for wicked problems is impossible if the majority of people are out of reach of innovation activities. In innovation policy, there is a need to move from the national level to places where people work together, in other words, to local ecosystems, where sustainable innovation policy is localized and where people and their networks serve as the primary sources of innovation activities. Understanding people and the flow of ideas as a basis of innovation activities challenges traditional innovation policy, and requires a systemic approach and deep institutional cooperation and interaction (Chesbrough, 2003; Pentland, 2014; Seshadri & Shapira, 2003). This approach requires sustainable and inclusive innovation policy in which all innovation activities are considered in terms of how they contribute to quality of life and to solving wicked problems. More research on impact and sustainability of innovation is continuously needed; for example, the sustainable nature of social innovation is generally taken as a given, but in practice, it needs critical research to verify the usefulness and valuableness of any innovation. In addition, no universally accepted definitions of sustainable innovation or indicators to measure it exist – more research on sustainability considerations, both in the private and in the public sector, would be useful. In this article, we have outlined some modifiers for sustainable innovation. Most importantly, sustainable innovation outlines significant changes in mindsets: all the effects of innovation must be evaluated according to their contribution to sustainable well-being.

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References

Alanen, O., Hautamäki, A., Kaskinen, T., Kuittinen, O., Laitio, T., Mokka, R., Neuvonen, A., Oksanen, K., Onnela, S., Rissanen, M., Vassinen, S. & Viljanen, V. 2010. *The Well-Being of Metropolis.* Espoo, Finland: The City of Espoo.

Auerswald, P. 2012. *The Coming Prosperity: How Entrepreneurs Are Transforming the Global Economy.* Oxford: Oxford University Press.

Belz, F-M., & Peattie, K. 2010. *Sustainability Marketing. A Global Perspective.* West Sussex: John Wiley & Sons.

Bahrami, H., & Evans, S. 2000. Flexible Recycling and High-technology Entrepreneurship. In M. Kenney (Ed.), *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region:* 165–189. Stanford: Stanford University.

Benkler, Y. 2006. *The Wealth of Networks: How Social Production Transforms Markets and Freedom.* New Haven: Yale University Press.

Bhatti, Y. A., & Ventresca, M. 2012. *The Emerging Market for Frugal Innovation: Fad, Fashion, or Fit?* Working Paper. Social Science Research Network.
http://dx.doi.org/10.2139/ssrn.2005983

Boons, F., & Lüdeke-Freund, F. 2013. Business Models for Sustainable Innovation: State of the Art and Steps Towards a Research Agenda. *Journal of Cleaner Production,* 45: 9–19.
http://dx.doi.org/10.1016/j.jclepro.2012.07.007

van Bueren, E., Klijn, E., & Koppenjan. J. F. M. 2003. Dealing with Wicked Problems in Networks: Analyzing an Environmental Debate from a Network Perspective. *Journal of Public Administration Research and Theory,* 13(2): 193–212.
http://dx.doi.org/10.1093/jpart/mug017

Carlson, C. R., & Wilmot, W. W. 2006. *Innovation: The Five Disciplines for Creating What Customers Want.* New York: Crown Business.

Castells, M., & Himanen, P. (Eds.) 2014. *Reconceptualizing Development in the Global Information Age.* Oxford: Oxford University Press.

Chesbrough, H. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology.* Boston: Harvard Business School Press.

Christensen, C. M. 1997. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Boston: Harvard Business School Press.

Crossan, M. M., & Apaydin, M. 2010. A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies,* 4(6), 1154–1191.
http://dx.doi.org/10.1111/j.1467-6486.2009.00880.x

Elzen, B., Geels, F.W., & Green, K. 2004. *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy.* Cheltenham: Edward Elgar.

Estrin, J. 2009. *Closing the Innovation Gap: Reigniting the Spark of Creativity in a Global Economy.* New York: McGraw Hill.

Etzkowitz, H., & Klofsten, M. 2005. The Innovating Region: Toward a Theory of Knowledge-Based Regional Development. *R&D Management,* 35(3): 243–255.
http://dx.doi.org/10.1111/j.1467-9310.2005.00387.x

Etzkowitz, H., & Leyersdorf, L. 2000. The Dynamics of Innovation: From National Systems and "Mode 2" to a Triple Helix of University–Industry–Government Relations. *Research Policy,* 29(2): 109–123.
http://dx.doi.org/10.1016/S0048-7333(99)00055-4

Fagerberg, J. 2006. Innovation. A Guide to the Literature. In J. Fagerberg, D. C. Mowery, & R. R. Nelson (Eds.), *The Oxford Handbook of Innovation:* 1–27. Oxford: Oxford University Press.

Florida, R. 2002. *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life.* New York: Basic Books.

Florida, R. 2005. *Cities and the Creative Class.* New York: Routledge.

Florida, R., & Gulden, T. 2005. The World is Spiky. *The Atlantic Monthly,* October: 48–51.

Geels, F. W. 2010. Ontologies, Socio-Technical Transitions (To Sustainability), and the Multi-Level Perspective. *Research Policy,* 39(4): 495–510.
http://dx.doi.org/10.1016/j.respol.2010.01.022

Geels, F. W., & Schot, J. W. 2007. Typology of Sociotechnical Transition Pathways. *Research Policy,* 36(3): 399–417.
http://dx.doi.org/10.1016/j.respol.2007.01.003

Hall, J., & Clark, W. 2003. Introduction to the Special Issue on Environmental Innovation. *Journal of Cleaner Production,* 11(4): 343–346.
http://dx.doi.org/10.1016/S0959-6526(02)00070-7

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Harris, J. M., Wise, T. A., Gallagher, K. P., & Goodwin, N. R. 2001. *A Survey of Sustainable Development.* Washington DC: Island Press.

Hautamäki, A. 2006. Innovation Ecosystem in City Policy: The Case of Helsinki. *Helsinki Quarterly,* 4: 17–21.

Hautamäki, A., & Oksanen, K. 2012. *Suuntana innovaatiokeskittymä.* [Towards the Innovation Center] Jyväskylä, Finland: Jyväskylä University Press.

von Hippel, E. 2005. Democratizing Innovation. Cambridge: The MIT Press.

Hämäläinen, T. 2013. *Towards a Sustainable Well-being Society.* Helsinki: Sitra, Erweco.

Kao, J. 2007. *Innovation Nation, How America is Losing Its Innovation Edge, Why That Matters, and What We Can Do to Get It Back.* New York: The Free Press.

Kao, J. 2009. Tapping the World's Innovation Hot Spots. *Harvard Business Review,* 87(3): 109–114.

Luoma-aho, V., & Vos, M. 2010. Towards a More Dynamic Stakeholder Model: Acknowledging Multiple Issue Arenas. *Corporate Communications: An International Journal,* 15(3): 315–331. http://dx.doi.org/10.1108/13563281011068159

McLean, L. D. 2005. Organizational Culture's Influence on Creativity and Innovation: A Review of the Literature and Implications for Human Resource Development. *Advances in Developing Human Resources,* 7(2): 226–246. http://dx.doi.org/10.1177/1523422305274528

Medina, C. C., Lavado, A. C., & Cabrera, R. V. 2005. Characteristics of Innovative Companies: A Case Study of Companies in Different Sectors. *Creativity and Innovation Management,* 14(3): 272–287. http://dx.doi.org/10.1111/j.1467-8691.2005.00343.x

Moore, J. F. 2006. Business Ecosystems and the View from the Firm. *The Antitrust Bulletin,* 51(1): 31–75.

Nambisan, S., & Baron, R. A. 2013. Entrepreneurship in Innovation Ecosystems: Entrepreneurs' Self-Regulatory Processes and Their Implications for New Venture Success. *Entrepreneurship Theory and Practice,* 37(5): 1071–1097. http://dx.doi.org/10.1111/j.1540-6520.2012.00519.x

Narayanan, V. K. 2001. *Managing Technology and Innovation for Competitive Advantage.* New Jersey: Prentice-Hall Inc.

Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. 2009. Why Sustainability Is Now the Key Driver of Innovation. *Harvard Business Review,* 87(9): 56–64.

Oksanen, K., & Hautamäki, A. 2014. Transforming Regions into Innovation Ecosystems—A Model for Renewing Local Industrial Structure. *The Innovation Journal: The Public Sector Innovation Journal,* 19(2): Article 5.

Peck, J. 2010. *Constructions of Neoliberal Reason.* Oxford: Oxford University Press.

Pentland, A. 2014. *Social Physics: How Good Ideas Spread—The Lessons from a New Science.* London: The Penguin Press.

Porter, M. E. 1980. *Competitive Strategy.* New York: The Free Press.

Porter, M. E. 1998. Clusters and the New Economics of Competition. *Harvard Business Review,* 76(6), 77–90.

Porter, M. E., & Kramer, M. 2011. Creating Shared Value: How to Reinvent Capitalism—And Unleash the Wave of Innovation and Growth. *Harvard Business Review,* 89(1/2), 62–77.

Radjou, N., Prabhu, J., & Ahuja, S. 2012. *Jugaad Innovation: Think Frugal, Be Flexible, Generate Breakthrough Growth.* San Francisco: Jossey-Bass.

Rennings, K. 2000. Redefining Innovation—Eco-innovation Research and the Contribution from Ecological Economics. *Ecological Economics,* 32 (2): 319–332.

Rittel, H. W. J., & Webber, M. M. 1984. Planning Problems Are Wicked Problems. In N. Cross (Ed.), *Developments in Design Methodology:* 135–144. New York: John Wiley & Sons.

Rogers, E. M. 2003. *Diffusion of Innovations,* 5th ed. New York: The Free Press.

Rogers, E. M., & Shoemaker, F. F. 1971. *Communication of Innovations: A Cross-Cultural Approach.* New York: The Free Press.

Saxenian, A. 2006. *The New Argonauts: Regional Advantages in a Global Economy.* Cambridge, MA: Harvard University Press.

Sen, A. 1999. *Development as Freedom.* Oxford: Oxford University Press.

Seshadri, S., & Shapira, Z. 2003. The Flow of Ideas and Timing of Evaluation as Determinants of Knowledge Creation. I*ndustrial and Corporate Change,* 12(5): 1099–1124.

Sethi, S. P. 1994. *Multinational Corporations and the Impact of Public Advocacy on Corporate Strategy: Nestle and the Infant Formula Controversy.* Boston: Kluwer Academic.

Simula, H. 2011. *Management of Commercialization: Case Studies of Industrial, Business-to-Business Product Innovations.* Aalto University School of Science, Department of Industrial Engineering and Management, Doctoral Dissertation Series.

Surowiecki, J. 2004. *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations.* New York: Doubleday.

WCED. 1987. *Our Common Future: Report of the World Commission on Environment and Development.* Oxford: Oxford University Press.

Weber, E. P., & Khademian, A. M. 2008. Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings. *Public Administration Review,* 68(2): 334–349. http://dx.doi.org/10.1111/j.1540-6210.2007.00866.x

Weinberger, D. 2011. *Too Big to Know.* New York: Basic Books.

Wexler, M. N. 2009. Exploring the Moral Dimension of Wicked Problems. *International Journal of Sociology and Social Policy,* 29(9/10): 531–542. http://dx.doi.org/10.1108/01443330910986306

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Governance Solutions for Wicked Problems: Metropolitan Innovation Ecosystems as Frontrunners to Sustainable Well-Being

Timo J. Hämäläinen

> *"Too close a view may interfere with one's grasp of an overall problem or concept."*
>
> Stafford Beer (1926–2002)
> Theorist, consultant, and business professor

The growing specialization and interdependence of societies as well as their rapid technological and economic transformation have increased the level of uncertainty and complexity in decision making and the role of wicked problems in policy making. This article analyzes the nature and evolution of wicked problems and argues that they stem from the gap between the complexity of the policy problem and the variety of the corresponding governance arrangements. This complexity gap can be closed with new governance solutions that include participation, interaction, and cooperation among stakeholders; collective learning processes; coordination by mutual adjustment and clear systemic direction, decentralization, diversity, and experimentation; and effective measures to overcome system rigidities and development bottlenecks. For several reasons, cities and metropolitan areas provide ideal ecosystems for addressing wicked problems. They have the requisite variety of resources, capabilities and services, physical proximity that facilitates rich face-to-face communication, learning and cooperation, as well as the right scope for producing and experimenting with the necessary public goods and services. The article concludes by arguing that Finland could become a global frontrunner in solving wicked problems in policy making by adopting a strategy of sustainable well-being. This strategy would build on the world-class well-being knowledge within the Finnish welfare state and the rapidly growing international research on subjective well-being and happiness.

Introduction

The industrialized world is undergoing a historical transformation. The current phase of the economic crisis that started in 2008 is a part of a deeper and longer-term structural crisis of the 20th century societal paradigm (Freeman & Perez, 1988; Hämäläinen, 2003). This structural crisis results from the maturity and negative spillover effects of the energy-intensive and material-intensive model of mass production and mass consumption that spread throughout the industrialized world during the past century. This economic model benefited from the opening of world trade and the development of welfare state institutions, which channelled resources to individuals with higher propensity to consume. These developments created new demand for the growing production capacity of industrialized countries. However, the accumulating problems of this socio-economic model have become increasingly evident since the late 1960s when the baby-boomers first rebelled against the established values of industrialized societies.

The problems of the established socio-economic model stem from various sources, such as the globalization of production systems and accelerated structural change in national and local economies, changing skill requirements of new technologies, unsustainable use of natural resources, aging of populations, decision making and governance problems in the face of increased uncertainty and economic complexity, changing values and demand patterns of citizens, as well as outdated regulatory frameworks. These problems have made the current societal model of industrialized countries unsustainable economically, socially, ecologically, and in terms of individual well-being.

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The accumulating problems of industrialized societies have reinforced the interest in sustainable development. However, the current discourse on sustainable development is still largely based on the work of the Brundtland Commission in the late 1980s. It defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). Although the Commission offered no definition of needs, they did refer to basic material necessities, such as food, water, and shelter. In the subsequent sustainable development work, this view has led to an emphasis on economic and equity issues, in addition to environmental concerns. The lack of clear definition of needs has made the concept of sustainable development rather difficult to implement in practice (Rauschmayer et al., 2011).

Today, many people feel that sustainable development policies and the associated drive towards more sustainable lifestyles tend to restrict their freedom of choice and subjective well-being. They feel that they would have to sacrifice their usual lifestyle in order to live in a more sustainable way. However, a more holistic understanding of human needs and well-being opens up new policy and behavioural options that can achieve the same sustainability benefits while maintaining or improving individual well-being. This is possible if the restrictions on individual freedom and resource use are compensated for with improvements in the other determinants of individual well-being. Such improvements can be an effective motivator for sustainable behaviour.

The traditional perspective to sustainable development emphasizes a society's resilience against downside risks. If we expand this perspective towards a more holistic view of well-being, we can adopt a more positive concept of *sustainable well-being*. This new concept suggests that societies should aim to meet *all* well-being needs of the present generation without compromising the ability of future generations to meet their needs. Thus, sustainable development policies should build on a deep understanding of the various determinants of human well-being in the changing natural and socio-economic environment.

As a result, the traditional economic, social, and ecological perspectives on sustainable development need to be supplemented with the *subjective well-being* and *responsibility of individuals*. The more holistic sustainable well-being framework is laid out in Figure 1. It was originally developed as a future vision for Finland and other advanced societies by Sitra, the Finnish Innovation Fund. The subjective well-being has been included in the framework because mental well-being problems have become increasingly prevalent in industrialized countries during the past few decades (Hämäläinen 2014; O'Hara & Lyon, 2014). Individual responsibility must be added, because sustainability cannot be reached in a complex society without responsible individual choices.

Figure 1. The sustainable well-being framework (Reproduced from Hämäläinen, 2013)

Citizens are generally well aware of the most important sustainability problems. However, there is much less consensus about the appropriate solutions to these problems. Sustainability experts are typically specialized in different dimensions of these problems (e.g., economic, social, ecological) and they do not typically attempt to integrate their various specialized solutions into a more holistic and coherent vision. This is unfortunate given that the key sustainability challenges – such as climate change, structural unemployment, persistent fiscal deficits, and lifestyle diseases – are *wicked problems* (Rittel & Webber, 1973) that cannot be solved with traditional compartmentalized policy and governance approaches. New governance solutions are clearly needed. And, such solutions may be built in innovation ecosystems that involve participants from private, public, and third sectors.

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This article analyzes the nature and evolution of wicked policy problems and suggests new governance solutions. It argues that the multi-stakeholder innovation ecosystems of cities and metropolitan areas (metros) have special advantages in developing the solutions that can match the increased complexity and uncertainty of contemporary economies and societies. The final section argues that Finland, and the Helsinki metropolitan area specifically, could become global frontrunners in the move towards a *sustainable well-being society* (see Hämäläinen, 2013).

Wicked Policy Problems

Unlike *tame problems,* which can be solved by established professions and experts in a routine way, the characteristics of wicked problems make their solution very difficult with traditional governance arrangements, such as markets or public-sector hierarchies (Berkes, 2007; Grint, 2005; Ho, 2012; Rittel & Webber, 1973). These characteristics induce the following:

- Wicked problems involve *multiple stakeholders,* each with their own cognitive frames, values, norms, and interests.
- There are *no definitive definitions* for wicked problems; each definition depends on the perspective taken. The preferred solution is linked to the chosen perspective and definition.
- There are *no optimum or correct solutions* for wicked problems, only good, satisfactory, or bad ones.
- Wicked problems have *no stopping rule.* There are no criteria for a sufficient understanding of wicked problems or the length of their causal chains in an open system.
- Wicked problems tend to involve *threshold effects.* Passing the threshold can cause a regime shift.
- Wicked problems *involve fundamental uncertainty and unpredictability*. They cannot be solved without collective learning and reframing processes that reduce this uncertainty to a manageable level.
- Every wicked problem is essentially *unique.* Customized solutions are required. Moreover, there is *no natural level* at which a wicked problem should be analyzed or solved.
- Every attempt to solve a wicked problem has *significant consequences.* In addition, these attempts tend to have *unintended consequences.*
- There are *no immediate or ultimate tests of the solutions* to wicked problems. The full consequences of a solution cannot be appraised until all repercussions have completely run out, and no one knows when they have.

Despite their widely acknowledged importance, the discourse on wicked problems in policy making has so far been more descriptive than analytical. Their nature and evolution have received scant theoretical attention.

Three fundamental reasons account for the increasing prominence of wicked problems in policy making in recent decades (Figure 2). Two of them have increased the *cognitive and relational complexity* of individual, organizational, and policy making environments. Cognitive complexity refers to the density and variability (quality) of interactions that take place among interdependent agents. Relational complexity, in turn, refers to the number (quantity) of parts in the system and the links between them (Boisot & Child, 1999). The third reason has limited decision makers' capacity to adapt to the increased complexity. The wicked problems result from this growing "adaptive tension" or "complexity gap" (Boisot & McKelvey, 2010; Casti, 2012).

First, the improved communication technologies, globalization of markets, and long-term economic growth have facilitated increasing specialization and division of labour in production systems. This trend has led to an increasing geographical and functional interdependence of economic activities (Geyer & Rihani, 2010; Hämäläinen & Schienstock, 2001; Wallis & North, 1986). The more numerous and tightly-interdependent economic activities have created growing relational complexity and coordination problems in industrialized societies. At the same time, these societies have become culturally and cognitively more differentiated, individualistic, and complex. The new information technologies have also made more people active stakeholders in societal problems (Roberts, 2000).

Second, the rapid techno-economic change of recent decades and the current socio-institutional transformation of industrialized societies have created fundamental economic uncertainty and cognitive complexity (Hämäläinen, 2003). The established socio-economic

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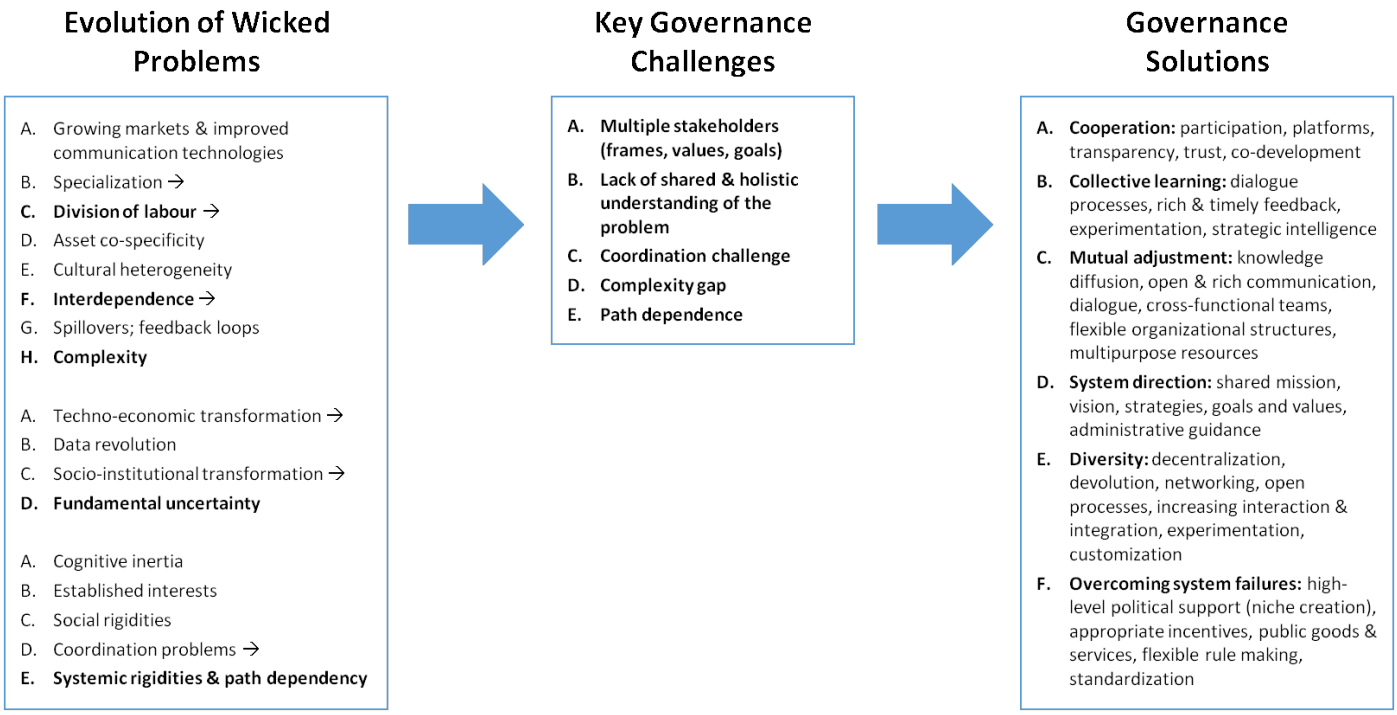

Figure 2. Evolution and governance of wicked problems. (The arrows signify causal relationships.)

arrangements and institutions are changing in unpredictable ways, which makes long-term planning extremely difficult. This uncertainty does not so much stem from the lack of data, the availability of which has exploded in recent decades, but from the insufficiency of the established cognitive frames, theories, and routines with which decision makers try to make sense of all the incoming data (Beer, 1973; Boisot, 1994). The "big data revolution" or narrow evidence-based policy making will not be of much help to decision makers struggling with making sense of wicked problems. Moreover, reactive and unpredictable policy making will only add to the systemic uncertainty.

Third, the long-term evolution and specialization of socio-economic systems tend to create various cognitive, economic, and social rigidities and coordination problems that reduce the behavioural and strategic options available to decision makers (Denning 2007; Fukuyama, 2014; Hämäläinen, 2007a; Olson, 1982; Weber & Rochracher, 2012). These systemic failures and rigidities produce path-dependent behaviour and resource lock-ins, which make structural changes difficult and increase the adaptive tension between the system and its increasingly complex environment.

As a result of these three factors, the established governance arrangements in industrialized societies suffer from a growing complexity gap and adaptive tension – a mismatch between the ever-more-complex environment and the limited capacity of the existing governance arrangements to cope with it (Ashby, 1958; Geyer & Rihani, 2010; Ho, 2012; IBM, 2010). This complexity gap can be found at all levels of the society: individuals suffer from growing life-management problems (Hämäläinen, 2014; Schwartz, 2005), corporations and governments struggle with the rigidities of large bureaucracies (Doz & Kosonen, 2007, 2014; Fukuyama, 2014; Hamel, 2007), and multinational institutions cannot find sustainable solutions to global wicked problems.

How to Build Requisite Variety for Solving Wicked Problems

There are basically two strategies for closing the complexity gap: complexity reduction and complexity absorption (Boisot & McKelvey, 2010). The complexity reduction strategy aims to simplify the incoming data by codification and abstraction (e.g., theories, models, and accounting ratios) or by simplifying the system's environment by reducing the number of interacting ele-

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ments and their interdependencies (e.g., modularization and standardization). This strategy is likely to work best in relatively stable and highly-institutionalized environments (Boisot & Child, 1999). The complexity absorption strategy, in turn, is more appropriate for highly complex and uncertain environments that involve plenty of context-specific and tacit knowledge. This strategy builds requisite variety, adaptability, and new strategic options by diversifying and combining the cognitive frames of key decision makers and increasing the number of system participants and their interdependencies.

The governance of complex systems and wicked problems has been studied by scholars in cybernetics (Beer, 1973; Espejo, 2003), resilience studies (Berkes, 2007; Ho, 2012) and organizational management (Boisot & McKelvey, 2010; Grint, 2005; Hagel et al., 2013; Heifetz & Laurie, 1997). The policy implications of their research are consistent with the complexity absorption strategy. This research suggests that governments should adopt a new stewardship role towards wicked problems in which they support (see Figure 2):

- participation, interaction, and cooperation of all key stakeholders (requisite variety)
- collective learning processes to create more diverse collective mental frames
- coordination by mutual adjustment and a clear overall direction
- growing diversity and experimentation in governance arrangements
- effective measures to overcome systemic rigidities and bottlenecks

The solutions to wicked problems can be searched for and found in multi-stakeholder ecosystems. These ecosystems demand the participation and contribution of all key stakeholders who, initially, have their own specific worldviews, values, goals, and interests. They need to build trust and a more holistic, shared understanding of the problem before a satisfactory and sustainable solution can emerge. The interaction and cooperation of key stakeholders can be facilitated by creating specific platforms and facilitated processes that bring them together for shared dialogues and co-development activities (Berkes, 2007; Klijn, 2008; Roberts, 2000). For example, customized foresight, strategy, workshop, or training processes as well as regular social events and gatherings can be used for this purpose. However, Roberts (2000) notes that "getting the whole system in the room" is not easy. It is challenging to figure out what the system is, who the stakeholders are and how to select them, how many can be accommodated under one roof, what the agenda will be, and how to facilitate interactions.

Collective learning processes and the collaboration of multiple stakeholders with different backgrounds and interests are often motivated by a major crisis or failure. Fortunately, there are also proactive ways to motivate such processes. These methods focus on other ways of creating the necessary *cognitive dissonance* in the minds of stakeholders (Festinger, 1957; Hämäläinen, 2007b; Heifetz & Laurie, 1997). Useful tools for this purpose include small-scale experiments, strategic intelligence activities (foresight, benchmarking, evaluations), critical research inputs, as well as measurement and feedback systems that challenge the established truths and mental models (Hagel et al., 2013; Hämäläinen, 2007b; Heifetz & Laurie, 1997).

Collective learning processes require deep dialogue that supports the development of shared understandings, language, and trust (Denning, 2007; Roberts, 2000). Ho (2012) describes the experience of the Singaporean government:

> *"Developing policies and plans to deal with… wicked problems requires the integration of diverse insights, experience and expertise. People from different organizations, both from within and outside of government, have to come together and pool their knowledge in order to discover potential solutions. Cooperative mechanisms need to be set up to enable the sharing of information and to strengthen collective action."*

Collective learning processes can be facilitated by *adaptive leadership* in which the leader (Denning, 2007; Grint, 2005; Heifetz & Laurie, 1997):

- understands the true wickedness and extent of the problem
- facilitates and participates in the social interaction and collective learning process
- does not provide all the answers but frames the key questions and issues
- makes the participants face the difficult problems and their responsibilities

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- protects dissident voices from lower levels of the organization
- exposes conflicts, viewing them as engines of creativity and learning
- manages the rate of change to protect the participants from excessive (paralyzing) uncertainty
- exerts the *soft power* of persuasion, ideological legitimacy, and attractive values rather than command and control
- challenges unproductive norms and orients people to new behaviour and roles

It is also important that the adaptive leader leaves maximum degrees of freedom for the participants so that they can respond to emerging issues and challenges. Self-organization, mutual adjustment, experimentation, and co-evolution tend to work better with wicked problems than rigid plans and organizational structures (Roberts, 2000).

Friedrich Hayek (1945) argued that the key problem in economic organization is the effective application of the dispersed local knowledge of economic actors while, at the same time, facilitating their efficient coordination. Highly complex and uncertain systems cannot be efficiently governed by either markets or hierarchical organization. It requires mutual adjustment among decentralized but interdependent actors, guided by a shared vision, goals, values and rules (Hämäläinen & Schienstock, 2001; Hayek 1983). The overall direction for the system can be reinforced by key performance indicators, administrative guidance, and multilevel partnerships that link actors at different levels of the system (Berkes, 2007; Espejo, 2003; Klijn, 2008).

Collective learning and mutual adjustment can be facilitated with the same policy tools: open and rich communication, cross-functional teams, and knowledge diffusion. Mutual adjustment can also be supported with multi-purpose resources, decentralized decision making, liberal or flexible regulatory environments, as well by standardization of key interfaces in the value-adding system (Baldwin & Clark, 1997).

As suggested above, the complexity gap can also be reduced by increasing the variety and complexity of the governance arrangements. Practical examples include collaborative networking, partnerships, and other hybrid organizations, open innovation, co-design, and co-production with customers, matrix structures, public–private–people partnerships, a whole-of-government approach, decentralization and devolution of decision making, as well as task forces and other contingent organizations that are formed on demand (Berkes, 2007; Espejo, 2003; Hagel et al., 2013; Heifetz & Laurie, 1997; Ho, 2012). Due the growing complexity gap, it is not surprising that most new organizational trends seem to move towards increasing variety and complexity.

Finally, wicked problems can rarely be solved without strong support from public authorities in overcoming systemic rigidities and bottlenecks. Their tailored interventions are needed for encouraging the reallocation of productive resources towards new solutions through the provision of appropriate incentives, necessary public goods and services, and appropriate institutional rules (Weber & Rochracher, 2012). The new governance solutions may need a safe niche to develop and show their potential without the interference of established interests or market pressures (Geels & Raven, 2006).

Governance Advantages of Metropolitan Innovation Ecosystems

The economic advantages of cities and metropolitan areas are well known. The agglomeration of people and resources facilitates high levels of specialization, interaction, and complexity, which leads to higher productivity, income, and growth (Bettencourt et al., 2007; Glaeser & Joshi-Ghani, 2013). These multi-stakeholder ecosystems offer the best possible environment for solving wicked problems in policy making. As Glaeser and Joshi-Ghani (2013) argue, cities and metros can also become "the engines of transformative change toward inclusive, people-centered, and sustainable development". There are seven reasons to believe that cities and metropolitan areas are ideally placed to develop sustainable solutions to wicked policy problems.

First, as dense agglomerations of people and organizations, cities and metros produce many negative externalities and wicked problems that demand innovative new solutions. But, they also have a specific *variety advantage,* meaning the requisite variety of different resources, capabilities, specialized services, and overlapping networks to develop innovative solutions to these complex problems. In addition, cities and metros have a wide variety of job, partnering, and leisure time opportunities, which attract more people with all kinds of skills to move to them, further increasing their diversity. The interaction of the various actors and resources is intensi-

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fied by low transportation and communication costs (Bettencourt, 2013). As Katz and Bradley (2013) emphasize: "[m]etros have emerged as the uber-network: interlinked firms, institutions, and individuals working together across sectors, disciplines, jurisdictions, artificial political borders, and… even political parties". And, the bigger the city, the more variety and complexity it has (Bettencourt et al., 2007).

Second, metros and cities can provide the close physical proximity for collective learning, sense-making, and innovation processes that require face-to-face interaction and dialogue as well as plenty of tacit, context-specific information and knowledge (Boisot & Cox, 1999). In addition, the innovativeness of cities grows more rapidly than their population as they become larger (Bettencourt et al., 2007). The physical proximity is also important for the mutual adjustment and coordination of complex networks of interdependent actors. "Metros are integrated rather than compartmentalized. Multiple public, private, and civic actors are empowered to look across challenges, naturally connecting the dots between related issues" (Katz & Bradley, 2013.

Third, metros and cities also have advantages in mobilizing the necessary cooperation. The established local relationships and personal networks provide a good basis for trust-building and cooperation. The similarities in context and daily experiences provide cognitive overlap that facilitates interaction. Key stakeholders are also easier to convene together locally than on a national or international scale. As Glaeser and Joshi-Ghani (2013) conclude, "proximity is valuable precisely because it makes connections easier".

Bettencourt (2014) underlines the efficient information processing that underlies the above governance advantages:

"Developed cities today are social and technical complex systems characterized by historically unprecedented levels of diversity and temporal and functional integration. This growing individual specialization and interdependence makes large cities extremely diverse and culturally relies on fine temporal and spatial integration and on faster and more information flows. The informational processes lie at the core of what makes cities the economic and cultural engines of all human societies."

Fourth, because metros and cities are concentrated action networks or *natural economic areas,* the governance solutions for wicked problems are often best aligned with their boundaries. The nature of these problems and citizen preferences for their solutions are likely to be more homogenous within particular metros and cities than among them. This is also consistent with the principle of *fiscal federalism,* which recommends that the boundaries of jurisdictions should match the benefiting areas of the public good and services that they provide (Oates, 1999). The local efforts to solve wicked problems are also likely to produce more committed and responsible behaviour among citizens when they can participate and see the results of their own contributions. These are their "own challenges" (Katz & Bradley, 2013).

Fifth, the smaller organizations of local governments can also make them more agile than large national ministries and bureaucracies in responding to local development and cooperation needs. Moreover, the local officials and politicians have better contextual knowledge and information, they are directly responsible to their local constituencies, and they do not have to commit themselves to rigid equality and universalism principles of national governments (Oates, 1999).

Sixth, the geographical concentration of people provides ecological sustainability benefits to cities and metros. The same physical infrastructure can serve more people (Bettencourt et al., 2007), commuting and transportation distances are shorter, and housing arrangements are less energy-intensive per capita than in less densely-populated regions.

Finally, the local experimentation of metros and cities is also welcome from the national policy perspective because parallel local experimentation increases the pace of collective learning and innovation while, at the same time, reducing the risks of systemic change compared to full-blown national reforms. However, this requires an appropriate systemic governance arrangement that collects, combines, and shares the lessons learned from successful local governance solutions (Heilmann, 2008; Sabel & Zeitlin, 2012).

Finland as a Frontrunner in Sustainable Well-Being

The transition towards a society of sustainable well-being needs frontrunners. Finland and the Helsinki metropolitan area are well placed to become a global frontrunner in sustainable development and well-being. Finland and the Helsinki metropolitan area could adopt a strategy that builds on a state-of-the-art understanding of well-being. This would yield several benefits (Hämäläinen, 2013):

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• It would help individuals, organizations, and policy makers to make better-informed decisions about how to improve the well-being of citizens and their living environments. This includes targeting the scarce public resources in a way that most effectively promotes the well-being of citizens.

• It would support and motivate the sustainable lifestyle changes of individuals.

• It would help firms to develop more competitive products and services with higher value-added and large international markets (because value ultimately stems from contributions to well-being).

• It would attract international investors and experts looking for world-class well-being knowledge, innovation networks, and living environments.

The economic benefits of sustainable well-being would be particularly attractive. With high costs and living standards, Finnish firms can only succeed with a high value-added strategy in international competition. Given that all value ultimately stems from contributions to individual well-being, a sophisticated understanding of well-being is crucial for the development of economic strategies in high-cost countries. Instead of trying to export the existing welfare services, a sustainable well-being strategy would focus on understanding and serving the changing well-being needs of individuals and communities. World-class well-being knowledge could be applied to create better and more sustainable products, services, policies, institutions, and living environments. This human-centric approach would create a new high-value-added advantage for Finland in the rapidly changing international division of labour.

The transition to sustainable well-being requires fundamental changes in lifestyles, public policies, and institutional structures. Such changes must be supported by cultural beliefs, values, and norms in order to be sustainable. Finland has cultural value orientation that supports a shift towards sustainable well-being. First of all, Finnish values emphasize intellectual autonomy, equality, and harmony. Intellectual autonomy includes independent reflective capacity, holistic worldview, curiosity, and creativity. Equality refers to the concern for the natural environment and the well-being of others. It also emphasizes social justice, responsibility, helpfulness, and honesty. Harmony, in turn, underlines the importance of adapting oneself to the social and natural worlds. It puts a high value on world peace, conservation, and unity with nature, and the acceptance of one's part in the world (Schwartz, 2011).

Secondly, the Finnish culture also emphasizes secular-rational and self-expression values (WVS, 2015. The secular-rational value orientation rejects religious, authoritarian, absolutist, and traditional family values, while accepting, for example, divorce, abortion, euthanasia, and suicide. The self-expression values, in turn, underline subjective well-being, self-actualization, and quality of life. This value orientation is typical in affluent societies that have already satisfied their economic and physical security needs. Such societies tend to move from materialistic to post-materialistic values, which give high priority to environmental protection, tolerance of diversity, interpersonal trust, and rising demands for participation in decision making in economic and political lives.

The actual quality of life and well-being are also high in Finland. In the 2012 European Quality of Life Survey, Finland ranked second after Denmark both in happiness and the perceived quality of life. The same survey revealed that the citizens of these two countries were also the most successful in balancing work and family lives. The trust in public institutions and among Finnish citizens is high. The Finnish welfare state provides equal educational and healthcare opportunities for all. The high quality of Finnish education and healthcare systems is known worldwide. The well-educated and reliable public authorities maintain well-functioning institutions and safe infrastructures. There is also plenty of space and nature for everyone to enjoy. Finns have a close relationship with nature, which is an important determinant of personal well-being (Basu et al., 2014). It is a great opportunity for Finland and the Helsinki metropolitan area to leverage these advantages to boost their transition to sustainable well-being and to build their attractiveness as a business location and living environment.

Conclusions

The growing specialization and interdependence of societies as well as their rapid technological and economic transformation have increased the level of uncertainty and complexity in decision making and the role of wicked problems in policy making. This article analyzed the nature and evolution of wicked problems and argued that they stem from the growing gap between the complexity of policy problems and the variety of the corresponding governance arrangements.

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This complexity gap can be closed with new governance solutions that include participation, interaction, and cooperation among stakeholders, collective learning processes, coordination by mutual adjustment, and clear systemic direction, decentralization, diversity and experimentation, and effective measures to overcome system rigidities and development bottlenecks.

For several reasons, cities and metropolitan areas are ideal environments for addressing wicked problems. They have special innovation ecosystems that have the requisite variety of resources, capabilities, and services; physical proximity that facilitates rich face-to-face communication, learning and cooperation; as well as the right scope for producing and experimenting with the necessary public goods and services. The article concludes by arguing that Finland and the Helsinki metropolitan area could become a global frontrunner in solving wicked problems in policy making by adopting a strategy of sustainable well-being. This goal could be achieved by building on the world-class knowledge of the Finnish welfare state and the rapidly growing international research on subjective well-being.

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Timo Hämäläinen is a Fellow in the Strategy Unit of Sitra, the Finnish Innovation Fund, and he is a Docent (Adjunct Professor) of International Business in the University of Eastern Finland. He has also been a visiting scholar in the OECD, Paris, and the Wilson Center, Washington, DC. He holds an MSc in Marketing from Aalto University (Helsinki School of Economics) in Finland and an MBA and a PhD in International Business from Rutgers University in New Jersey, United States. Timo's research has focused on organizational strategy and theory, institutional economics, long socio-economic cycles, social and institutional innovation, everyday life and well-being, public-sector governance, as well as innovation and industrial policy. His most recent research projects have centered on the changing nature of well-being in advanced societies, sustainable socio-economic model and the development of new business ecosystems.

References

Ashby, W. R. 1958. Requisite Variety and Its Implications for the Control of Complex Systems. *Cybernetica,* 1(2): 83–99.

Balwin, C., & Clark, K. 1997. Managing in an Age of Modularity. *Harvard Business Review,* 75(5): 84–93.

Basu, A., Kaplan, R., & Kaplan, S. 2014. Creating Supportive Environments to Foster Reasonableness and Achieve Sustainable Well-Being. In T. Hämäläinen & J. Michaelson, J. (Eds.), *Well-Being and Beyond: Broadening the Public and Policy Discourse.* Cheltenham, UK: Edward Elgar.

Beer, S. 1973. *Designing Freedom.* Massey Lecture. Toronto: Canadian Broadcasting Corporation.

Berkes, F. 2007. Understanding Uncertainty and Reducing Vulnerability: Lessons from Resilience Thinking. *National Hazards,* 41(2): 283–295. http://dx.doi.org/10.1007/s11069-006-9036-7

Bettencourt, L. M. A. 2013. *The Kind of Problem a City Is.* SFI Working Paper 2013-03-008. Santa Fe, CA: Santa Fe Institute.

Bettencourt, L. M. A. 2014. The Uses of Big Data in Cities. *Big Data,* 2(1): 12–22.

Bettencourt, L. M. A., Lobo, J., Helbing, D., Kühnert, C., & West, G. B. 2007. Growth, Innovation, Scaling, and the pace of Life in Cities. *Proceedings of the National Academy of Sciences,* 104(No): 7301–7306. http://dx.doi.org/10.1073/pnas.0610172104

Boisot, M. 1994. Information, Economics, and Evolution: What Scope for a Menage a Trois? *World Futures: The Journal of New Paradigm Research,* 41(4): 227–256. http://dx.doi.org/10.1080/02604027.1994.9972490

Boisot, M., & Child, J. 1999. Organizations as Adaptive Systems in Complex Environments: The Case of China. *Organization Science,* 10(3): 237–252. http://dx.doi.org/10.1287/orsc.10.3.237

Boisot, M., & Cox, B. 1999. The I-Space: A Framework for Analyzing the Evolution of Social Computing. *Technovation,* 19(9): 525–536. http://dx.doi.org/10.1016/S0166-4972(99)00049-8

Boisot, M., & McKelvey, B. 2010. Integrating Modernist and Postmodernist Perspectives on Organizations: A Complexity Science Bridge. *Academy of Management Review,* 35(3): 415–433.

Casti, J. 2012. *X-Events: The Collapse of Everything.* New York: Harper Collins/Morrow.

Denning, P. J. 2007. Mastering the Mess. *Communications of the ACM,* 50(4): 21–25. http://dx.doi.org/10.1145/1232743.1232763

Doz, Y., & Kosonen, M. 2007. *Fast Strategy: How Strategic Agility Will Help You Stay Ahead of the Game.* Philadelphia, PA: Wharton School Publishing.

Doz, Y., & Kosonen, M. 2014. *Governments for the Future: Building the Strategic and Agile State.* Sitra Studies 80. Helsinki: Sitra.

Metropolitan Innovation Ecosystems as Frontrunners to Sustainable Well-Being

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Espejo, R. 2003. Social Systems and the Embodiment of Organizational Learning. In E. Mitleton-Kelly (Ed.), *Complex Systems and Evolutionary Perspectives on Organizations: The Application of Complexity Theory to Organizations.* Amsterdam: Elsevier Science.

Festinger, L. 1957. *A Theory of Cognitive Dissonance.* Evanston, IL: Row, Peterson and Company.

Freeman, C., & Louca, F. 2002. *As Times Go By: From the Industrial Revolutions to the Information Revolution.* Oxford, UK: Oxford University Press.

Freeman, C., & Perez, C. 1988. Structural Crises and Adjustment, Business Cycles and Investment Behavior. In G. Dosi, F. Christopher, N. Richard, G. Silverberg, & L. Soete (Eds.), *Technical Change and Economic Theory.* London: Pinter Publishers.

Fukuyama, F. 2014. America in Decay. *Foreign Affairs,* 93(5): 3–26.

Geels, F., & Raven, R. 2006. Non-Linearity and Expectations in Niche-Development Trajectories: Ups and Downs in Dutch Biogas Development (1973-2003). *Technology Analysis & Strategic Management,* 18(3-4): 375–392. http://dx.doi.org/10.1080/09537320600777143

Geyer, R., & Rihani, S. 2010. *Complexity and Public Policy: A New Approach to 21st Century Politics, Policy & Society.* London: Routledge.

Grint, K. 2005. Problems, Problems, Problems: The Social Constructions of Leadership. *Human Relations,* 58(11): 1467–1494. http://dx.doi.org/10.1177/0018726705061314

Hagel, J., Brown, J. S., Samoylova, T., & Arkenberg, C. 2013. *Coherency in Contradiction.* Report 5 of the 2013 Shift Index Series. Westlake, TX: Deloitte University Press.

Hamel, G. 2007. *The Future of Management.* Cambridge, MA: Harvard Business School Press.

Hayek, F. A. 1945. The Use of Knowledge in Society. *The American Economic Review,* 35(4): 519–530.

Hayek, F. 1983. *Law, Legislation and Liberty: Volume I, Rules and Order.* Chicago, IL: The University of Chicago Press.

Heifetz, R., & Laurie, D. 1997. The Work of Leadership. *Harvard Business Review,* 75(1): 124–134.

Heilmann, S. 2008. From Local Experiments to National Policy: The Origins of China's Distinctive Policy Process. *The China Journal,* 59(Jan): 1–30. http://dx.doi.org/10.2307/20066378

Ho, P. 2012. *Governing for the Future: What Governments Can Do.* RSIS Working Paper No. 248. Singapore: S. Rajaratnam School of International Studies.

Hämäläinen, T. 2003. *National Competitiveness and Economic Growth: The Changing Determinants of Economic Performance in the World Economy.* Cheltenham, UK: Edward Elgar.

Hämäläinen, T. 2007a. Social Innovation, Structural Adjustment and Economic Performance. In T. Hämäläinen & R. Heiskala (Eds.), *Social Innovations, Institutional Change and Economic Performance: Making Sense of Structural Adjustment Processes in Industrial Sectors, Regions and Societies:* 11–51. Cheltenham, UK: Edward Elgar. http://dx.doi.org/10.4337/9781847206992.00008

Hämäläinen, T. 2007b. Policy Implications: How to Facilitate the Structural Adjustment and Renewal of Advanced Societies? In T. Hämäläinen & R. Heiskala (Eds.), *Social Innovations, Institutional Change and Economic Performance: Making Sense of Structural Adjustment Processes in Industrial Sectors, Regions and Societies:* 95–119. Cheltenham, UK: Edward Elgar. http://dx.doi.org/10.4337/9781847206992.00011

Hämäläinen, T. 2013. *Towards a Sustainable Well-Being Society: Building Blocks for a New Socioeconomic Model.* Helsinki: Sitra.

Hämäläinen, T. 2014. In Search of Coherence: Sketching a Theory of Sustainable Well-Being. In T. Hämäläinen & J. Michaelson (Eds.), *Well-Being and Beyond: Broadening the Public and Policy Discourse:* 17–67. Cheltenham, UK: Edward Elgar.

Hämäläinen, T., & Michaelson, J. (Eds.) 2014. *Well-Being and Beyond: Broadening the Public and Policy Discourse.* Cheltenham, UK: Edward Elgar.

Hämäläinen, T., & Schienstock, G. 2001. The Comparative Advantage of Networks in Economic Organisation: Efficiency and Innovation in Highly Specialized and Uncertain Environments. In *Innovative Networks: Co-Operation in National Innovation Systems:* 17–45. Paris: Organisation for Economic Co-operation and Development (OECD).

IBM. 2010. Capitalizing on Complexity: Insights from the Global Chief Executive Officer Survey. *IBM.com.* Accessed October 1, 2015: http://www-935.ibm.com/services/us/ceo/ceostudy2010/index.html

Katz, B., & Bradley, J. 2013. *The Metropolitan Revolution: How Cities and Metros Are Fixing Our Broken Politics and Fragile Economy.* Washington, DC: Brookings Institution Press.

Klijn, E-H. 2008. Complexity Theory and Public Administration: What's New? *Public Management Review,* 10(3): 299–317. http://dx.doi.org/10.1080/14719030802002675

Oates, W. 1999. An Essay on Fiscal Federalism. *Journal of Economic Literature,* 37(3): 1120–1149. http://dx.doi.org/10.1257/jel.37.3.1120

O'Hara, M., & Lyon, A. 2014. Well-Being and Well-Becoming: Reauthorizing the Subject in Incoherent Times. In T. Hämäläinen & J. Michaelson (Eds.), *Well-Being and Beyond: Broadening the Public and Policy Discourse:* 98–122. Cheltenham, UK: Edward Elgar.

Olson, M. 1982. *The Rise and Decline of Nations.* New Haven, CT: Yale University Press.

Rauschmayer, F., Omann, I., & Fruhmann, J. 2011. Needs, Capabilities, and Quality of Life: Re-Focusing Sustainable Development. In F. Rauschmayer, I. Omann, & J. Fruhmann (Eds.), *Sustainable Development: Capabilities, Needs, and Well-Being:* 1–24. London: Routledge.

Rittel, H., & Webber, M. 1973. Dilemmas in a General Theory of Planning. *Policy Sciences,* 4(2): 155–169. http://dx.doi.org/10.1007/BF01405730

Roberts, N. 2000. Wicked Problems and Network Approaches to Resolution. *International Public Management Review,* 1(1): 1–19.

Sabel, C., & Zeitlin, J. 2012. Experimentalist Governance. In D. Levi-Faur (Ed.), *The Oxford Handbook of Governance:* 169–183. Oxford, UK: Oxford University Press. http://dx.doi.org/10.1093/oxfordhb/9780199560530.013.0012

Metropolitan Innovation Ecosystems as Frontrunners to Sustainable Well-Being

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Schwartz, B. 2005. *The Paradox of Choice: Why More is Less*. New York: Harper Perennial.

Schwartz, S. H. 2011. *Kulttuuriset arvo-orientaatiot: kansallisten erojen luonne ja seuraukset*. Helsinki: Limor Kustannus.

Wallis, J., & North, D. 1986. Measuring the Transaction Sector in the American Economy, 1870–1970. In S. Engerman & R. Galman (Eds.), *Long-term Factors in American Economic Growth:* 95–162. Chicago, IL: University of Chicago Press

Weber, K. W., & Rochracher, H. 2012. Legitimizing Research, Technology and Innovation Policies for Transformative Change: Combining Insights from Innovation Systems and Multi-Level Perspective in a Comprehensive 'Failures' Framework. *Research Policy*, 46(6): 1037–1047. http://dx.doi.org/10.1016/j.respol.2011.10.015

WCED. 1987. *Our Common Future: Report of the World Commission on Environment and Development*. New York: United Nations.

WVS. 2015. Findings and Insights: Cultural Map – WVS Wave 6 (2010–2014). World Values Survey (WVS). Accessed October 1, 2015: http://www.worldvaluessurvey.org/wvs.jsp

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Scaling Spatial Transformation: Smart Specialization of Urban Capabilities in the Helsinki Region

Renita Niemi, Eelis Rytkönen, Robert Eriksson, and Suvi Nenonen

> *"A great city is not to be confounded with a populous one."*
>
> Aristotle (384–322 BC)
> Philospher and scientist

Societies are shifting towards more complex structures and agile networks through spatial transformation. That shift affects the ways in which citizens interact with and within their physical and virtual surroundings. The interactions define purposes for the modern hybrid spaces, depending on individual demands in relation to space and time. As facilities per se are becoming less relevant, spatial concepts and service that support, attract, and engage modern individuals must be invented. The capabilities of user-orientated processes are important in terms of connectivity, co-creation, and communication, involvement in change, and control as well as governance. This article explores the potential scaling in diverse spatial transformations and summarizes the lessons learned from managing a campus as a small city to managing a larger-scale urban area. The study uses a case study methodology: the data was collected through interviews and document analysis. The framework of five urban capabilities (5Cs), which were initially introduced by the urbanist John Worthington, guided the content analysis of data. The results indicate that the lessons learned in the diverse urban projects can be scaled from a minor urban-area campus to a large urban area. Users of spaces have a need and will to collaborate, co-create, and impact their environments. This view expands the roles of decision makers and planners to controlling the uses of spaces for supporting grassroot initiatives. Consequently, active citizens engage and contribute, which can be a driving force for co-creation, shared ownership, and attractiveness of small- and large-scale areas.

Introduction

The digital paradigm and technological innovations are changing the way we interact with and understand our surrounding spaces. Castells (2004) argues that we are shifting from a space of static places to a space of flows where information and knowledge are exchanged globally in ever-denser networks. Building on similar thoughts, Mehaffy (2014) sees cities through the lenses of six fundamental elements: cities as spatial networks, as social networks, as partially decentralized and as partially generated by self-organizing agents, as partially scale-free, as partially scale-dependent, and as cognitive and symbolic systems. Nonaka (1998, 2000) introduces the concept of Ba in organizational settings as a shared physical, social, and virtual space that can facilitate knowledge creation between individuals. Multiple scholars argue that, as the cycles of change become ever denser in increasingly competitive markets, the capability of creating adaptable built environment is becoming more and more crucial (Finch, 2012).

However, the essence of moving from the setting of a stable built environment towards dynamic multi-locational concepts is a major factor in scalable urban development. Nevertheless, the mere concepts do not suffice: the change in user behaviour and community culture is an essential driver of the emerging change. Increasing the alignment and integration of virtual and physical environments has induced new forms of behaviour.

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Large parts of our daily activities take place in virtual environments and affect the physical layers of our environment. For example, Demos Helsinki (2014) announced a Smartup Manifesto listing organizations that represent a new wave of startups that focus on increasing the efficiency of using physical resources by offering virtual services, such as AirBnB, Uber, Sharetribe, and Venuu. As another simple example, one can observe the disappearance of telephone booths from cities and buildings as static small cubicles – now the telephone is a mobile, intangible bubble around us wherever we are. Diverse solutions, propositions, and recommendations are available for mobile phones. Moreover, the city of London, for example, has updated numerous old booths to providing free Wi-Fi access. Physical, social, and virtual layers of our environments are inevitably more and more integrated.

Mobility has increased individual freedom and choice. Sustainability drivers have made individuals more aware of, for example, different transportation alternatives. New ways of using and sharing resources are increasing (Brinko et al., 2014; Lindsay, 2014; Termaat et al., 2014) due to the rise of the sharing economy. Additionally, the emphasis on social sustainability includes issues such as happiness, wellbeing, and satisfaction with life. The flexibility and attractiveness of the social, virtual, and organizational infrastructures that a city creates provides a competitive edge. The greater variety cities are able to offer in terms of local, dense, and thematic communities, the larger their potential to attract talented people and organizations. The aim of this article is to explore the potential of scaling in diverse spatial transformations. The research question asked is whether the practices of managing a campus as a small city can be scaled to managing a larger-scale urban area.

Drivers of Change

The consequences of more mobile lives and work styles can be seen in academia and the private sector: both are struggling with low space-utilization rates resulting in high bills. Multiple studies in European and US-based universities indicate space-utilization rates of less than 40% during the office hours (Den Heijer, 2011; Den Heijer & Zovlas, 2014; Harrison & Les Hutton, 2014; Neary et al., 2010; University Herald, 2013). According to Den Heijer and Zovlas (2014), campuses constitute about 5–15% of European university budgets.

For example, a recent study in Aalto University showed that space-utilization rates tend to vary between 20–40% during office hours (Hietanen, 2014). Aalto University's main campus consists of 30 buildings covering an area of about 240,000 square meters. The campus costs, including rents and maintenance, exceeded 70 million euro in 2015. Facilities form the second largest cost after human resources. At the same time, despite slightly higher utilization rates, a million square meters of office premises lack tenants in the metropolitan area of Helsinki. These vacancies represent about 12% of the total office building mass in Helsinki and 20% in nearby Espoo. These empty or half-empty offices are part of the image of the campus and cities. The supply of the built environment does not match the demands of mobile life and work.

It seems that the places where knowledge work is accomplished are scattered across multiple spaces, from traditional offices and business park complexes, to hubs, co-working spaces, and home offices (Waber et al., 2014). What we used to know as the "third place" that supports the infrastructure created by offices and homes are remodelled to diverse service offers in a more conscious way (e.g., Brinko et al., 2014; Termaat et al., 2014). The organization no longer defines the location of the work; the work is disseminated all over the city structure: homes, public spaces, the premises of clients or partnering organizations, private cafes and restaurants, and diverse co-working places. The whole city can be seen as an office and in the minor scale, and similar dissemination can be seen in the campus area: the location of an individual's own department or faculty is no longer the main determinant. The administrative section can have an address, but networks rarely have a stable address – learning and working on the campus occurs in diverse locations if the university offers the mobile possibilities.

The total amount of square meters per knowledge worker is not thus diminishing, but probably even increasing. Even though workplace changes from traditional office concepts towards activity-based concepts, offices can reduce the amount of square meters in relation to one workstation: the amount is increasing per employee, because mobile work can be completed in diverse work zones. Work is scattered across multiple places and dictated by the collaborative processes – considering the utilization rate of diverse places is much more relevant than the rate of one single workstation. A similar trend can be identified in the context of learning environments. The use of classrooms is no longer the main success factor but greater emphasis should be put on the amount, quality, diversity, and use of learning and working zones – to scatter the learning and work-

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ing activities around the campus instead of the silos of faculties, or building wings for staff or students only.

The dominant role of institutional ownership of buildings and individual ownership of desks will most likely diminish in the course of time. The booming trends indicate that work is increasingly accomplished in the shared premises of multiple organizations that have a common agenda. Gathering the stakeholders and facilitating their collaboration requires operators who would take the premises into efficient use. This approach will most likely offer new business opportunities while changing the dynamics of the traditional ways of leasing spaces on the basis of fixed contracts for multiple years. Dynamic spatial abilities, such as flexibility and adaptability of the building services and processes that building facilitators and operators are offering, will probably play an increasingly important role in the market.

Actually, new operators are constantly entering the market and diverse concepts can subsequently be identified both in the city and on the campus. Examples of multi-locational work concepts in the metropolitan area of Helsinki include service concepts in co-working such as Kontoret, Hub13, Urban Office, Urban Mill, and StartUp Sauna, to name a few. Kontoret as a concept aims to build a network of on-demand spaces for modern knowledge workers. The operators of Urban Mill strive to replicate the lean methodology they applied in Urban Mill and take over underutilized assets beyond the campus in an attempt to attract organizations and create more thematic communities that would benefit from a common platform. In their operations and risky business strategy, facilities management is in the secondary role, and greater emphasis is put on the community management role, which is supported by physical and virtual infrastructures.

The focal question for both effective and efficient workplace orchestration lies in scalability: from office space to the use of the building to the use of the city. On the space-user level, the core is thus in the scalability of the new ways of working and learning at individual, team, and organizational levels. On the other hand, there are varieties of reasons why organizations do not support the dissemination of work. Lindsay (2013) proposes that co-working generally falls into one of the three categories: co-working in a separate location, co-habiting a common space with a partnering organization, or opening up an organization's workspace to a wider community, resulting in a working commons. Co-working in a separate location involves shared environments where individuals and small groups gather together to work in a community, usually paid for on a membership basis and invoiced either monthly or daily. These spaces provide a community workspace with shared services that let individuals and small groups share ideas and mutually support each other's work. Lindsay (2013) has found that corporate organizations are encouraging their own employees to work in co-working spaces as an alternative to their regular workspace, not primarily to save on costs, but to facilitate their interaction and knowledge sharing with others, and to inspire creativity.

In addition to co-working spaces, organizations are opening up their own workspace to a wider community in an attempt to invite others in to share it (Lindsay, 2013). The working commons emerges as one kind of a semi-public shared space similar to the learning commons in the university context. University campuses have moved away from libraries exclusively designated as places for reflective study, to spaces where informal and ad hoc collaboration happens in learning commons. The Aalto University library is following this direction in developing its premises through bottom-up processes such as AaltoHUBs, which recycles underutilized spaces through collaborative, community-engaging design processes. Typically, these spaces include places to meet, study, make connections, and exchange ideas. Food and drink are welcomed, furniture and equipment are mobile or reconfigurable, and access is allowed at all hours. The settings of the space change by the hour, day, and week. Municipal governments could have an emerging role in hosting these kinds of shared spaces.

Co-habiting means several partnering organizations sharing a common work environment. They are types of workspace where, rather than an individual organization opening up to others or to the wider community, several organizations together share a work environment with the purpose of gaining from each other's knowledge and experience. Furthermore, Lindsay (2014) has identified six new types of workspaces that are supplanting the corporate campus because they offer ways to increase the probability of interactions that lead to innovation and productivity: real-time offices, permeable offices, office networks, office neighbourhoods, office-as-a-service, and the new guilds.

The complex environment challenges municipal decision makers and politicians to prioritize and make decisions among a vast number of initiatives, projects, and events. Organic bottom-up projects have become

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more and more attractive alongside hierarchically structured top-down projects. In a recent study (Rytkönen, 2015), the same phenomenon has been detected in micro-scale in university campuses, where spatial transformation is affecting the rules of the game. From the university campus management organization, the spatial transformation seems to require the ability to balance between individual and communal demands, local and global foci, and project-based pioneer projects and standardized hierarchical projects. In order to support the core tasks of universities, campus managers and university administrators should support multiple business models and processes, thereby enabling interdisciplinary, cross-organizational actions to take place on their campuses. Rather than facilitating or managing the facilities per se, the essence of their work seems to shift towards orchestrating the communities that act within the facilities.

On the scale of urban planning, Horelli and Wallin (2013) have similarly identified that, rather than only having roles as administrators and hierarchical watchdogs, the tasks of city managers and planners are expanding towards following, engaging, empowering, and supporting the grassroot pioneer initiatives that attract interest and buzz in the cities. Balancing between them and the more stable, standardized, and static processes is a focal task in competing in the global market. On the one hand, it is important to identify the typographies of different scales in order to respond to the needs of mobile living, working, and learning; but, on the other hand, it is important to identify the common factors in diverse processes of developing such a physical and virtual infrastructure.

Methodology

This study took a qualitative approach in an attempt to build propositions on data collected about the case study. The case is urban area consisting of three districts: the university main campus as a district for science, research, education, and arts; the business district; and the cultural, living, leisure, and retail district. The content analysis of data was guided through the framework of five urban capabilities, which were initially introduced by the urbanist John Worthington (Worthington & Bouwman, 2012). Allowing comparison between the approaches of six learning cities' projects, discussions were structured around these five themes, which are the "5Cs": connecting, changing, collaborating, communicating, and controlling. The 5Cs have been further explored and developed by Niemi and colleagues (Mangs et al., 2013; Niemi et al., 2013), who concluded that the 5Cs framework can be applied to the analysis of open-ended projects with clear goals, budgets, and deadlines spread over time (Niemi et al., 2013). The approach was furthermore seen as scalable in the city and in district scales, and particularly for observing certain everyday practices. Although the scholars pointed out its limitations as an evaluation tool, they emphasized its ability to recognize different phenomena in city development.

Case Study: Smart Specialization in the Helsinki Region

History, visions, decision making, and physical dimensions

The so-called T3 area of Espoo consists of three districts: the Aalto University main campus as a district for science, research, education, and arts; the business district of Keilaniemi; and the cultural, living, leisure, and retail district of Tapiola. Each district has a rich history: the task of the city is to integrate the original Tapiola garden city vision from the 1960s, the Keilaniemi business tower vision from the 1990s, and Otaniemi campus vision that was updated from the original 1960s vision of Alvar Aalto, to the 2006 vision for Otaniemi as a hub for science and business, and most recently, the interdisciplinary Aalto University campus vision of 2011, bringing together arts, technology, and business. Together, these districts form one of the most attractive areas to live and to do business globally. However, in order to make it even more attractive, professional operators are needed to facilitate and integrate collaboration that creates synergies. The region and its districts are illustrated in Figure 1. The figure identifies the three different districts found in the T3 area. The five capabilities are covered throughout these districts and can be found more intensely unified in the minuscule scale in the Science and Technology district, which relates to the campus.

The Aalto University main campus, representing one of the three districts of the T3 area, is the playground for the university that merged in 2010 from three original universities: the Helsinki University of Technology, the University of Art and Design Helsinki (TaiK), and the Helsinki School of Economics. The vision of Aalto University, and consequently, the vision for its campus, is strongly rooted in the interdisciplinary synergies between technology, arts, and business, and it has been collaboratively created by 2500 Aalto community members. It aims to be a world-class university by 2020. In order to facilitate the synergies, the majority of the actions are centralized on the main campus of the former Helsinki University of Technology. The former TaiK

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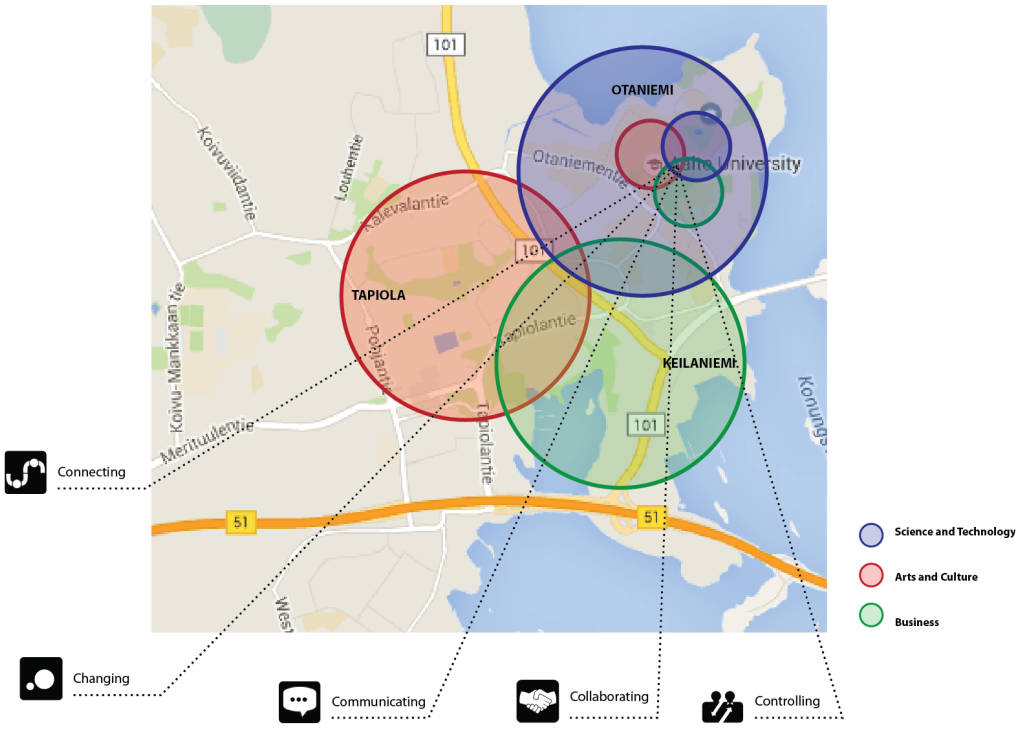

Figure 1. The T3 region and the 5Cs model (applied from Niemi et al., 2013; Worthington & Bouwman, 2012)

campus on the other side of the Metropolitan area of Helsinki is abandoned, as a new construction is being built on Aalto, the main campus and all the bachelor-level education is centralized to the bachelor cradle, formerly the main building of the Helsinki University of Technology. In addition to these and other strategic decisions, various grassroot, bottom-up projects are ongoing: the alternative learning and research environments such as the Design Factory, StartUp Sauna, AaltoHUBs, ADDlab, and Urban Mill, to name a few. Their quick-and-dirty, iterative approaches to creating attractive collaboration seem unique in the university context and have the potential to scale up to the urban development level (Rytkönen et al., 2014).

Results

The results indicate that the lessons learned in the diverse urban project can be scaled from a minor campus area to a large urban-area scale. Users of space have a need and will to collaborate, co-create, and impact their environments. This view expands the roles of decision makers and planners from controlling the uses of spaces to supporting grassroot initiatives. Consequently, active citizens engage and contribute, which can be a driving force for co-creation, shared ownership, and attractiveness of small- and large-scale.

Theme 1: Connecting – area and people

Connectivity refers to the connection between different communities as well as to the capability to connect to the physical environment, with the help of virtual infrastructure such as social media and social networks. Aalto University has three separate campus areas that will be diminished to two: one in the Helsinki city centre and one in the traditional campus location in Espoo, in the former campus of the University of Technology. The vision of Aalto University is to connect the professionals of arts, technology, and business. Both campuses have their own buildings although concepts such as the Aalto Design Factory and Learning Hubs are the elements truly connecting Aalto University. These places are physical surroundings and virtual platforms; they are diverse ways of accomplishing tasks processes to develop, use, and maintain places that serve as platforms for collaboration between different disciplines and actors.

The T3 area has three urban areas with different profiles to connect: the Aalto University campus as an area for research and education, the business district of Keilaniemi, and the cultural, living, leisure, and retail district of Tapiola. Large highways physically separate three districts. The main driver of the connection is often viewed to be transportation. The T3 development

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combines different modes of transport, and the new metro line is the main connector. It is seen as a major link between three areas as well as linking the region to the city centre of Helsinki. Additionally, the connecting characteristics of nature are identified in terms of cycling, walking, and using natural pathways and green corridors as shortcuts across the areas. Water as an element has more surrounding than connecting characteristics. Connectivity can be encouraged by creating hotspots (i.e., a physical location with wireless access), which are connected to each other as a network of places as processes in order to co-create, operate, and co-develop them. However, communities require active facilitation. Even though packing interdisciplinary and cross-organizational students, researchers, professors, practitioners, and people from the public sphere into a dense area might support connectivity due to proximity, it is not enough if there are no processes to connect the diverse actors. Allen and Henn (2008) argue that increasing the opportunities for knowledge transfer, inspiration, and later innovation is achieved in organizations by maximizing the opportunities for communication. This concludes the configuration of the organizational structure and physical space. Similarly, a connector in infrastructure does not guarantee connectivity in the social context if it does not serve mobility between the areas, which also connect people through the processes of creating the area.

Theme 2: Changing – towards the vision

Change is a natural phenomenon of development, but the essential aspect in organizational settings is in reacting to change. Change occurs both physically and perceptually, and it is more about changing a mindset than physical alterations per se. The current changes on the Aalto University campus are based on the organizational change of the university, which affects the built environment by and large. Innovative grassroot initiatives are blossoming next to massive traditional renovations, new investments, and exits. Larger change nurtures smaller change and vice versa. However, the cultural change of breaking out from the traditional silos takes time, and so does engaging the middle management at the core of continual change. The organizational change of Aalto University has potential to affect the city of Espoo as an attractor of new types of businesses to the Keilaniemi area.

The challenge in Aalto University is to integrate three old institutional systems while respecting the original identities and creating motivators for the units to follow and implement the ambitious new visions. The same challenge applies to the T3 area. From these ingredients, a believable synthesis and incentive system, that the actors from all areas can relate to and are motivated to implement, should be created. Both Aalto University and the T3 area could become more resilient and adaptable to change from spatial, organizational, and operational perspectives. Involving people in the early phase of the development process decreases the unwillingness for change. Flexibility and resilience are the focal capabilities in recovering from the changes. The resilience strategy for the T3 area could be part of the visionary work conducted in long-term urban development.

Theme 3: Communicating – narrative and image of the area

Communication concerns promotional activities and interaction with others. By means of communications, a brand and a collective image can be built, but individuals build identity. A brand can be seen as a collective agreement of the image, whereas identity concerns an individual, their self-perception and self-presentation expressing one's personality. The Aalto University brand is strong and externally well known. The Aalto main campus offers world-class examples of co-creational actions and initiatives that have been well-communicated and function as communication platforms for their user communities. Yet, these communities only represent a small portion of early adopters among the university actors. The internal institutional units of Aalto University are still heavily struggling with building the Aalto identity, which is why the internal communications require greater investment of money and time. AaltoHUB is one of the projects that aim to affect the overall identity of Aalto people. The hubs are co-created, informal places for studying – they offer relaxed and flexible learning environments where the students need them the most. The challenge in the T3 area is communication between three districts. Today, its role is undervalued. In the future, it will be central to the success of the whole area. The city of Espoo should engage its citizens and empower entrepreneurs and industries to follow the external communications examples of Aalto University. Arnstein (1969) introduced an idea of citizen participation as citizen power.

There is no single sign to brand or identify the T3 area – it is rather an internally strong mental model. To make it visible, sensible, and encouraging requires action on the physical and virtual, internal, and external communication channels. The capability to create experiences – the sense of the place and diversity – is increasing in Aalto University. This is important competence, because often decisions are based on feelings and, therefore, it is important that those involved in planning

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processes are aware of this phenomenon and create (communicate) solutions in the best possible ways to support the end-user choice. The essence of successful grassroot activities is in the interaction and communications between the top management and grassroot actors. Two-way communication (top-down and bottom-up) is a process in which participants create and share information to research mutual understanding. Communications can raise awareness and change perceptions to support cultural, behavioural, and physical change.

Theme 4: Collaborating – user involvement
Collaboration means capability to collaborate informally and formally. Two key phenomena related to collaboration are complexity and diversity. Collaboration should not be seen as restrictive practices, but rather as a set of processes for creatively balancing conflicting and mutual interests. It is about working across different scales, interests, functions, and cultures with the aim of building up a community spirit. Collaboration includes both informal and formal processes.

The merger of three universities into one organization multiplies the complexity of the main Aalto campus. On the one hand, complexity forms a barrier to the new organization to collaborate internally. On the other hand, the increasing diversity offers great opportunities, which should not be underestimated. Due to the diverse characteristics of regional development projects in the T3 area, one can encounter questions that are "wicked", "messy", and "fuzzy" (Rittel & Webber, 1973; Buchanan, 1992). One profession or industry simply cannot solve them alone, which is why collaboration is needed to overcome the issues of complexity and diversity. Aalto University plays an important role in creating partnerships and in linking and forming platforms for public and private sectors. One of the most promising concrete grassroot initiatives is Urban Mill, which focuses on facilitating new public–private–people partnerships in an attempt to find common and shared value within the public and private sectors. On Aalto's main campus, interdisciplinary and cross-organizational collaboration has been fostered through these kinds of boundary objects. Buildings and spaces function as thematic platforms for collaboration around the campus, such as the Energy Platform, the Digi Platform, and the Living+ Platform. Creating a collaborative culture across organizations and disciplines requires time. However, a collaborative culture can be empowered by hybrid operators who facilitate the activity process. Aalto University has been successful in external collaboration, but the internal collaboration would require even more incentives to be reinforced – this is not the tradition of rewards systems in universities in general as they rather focus on individual merits and achievements.

In order to create a collaborative culture among the T3 spectrum of areas – culture, arts, living, leisure, business, and science – initiatives exist, including Espoo Innovation Garden, Espoo Day, and Base Camp, among others. These refer to innovative, common ways of working and a culture of collaboration and co-creation. The collaboration should be active among operators who identify and facilitate the collaboration of organizations and institutions with the same agenda or theme. This active facilitation could mentally draw areas closer to each other in an attempt to blur the physical boundaries. A continuous series of small events is essential to gradually raise awareness and change perceptions. When building a community, it can help to have engaging individuals who are willing to be pro-active and responsible and who then spread a climate of confidence and opportunity for change – they help in achieving a paradigm shift.

Theme 5: Controlling – direction, principles, and rules
Controlling in this context should not be perceived as traditional top-down restrictive action. Rather, it is defined here as a continuous management process that has a forward-looking attitude. Control can be achieved through common direction, principles, and rules. Organizations should, therefore, be motivated to relate to and engage in the same principles. Successful control requires a balance between creating and reinforcing vision and mission, and then managing the process of change through a combination of regulatory controls and behaviour.

Aalto University has a strong mission and vision but the incentives for implementing them are contradictory. A path should be selected that either aims for high international university rankings with the criteria of interdisciplinary work and focus on societal impact or that position the organization in more traditional rankings emphasizing the merits of academic research. The lesson of successful bottom-up cases in Aalto is that shared control and active communications between top, middle, and bottom levels of organizations is important.

The vision of the T3 area for connecting the physically separated cultural, business, and science districts together challenges organizations to perform a profound cultural change and institutional collaboration. To perform such a change, boundary objects and thematic entities are needed – platforms that foster sharing across

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organizations and nodes. The implementation can then be built on the ongoing collaboration. The developments of area management and areal operators evolve alongside the developments of the physical environment and the temporal development and control. Control can be managed through functioning partnerships between the key stakeholders with the agreed goals. The essence is in finding an operator with the ability to keep the different parties aligned and engaged. The operator has to orchestrate the process of change and sustain other stakeholders who are committed and keep the project alive. It is crucial to engage the actors to contribute to the common mission through incentives.

Reflecting on the learnings from the campus organization, it seems that pioneer facilities and community operators should start actively seeking underutilized facilities and start gathering stakeholders that benefit from one another under the same roof. The social and economic benefits from moving towards a more mixed-use, live, work, play society are the opportunity for knowledge distribution, local economic growth, and walkable neighbourhoods. On Aalto campus, the first steps have usually been thematic events and workshops. Moreover, these operators tend to offer pop-in and collaborative spatial entities where the organizations should not stay statically but dynamically spend some of their time collaborating with each other and then again head towards their clients or home organizations to share the lessons. It is yet remarkable that most of the campus real estate mass is still operated rather conservatively. To implement the novel and dynamic kind of culture on a larger scale takes time but the next generations are already knocking on the doors of the job market. The spatial transformation paradigm seems to be bubbling on the surface of the city as a blurry playfield for a mixture of working, learning, retail, leisure, and daily routines.

Takeaways

Based on our analysis of this case, we offer the following key insights:

1. Dynamic connectivity can be created through alternative spatial platforms and processes including co-creation, maintaining, and co-development.

2. Change has a pearl in it – incentives towards the targeted change and respect of minor-scale changes can provide elements for large-scale changes, too. Resilience can be a strategy for overcoming the ongoing turbulence of change.

3. Communication materializes in visible artifacts and in social discourse: a brand can be strong but identity weak – balancing between internal and external communication is as important as balancing between vertical and horizontal communication.

4. Collaboration is rarely linear – it happens even though it would seem chaotic, unclear, fuzzy, or wicked.

5. Control is about communication and incentives – motivation cannot be commanded but ownership and empowerment can be enforced.

Conclusions

The shift in the concept of space from being a space of static places towards a more dynamic space of flows is evidently ongoing, as Castells (2004) and Nonaka (1998, 2000), among others, describe. As the activities increasingly mix, regardless of the space, the current practices in the built environment do incompletely support this mixture but tend to silo each activity in their own block. The 5C analysis indicates that the campus areas can function as great living labs for experimenting and prototyping bottom-up concepts for facilitating collaboration among public and private stakeholders as they are densely packed in a manageable entity and as universities create new models and practices, through their core business, research. They are also rather objective and capable of providing a common ground for institutes, municipalities, decision makers, politicians, business, and industry representatives alike.

The tested solutions can thereafter be applied on a larger city scale to answer demands outside the university barriers. Based on the results of the analysis, it seems clear that the spatial solutions are only knots in the network. Collaboration needs to reach beyond the single hotspots in order to create an interactive network where great minds interact in the spaces of flows. To truly reach the business potential of mobile knowledge work facilitation and revitalize larger city areas, we need new types of hybrid operators – or new processes, practices, and businesses for the existing operators – that are capable of strengthening what is in between the knots. The buildings themselves are not in the core but the essence is in managing what happens inside and in between them, in the network facilitation.

The challenge in land use and planning is that law dictates it, and there is no control or ownership of the management of processes – a situation similar to the

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campus area only a decade ago. Strong individuals who seem to have strong ownership of the projects lead the case examples. If they leave the organization, they are difficult to replace and the successful initiatives might discontinue. On the other hand, little by little, these novel practices and niche innovations build on each other, creating change in the standards of processes. In order for the bottom-up processes to take place by and large in the built environment, the approach of managing and commanding through hierarchies, standards, and mechanisms of passive control must be flipped to the approach of actively orchestrating the actions by support, incentives, and other enablers. Furthermore, the results must be measured in terms of the holistic quality of the action and the effectiveness that the built environment enables – not solely in terms of the efficiency of the built environment itself.

About the Authors

Renita Niemi is a design strategist for human-centered change. She is a creative professional who graduated in 2004 from the University of Art and Design Helsinki (TaiK) in Finland. She has major in Industrial and Strategic Design and minor in International Design Business Management (IDBM). Currently, she focuses on her part-time PhD studies at Aalto University. Having several years of academic background working at TaiK and Aalto University, she is experienced at multidisciplinary research, concept development, and design. She has completed a diverse range of design research projects related to housing and living. Her ambition is to form broad initiatives to facilitate further innovation, which involves networking between people with different perspectives, as well as rapid experimentation and creative collaboration. Her passions are greatly connected to planning, design, services, and innovation in context of the urban environment.

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Robert Eriksson graduated as an architect from Chalmers University of Technology in Gothenburg, Sweden, in 2005. Currently, he works as a senior advisor in a consultancy solving problems related to the built environment. He has extensive experience in city planning, renewable energy, and open data. Robert has also been active in research, having published scientific publications related to, for example, user empowerment and future campus development.

Suvi Nenonen has worked as a Research Manager in Aalto University, Finland, since finishing her doctorate in 2005 on work environments that support new knowledge creation. She has published over a hundred scientific publications and acts actively in multiple international facilities management networks such as EuroFM and NewWOW. Suvi also acts as a docent in the Tampere University of Technology, Finland.

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References

Allen, T. J., & Henn, G.W. 2008. *The Organization and Architecture of Innovation*. Oxford, UK: Elsevier.

Ariely, T. 2008. *Predictably Irrational the Hidden Forces That Shape Our Decisions*. New York: Harper Collins.

Arnstein, S. R. 1969. A Ladder of Citizen Participation. *Journal of the American Institute of Planners,* 35(4): 216–224. http://dx.doi.org/10.1080/01944366908977225

Buchanan, R. 1992. Wicked Problems in Design Thinking. *Design Issues*, 8(2): 5–21. http://dx.doi.org/10.2307/1511637

Brinko, R., Van Meel, J., & Nielsen, S. B. 2014. The Shared Building Portfolio: An Exploration and Typology. In *Proceedings of CIB Facilities Management Conference 2014:* 154–165. Copenhagen: Technical University of Denmark.

Castells, M. 2004. Space of Flows, Space of Places: Materials for a Theory of Urbanism in the Information Age. In S. Graham (Ed.), *The Cybercities Reader:* 82–93. London: Routledge.

Demos Helsinki. 2014. *Smartup Manifesto – A New Wave of High Impact Startups Is Emerging from Consumer Cleantech*. Helsinki: Demos Helsinki.

Finch, E. (Ed.) 2012. *Facilities Change Management*. Chichester, UK : Wiley-Blackwell.

Hietanen, P. 2014. *Co-designing Campus*. Seminar presented at the Nordic Association of University Administrators (NUAS) on August 26, 2014. Available at: http://blogs.helsinki.fi/nuas-facilities-and-environment-2014/files/2014/08/Co-designing-campus_Paivi-Hietanen.pdf

Horelli, L., & Wallin, S. 2013. Towards an Architecture of Opportunities. In L. Horelli (Ed.), *New Approaches to Urban Planning – Insights from Participatory Communities:* 153–161. Helsinki: Aalto University.

Lindsay, G. 2013. Coworking Spaces From Grind to GRid70 Help Employees Work Beyond the Cube. *Fastcompany,* February 11, 2013. Accessed October 15, 2014: http://www.fastcompany.com/3004915/coworking-nextspace

Lindsay, G. 2014. 6 New Workspaces That Are Killing the Corporate Campus. *Harvard Business Review,* September 18, 2014. Accessed October 15, 2014: http://blogs.hbr.org/2014/09/6-new-workspaces-that-are-killing-the-corporate-campus/

Mehaffy, M. 2014. What Can a 'Science of Cities' Offer Planners? *Planetizen,* June 25, 2014. Accessed October 15, 2014: http://www.planetizen.com/node/69957

Niemi, R., Nenonen, S., & Junnonen, J-M. 2013. *Investigating the Competencies for Serviceability of Urban Areas*. Paper presented at the CIB 2013 World Congress, May 5–9, 2013. Brisbane, Australia.

Nonaka, I., & Konno, N. 1998. The Concept Of "Ba": Building a Foundation for Knowledge Creation. *California Management Review,* 40(3): 40–54.

Nonaka, I., Toyama, R., & Konno, N. 2000. SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation. *Long Range Planning,* 33(1): 5–34. http://dx.doi.org/10.1016/S0024-6301(99)00115-6

Mangs, A., Väistö, T., Karhu, J., Rajala, A., & Niemi, R. 2013. *Facilitating the Emergence and Development of Engagement Networks in Urban Surroundings*. Paper presented at the Industrial Marketing and Purchasing (IMP) Conference 2013, August 30 – September 2, 2013. Atlanta, GA.

Rittel, H. W. J., & Webber M. M. 1973. Dilemmas in a General Theory of Planning. *Policy Science,* 4(2): 155–169. http://dx.doi.org/10.1007/BF01405730

Rytkönen, E. 2015. University Campuses in Spatial Transformation: A Business Model Typology of Case Aalto University. *Facilities,* 33(9/10): 794–818. http://dx.doi.org/10.1108/F-04-2014-0042

Rytkönen, E., Nenonen, S., & Österlund, E. 2014. Facilitating Interdisciplinary Learning Communities: A Case Study from Finland. In *Proceedings of CIB Facilities Management Conference 2014:* 354–368. Copenhagen: Technical University of Denmark.

Termaat, A., Van Sprang, H., & Groen, B. 2014. Workspace 2020 – Club, Hub and Co-work Space: Business Models for Optimal FM Support for Office Workers in the Future. *Proceedings of the European Facility Management Conference (EFMC),* 4–6 June, 2014. Berlin: EFMC.

Waber, B., Magnolfi, J., & Lindsay, G. 2014. Workspaces That Move People. *Harvard Business Review,* 92(10): 68–77.

Worthington, J., & Bouwman, H. 2012. *Places of Connection – Themes, Concepts and Principles*. Utrecht: The Academy of Urbanism; Learning Cities Platform.

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Keywords: urban development and management, campus management, mobile work, hybrid spaces, scaling businesses

Orchestrators of Innovation-Driven Regional Development: Experiences from the INNOFOKUS Project and Change2020 Programme

Mervi Rajahonka, Toni Pienonen, Riikka Kuusisto, and Jari Handelberg

> *"Be the change that you wish to see in the world."*
>
> Mahatma Gandhi (1869–1948)
> Leader of the Indian independence movement

The article takes a practical view of regional innovation ecosystems and presents ways to advance more efficient uses of public funding instruments by regional developers. Documenting the views of Finnish regional developers into two workbooks and a toolbox, the results of the INNOFOKUS project and its Change2020 development programme identified that promoting a high-impact project culture and smart specialization in Finland requires a continuous learning and participation process. Key individuals who can make this happen are innovation orchestrators who facilitate activities and compose the big picture. This article aims to bring forth an overview of the building blocks of an enriching and energizing environment and high-impact projects, and it presents an overview of how to enable the work of innovation orchestrators, who play a critical role in facilitating innovation ecosystems.

Introduction

The dawn of the 2014–2020 programme period of the European Union (EU) coincides with the financial crisis facing the European economy. Funding instruments are expected to generate more results with less money. The EU has introduced "smart specialization" strategy for research and innovation (also referred as RIS3) as a new innovation policy concept designed to promote the efficient and effective use of public investment in research. Its goal is to boost regional innovation in order to achieve economic growth and prosperity, by enabling regions to focus on their strengths. In its emphasis and design, the new smart specialization agenda differs from previous regional innovation policies in the respect that universities have a potentially fundamental role to play in its delivery (Kempton et al., 2014). In Finland, European project funding is one of the most important regional development tools for the higher education institutions and their networks, but the new conditions require a new mindset to answer questions such as: *What makes a good public development project?* and *How can higher education institutions contribute more to society with projects?* At the same time, the Finnish regions are at different stages in adopting smart specialization – some are pioneering it with participatory processes while laggards are either treating the subject of smart specialization as business as usual or are confused by uncertain expectations.

The INNOFOKUS project and its Change2020 programme developed tools for learning-driven regional development to tackle these questions. Throughout the year 2014, the programme studied these topics and organized several opportunities to clarify these issues. Following dozens of participatory workshops and bench-learning events for hundreds of participants, the project summarized the results under two perspectives that this article attempts to outline: i) a thematic perspective, consisting of the toolbox – 10 elements or themes for enriching and energizing the project environment, and ii) a project perspective, including a model for high-impact projects.

The article is organized as follows. After this introduction, we present a short review of the literature on in-

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novation-driven regional development. After that, we discuss the methodology and data. Next, we elaborate the findings of the INNOFOKUS project, first from thematic perspective of ensuring an enriching project environment and then from the perspective of high-impact projects, including the role of orchestrators. Finally, we conclude by discussing the findings and key implications of the project.

Literature Review on Innovation-Driven Regional Development

Kolehmainen and colleagues (2015) state that innovation is currently central to most EU economic and regional development funding programmes, and that the EU-led smart specialization agenda is a good example of that trend. Furthermore, they claim that knowledge-based and innovation-driven regional development calls for certain kinds of actors, activities, and collaborative practices, and therefore the concepts of "triple helix" and "quadruple helix" are relevant. The concept of triple helix was introduced by Etzkowitz and Leydesdorff (1995) around the idea that universities and business and public sector organizations nurture innovation and economic prosperity of the region together. The concept of quadruple helix adds one more actor group to the triple helix, namely the wider community: people. These concepts are kin to the "system of innovation" approach, which was introduced by Lundvall in 1985. According to innovation system theory, innovation and technology development result from complex relationships among actors in the system, which includes enterprises, universities, and research institutes. Freeman (1988) introduced the expression "national innovation system", and the concept was later applied to regions with the expression "regional innovation system".

In the innovation management literature, the term "innovation orchestration" has been used to describe the activities of a hub firm in developing, managing, and coordinating an inter-firm innovation network (Ritala et al., 2009). Launonen (2015) describes the orchestration of innovation networks as "a process of creating conditions and support infrastructure whereby innovation can emerge and be sustained." Klerkx and Aarts (2013) claim that the innovation literature seems to neglect the difficulties, paradoxes, and dilemmas in innovation network orchestration, as well as the notion that multi-organizational innovation networks can become politicized negotiation arenas. Operating in innovation networks is thus not easy: several challenges and paradoxes exist, balancing between new and existing relationships, openness and closure, and informal and formal relationships, as well as finding correct ways of interacting. Kolehmainen and colleagues (2015) point out that, because each actor of the collaboration network has its own vision concerning its own future and the future of the whole region, it is important to have joint processes for forming shared visions concerning the region. This in turn requires actors – organizations or individuals – who are capable of visioning between visions (Kolehmainen et al., 2015; Sotarauta et al., 2007).

In this process of shaping joint and shared visions, regional leadership is needed, calling for enthusiasm and the ability to motivate and energize different actors. However, different people or actor groups may be in charge of the process at different stages of the development process. There is a need for people that have a connecting role in local and regional networks, acting as brokers in interweaving the networks and explaining objectives for different stakeholders (Kolehmainen et al., 2015). Launonen (2015) depicts orchestrators as requiring interpersonal, facilitation, and design skills. They have to master balancing and negotiation. In terms of network stability, orchestrators must be able to influence, vision, motivate, as well as to solve problems and manage change. Klerkx and Aarts (2013) complement this view, describing that the work of "innovation champions" should be to orchestrate and operate on different levels within networks and innovation communities. They state that the key tasks of innovation network orchestration are vision articulation, matchmaking, and process management. In their conclusion Klerkx and Aarts state that different orchestration roles are ever changing in the innovation networks and communities, emerging over time via informal and formal interaction.

The Japanese approach brings up yet another perspective on orchestration: the concepts of "Ba" and the "SECI" cycle (i.e., socialization, externalization, combination, and internalization), as described by Nonaka and Konno (1998). These concepts help to summarize what type of practical steps need to be taken to facilitate the generation of new knowledge and learning. According to Nonaka and Konno, Ba is a shared physical or virtual space that serves as a foundation for knowledge creation. It is a serendipitous environment where the participants feel safe to share and contribute. There are different types of Ba, each related to a different phase of the SECI process that demonstrates how new knowledge is created by a cycle of interaction, experi-

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mentation, and interaction between people (Konno, 2015; Nonaka & Konno, 1998). Also, Kolehmainen and colleagues (2015) argue that there is a need for regional forums and arenas in which shared visions can be discussed and shaped among different quadruple helix actor groups. Moreover they claim that formal written contracts with common goals are also needed.

Methodology

The INNOFOKUS project was implemented between 2012 and 2015. It was funded by the European Social Fund and the Finnish Ministry of Education and Culture, and it was managed by the Aalto University School of Business Small Business Center. The Change2020 development programme was a part of the operations carried out by the INNOFOKUS project. The predecessor of the INNOFOKUS project had been the Orchestration-Inno project, which had developed innovative project activities and project skills at the project-operator level. During the Orchestration-Inno project and its training and networking activities, the messages from the project-operations level had highlighted the need to develop the approaches used by the project organization towards more innovative and networked models. Also, the Finnish Ministry of Education and Culture had implemented a study that revealed that the project organizations have a lot of room for improvement, for example, with respect to the quality of project activities and related support services. Therefore, in the INNOFOKUS project and its Change2020 programme, the key target group were R&D organizations, especially higher-education institutions. The objective was to develop better cooperation models for organizations for regional development as well as tools and operations models for project organizations to pursue learning-driven regional development. Throughout the year 2014, the programme studied these topics and organized several opportunities for different stakeholders involved with regional development, R&D, and innovation practices to clarify these issues. The project and the programme worked as a platform for co-creation and bench-learning for the participants, as well the project group.

This article documents the project process and empirical data, first from participatory bench-learning events, and second, from semi-structured interviews. The Orchestration-Inno project acted as a case-owner during the 2011 Aalto Camp for Societal Innovation (ACSI) for a challenge named "ESF [European Social Fund] Actors Creating New Collaboration & Networking Models to Increase the Impact of Societal Innovations" (tinyurl.com/nv62hj7). The ACSI is an action-learning camp addressing societal concerns in a new and effective manner: it initiates a continuing process empowering people and organizations to think and act, creating shared understanding of how opportunities for societal innovation emerge, and how to use them constructively in business and research. At the same time, participants apply innovation skills to address challenging real-life issues. The prototype co-created as an outcome of the Orchestration-Inno project's challenge at the ACSI 2011 was further developed and realized during the INNOFOKUS project as a tool called "Toolbox – 10 Themes for Creating More Innovative Projects and Working environments".

Before Change2020 started during the years 2012 and 2013, the INNOFOKUS project arranged or participated in more than ten events in which the themes of the project were discussed with small and large audiences. During 2014, the Change2020 programme arranged four two-day workshops and five shorter events. Through the Change2020 programme, every participating organization brought together a development team and determined their own development process, linked to the themes of the INNOFOKUS project. In the workshops, these development processes were elaborated inside the teams and together with other organizations' teams in bench-learning sessions. Professional facilitators were used in the workshops. Additionally, 13 people were interviewed during October and November 2014. The interviews lasted between 40 to 100 minutes, and in them, new innovative models for high-impact projects were discussed, along with the Toolbox themes. The interviewees were from seven different organizations: two from funding organizations, four from universities, and seven from universities of applied sciences. All the discussions in the events, as well as the interviews, were recorded and detailed notes were drawn up for the purpose of analysis. Based on the material, two practical workbooks (Pienonen & Markkanen, 2014a, b) and a toolbox were compiled for the project organizations to use in their regional development work. This article is compiled based on the material and all the learnings the INNOFOKUS project group has gained during the project. Table 1 gives an overview of the empirical material used in the process and for this article. In the next three sections, we discuss the findings and conclusions of the INNOFOKUS project and the Change2020 programme.

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Table 1. Empirical material used in this article

Data Source	Purpose	Outcome
ACSI 2011	• European Social Fund actors creating new collaboration and networking models to increase the impact of societal innovations	A prototype consisting of Toolbox themes for enriching and energizing the project working environment
INNOFOKUS Change2020 programme: Four workshops and five other co-working events	• To facilitate bench-learning between regional groups working for smart specialization strategies (e.g., regional developers, education actors) • To develop tools for regional groups to use in their regional development activities and for developing the RIS3 strategies into practice	Two workbooks and the Toolbox
Interviews (13)	• To discuss the toolbox themes and new innovative project models for regional development	Two workbooks and a further developed and tested Toolbox

Thematic Perspective: The 10 Toolbox Themes

The ten Toolbox themes listed below were developed by an international multidisciplinary team of experts participating in a co-creative process during an earlier Orchestration-Inno project at ACSI 2011:

1. Creating Great Beginnings (always remember facilitation)

2. Creating Art of Projects (how to break the prison of traditional project management thinking)

3. Building to Last and Expand (thinking beyond the project lifecycle)

4. Creating Networks for Talent Hunting (recognizing individual competences, appreciating and making connections, knowing people, and creating or identifying a network of connectors or mediators)

5. Investing in Networking (face-to-face networks and virtual forums)

6. Co-Creative Collaborative Thinking (game spirit as part of co-creative work; benefits, interests, continuous communication)

7. Promoting Informal Ways of Working (collaboration and co-creation; energizing working environments)

8. Promoting Transparency (sharing information openly, tolerating the feeling of incompleteness and risk taking during the transitory phases of development processes, and minimizing rigid planning based on end results)

9. Identifying Enablers (seeing problems as challenges and looking for the enablers instead of barriers; where to find inspiration; how to open a closed mind)

10. Being Visual (learning to visualize)

These ten themes are the elementary building blocks in generating and maintaining an innovative, co-creative, and co-learning environment. Both the project culture and the values that are truly shared in the organization are essential for the well-being of people and their productivity, not to mention the importance of the tools for co-working and co-learning that the organization has to offer. The Toolbox elements enable an innovative environment for individual projects, higher-education institutions, and other organizations, including companies.

In addition to the ten Toolbox themes, three basic pillars – trust, respect, and joy – were identified as the core and foundation for the co-creative collaboration culture and innovative working and learning environment. These factors cannot be taken for granted, but they call for common values and managing of the organization's value culture. These three pillars, as well as sharing of

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common values, assure an energetic, safe, and innovative environment for project work:

• *Trust:* creating and maintaining an atmosphere of trust as a living thing between people and as part of the operating model and organization structure

• *Respect:* creating a safe environment where all ideas are welcome and highly respected, developing joint rules, fostering positive and constructive thinking and acting, sharing knowledge, and encouraging openness

• *Joy:* creating conditions where joy can be experienced in the act of co-creation and through its outcomes

All ten themes were discussed, tested, and further developed during the Change2020 programme. The themes were concretized into 10 wooden batons (Figure 1), which were used during co-creation activities, including the bench-learning workshops. Also, a Toolbox game-development competition was arranged. There were several ways discovered with respect to how the Toolbox batons could be used as physical objects for generating ideas in day-to-day work or in weekly or monthly meetings to improve the working practices and change the working culture towards more innovative and productive directions. For example, the "Being Visual" baton was used for discussing which practices were used when presenting information or publishing results in projects and, if the current practices were not satisfactory in visual terms, how they could be improved. The Toolbox game can be found at:
http://www.innofokus.fi

Figure 1. Toolbox batons, each representing one of the 10 themes

Project Perspective: A Model for High-Impact Projects

Following the thematic perspective, in this section we summarize the views of the Change2020 participants on prerequisites of higher-impact regional development projects into five learning points:

1. Remember that co-creation is where it all begins.

2. Focus on the big picture.

3. Create focus and relevance by building on strengths.

4. Encourage agile experimentation.

5. Put learning at the core of development projects.

We believe that these learning points are of practical value for project managers and designers and other R&D staff in higher-education institutions and regional development organizations, but also in other project organizations. Overall, it could be said that, in the past, many Finnish regional development projects were too planning-driven and were managed in closed systems. Risk taking has been minimized by rigid planning based on end results. These five learning points are summarized in the subsections below and are described in greater detail in one of the workbooks by Pienonen and Markkanen (2014b).

1. Remember that co-creation is where it all begins
Regional development projects must be: demand-driven and rooted in the needs of the surrounding economy and society; co-created together with users and partners; designed to follow the principles of open innovation (e.g., Kolehmainen, 2015). Society and business must be at the core of the projects from the initial planning phase. These projects bring out real-life problems, needs, opportunities, and wicked problems that are worth solving with the help of the higher-education institutions in projects. On this learning point, experiences from the Change2020 programme yielded the following recommendations:

• Identify and formulate the need or opportunity.

• Co-create the vision.

• Co-create the solution.

• Share active ownership.

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2. Focus on the big picture

Development projects are just tools to attain a desired level of change. They are always parts of something bigger – organizationally, regionally, and activity-wise. Specifically, projects managed by higher-education institutions must integrate their outcomes and outputs into the two other missions of the university: research and education. As much as possible, higher-education institutions should involve teachers, researchers, and students in project planning and execution. Their involvement creates spill-over benefits and integrates the explorative project work results exploitatively into the other missions of the university. (Brady & Davies, 2004; Davey et al., 2011; Goddard & Vallance, 2011). On this learning point, experiences from the Change2020 programme yielded the following recommendations:

- Position the project in the portfolio of the organization, region, or nation.
- Manage organizational integration. For example, in projects managed by higher-education institutions, any activity undertaken in a project must be aligned to leverage and utilize the different types of university–society cooperation.

3. Create focus and relevance by building on strengths

Project managers should take a careful look at what kinds of skills and expertise are required to make their plans happen. Typical team-related problems in development projects are often two-fold. First, there may be a total lack of a team: one person (usually the project manager) may have to do everything. Second, the project manager is typically hired purely based on rather narrow professional competence requirements, but projects need a variety of skills – from organizing events to sales, productization, communication, and administration (bureaucracy). Furthermore, projects should make use of specific strengths that are unique to the project organization and region, making their uniqueness a value proposition for domestic and international partners. The project organization should look for the necessary knowledge and expertise from its partners, rather than trying to build everything from scratch itself. For example, universities of applied sciences can focus on adapting the results from research universities' newest technology studies to small and medium-sized businesses and build up their knowledge absorptive capacity with the help of regional development agencies, instead of trying to develop new technology themselves. On this learning point, experiences from the Change2020 programme yielded the following recommendations:

- Build a team of individuals with complementary competencies for different tasks.
- Leverage the complementary strengths of participating organizations and regions.

4. Encourage agile experimentation

Currently, Finnish project development remains too planning-driven. Instead, there should be more experimentation and agile processes. After all, one of the purposes of public development projects is to radically test new solutions that would otherwise be deemed too risky or unaffordable. When developing something entirely new, it is difficult to be certain of the results beforehand. This is why agile process and learning by experimenting – doing, testing, and failing – are needed in projects, as opposed to more planning-driven development. In this mindset, failure is a success; it merely proves that something does not work. In an experimentation-driven project model, the key driver is rapid learning in order to create something unique (Salmelin, 2015; Tuulenmäki, 2012). On this learning point, experiences from the Change2020 programme yielded the following recommendation:

- Experiment, pilot, and scale to market.

In Figure 2, we present an example of how to incorporate an experimentation-driven model into the structure of a public regional development project. At the beginning, the project sets out a clear vision. In the first phase of its journey (1), the project executes small-scale experiments to test suitable ways of reaching the goal. A project plan describes the number of pilots and gives a rough outline of how testing and analysis will be done to give reassurance for the financing authority. Then, the project analyzes the experiments, eliminates those methods that do not work, and continues with larger-scale pilots (2). Finally, a scalable solution is born out of the best of three larger-scale pilots (3). Because the solution has undergone extensive real-life experimentation, there should be enough inertia and demonstration evidence to help it survive on its own.

Note that a similarly structured approach can be applied on a regional level. It starts out with a co-created vision by members of the innovation ecosystem that states what they want to achieve. This vision can be based on a common thematic area, for example, a societal challenge, issue, or a wicked problem; a regional smart specialization spearhead; or an emerging technology. First, regional actors carry out small-scale activities (i.e., lump sum projects) to demonstrate a variety of

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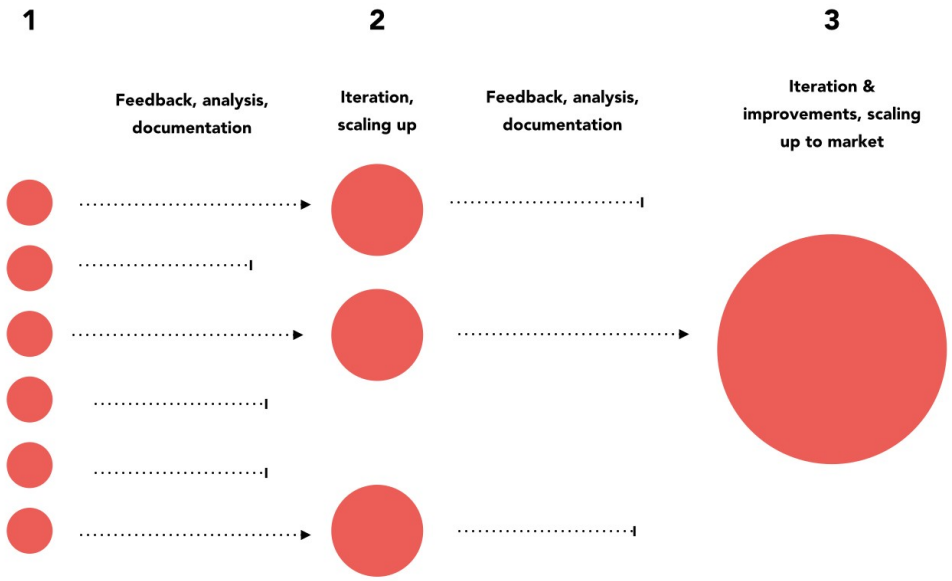

Figure 2. Incorporating an experimentation-driven model into the structure of a public regional development project

solutions before moving up to bigger projects. On this scale, the relevance of a shared vision grows ever more important, because different activities are likely to be implemented by a variety of actors, who all require a sense of common purpose to direct them.

5. Put learning at the core of development projects

By focusing on learning and self-reflection, it would be easier for projects and supporting authorities to talk about failures and mishaps without fear of punishment. Projects should reflect on what kinds of internal learning processes they use in practice. They should constantly ask themselves to what extent the results of the experiences are shared with the rest of the project organization, and how informed the stakeholders are of what is happening. With project work and its limited time, flawlessness should not be the goal. To make this happen, all projects should integrate a proper learning process into the project plan and organize time for people to experience it experimentally (e.g., Markkanen & Pienonen, 2014; Nonaka & Konno, 1998; Järvenpää & Kankare, 2012). On this learning point, experiences from the Change2020 programme yielded the following recommendation:

• Focus on continuous learning and reflection, both externally and internally.

Project Findings

Based on the INNOFOKUS project and its Change2020 development programme, it can be concluded that, to achieve the aforementioned conditions for high-impact projects, an ongoing process of discovery and learning is needed, where everyone learns by doing, experiments, and participates socially. The participants of the Change2020 programme, for example, stated that a regional research and innovation strategy for smart specialization (RIS3) should not be a paper that is "written once and then forgotten in a drawer". This learning process should be supported and facilitated at several levels, as described by Klerkx and Aarts (2013) and Launonen (2015), or by creating Ba-like environments that promote the SECI cycle (i.e., socialization, externalization, combination, and internalization) (Konno, 2015; Nonaka & Konno, 1998). The Change2020 participants identified several examples of good practices to enable this. For example, the Region of Kymenlaakso in Southeastern Finland embarked on a journey to shape their RIS3 strategy through an iterative co-creation process in which the steps themselves, not just the outcome, were perhaps just as important. This is only possible by creating venues – large and small – for interaction. Another good example of practice from Change2020 comes from Finnish Lapland (Box 1), a region where frequent staff exchange between regional project organizations (higher-education institutions,

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development agencies, regional authorities) allow their experts to simultaneously work for different organizations and projects. Given that most valuable project knowledge (tacit knowledge and social capital) is so strongly embedded in individual people – and is therefore difficult to transfer – regional developers in Lapland felt that one of the best ways to increase learning in ecosystems was ”knowledge transfer on legs” via staff exchange.

Furthermore, to achieve higher impact, greater synergy in using different funding instruments is needed. In Finland, different funding instruments are currently managed by a plethora of funding authorities, often in disaccord and without a plan for the big picture. Although the official ethos surrounding the new European Union programme period 2014–2020 promises improvements, synergy cannot happen with words alone. A good practice case of a funding authority solving this particular challenge is from North-Karelia in Eastern Finland, where the two authorities responsible for grants – the European Social Fund (ESF) and the European Regional Development Fund (ERDF) – organized a three-phase open idea submission, commentary, and co-creation process for potential project organizers well before the actual funding call. The process took place online and in face-to-face workshops. This approach reduced overlapping project submissions and unnecessary competition. The role of funding authorities, as one of the quadruple helix parties, in enabling transparency and openness should not be understated.

Finally, to make this happen, any high-impact project ecosystems need orchestrators to guide the process and draw the big picture with an exciting vision. Based on the experiences of the Change2020 programme, the orchestrator can be a person (or a team of people) who takes the role (in an organization, a region, a network, or nationally) of transparently facilitating the development activity with information, resources, and learning. The Change 2020 participants experienced this personally at the Urban Mill (urbanmill.org) in Espoo, Finland, which also acted as a venue for one of the workshops. In addition to being a co-working and event space, the Urban Mill is also a thematic co-creation and co-development platform that also acts as a hands-on orchestrator in the theme of urban innovations in the Helsinki region, bringing citizens, academics, business people, and public actors together. It is more than just a science park or co-working space. Such thematic platforms that operate on both grassroots and strategic levels can be the strategic nodes from which the ecosystem gains the common direction.

Box 1. Lapland and its "Smart Strengths"

During a Change2020 workshop in Lapland, the participants found that, in addition to the regional strategic smart specialization and expertise in mining, tourism, and bioeconomics, Lapland has plenty of other strengths and characteristics that make it a unique region in Finland, Europe, and the world. Some of the strengths that outsiders noted include:

1. Global megatrends are likely to increase the significance of Arctic regions.
2. Active knowledge exchange and multitasking are typical in the daily work of Lapland’s regional developers. This regional learning makes easier to transfer tacit knowledge.
3. The international aspect is everywhere in Lapland, which has three bordering countries: Sweden, Norway, and Russia. A long history of cross-border activity and good logistics connections make Lapland the most international region in Finland. International experience is one of its critical assets in development work.
4. Lapland is a perfect location for applying and testing technology in a unique setting. Although Lapland is not necessarily the best place for researching completely new things, Arctic conditions provide a unique setting for testing new technologies and solutions in extreme conditions.

The conditions under which the orchestrators must work within networks are very different from ordinary business environments. The Change 2020 process revealed that traditional management models and paths do not apply under such conditions, because networks are living systems of self-organization. Further confirming the view of Klerkx and Aarts (2013), it can be noted that networks of regional development projects cannot be controlled, only nudged in the right direction. The leadership in networks is shared and comes in different forms – as opposed to hierarchy and official leadership positions. Because of this, the above-mentioned shared vision is vital: it is the glue that binds together individual activities and gives a sense of purpose to all involved.

One of the most important conclusions based on the experiences of the Change2020 programme is that innovation orchestrators play an important role in regional

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innovation. As proposed by Bror Salmelin (2015) from the Open Innovation Strategy and Policy Group (OISPG) of the European Commission Directorate General for Communications Networks, Content & Technology (DG Connect), these orchestrators are the *curators* and *bridgers,* who: i) maintain the quality of content generated by different innovation players and the communities and ii) are inherently interested in everything, and they connect and create new linkages between people and organizations. Orchestrators facilitate key people with information, resources, and knowledge, as shown in Figure 3.

Conclusions

This article identified ways to enhance the efficient use of public funding instruments in regional innovation ecosystems by studying the prerequisites of an enriching and energizing project environment and high-impact project culture. The article has at least two kinds of generally applicable implications for innovation managers. First, the findings corroborate that the promotion of an enriching and energizing project environment and high-impact project culture requires a continuous learning and participation process. The applicability of results is not limited to publicly funded or regional innovation systems, but can be generalized into any kind of complex innovation network. Second, the results show that the key individuals, who can make the enriching and energizing project environment and high-impact project culture happen, are innovation orchestrators. The orchestrators facilitate activities and compose the big picture. They are the key actors for employing the full potential of innovation platforms, regions, and ecosystems.

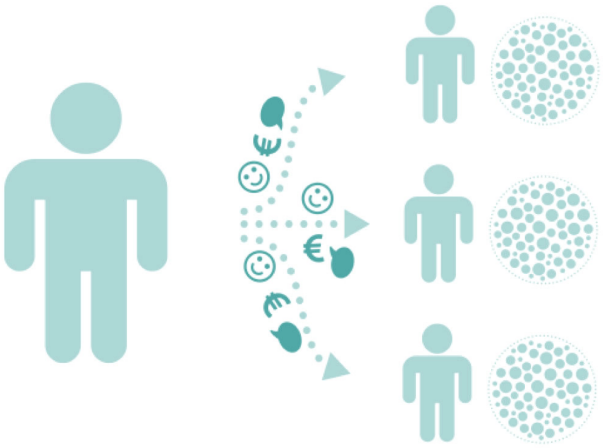

Figure 3. Orchestrators facilitate the activities of key people with information, resources, and knowledge

Furthermore, we can draw at least two implications for policies supporting regional innovation ecosystems. First, because orchestrators and their work are essentially important in the regional innovation ecosystems, they should be recognized. Therefore, public recognition of this new profession needs to be strengthened, for example, by creating curricula and training that help to increase the meta-skillsets of orchestrators (e.g., facilitation, vision-setting, curation). Second, the role of an orchestrator should be built into all development projects and platforms from the get-go. This can either be a requirement by the funding authority for any prospective projects, or it can be facilitated by funding regional coordination projects that focus on enabling the orchestration work. In the long term, to avoid the buildup of unnecessarily bureaucratic and inefficient intermediary structures, regions and innovation communities should be open to experimenting success-fee-driven models, where both the public and private innovation orchestrators receive compensation based only upon the results of their work.

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References

Brady, T., & Davies, A. 2004. Building Project Capabilities: From Exploratory to Exploitative Learning. *Organisation Studies,* 25(9): 1601–1621. http://dx.doi.org/10.1177/0170840604048002

Davey, T., Baaken, T., Galan-Muros, V., & Meerman, A. 2011. *The State of European University-Business Cooperation Final Report – Study on the Cooperation between Higher Education Institutions and Public and Private Organisations in Europe.* Münster, Germany: Science-to-Business Marketing Research Centre, Münster University of Applied Sciences.

Etzkowitz. H., & Leydesdorff., L. 1995. The Triple Helix—University–Industry–Government Relations: A Laboratory for Knowledge-Based Economic Development. *EASST Review,* 14(1): 14–19.

Freeman, C. 1988. Japan: A New National System of Innovation? In G. Dosi, C. Freeman, R. R. Nelson, G. Silverberg, & L. Soete (Eds.), *Technical Change and Economic Theory.* London: Pinter.

Goddard, J., & Vallance, P. 2011. *The Civic University: Re-Uniting the University and the City.* Paper presented at the OECD Conference: Higher Education in Cities and Regions: For Stronger, Cleaner and Fairer Regions, February 10–11, Seville, Spain.

Järvenpää, T., & Kankare, I. 2013. *Veikö Moolok vallan? Vapauta projektisi tuhlaajakultista.* [Did Moloch Take Over? Release Your Project from the Big Spender Cult.] Helsinki: Talentum.

Kempton, L., Goddard, J., Edwards, J., Hegyi, F. B., & Elena-Pérez, S. 2014. *Universities and Smart Specialisation. JRC Technical Reports; S3 Policy Brief Series No. 03/2013.* Seville, Spain: Institute for Prospective and Technological Studies, Joint Research Centre.

Klerkx, L., & Aarts, N. 2013. The Interaction of Multiple Champions in Orchestrating Innovation Networks: Conflicts and Complementarities. *Technovation,* 33(6–7): 193–210. http://dx.doi.org/10.1016/j.technovation.2013.03.002

Kolehmainen, J., Irvine, J., Stewart, L., Karacsonyi, Z., Szabó, T., Alarinta, J., & Norberg, A. 2015. Quadruple Helix, Innovation and the Knowledge-Based Development: Lessons from Remote, Rural and Less-Favoured Regions. *Journal of the Knowledge Economy,* Published online: September 3, 2015. http://dx.doi.org/10.1007/s13132-015-0289-9

Konno, N. 2015. *"Ba" and Open Innovation: A View from Japan.* Paper presented at the Open Innovation 2.0 Conference, Espoo, Finland, June 8, 2015.

Launonen, L. 2015. Determinants for Orchestrating Open Innovation Networks. In P. Lappalainen, M. Markkula, & H. Kune (Eds), *Orchestrating Regional Innovation Ecosystems: Espoo Innovation Garden:* 199–208. Espoo: Aalto University in cooperation with Laurea University of Applied Sciences and Built Environment Innovations RYM Ltd.

Lundvall, B.-Å. 1985. *Product Innovation and User-Producer Interaction, Industrial Development.* Research Series 31. Aalborg: Aalborg University Press.

Markkanen, M., & Pienonen, T. 2014. *Hankemaailman Skynet ja muita tarinoita kannattavampaan kehittämistyöhön.* [Project World's Skynet and Other Tales for More Profitable Development Work]. Jyväskylä, Finland: Business Arena Oy.

Nonaka, K., & Konno, N. 1998. The Concept of "Ba": Building Foundation for Knowledge Creation. *California Management Review,* 40(3): 40–54.

Pienonen, T., Markkanen, M., Widgren, P., Davey, T., & Galan-Muros, V. 2014. *Operaatio Metsonpesä - Korkeakoulujen työelämäyhteistyön tilannekuva haltuun.* [Operation Metsonpesä – Flash Picture of the Collaboration of HEIs and Working Life]. Project report. Jyväskylä, Finland: Business Arena Oy.

Pienonen, T., & Markkanen, M. 2014a. *RIS3 Workbook for Learning Driven Regional Development: For Project Organizations, Regions and Project Consortiums Involved in Regional Development Projects, INNOFOKUS Change2020 Workbook A:* http://www.innofokus.fi/ris3+workbooks+hanketoiminnan+uusi+malli+-tyokalut/

Orchestrators of Innovation-Driven Regional Development

Mervi Rajahonka, Toni Pienonen, Riikka Kuusisto, and Jari Handelberg

Pienonen, T., & Markkanen, M. 2014b. *RIS3 Workbook for Projects: For Project Managers, Designers, R&D Staff and Regional Development Organizations, INNOFOKUS Change2020 Workbook B:* http://www.innofokus.fi/ris3+workbooks+hanketoiminnan+uusi+malli+-tyokalut/

Ritala, P., Armila, L., & Blomqvist, K. 2009. Innovation Orchestration Capability — Defining the Organisational and Individual Level Determinants. *International Journal of Innovation Management,* 13(4): 569–591. http://dx.doi.org/10.1142/S136391960900242X

Salmelin, B. 2015. *Opening Ceremonies and Plenary.* Open Innovation 2.0 Conference, Espoo, Finland, June 8, 2015.

Tuulenmäki, A. 2012. *Lupa toimia eri tavalla.* [Licence to Act Differently]. Helsinki: Talentum.

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Keywords: regional development, regional innovation ecosystem, orchestrator, high-impact projects, experimentation-driven development, agile project development, smart specialization, smart specialisation

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