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Smart Cities and Regions

Welcome to the December issue of the *Technology Innovation Management Review*. 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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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 December 2016 issue of the *Technology Innovation Management Review*. In this issue, we revisit the theme of **Smart Cities and Regions**, and it is my pleasure to welcome back 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 January and February, we will explore the popular theme of **Living Labs** in collaboration with the European Network of Living Labs (ENoLL; openlivinglabs.eu).

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 the second thematic issue on Smart Cities and Regions in the TIM Review. This issue focuses on explaining how regions and cities are getting smart, and we acknowledge Dameri (2013), who defines a smart city 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."*

The discussion on smart cities and regions is expanding rapidly, and more and more practitioners and researchers are involved in the debate (Leminen & Westerlund, 2015; McPhee et al., 2015; Tukiainen et al., 2015). We hope that this special issue will further the debate on this topic, and we propose that future research should emphasize the intersection of smart cities and living labs, because these bodies of literature discuss some of the same thematic areas, particularly through living labs facilitated in a city context for the improvement of the daily lives of citizens (e.g., Leminen et al., 2012).

This issue of the TIM Review contributes five theoretically and practically oriented articles for researchers, managers, and innovation developers wishing to benefit from the emerging opportunities in the smart city domain. The selected articles incorporate smart city activities, particularly addressing work on regional innovation ecosystems taking place today in Europe and introducing frameworks and approaches to be used for business creation, opportunities and challenges in collaboration in smart cities, as well as best practices and contributions to smarter regions. In this vein, the issue continues the discussion initiated in the October 2015 issue of the TIM Review: timreview.ca/issue/2015/october

The first article, by **Jukka Viitanen**, CEO and Managing Partner of Resolute HQ Inc., discusses the differences in regions and raises the question of how sub-optimal innovation ecosystems can become more similar to forerunners. He takes the global best practice perspective to

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developing innovation hubs, and offers a novel, holistic regional innovation hub framework to manage such ecosystems. The framework combines public and private sector interests for joint innovation activities, and is tested and validated through a case study of Cambridge, United Kingdom.

The second article, by **Karlos Artto**, **Riikka Kyrö**, **Antti Peltokorpi,** and **Kristiina Sandqvist** from Aalto University and **Tuomas Ahola** from Tampere University of Technology in Finland, introduces the Cuckoo´s Nest approach, which highlights the need for integrating expert organizations to design systems and assigning organizations' design rights. The approach proposes that, in contrast to many development actions, the needs of the ecosystem come first and the goals and design features of single organizations follow on from the ecosystem's goals. The authors illustrate the approach using the outcomes of two workshops in the metropolitan area of Helsinki, Finland.

In the third article, **Jukka Ojasalo** and **Lassi Tähtinen** from Laurea University of Applied Sciences in Finland seek to increase knowledge of how to integrate open innovation platforms into public sector decision-making processes. They create and discuss an open innovation platform model for public sector decision making in a city based on a qualitative. explorative study. In particular, the study addressed different types of relationships in the platform. Ultimately, the model has several practical implications as it can be used as the starting point for collaborative innovation in cities and to show ways of breaking silos in the conventional bureaucratic model.

The fourth article, by **Jukka Ojasalo** and **Heini Kauppinen** from Laurea University of Applied Sciences in Finland, aims to increase understanding of the opportunities and challenges of collaborative innovation between a city and various external actors, such as companies, research institutions, and citizens. The authors discuss multiple types of opportunities and challenges for collaborative innovations in a city. The study concludes by offering research and policy recommendations to city governments and proposed future avenues for research on collaborative innovation in cities.

In the fifth article, **Hanne Melin** and **Samuel Laurinkari** from eBay along with **Taina Tukiainen** from Aalto University, Finland, ask: *"How can online platforms contribute to smarter and more prosperous regions in Europe?"* The authors discuss the costs of distance as a key issue in commerce in Europe and abroad, and they argue that the decentralized nature of digital commerce helps to foster economic growth and entrepreneurial activity. They also describe new emerging economic hotspots and propose a shift from regional variation towards regional integration.

We hope that the diverse perspectives offered in these articles will help scholars and managers to better understand the multifaceted phenomena of smart cities and regions, and will encourage them to help develop and discuss the concepts further.

Taina Tukiainen, Seppo Leminen, and Mika Westerlund
Guest Editors

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Editorial: Smart Cities and Regions

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 EU 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 title of her latest book was *The Finnish Startups in Globally Evolving Ecosystems: Value for Finland* (2014).

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 doctoral degree in Industrial Engineering and Management in the School of Science 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 Business Industrial Marketing,* 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, ecosystems, living labs, collaborative innovation, open innovation, regional innovation, online platforms

Profiling Regional Innovation Ecosystems as Functional Collaborative Systems: The Case of Cambridge

Jukka Viitanen

> *"Make no little plans; they have no magic to stir men's blood… Make big plans; aim high in hope and work."*
>
> Daniel H. Burnham (1846–1912)
> Architect and urban planner

It has been widely recognized that the national and regional development of innovation ecosystems has been a relatively successful model for regional revitalization, bringing together key actors to perform the relevant technology-driven development processes. The ecosystems have been organized and combine readily public sector interests with private sector business-oriented actions. However, all regions are not uniformly successful, which leaves open the question of how to guide the sub-optimum regional systems closer to the front-runner position. Why do some score better than the others? This article presents both theoretical and practical evidence of global best practice in developing regional innovation hubs and renders a fully integrated innovation hub framework that defines a novel, holistic approach to managing these ecosystems. The framework is tested and validated through a selected case study of Cambridge, United Kingdom, identifying the key ecosystem elements that are necessary for building up a solid foundation for the innovative regions.

Introduction

Changing realities in innovation ecosystems challenge the next generation of development processes for innovation environments at all levels. According to findings in the most recent innovation studies, discussion on closed national innovation systems is rather artificial, while new scientific knowledge and technological inventions are generated in almost purely global settings (Hautamäki, 2008; Ishikura, 2006; Kao, 2007; Saxenian, 2006). The expanding collaboration in value networks brings innovation production closer to the marketplace, the pure technology-push approach is increasingly being complemented with a market-pull type needs analysis for penetrating a growing number of market segments, and a practically free movement of talented people brings down artificial national borders and provides a foundation for a creative transfer of knowledge between the interconnected innovation ecosystems.

Regional innovation ecosystems are the core building blocks for innovation-creation activities from a national innovation policy point of view. They build on a local knowledge base and specialize in bringing out the best in their respective innovation processes. They focus on accumulating academic knowledge and combining it with private sector, market-driven commercialization processes. In most cases, these regional ecosystems are organized around a core-hub organization such as a science or technology park, or alternatively a regional cluster management office, where all the key coordination decisions are made. But, the innovation hub itself is necessarily a much wider concept than only a park or a coordination office. It consists of all the regional innovation ecosystem elements, starting from policies and ending with market-driven business activities.

Accordingly, the work at hand aims at interpreting the systemic interplay of the common characteristics of successful innovation environments and ecosystems in

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their respective contexts. The article presents both theoretical and practical evidence of global best practice in developing regional innovation hubs and renders a fully integrated innovation hub framework that defines a novel, holistic approach to managing these ecosystems, where all necessary ecosystem elements are being planned coherently under one unified regional master plan to seamlessly connect all framework elements.

The framework is further tested and validated through a selected case study of Cambridge, United Kingdom (UK), which describes Cambridge's internal, inter-domain relations and critical success factors in attracting, keeping, and developing the necessary resources, talent, and capacities for continuous innovation activities. Cambridge's ecosystem profile is analyzed for its capacity and readiness to meet the globalization challenge. It is generally argued that, if and when done properly, the related analyses can reveal a formula for replication and speed up the development of the next generation of environments – not necessarily directly copying and transferring the results "as is" to distant cultural contexts, but more likely imitating the proven functional behaviour for quality results.

One article cannot exhaustively address the complex phenomena at hand. Moreover, some parts of any case analysis are necessarily subjective in interpretation and essentially only represent the authors' own understanding of the core issues and their relational associations. However, it is boldly argued that the combination of the presented framework, case study, and ultimate results provide novel perspectives on the development of successful regional innovation ecosystems for the future. The article gives the reader a chance to familiarize themselves with key concepts related to ecosystem development and the particular characteristics of a global best-practice case site, and then it provides them an opportunity to reflect on the presented notions in relation to their own practices and any specific development and management challenge they are facing.

The Innovation Hub Framework

Pioneering development of regional innovation hubs has focused to a great extent on the mutually complementing challenges of fostering the local pools of know-how and orchestrating the actions of the complementing stakeholder groups. It is widely argued that the most attractive regional innovation ecosystems have been built on a strong knowledge base, accumulating a network of complementary innovation processes and advanced combinations of innovation resources (i.e., talent, funding, and infrastructures). The top ecosystems have managed to channel the accumulation of academic knowledge for joint innovation activities and combine the related outcomes with the market-driven commercialization processes.

The triple helix model and knowledge triangle (Etzkowitz, 1997; European Parliament, 2000; Leydesdorff, 2006) approaches have been used to explain these related dynamics and to justify the interlinked relations of the collaborative stakeholder groups. They address the challenges of combining the highly specialized talent pools to productive co-creation processes and utilizing the complementing processes for synergetic outcomes. However, in this article, it is argued that the traditional stakeholder group models and intra-regional analysis will not prepare the regional innovation ecosystems for truly global competition. The future top regional innovation ecosystems will be necessarily embedded in a more globalized, interconnected, and collaborative context, where information, resources, talent, and solutions can flow freely and effectively between mutually complementing or competing locations.

The future challenge for the development of the ecosystems lies in their ability to extend the value network collaboration closer to the marketplace and complement the pure technology-push approach with a market-pull type needs analysis for penetrating a growing number of market segments. A practically free movement of talented people brings down artificial national borders and provides an opening for a creative transfer of knowledge between the interconnected innovation ecosystems. Accordingly, we have to modernize our thinking on future development of regional innovation ecosystems and adopt a more systemic, ecosystem-level approach, which incorporates the triple helix model into a practical ecosystem-orchestration approach.

The following innovation hub framework (Launonen-Viitanen, 2011) introduces a comprehensive approach to regional innovation ecosystem development, advocating coordinated planning and implementation of the key ecosystem elements and close interplay among the key innovation actors. The framework guides regional planners, political decision makers, and core-hub organizations to address ecosystem development from a unified cross-sectoral point of view – as a complete regional master planning challenge to connect both public and private sector interests for joint innovation

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actions. If managed properly, these collaborative actions can lead to mutually reinforcing arrangements for parallel innovation processes, and they can facilitate the efficient distribution of best-practice know-how throughout the ecosystem.

The framework illustrates the key regional innovation ecosystem elements that are necessary for building up a successful regional innovation hub (Figure 1). Each element (layer or driver) represents a significant development task of its own, but only in combination can they produce an ecosystem that can truly rise to the globalization challenge and take its place in the value network context. Accordingly, the core management organizations should be able to plan, organize, manage, and further develop the regional ecosystem as a complete set of interconnected elements where interplay and complementarities between the layers give the ecosystem its soul and strength.

Activities driven by the public sector

The hub framework builds on the national and regional innovation policy foundation, combining actions driven by public policy with private sector interests. The development challenges at the lower part of the pyramid (physical infrastructure and service structure, education policies and curriculum, research and development activities) are addressed primarily from interests driven by public policy, while these elements also have wider societal implications for developing regions and in most cases constitute basic service for the majority of citizens. The infrastructure element addresses issues such as shared R&D infrastructure (schools, health care centres, shopping malls, etc.), solutions for logistics (road and train networks, airports, etc.), possible park/hub construction, and wider community development projects. The service structure element, in turn, is highly dependent on the actual needs of the ecosystem (not so much on deliberate service provision planning).

The education element should be addressed in a much wider context than the needs of the immediate innovation activity process would otherwise imply, while ecosystem advantages could include quality provision of primary to secondary school (i.e., K–12) education, international multi-lingual high schools, open universities with international degrees, schools for lifelong learning and continuous re-education, and so on. It could also be complementing the R&D activity element providing high-quality graduate schools for master's

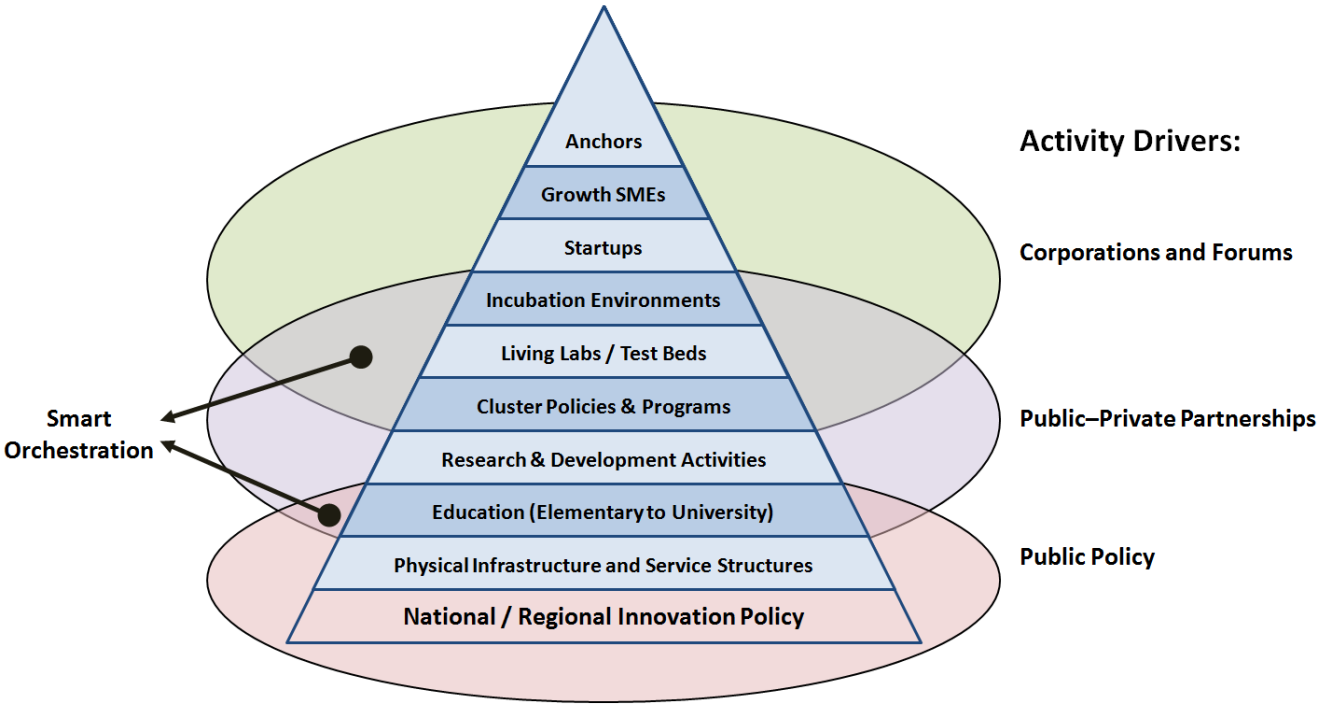

Figure 1. The innovation hub framework and its key regional innovation ecosystem elements

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and doctoral students, international summer schools for "brain circulation", and executive training programs to refresh management talent.

The R&D activity element takes account of regional strengths in the research environment and focuses primarily on university-level research. Here, the addressed issues include the quality and breadth of the faculties, unique qualities in research endeavours, output for extended innovation processes, opportunities for multi-disciplinary studies, willingness and ability to participate in contract research projects, technology transfer know-how, and success rates in attracting the centres of excellence to the research units in the region. The university-level research is naturally complemented with close-by national research institutes, which can bring know-how to the innovation hub that is specific to the research sector and attract the private sector to joint development projects.

Activities driven by the private sector

The innovation processes and collaborative activities towards the top of the pyramid are primarily corporate-driven and forum-driven, where the innovation activities take place much closer to the market and the requirements for speed in creating solutions for the real customers are much higher. The first notion in this context is that every regional innovation hub needs dynamic anchor companies close to the core for their abilities in taking part in global value network competition and for their result-oriented, comprehensive approach in business process development. The anchor companies are usually the key partners in innovation commercialization and have in-house expertise to implement an active intellectual property utilization strategy. However, the "any big company will do" approach is not adequate for identifying the anchor companies, while the business realities and power structure within the companies need to be compared with their innovation-creation abilities. The true anchor companies should have adequate decision-making powers, access to global networks, and concrete innovation creation activities as a relevant starting point for their regional engagement.

The second major group of private actors comprises the high-growth small and medium-sized enterprises (SMEs) and startups. They bring dynamism to the innovation ecosystem with their new ideas and business-creation drive, which utilize emerging regional knowledge in developing new products and services for the marketplace. The SMEs and venture companies are also major employers within the regions, providing anything from one-third to almost 70% of all new jobs created, and the high-growth companies perform even better than the average in this respect (e.g., Acs, 2004; Autio, 2005). These SMEs and startups are active users of knowledge-intensive business services (KIBS), outsourcing all non-essential processes (e.g., financing, accounting, legal) to the professional firms and utilizing service providers for contract management, commercialization projects, and channeling necessary funds for growth (e.g., via business angels and venture capitalists). Usually, they also seek partnerships and collaborate actively for subcontracting to boost their reach to markets. Their key role is, ultimately, to provide specialized solutions for the anchor companies and contribute to the value network collaboration (while naturally growing their individual businesses).

Activities in public–private partnerships

The middle part of the pyramid is a field of shared public–private interest, where innovation activities to support the creation of intellectual property and cross-sectoral collaboration are often planned together. First, the regional cluster programs are aimed at increasing regional innovation and economic activities, encouraging various stakeholder groups to engage in collaborative projects. The programs are used in creating shared vision and values for the region and bringing together cross-sectoral talents at mutually open round tables, which provide risk-free platforms for the exchange of ideas.

The second public–private element introduces living labs and test beds as integrated, collaborative piloting platforms where innovation actors can implement interoperability testing and real-life user experimentation within trusted micro-environments. Typical examples of these platforms include interconnected parts of user-driven cities, real-life experimentation sites on streets, open system platforms for developing mobile applications (with users), and Internet-based, end-user beta-testing environments to engage users in an early-stage R&D process.

The final innovation ecosystem element is in the incubation environments, which provide essential, professional growth services for startups and growing SMEs. It should be noted that, unfortunately, some incubation environments have been developed almost purely from a real estate business point of view, where local contractors create a mere physical frame for the incubated companies and market the centres to potential clients

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with some public-sector backed subvention for rents and basic office service support (phone/mobile/internet connections, secretary services, etc.). In this context, these settings are not considered as incubation centres, but merely as random "office hotels". The real incubation environments are physical locations where a selected group of young companies receive professional support for their management concerns.

The smart orchestration challenge

The challenge in comprehensive innovation ecosystem planning and management is in combining the parallel interests of the various innovation processes, whether driven by a company or forum, the public sector, or a public–private partnership. As noted, every framework layer is important and the missing parts would be very difficult to be substituted with compensating activities in other layers. Moreover, national and regional innovation policy frameworks put some regulatory limitations on the alternative available paths to be adopted. The related critical management issue can be found in collectively managing the various sectoral interests and interfaces.

It is argued, in this context, that the planning and management of regional innovation ecosystems require special talent and particular abilities to interpret and match the multi-domain interests under one unified management structure. Someone must specialize in aligning the collaborative processes, network relationships, and gradually developing common practices for effective innovation creation, accumulating the required experience, know-how, and connections into one core entity for efficient ecosystem-level coordination. Consequently, orchestrated ecosystem development calls for the establishment of a dedicated hub organization that can take the responsibility for defining a shared vision for the future of the ecosystem, a clear set of objectives for the continuous maintenance of network relationships, and guidelines for effective project coordination and resource allocations throughout the ecosystem. This innovation hub organization can focus its efforts on the ecosystem-level target setting, relationship management, and resource allocations.

In practice, these hub organizations can take over the coordination task of hub planning and management functions, and concentrate their efforts on building up the necessary partnerships for systemic, reciprocal success. They can serve as the ecosystem management offices supporting the innovation actors in their joint activities: i) draft the master plan for the entire ecosystem, ii) build up and complement local networks for quality service provision, and iii) provide hands-on support for intra-ecosystem networking, information exchange, and cross-domain communication. They can orchestrate the joint initiatives and development programs, channel resources to the region and to local innovation actors, and build a positive brand image for the region. In this way, the innovation hub organizations serve others as true "needs-seeds" mediators, value-system matchmakers, and regional networkers.

Turning the Framework into an Analytical Tool

Emerging needs to understand the systemic nature of regional innovation ecosystems

It is generally argued that studying and analyzing the competing innovation ecosystems can reveal some common characteristics and universal nominators to explain their success or demise. Scholars and practitioners alike believe that benchmarking and analytical reconstruction of local success models can help them to identify the critical success factors for developing effective, functional, and attractive environments for shared innovation creation. It is possible to study the key building blocks and core management processes of the chosen best-practice environments and then interpret their qualities in given local contexts. If and when done properly, the analysis could reveal a formula for replication and speed up the development of the next-generation environments – not necessarily directly copying and transferring the results "as is" to distant cultural contexts, but more like imitating the proven functional behaviour as a common baseline action for quality results. Consequently, the studies go on and quality evaluations are always in high demand.

The investigated phenomena – development processes of regional innovation ecosystems, analyses of the key ecosystem elements, and related management challenges – are all widely researched. Studies on each framework element alone or their direct implications for derived regional ecosystem management could already constitute a complete study of their own (and many highly regarded scholars have chosen to address these questions appropriately). In the same way, a truly comprehensive study of only one regional ecosystem could already serve any scholar in their quest for understanding these complex phenomena (and plenty of published studies of individual ecosystems can be found based on descriptive case study analyses). However, it

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is argued that there is a rising, explicit need to understand regional innovation ecosystems as complete interconnected systems that could and should be managed for "optimized" socio-economic outcomes in a "glocal" context. These generic notions for mutual complementarities, systemic interconnections, and cross-domain management challenges, call for comprehensive ecosystem-level analyses and further development of related models, frameworks, and practical analytical tools.

In innovation ecosystem research, the *research problem* should focus on studying the key elements and success factors for effective design and management of regional innovation ecosystems: to identify the local strengths in a global context and to discover systemic, ecosystem-level processes for developing optimized, regional innovation ecosystems. Accordingly, we should deeply investigate global best-practices of regional ecosystem development and extensively analyze the leading innovation regions and their value network connections. On one hand, empirical data and related analyses of global best-practice environments could provide valuable insights into core issues at hand and bring alive the presented innovation hub framework and its local interpretations. On the other hand, the accumulating insight would make it possible to test, interpret, and complement (if necessary) the frameworks already used, and develop them further for generic global use.

Case study outline and operationalization of the framework

The regional innovation ecosystem case studies should be conducted in compliance with qualitative research approaches and multiple case study methods to actually address and grasp the complex nature of the investigated phenomenon. The case design and conduct should be decided as follows. The investigators should visit all the sites for the actual case study data collection, interview the local key actors, and observe the present state of the developed ecosystems (infrastructure, service structures, availability of cross-sectoral facilitation, etc.). The empirical data collection must be conducted using multiple sources of evidence (e.g., written reports, archival records, previous studies, public information) to find converging evidence to cross-check the findings. The interviews are recommended to be conducted using a semi-structured interviewing technique where the interviewers are following a predetermined set of questions, but allowing the interviewees to respond in a relaxed, conversational manner, jumping around freely from topic to topic in their expression of ideas. The applied technique allows collection of large amounts of data quickly and efficiently, enabling exploration of many topics in a relatively short time. The immediate follow-up questions make it possible clarify and interpret the key concepts.

The developed innovation hub framework (with its firm theoretical foundations and advanced extensions) is an appropriate tool to analyze regional innovation ecosystems. The framework thoroughly describes the core elements (layers) needed for systemic ecosystem development and defines their key characteristics in advancing the globalization of ecosystems. It guides and frames the related discussions of regional innovation policies, collaborative actions for joint creation of intellectual property, and coordination of the local management processes. Consequently, the framework seems to meet the criteria for extensive use in exploratory case studies.

However, it is evident that the framework needs to be operationalized further for analytical purposes. In this study, it has been operationalized as follows. First, it was decided that each layer must be explicitly addressed in the analysis to maintain the uniformity of cases regardless of the rating, level, or qualities in given contexts (sites) of individual layers. This approach leads to a candid ecosystem-level analysis and treats each case equally on an aggregate level. Second, it was relevant to determine in advance the key criteria for layer-by-layer analysis to guide the basic case design, the selection of appropriate methods for data collection, and the ultimate way to use the chosen framework in the analysis. It was important to keep the focus on the chosen research questions at all times and maintain an unchanged case setting and approach for the case study site.

The layer-by-layer criteria for analysis were determined by sets of key questions for each layer (Table 1). The questions were chosen to best characterize the developmental state and potential of each layer in terms of relative preparedness for "glocal" value system contributions, openness for cross-sectoral collaborative activities and actions, and resident abilities to engage and succeed in global, inter-ecosystem competition. Consequently, it was never enough to just claim and state that some elements exist in the local ecosystem, but to broaden the analysis to include evaluations of the scale, scope, and breadth of use of each element.

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Table 1. Key questions for the layer-by-layer analyses and evaluations

Element	Questions
Anchor Companies	• How many domestic/global anchors are located within the ecosystem? • How active are these anchors in cross-sectoral collaboration? • Have they had an interest in managing the "glocal" activities? • Do they engage actively in open innovation processes?
Startups & Growth-Oriented SMEs	• How many startups and ventures are born within the ecosystem? • How growth-oriented have the local SMEs been (going public)? • How internationalized (global) is the venture habitat? • Do the ventures and SMEs participate in "glocal" joint activities?'
Incubation Environments	• What kind of incubation services are available to tenants? • How well does the incubation system facilitate SME growth? • How open is the incubation system for global activities? • Do the incubators participate in "glocal" joint actions?
Living Labs & Test Beds	• What kinds of test environments exist within the ecosystem? • Are testing facilities and systems open to all actors? • How well are the test environments connected to the outside? • Do the test environments involve end users in joint activities?
Cluster Policies & Programs	• How many cross-sectoral cluster programs are established? • Have these programs been able to induce true collaboration? • How well do they run after the initial public support runs out? • Are these programs connected to the outside (globally)?
R&D Activities	• How many top-quality actors are located within the ecosystem? • How active are these actors in cross-sectoral collaboration? • How successful has the R&D system been in a global context? • How open are the R&D systems for global collaboration?
Education (Elementary to University)	• How well has the education system developed (at all levels)? • How well does the education system support continuous development of human resource skills? • Are there any truly international actors located within the ecosystem? • How well does the education system meet global criteria?
Infrastructure/Service Structures	• How well does the local infrastructure/service structure meet global criteria? • Are the local structures truly connected to national infrastructure? • Is the local infrastructure truly connected to the world (logistics)? • Are all the services readily available in English for foreigners?
Innovation Policy Framework	• How well have the local actors managed to link in and benefit from the national policy framework, programs, and structures? • How successful have these actors been in attracting funding? • How well do the framework conditions/incentive structures meet needs?

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In other words, the related analysis had to comprise evaluations on the actual relevance, functionalities, and impact of organized activities within the given layer. The individual outcomes were recorded and then compared against an ideal, fully-developed, best-practice layer – case-by-case, layer-by-layer, – and given a numerical value (percentage 0–100) that indicated their levels of maturity in global ecosystem comparisons (the higher a numerical value, the more advanced an individual layer would appear to be). The use of numerical values was chosen to give each layer a concrete measure to illustrate its present state and potential, and to make it easier to summarize the findings in a powerful and concrete way.

The individual layer analyses were, finally, matched against the whole innovation hub framework to draw a comprehensive ecosystem profile (case-by-case), which would *approximate the overall ecosystem maturity and highlight the key gaps in the present state of the ecosystem in question.* The profile summarizes the systemic analysis and provides a graphical representation of the case study outcome in question. In some cases, these profiles can even reveal the underlying characteristics of local development strategies and guide the next generation of ecosystem planners in their efforts to identify the right path to the future. It is argued, therefore, that the ecosystem profiles can be used effectively in comparing the best-practice environments and identifying the local development needs for systemic actions.

Each case study was summarized in the end using a combination of three parallel continuums, which collectively *quantify each ecosystem's capacity and readiness for meeting the globalization challenge* (Figure 2). It is argued that the future success of a regional ecosystem is strongly related to its ability to link local strengths to emerging global opportunities, and to its readiness to engage in truly global value network collaboration with other first-class environments. The best ecosystems could serve as interconnected innovation-creation and market-entry hubs, providing a platform for market-specific product and service localizations as well as a route to local markets. Accordingly, it was of utmost importance to estimate and assess the capabilities in related terms.

The first continuum assesses the level of reach and impact of the individual ecosystems in their respective countries and regions. It is argued that all ecosystems could be considered relevant within their local context, but only some can advance to meet the national or global benchmarks and criteria. However, all ecosystems could benefit from shifts to higher grades and, consequently, should aim for the furthest possible reach.

The second continuum appraises the advancement of the ecosystems as global hubs. Some of them are still on the starting line and have only begun to address the globalization challenge while others have thoroughly advanced mechanisms and processes in place for full-scale global engagements. It is argued that the future "winners" must shift to the right and actively seek a position as a global hub.

The third continuum assesses the overall maturity of the ecosystems' hub-management processes and structures. Some ecosystems have been developed following a systematic master plan (drafted by regional or national authorities) with good results while others have taken an almost pure, organic route to excellence. Regardless, it has become evident (through analyses) that all ecosystem-development processes have enjoyed some degree of coordination, which has resulted in broader cross-sectoral engagements, in-depth value-network development processes, and advanced innovation-creation practice. Consequently, hub management pro-

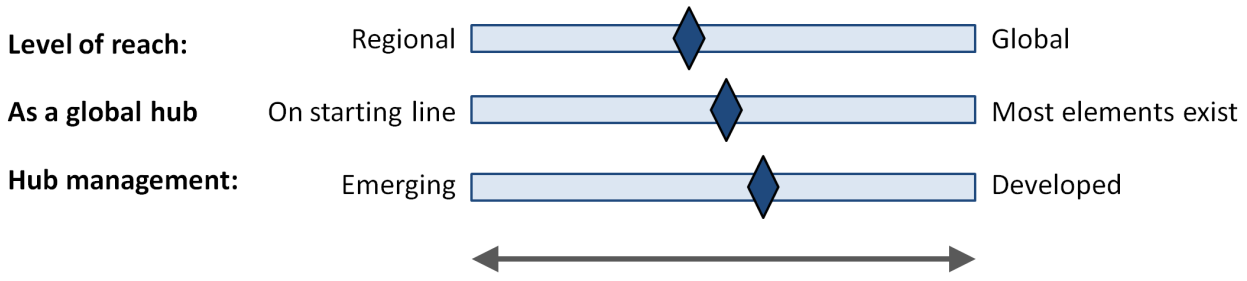

Figure 2. An example of a continuum combination

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cesses are the core elements in building up the innovation capacity of the individual ecosystems and their ability to engage in global value-network competition. Again, shifts to the right of the continuum improve the overall position of the ecosystems.

Approach to data collection
The case design and conduct followed the recommendations described above. The author visited the selected site for the actual data collection, interviewed the local key actors, and observed the present state of the developed ecosystems.

The case data was collected between April 2009 and August 2010. The collected data was archived in a research database and rearranged to meet the theoretical framework and presentations, facilitating the further analyses and possible cross-site comparisons. The unit of analysis was determined at the regional innovation ecosystem level with embedded collection and analysis of data from both sub-unit (framework layer) and aggregate (systemic ecosystem level) levels. The results of the study are presented as follows.

Case Study: Cambridge

The Greater Cambridge area (referred to in this context as the Cambridge Sub-Region) is located in close proximity to London, the UK's capital and largest city, thereby benefiting to a great extent from its advanced service structures and readily available resource pools. Cambridge is world-renowned for its academic traditions, the scientific pre-eminence of the University of Cambridge, and the high standard of living as a beautiful countryside community. The City and the University are located right in the heart of the sub-regional ecosystem, interconnecting a number of local communities, innovation platforms, and research institutions into a mutually reinforcing structure of regional development (Granger, 2009). It is argued that the Cambridge Sub-Region enjoys a true critical mass of businesses and academic institutions involved in high-tech R&D and technology commercialization, creating a rich ecosystem for targeted innovation creation, timely technology transfers, and a dynamic "engine of economic growth" in the broader regional and national contexts.

The Cambridge Sub-Region has turned in impressive innovation-related performance across a broad range of sectors over the last four decades. It has been recognized as a key contributor to the UK economy, which can be seen directly in national GDP figures and indirectly through a range of productivity gains throughout the economy – including the ability to attract world-class R&D facilities to the sub-region, transferring ideas and knowledge to other parts of the economy, and advancing the growth of many highly entrepreneurial companies (GCP, 2008). The sub-region has enjoyed steady growth in employment in knowledge-based professions and its skilled workforce is seen as one of the biggest regional assets in terms of global competitiveness.

Cambridge and its surroundings are sometimes referred to as Silicon Fen (tinyurl.com/glh6bma), an allusion to Silicon Valley (tinyurl.com/roc7a), because of the density and qualities of technology incubators and high-tech businesses that have developed in and around the 11 science and technology parks circling the city. The business landscape has a diverse blend of university and corporate spin-offs, growth-oriented SMEs, and a strong presence of publicly listed companies, which are professionally supported by numerous technology consultancies and other business service providers. Consequently, the Cambridge Sub-Region has become a preferred destination and target for angel, venture capital, and foreign direct investments from all over the world, and it has become one of the top innovation regions in Europe in terms of total institutional investment per capita (Library House, 2008).

It should be noted in this context that the cited development over past decades and the regional collaborative structures that emerged are the ultimate outcomes of a rather random "bottom-up" development of gradually aggregating, innovative technologies and companies, embedded in a rich and diverse science base of world-class universities and a readily available, abundant human resource pool of top-quality talent and minds. It is argued that this so-called "Cambridge Phenomenon" emerged from a myriad of local factors and individual decisions (not as a result of a deliberate plan) over a longer period of time and almost as a gradually self-fulfilling prophecy, with no managed, intervening local processes. The local dynamism has grown from the collective and cumulative contributions of passionate individuals and forward-looking organizations alike, acting (perhaps) in their self-interest but understanding the strategic importance of shared vision, purpose, and coordinated actions. Their actions have resulted in advanced structures of region-wide networking, bringing together diverse interest groups to guard and reinforce the shared processes, enabling them to partner for

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timely transfers of information and technologies for effective commercialization and joint development of local communities. This strong culture for mutually reinforcing interaction has translated readily into local economic dynamism and regional innovation excellence.

Key figures and facilities

The Cambridge Sub-Region refers to an area within a 40-kilometer radius around the City of Cambridge with a resident population of 750,000 and a working population of 360,000 people. It hosts a total of 27,500 businesses employing over 43,000 high-tech professionals and generating an annual regional GDP of about £15.8 billion GBP ($26.6 billion CAD). According to recent estimates, the region has five times more R&D-related jobs than the national average and about 46% of the local workforce is educated to a university degree level (GCP, 2008; Granger, 2009).

The sub-region receives 17% of the national public R&D expenditure and 9% of total university research funding (EEDA, 2009). The local ecosystem hosts two major universities, the University of Cambridge – ranked 4th overall in the World University Rankings 2016–2017 (Times Higher Education, 2016) – and Anglia Ruskin University, which educate a combined student population of 49,000 in all fields of science. The University of Cambridge alone has 31 colleges, 3 graduate colleges, and 150 departments, faculties, and schools to provide the highest-quality university-level education and researcher training in the country. It also boasts 150,000 alumni graduates worldwide and extends its reach to all continents through its extensive network of collaborative institutions. Over 70% of all published research work and results from the University of Cambridge are rated as either world-leading or internationally excellent, positioning it second in overall UK university rankings (EEDA, 2009; University of Cambridge Web, 2010). Anglia Ruskin University complements the local university scene by offering mostly undergraduate-level education and degrees for both onsite and offsite student populations. Nine percent of its almost 40,000 students come from outside the European Union (CUG, 2016).

By 2008, there were, in total, 1,500 high-tech companies in the Cambridge Sub-Region (half of which engaged directly in R&D while the other half focused on supporting the first half through advanced service provision), most of which were located in or around one of the 11 regional science parks. The ecosystem hosts several R&D centres of globally-renowned industrial giants (e.g., Toshiba, Microsoft, Nokia, ECM, ARM, Qualcomm, Philips, Takeda, AstraZeneca, Pfizer), which participate actively in horizontal collaboration and seek regional partnerships with first-class research teams and emerging high-tech ventures. Local businesses in the sub-region spend more on R&D and make more innovation investments than actors in any other region in the UK (EEDA, 2009). The local industries, startups, and ventures have been able to attract over £200 million GBP ($340 million CAD) in venture funding to the ecosystem. Spin-outs from the University of Cambridge alone have received more venture capital investment than those of any other UK university, testifying to the high qualities of both research and innovativeness in commercializing potential ideas for actual use in the marketplace. With these numbers, the Cambridge Sub-Region accounts for 7.8% of all UK venture capital investments and ranks first in Europe in terms of investments per capita, contributing to the total of almost £800 million GBP ($1.3 billion CAD) of institutional capital currently committed into the cluster (Greater Cambridge, 2009; Library House, 2008).

Key players in the innovation ecosystem

The Cambridge Sub-Region features four groups of key players in its innovation ecosystem:

1. Public sector actors and park management

2. Universities and national research institutes

3. Private industry and incubators

4. Collaborative networks (official and social)

The key public sector actors, the Cambridgeshire County Council and five District Councils, have continued to support the local ecosystem development for decades. They have lobbied for national funding and program support for the sub-region, have actively promoted the local triple helix collaboration, and have engaged public actors (councils, agencies, and working groups) in joint innovation platform development. These local authorities have been keen supporters of various forms of public–private partnerships and, consequently, put special emphasis on developing specialized expert organizations to facilitate these processes. Accordingly, part of the public funding is channeled into "softer", coordinating infrastructure/service structure maintenance.

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The Greater Cambridge Partnership (GCP) was established to coordinate the regional public sector activities and related initiatives for public–private–third-sector partnerships. It plays an important role in direct program implementation, securing funding for key economic interventions and lobbying for government support to achieve regional visions and development objectives. Moreover, it orchestrates cross-domain collaboration, information exchange, and joint regional programs for all involved, and it liaises with other public agencies and expert organizations. Cambridgeshire Horizons, in turn, coordinates all the regional infrastructure and service structure development initiatives to maintain local functionality and dynamisms around innovation activities. It promotes design of the highest quality and channels information, funding, and project flows in and between the local districts and communities (Cambridgeshire Horizons, 2008).

As mentioned, the Cambridge innovation ecosystem hosts 11 science and technology parks. Each park has its own management structure and is run as an independent, for-profit organization that has to find its place in the broader ecosystem context against the severest economic competition. This setup ensures that each established structure contributes, in practice, to the common good, and strengthens the local ecosystem in a meaningful way.

As argued earlier, the private industry structure has matured gradually over time and today plays its fully functional role in the sub-regional economy. The ecosystem hosts several R&D centres of globally-renowned industrial giants and dominant market leaders in their respective industries. It has been noted in several contexts (EEDA, 2009; Library House, 2008) that these true anchor companies are exceptionally open and ready for horizontal collaboration in this particular, regional context, and that they engage actively in local networking, joint research and development and innovation (R&D&I) processes, and commercialization of emerging technologies and solutions. They take shared responsibility for developing the local infrastructures, programs, and interaction (for all to benefit), and they engage in open dialogue on public forums, commit their resources (time and money) in collaboration, and support the overall wellbeing of the entire sub-region as *their* key asset for future success.

These activities of anchor companies are conveniently complemented with a network of hundreds of high-tech startups, growth-oriented SMEs, and technology providers, which operate in closely interlinked, industry-based value systems within the ecosystem (usually in or around one of the local campuses or parks). Strategic partnerships with leading anchors serve the venture habitat in identifying the best commercialization and market opportunities at the right time, and in building up the necessary value networks for rapid business ramp-ups. The strong technology clusters have attracted both professional service providers and investors into the sub-region and, today, the Cambridge innovation ecosystem hosts a vibrant group of technology consultancies, venture capital companies, business angels, and knowledge-intensive business service (KIBS) providers. These actors contribute, for their part, to the development of a new generation of entrepreneurs, ecosystem-level learning processes and smooth transfer of knowledge throughout local value networks.

There are several incubation centres within the ecosystem, but St John's Innovation Centre is considered the leading provider of comprehensive incubation support services in the sub-region. It provides premises, offices, and technical and business development services to its clients in both early and growth stages. The Innovation Centre has developed and implements an internationally recognized model for incubation, collaborates with nine European incubation partners, and supports all the main regional programs (Business Link, Enterprise Hub, Cambridge Corporate Gateway, etc.) for entrepreneurial development (St John's Innovation Centre, 2010). It is commonly argued that the Innovation Centre provides a dynamic support structure to accelerate the growth of ambitious innovative firms in the Cambridge Sub-Region. Apart from this "pure" incubation, the Cambridge innovation ecosystem is known for its numerous support structures for entrepreneurial activities. The Judge Business School, Cambridge Enterprise, Cambridge–MIT Institute, and the Centre for Entrepreneurial Learning all support the active development of the local venture habitat.

The entire ecosystem is built up and around its core university, the University of Cambridge, which is home to over 18,000 full-time students (one-third enrolled in graduate programs) and more than 12,000 scholars and staff. Fifteen percent of the undergraduate students, almost fifty percent of the postgraduate students, and thirty percent of the scholars/staff originate from outside the UK. Therefore, even though the University is a publicly funded institution committed to the education of British students, it is also seen as an open platform

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for education and research excellence for people from around the world, who thirst for knowledge and show exceptional promise and a capacity for first-class, innovative thinking (University of Cambridge Web, 2010). In addition, the University of Cambridge and the mostly undergraduate Anglia Ruskin University, the Open University in the East of England opens up the UK education system to distance and adult education populations by providing undergraduate part-time education to over 17,000 students in the sub-region.

The Cambridge Sub-Region also hosts dozens of national research institutes as one of the key research platforms of the UK and most of them can be found within the University of Cambridge, next to the key faculties and research teams in different disciplines. For example, most of the (bio)medical institutions are located at the same site as the School of Clinical Medicine (such as Cancer Research UK, the Laboratory for Molecular Biology, Brain Research and Repair Centres, and the Institute for Public Health) at Addenbrooke's Biomedical campus and are supported by the Medical Research Council of the UK. These collaborative, co-location arrangements give all researchers direct access to the accumulated scientific knowledge and efficiently bring together the brightest minds to work on interrelated, multidisciplinary research themes and topics.

The local universities and research institutes are very keen supporters of academia–industry collaboration and entrepreneurial activities (Barrell, 2005). The university organizations participate actively in local (research) infrastructure development and help the private sector to utilize and commercialize the created intellectual properties in their everyday businesses. There are currently 16 different groups within the University of Cambridge alone, supporting entrepreneurial activities (venture creation, technology transfer, licensing, networking, etc.) and local innovation processes in specific areas of research. For example, the society for Cambridge University Entrepreneurs (CUE) organizes a range of co-learning events, including lecture series and pitching challenges. Between 1999 and 2009, it has received over 450 entries to its competitions and awarded grants of around half a million dollars USD to over 40 business ideas. These ideas have turned into real companies that have managed to raise a further £40 million GBP ($66 million CAD) in investments (Granger, 2009).

The scattering of the sub-regional innovation infrastructures around the City of Cambridge, in numerous campuses and park environments, makes it difficult (at times) to communicate effectively across domains. Therefore, the local ecosystem needs to be collectively engineered for horizontal collaboration – to bring together otherwise distant actors on joint platforms. Consequently, the local actors have become very active in networking and building up virtual communities to fight the risk of isolation.

The ecosystem hosts a wide variety of networking support organizations that provide solid foundations for intense interaction among the local actors. Local Chambers of Commerce together with Cambridge Enterprise & Technology Club, Cambridge High-tech Association of Small Enterprises, and the Cambridge Network, provide dynamic collaborative platforms for active interchanges and bring together expert and special interest groups to facilitate mutually beneficial exchanges of ideas, technologies, and solutions. The Cambridge Network has a membership of about 1,400 like-minded people from business and academia that link to each other and to the global high-tech community. These activities offer access to scale economies on the local training scene and improve the overall quality of training/coaching/mentoring within the peer networks. As a testament to event qualities, participating industries fund almost all the activities of the network.

One Nucleus, a not for profit membership organization representing life science companies was formed in 2010 as a merger of the Eastern Region Biotech Initiative (ERBI) and the London Biotechnology Network (LBN). The organization brings together actors within a given industrial context and promotes horizontal collaboration throughout the local value system. It organizes annual events and monthly meetings, which usually lead to concrete partnering exchanges, boosting local efficiencies and concrete business creation. Today, it has over 500 members and is recognized as Europe's most successful regional cluster group.

Analysis of the Co-existence of Ecosystem Elements in the Cambridge Sub-Region

The Cambridge Sub-Region can be characterized as a fully-functional innovation ecosystem for coordinated knowledge creation, efficient transfer of technology and orchestrated high-tech commercialization, as well as a dynamic "engine of economic growth" in the broader regional and national contexts. It is seen as a true "hotbed" of advanced startup and venture development activities, bringing together academia, established businesses, and industrial clusters to commercially exploit scientific knowledge in proprietary or open innovation creation processes. As such, it

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provides both an attractive setting and an advanced collaborative culture for strategic contract research and targeted innovation-creation activities across complementary domains.

The local actors are thoroughly interconnected through advanced partnerships and promote collective learning and networking within regional value systems. As a consequence, organizations and individuals are very keen and willing to help each other, which is reflected in the high level of engagement of the business community in collective innovation activities throughout the sub-region (Granger, 2009). The compact size and relatively small local population indirectly support the emergence of truly tangible horizontal mechanisms and effectively interconnect the core actors for shared program/project development.

However, the sub-region has started to hit its limits of indigenous growth due to gradually degrading regional conditions (e.g., high housing prices, infrastructure deficits, skills shortages, slowing growth of ventures and startups, stretched essential services) and, consequently, the long-term health of the local ecosystem may be at risk (Greater Cambridge, 2009).

Some argue that, although the sub-region and its innovative clusters are significant in regional and national contexts in certain measures, the ecosystem, as a whole, remains relatively small when compared with other leading global clusters. The sub-regional ecosystem lacks the necessary critical mass as a single entity to fully compete on a global scale (Granger, 2009; Library House, 2007). Consequently, it may be time for both regional and national decision makers to join forces to develop a common vision for the Cambridge's future and secure the necessary resources to build on the set foundations of shared core strategies, dense agglomeration of quality actors, open collaborative culture, and world-class research excellence.

Overall, the innovation ecosystem profile of the Cambridge Sub-Region is better balanced than many of its global peer innovation hubs, as shown in Figure 3, where a numerical value (percentage 0–100) indicates each layer's level of maturity in global ecosystem comparisons (i.e., the higher a numerical value, the more advanced an individual layer would appear to be). The regional and national governments are well aware of the importance of the ecosystem in terms of both innovation creation and economic impact. Consequently, the local councils have granted generous support to the local actors and developers. They have lobbied for national funding and program support for the sub-region, have actively promoted the local triple helix collaboration, and have engaged public actors (councils, agencies, and working groups) in joint innovation platform development. The regional strategies have been drafted in an open dialogue between key actors and resulted in a shared vision for the future. Accordingly, the policy makers are committed to joint actions and readily assign the necessary resources (time, human resources, and funding) for supporting cross-domain innovation activities.

The local infrastructure for innovation-related activities is extremely well-developed, with one actor a world-renowned top-tier university, dozens of national research institutes, and a more than an adequate number of facilitative horizontal structures in place. Moreover, the ecosystem hosts a total of 11 science and technology parks, numerous incubation environments, and dozens of private R&D units and facilities, which readily combine their innovation resources and dedicated infrastructures for open, collaborative processes. The basic infrastructure in the Cambridge Sub-Region is in good order, providing fully-developed structures for all to share and connecting the ecosystem to the Greater South East "supercluster" involving London and Oxford. The regional service structures are equally well-developed, providing a full set of basic KIBS, incubation, and globalization services complemented with advanced investment schemes for meeting the diverse funding needs.

However, as noted, the Cambridge Sub-Region faces serious challenges in its future infrastructure development. As the region has been developing over hundreds of years in the middle of an idyllic countryside setting, the existing road and train networks are rather underdeveloped to meet the rapidly increasing population and their commuting needs. The local roads are often congested and intra-ecosystem commuting is both time-consuming and frustrating, limiting the possibilities for continuous dynamic interchanges. Moreover, affordable housing has become a scarce resource with a booming real estate market, and the existing dwellings rarely meet the most modern requirements for symbiotic functionality and comfort. It is evident that the local infrastructure development has not kept pace with changing ecosystem realities and may also begin to limit the overall innovation potential. Under these circumstances, dispersed innovation infrastructures cannot be in optimal use until the ease of movement and effective interconnections between the complementing clusters of innovation are restored.

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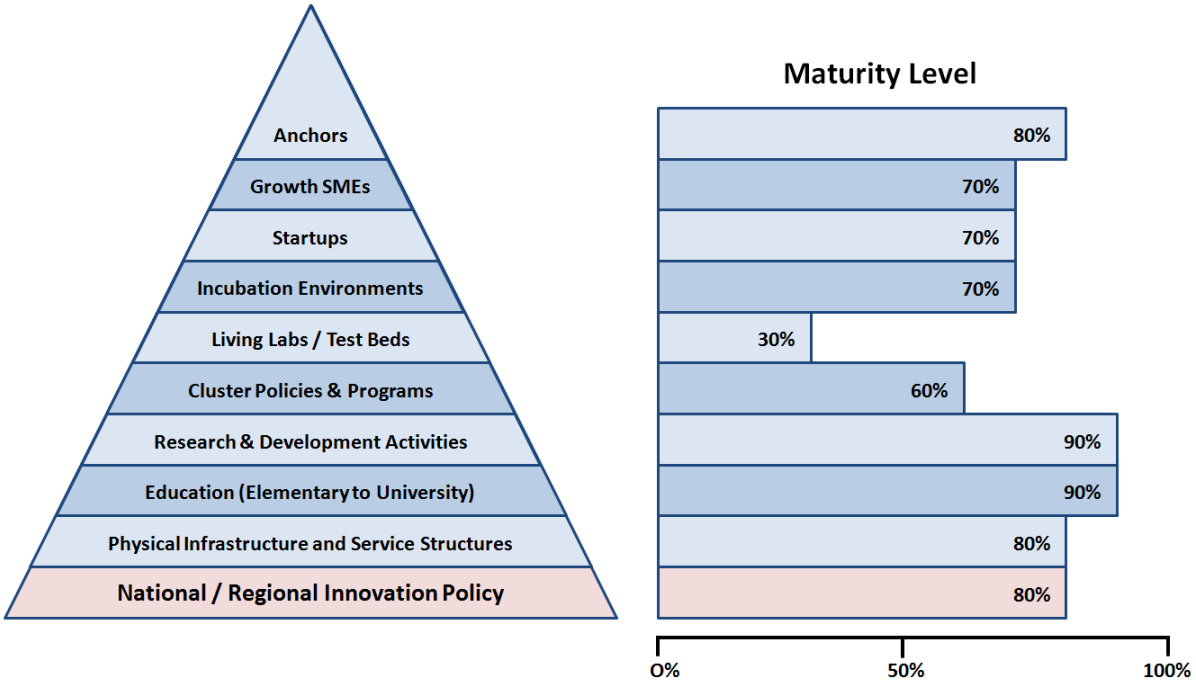

Figure 3. The ecosystem profile of the Cambridge Sub-Region and the maturity levels (%) for each of its layers

The regional education system meets well the national and global standards for the highest-quality primary to secondary (i.e., K–12), undergraduate, and graduate curricula, offering pupils, students, and researchers alike an attractive choice of location. The University of Cambridge has participated actively in developing local education environments and supported all educators in their efforts to meet the truly global demand. Consequently, both public and private schools in the area enjoy a good reputation and continuously develop their curricula for domestic and international students. Moreover, a significant number and range of vocational training institutions, language schools, and further-education centres provide advanced skills-development courses for various student segments. They complement the educational structures at the university level and maintain, on their behalf, the skill profiles and innovation capacity of resident asset pools. In addition, they collaborate with local intermediary organizations (societies, associations, and agencies) on a human resources re-training scene and promote continuous life-long learning among regional stakeholder groups (GCP, 2008).

The Cambridge Sub-Region is world-renowned for its academic traditions, the scientific pre-eminence of the University of Cambridge and first-class research infrastructures. According to recent studies, the sub-region ranks as a high performer among UK regions in overall research quality, public R&D investments, and business involvement in all innovation activities, and performs on a truly global level in various fields of science and research in terms of originality, significance, and rigour (EEDA, 2009). The University of Cambridge is a major recipient of governmental R&D support for maintaining and upgrading continuously its research infrastructures and educational facilities, offering the sub-region the necessary foundation (and resources) for continuous science and technology and R&D collaboration. Its diverse science base and multidisciplinary research capabilities have fostered the ability and capacity to diffuse knowledge and experience through the regional value systems.

R&D activities are also performed at Anglia Ruskin University, resident science parks, and dozens of public and private research institutes. In combination, they offer open, fully-functional platforms and research environments for gradually converging high-tech clusters of information technologies, biotechnologies, and nanotechnologies. They also breed an emergence of practical, application-oriented research culture bringing into focus the cross-domain settings for collaboration and connecting academic problem-solving excellence to practical industry-specific applications.

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The first-class R&D infrastructure and platform are the necessary building blocks for initiating local innovation processes and attracting global talent to the ecosystem to strengthen the local knowledge and asset pools. In the Cambridge Sub-Region, the regional research and development and innovation (R&D&I) collaboration has decades-long traditions and has been translated into functional, knowledge-based cluster development processes, improving collective capacities to innovate on a grand scale. Consequently, the local private sector actors in Cambridge are ranked, today, as the leading high-performers in the UK in new product/process introductions, and lead their peers in overall high-tech patenting performance (EEDA, 2009).

The innovation culture at the Cambridge Sub-Region embraces regional cluster development. Local collaboration is built around a regional Enterprise Hub Strategy, which aims at developing the mechanisms to boost industry-specific networking and collaboration. The specific actions include shared, long-term vision work and program planning for entire high-tech clusters and industry groups, and attraction of both public and private funding support to boost cross-domain innovation activities. The emerged partnerships have matured over time and brought together the key decision makers to draft broader socio-economic strategies for the extended sub-region, to support local community development, and to coordinate the more generic sub-regional plans for continuous growth (in numbers of homes, jobs, and available amenities).

However, the resident science parks within the ecosystem are not very keen, or active, participants in developing the local cluster structures. Given that they operate under strict financial control as for-profit organizations, they execute an almost pure real estate business model, limiting open possibilities for complementary service development, which would be essential for creating high-potential new businesses and local programs for joint cluster actions. This is not to say that nothing is done to facilitate collaboration, but most park-driven initiatives are implemented with nominal budgets and few dedicated personnel. Consequently, the industry-level platforms and value networks within parks remain quite weak in comparison to the regional potential. The local science and technology parks have a rather modest role as "real" innovation hubs and do not realize their fullest role and responsibility as true cluster actors.

There is no evidence available to indicate that the Cambridge innovation ecosystem would be very advanced in providing access to pilot, testing, or co-creation platforms. The majority of testing and measuring facilities are located within universities and national research institutes, which are equipped and set up primarily for scientific research purposes. Their use produces the highest-quality research results, but their context of use remains relatively closed, especially to SMEs and converging, industry-level technology platforms. In the same way, there are no established living labs within the sub-region and, consequently, no culture for user-centric innovation creation or rapid testing of product/service combinations for emerging markets.

As mentioned earlier, the sub-regional incubation, growth, and globalization services are provided primarily within the university infrastructures, which offer patient and generous support for innovative, entrepreneurial thinking. The St John's Innovation Centre is considered to be the leading provider of comprehensive incubation services in both early and growth stage business development. It implements a full-service model for incubation, collaborates with European incubation partners, and participates in all main regional programs for entrepreneurial training (St John's Innovation Centre, 2010). In this sense, it provides the necessary support structure for the accelerated growth of ambitious, "born global" SMEs and builds up the local venture culture to meet and match the toughest criteria for successful business endeavours. By 2007, St John's had already incubated over 300 high-tech ventures (and helped hundreds of off-site SMEs) and had become a critically important node in many industry–academia networks that characterize the Cambridge Sub-Region.

Now, the regional government and district councils have decided to increase basic investments in sub-regional incubation (and enterprise hub) infrastructures for all leading industry sectors. The latest additions are, for example, Babraham Institute's bioincubator, Allia Future Business Centre, and Ideaspace for pre-start and early-stage ventures (GCP, 2008; Cambridge Network, 2016). These industry-specific incubators operate with principles similar to those of St. John's (albeit on a more modest scale) supporting, on their part, the continuous flows of orchestrated high-tech commercialization in the region. In same context, it has been agreed that all established and new centres and hubs would receive the full support of dedicated intermediary service providers (Judge Business School, Cambridge Enterprise, the Cambridge–MIT Institute, and the Centre for Entrepreneurial Learning, etc.) for their efforts in developing the local venture habitat, business communities, and region-wide value networks.

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The Cambridge Sub-Region is world-renowned for its ability to create and support innovative high-tech startups and growth ventures. The local business landscape comprises an excellent blend of university and corporate spin-offs, SME ventures, and an impressive presence of young, publicly listed companies (professionally supported by numerous technology consultancies, proactive angel investors, and dedicated venture funders). These actors operate in closely interlinked, industry-based value systems and build on mutually beneficial, strategic partnerships, readily transferring information, resources, and technologies for effective (joint) commercialization.

Recent studies (Garnsey & Heffernan, 2005) estimate that the University of Cambridge alone has created over 300 spin-off and startup companies over the last three decades. Based on financial data collected on 172 of them, they have generated a combined market capitalization of over £5 billion GBP ($8.6 billion CAD) and employ more than 8,800 people, indicating a significant amount of socio-economic value at both regional and national levels. Concurrently, it is argued that an open attitude towards mutually beneficial technology transfer from academia to industry has had a profound indirect impact on almost all regional business creation. Researchers and scholars have readily placed their global reputation and functional networks at the disposal of smart businesspeople, and boosted venture development to an unprecedented extent. Furthermore, given that as university-based ventures represent only a modest proportion (about 20%) of the total venture habitat in the sub-region, it could be argued that the total socio-economic impact of all Cambridge-born SMEs represents a significant proportion of regional wealth and employment.

The ecosystem is particularly good at supporting venture creation and early-stage growth. The resident incubators and innovation centres are usually full of tenants and their clients typically grow fast for the first couple of years while enjoying local support from quality mentors and early-stage financiers. According to recent statistical evidence (Garnsey & Heffernan, 2005; Library House, 2008), it is clear that the Cambridge-born ventures are very successful in attracting institutional funding for their early-stage business development. However, the ecosystem-level analysis shows that the strongest SMEs have been equally able to channel significant amounts of equity investments to later-stage growth, and their relative attractiveness in the mergers and acquisitions (M&A) and initial public offering (IPO) markets of the UK has remained strong the last decades. Overall, the number of publicly quoted companies from the Cambridge industry clusters has increased from one in 1990 to 70 in 2006 (Library House, 2007).

However, the Cambridge innovation ecosystem seems to face continuous challenges in attracting adequate numbers of entrepreneurs and businesses who can tell a compelling story to investors, customers, and the market. Despite the increased professionalism that generations of successful serial entrepreneurs have brought to the cluster, the local venture habitat does not seem to develop parallel to external business environment changes, and it lacks the capacity to transfer the resident innovation processes to meet and match emerging market needs – especially in the service, media, web/Internet, and creative industry sectors (Library House, 2007). The ecosystem is apparently not very good at keeping the venture growth within the sub-region, and often loses its "brightest stars" early-on in their accelerated growth stage. It is notable that, as SMEs grow to a respectable size, they usually domicile abroad and merge with larger entities. In this way, the local venture development and support processes create visible results and wealth, but remain somewhat detached and sidelined from the overall ecosystem development.

As described earlier, the top end of the framework triangle is well-developed and hosts several R&D centres of globally-renowned industrial giants. In addition to their roles as anchor companies that are actively engaged in local networking, joint R&D&I processes, and commercialization of emerging technologies and solutions, it is common for them to seek reciprocal partnerships with first-class research teams, and contract advanced research projects to the resident universities and research institutes. The resident anchor companies are also active partners in the local venture habitat. They often take a leading role in organizing industry-wide networks and partnerships for joint innovation creation, channeling a continuous flow of ideas, resources, and technologies to be commercialized in emerging markets. In some cases, they offer ventures an access to their proprietary, global networks, industry-wide distributions systems, and alternative sales channels, accelerating business growth and strengthening the regional value system. At the same time, they are often willing to send their experts and management teams to local networking events, and they encourage their employees to engage in special interest groups and reciprocal learning collaboration activities. In this

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way, the Cambridge Sub-Regional anchor companies act as business mentors, ecosystem developers, and trusted partners for regional collaboration.

In summary, the Cambridge Sub-Region innovation ecosystem can be characterized as a fully-functional innovation creation platform combining rich regional knowledge assets and collaborative processes in a dynamic public–private partnership context. The sub-region enjoys a true critical mass of first-class businesses and research institutions involved in high-tech R&D and technology commercialization, generating a dynamic "engine of economic growth" in the broader regional and national contexts. It has turned in an impressive innovation-related performance across a broad range of sectors and is recognized as a key contributor to the UK economy. Consequently, the ecosystem can be seen as regionally important and both nationally and globally relevant with full potential to continue as one of the leading locations for global innovation-creation activities (Figure 4).

Moreover, Cambridge is recognized as one of leading technology clusters in Europe, attracting a continuous flow of talent and funding to support and strengthen its indigenous innovation processes. It readily interconnects local actors under unified horizontal structures, builds a strong chain of "glocal" innovation activities on-site and extends the regional/national value networks gradually to neighbouring regions and innovation hubs. The local hub management structures are actively developed and coordinated by key regional intermediaries, which promotes the open exchange of information, resources, and talent throughout the ecosystem, and facilitates joint actions. However, there are no indications that the local actors seek new opportunities to engage in mutually beneficial partnerships with other top-runner environments or consequent global alliances of trusted innovation partnerships, which may limit ecosystem potential to some extent. Nevertheless, with widespread national appeal and significance due to its positive impact on regional socio-economic transformations, the Cambridge Sub-Region has been, and continues to be, a model for regional innovation and economic development throughout the world.

Conclusions

This article presented both a comprehensive theoretical framework and detailed practical evidence of best practices in developing and managing regional innovation ecosystems and hubs. It has been demonstrated that the presented innovation hub framework constitutes a fittingly comprehensive approach to regional innovation ecosystem development, advocating coordinated planning and implementation of the key ecosystem elements and close interplay among the key innovation actors. The framework guides regional planners, political decision makers, and core-hub organizations in addressing ecosystem development from a unified cross-sectoral point of view – as a complete regional master planning challenge, aiming to connect both public and private sector interests for joint innovation action. If managed properly, such collaborative action can lead to mutually reinforcing arrangements for parallel innovation processes, and it can facilitate the efficient distribution of best-practice know-how throughout the ecosystem.

It is argued that the most successful innovation ecosystems of the future will be embedded in a truly globalized, interconnected, and collaborative context, where information, resources, talent, and solutions can flow freely and effectively between mutually complementing or competing locations. Any modern innovation ecosystem must first have a strong basis in the relevant local know-how and pool of talent in order to build on re-

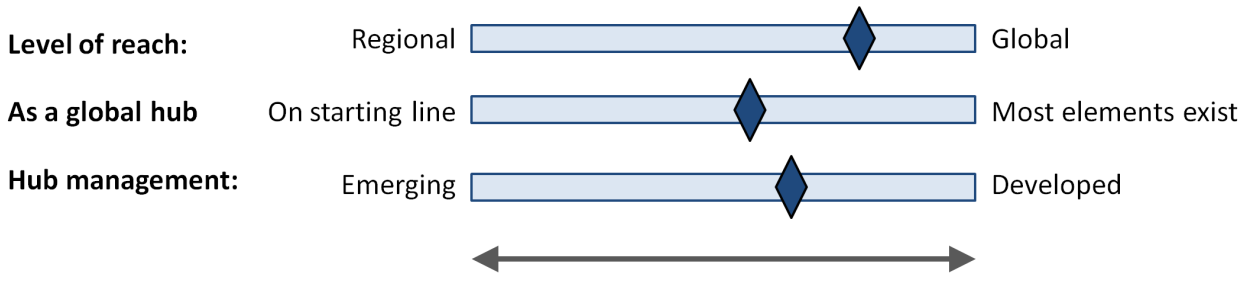

Figure 4. The Cambridge development continuum

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gional abilities. However, due to changing innovation realities, these locally optimized environments should proactively develop stronger links to complementing networks, preferably together with other equally qualified top-runner ecosystems, to make sure that each individual site would meet the real global targets from day one. In most advanced cases, these interconnected sites could go even one step further and formalize their partnerships as identifiable innovation alliances, which build collaboration on shared, open innovation principles, leveraging trusted relationships for maximum global impact. These alliances could be seen as the ultimate ecosystem generation in collaborative relationship development, serving regional economies as a truly interconnected network of innovation creation platforms and market-entry hubs, providing functional mechanisms for market-specific product and service localizations.

Consequently, the author has begun to advocate for the deliberate adoption of a comprehensive ecosystem development approach to boost real-life regional innovation creation capacity. This approach is built on four principal elements:

1. *Grand master planning:* As argued above, future development processes for regional innovation ecosystems should be built on comprehensive regional master plans, where all related ecosystem elements could be addressed concurrently to ensure their highest quality, reciprocal compatibility, and relevance in the broader global context. These (top-down) plans translate general collaboration ambitions and ideas into practical development concepts, integrate diverse (bottom-up) innovation-creation practices into manageable entities and introduce comprehensive targets for elevated, ecosystem-level innovation outcomes (joint vision and shared targets).

2. *Coordinating service provision:* Innovation hub actors can serve ecosystems in several intermediary roles, facilitating cross-industry/domain collaboration and providing professional services in their own specific fields of expertise. They can coordinate the ecosystem-level service provision (use of facilities, development of the KIBS network, upgrades in incubation and growth services, etc.), and safeguard the set quality criteria for planned infrastructure and service structures (audits, evaluations, referrals, etc.). They can guide, promote, and support the other service providers in building up their respective businesses and make sure that all actors strive for top quality and global best practice.

3. *Smart orchestration:* As identified earlier, coordination of parallel, partly conflicting, sectorial interests, and orchestration of common collaborative interfaces establish one of the most critical management issues for all innovation hub organizations. The public sector actors focus on setting up the policy foundation and related regulatory framework to meet the broadest possible societal needs and actively promote pro-innovation, cross-sectorial collaboration, while the private sector actors plan to line up their in-house innovation processes for delivering the maximum commercial benefits. As neither side could accomplish their respective missions without the other, they are drawn to establish productive, mutually beneficial partnerships. And, they often look for facilitators to mediate the process. This key orchestration activity is called a smart orchestration, which implies active cross-sectoral communication to reduce overall ambiguity, coupling the sector-specific needs and requirements for a unified ecosystem structure, leading the shared development of the pro-innovation culture and joint processes towards regional ecosystem excellence.

4. *Channeling ecosystem resources:* It is natural to conclude that the innovation hub actors could also play an important role in channeling and managing the ecosystem-level resource flows to support shared activities and collaborative processes. In most cases, ecosystems can benefit from a professional coordination function, which specializes in core funding issues, application procedures, and channeling resources (both public and private) for effective combinations. Accumulating expertise improves overall process efficiencies and facilitates practical coordination. Consequently, the hub actors could play a key role in advising the other innovation actors on the planning and management of joint infrastructure projects, layer-by-layer development programs, and related coordination of regional innovation creation processes.

In summary, when planning and evaluating innovation ecosystems and hubs, a systemic and comprehensive analysis is not only possible, but if done properly, can reveal the key blueprint for successful ecosystem applications in an increasingly globalizing world. In the course of this study, the author was able to identify gradually emerging, common patterns of behaviour, discover critical subsets of core structural elements for enhanced, joint innovation processes, and unveil the systemic nature of interconnections between actors, actions, and collaborative outcomes. Consequently, it is

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argued that the related analyses can reveal a formula for replication and speed up the development of the next generation environments – not necessarily directly copying and transferring the core practices "as is" to distant cultural contexts, but rather imitating proven functional behaviour for quality results. This holistic approach to developing future innovation ecosystems and related organizational processes can effectively support local decision makers in achieving the best possible joint innovation outcomes.

About the Author

Jukka Viitanen is CEO and Managing Partner of Resolute HQ Inc. and former CEO and Partner of Hubconcepts Inc. He has PhD in Information Systems Management and an MSc in Marketing. His academic research has focused on the strategic alignment of business and ICT strategies and the management of global network organizations. Dr. Viitanen has extensive international experience in planning and managing innovation platforms for global excellence. He has served several organizations in Asia and Oceania and managed the Finnish Science Institute in Japan, the Finnish Innovation Center – Finnode Japan, and Asia-Pacific Insight consultancy during his 15 years abroad. Moreover, Dr. Viitanen has developed several governmental programs to facilitate cross-border technology transfer, SME market entry, and S&T funding collaboration between Finland and its global partners. In his work, he has been responsible for drafting strategies, proposals, and programs for international science and technology collaboration and innovation platform development.

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The Cuckoo's Nest Approach for Co-Creating Business Ecosystems in Smart Cities

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Antti Peltokorpi, and Kristiina Sandqvist

> *"The stars up close to the moon were pale; they got brighter and braver the farther they got out of the circle of light ruled by the giant moon."*
>
> Ken Kesey (1935–2001)
> In *One Flew Over the Cuckoo's Nest* (1962)

The development of business ecosystems in smart cities is currently hampered by the absence of established approaches for facilitating long-term value and sustainability. In our view, the underlying reason is the lack of collective action involving various organizations in the design process. Collective action for the good of the whole ecosystem does not take place in existing participatory practices because of the dominating role of a single customer or designer organization (in urban development projects typically the owner-developer or lead architect), who uses their bargaining and decision-making power over others. This leads to sub-optimal behaviour where the system is optimized for the goals of one strong organization instead of collectively developed system-level goals of the business ecosystem as a whole. The Cuckoo's Nest approach addresses this problem by inviting various expert organizations to design the system and assigning each organization design rights for the ecosystem and its system-level goal. The Cuckoo's Nest approach enhances collective action among the organizations by making individuals from various organizations consider the interests, goals, objectives, and value-adding elements of other organizations – not just those of their own organizations. With the Cuckoo's Nest approach, the business ecosystem comes first, and single organizations' goals or specific design features come second. This article discusses the outcomes of two workshops where the Cuckoo's Nest approach was used for the purpose of developing business ecosystems in connection with smart city development projects within the Helsinki Metropolitan Area. We outline the steps involved in the Cuckoo's Nest approach and how they were applied in these two smart city projects, and we describe how it is being refined for further use in other locations and contexts.

Introduction

The current global megatrends of rapid urbanization and digitalization are placing great pressure on the sustainability of our cities and are bringing about major changes in the living environment of city dwellers. Simultaneously, these trends also offer increased possibilities for sustainable urban development following the principles of circular economy, including the exploitation of existing infrastructure and services while taking advantage of new technology. Additionally, smart city strategies include engaging citizens and local businesses in the development of their communities. Indeed, participatory planning has been a growing trend in urban development projects in the past few decades. End users have been increasingly engaged in design processes using different collaborative methods. While this is a clear improvement compared to a designer-centric approach, the existing participatory planning methods generally involve a pre-defined object of design, as well as a professional designer to lead the process.

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This article stems from the premise that, despite advancements in end-user and community participation, planning practice has continued to put the designer-architect in the leading role and to identify the physical environment as the ultimate goal of the process. Modern solutions, such as the cave automatic virtual environment (CAVE; tinyurl.com/pcraeq7) and living labs, allow for users to experience the facility that is being designed but therefore also inherently impose the facility design on the user. In an attempt to shake this tradition, Aalto University's Project Business Research Group developed a novel approach to collaborative design: the Cuckoo's Nest approach. The focus of this new approach is on business ecosystem development, and it gives individuals the freedom and independence to use all their previous personal or business expertise in the process.

The Cuckoo's Nest approach focuses on developing a business ecosystem and its system-level goal through collective action. With this process, we invite individuals representing different professions and fields of business to collectively create a multi-organizational network. Invitations are extended to all organizations related to the ecosystem under design, not only the known developers and designers or intended users. The Cuckoo's Nest design process builds on the services and processes that the organizations are willing to develop in collaboration with others. The process steers the organizations towards seeing the "bigger picture" and the business ecosystem as a whole, rather than sub-optimizing and promoting their own individual businesses. This principle is supported by the theories of business networks, which suggest that: i) networks are dependent on the different resources possessed by their organizations (Hakanen & Jaakkola, 2012), ii) that relationships between organizations can be characterized by their competing or complementing offerings (Casadesus-Masanell & Ricart, 2011), and iii) that network development is a purposeful activity coordinated by a focal firm (Ritala et al., 2012).

The context of the current study is smart city development, and it explores two case projects where the Cuckoo's Nest approach and associated workshop method was used to design business ecosystems (Autio & Thomas, 2014). Both case workshops focused on smart city development projects within Finland's Helsinki Metropolitan Area: i) the Otaniemi Metro Centre and ii) the Ruskeasuo Health Park. The ecosystem for the Otaniemi Metro Centre focuses on a planned facility to be built on a campus of Aalto University. The Ruskeasuo Health Park's ecosystem focuses on a hospital campus. During the associated case workshops for each case, real estate developers and architects participate in the workshop as peers, not as facilitators or in other pre-established roles. The same principle also applied to larger retail chains, which often dominate retail development projects. During the Cuckoo's Nest workshops, smaller retailers and other small organizations had equal weight in contributing to the design of the business ecosystem.

These two cases represent an application and refinement of the Cuckoo's Next approach. This article introduces the study (and the new approach) by first providing background on existing participatory approaches. Then, the study design, including the case descriptions and the workshop process is described. Next, the outcomes of the two workshops are analyzed. Finally, we offer conclusions and look ahead to the future of the two cases and the application of the Cuckoo's Nest approach to new contexts and locations.

Background: Existing Participatory Approaches

Participatory planning is a form of co-design and has been well represented in urban development projects for at least two decades. End users have been engaged in city planning processes using different participatory methods, such as workshops, discussion forums, and interviews. Engaging in dialogue with the community is generally considered good practice and professionalism on behalf of the planner (Forester, 1999). Consequently, different participatory methods have also been introduced in planning school curricula. Booher and Inner (2002) argue that planners need to have management, facilitation, mediation, and negotiation skills. Participatory planning methods have been developed for and used in different built environment projects, whether an individual building or an urban neighbourhood (Sanoff, 2000). In Finland, the location of the current study, urban planning has become significantly more community focused in recent years, and participatory methods are widely used (Horelli, 2013).

End user experiences have been particularly well accommodated in the design of healthcare environments (e.g., Bowen et al., 2013; Carmel-Gilfilen & Portillo, 2016; Elf et al., 2016; Luck, 2003; Perkins, 2013) and modern learning environments (e.g., Brown & Long, 2006; Kyrö & Artto, 2015; Kyrö et al., 2016; Rytkönen, 2015). Bowen and colleagues (2013) introduce a case of experience-based design from the healthcare sector, which utilized

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the method of storytelling. Similarly, in healthcare, a group of design students found that user stories enhanced their empathy and thus made for a better design (Carmel-Gilfilen & Portillo, 2016). Regarding the focus on designing the business that takes place in the facility (and not designing the facility as being separated from the actual business ecosystem), Elf and colleagues (2016) introduce a method called group modelling, where workshops are used for the primary purpose of the development of the healthcare organization and processes; the plans of the facility are then prepared only after the organization and processes have been designed properly in the group modelling exercise.

Meanwhile, Redström (2006) finds the whole concept of participatory design problematic, because the perceived end user does not exist until a designer creates something for them to use. His argument is that the perceived user cannot know how they will experience the designed object once it is finalized, therefore design should be left solely in the hands of the architect or professional designer. With the help of modern design tools, such as virtual environments, his argument seems philosophical at best, invalid at worst. Sanders and Stappers (2008) argue that, in recent years, the user has actually been promoted from an object of the design (user-centered design) to a co-designer, however, the designer still has a key role in giving form to the design. They also point out how co-design challenges existing power structures, which may be difficult for those who are used to being in charge of the design process. Luck (2003) considers that the difference between user and designer is sometimes blurred due to the major role given to end users. Horelli (2013) goes even further and suggests that participatory approaches should move towards self-organized participation instead of top-down, staged participation.

The various participatory approaches are used for collectively defining the system (e.g., a project, its outcome, or the ecosystem), and therefore collective action is at the core of such approaches. Broader theorizing on collective action can be found in Ostrom (1990) and Olson (1965). To facilitate the collective action to leverage knowledge integration and networked innovation, selecting appropriate boundary objects are of importance (Mäenpää et al., 2016). To enhance knowledge integration and innovation, the aim of boundary objects should be to even out the power structures and achieve a common understanding between the various actors, and to allow for putting focus on the business ecosystem design and not merely the facility design. Kjolle and Blakstad (2014) used a boundary object in the form of a design brief to enhance collaboration and innovation among actors participating to a workshop. For workplace design, Broberg, Andersen, and Seim (2011) list several possible boundary objects, including layouts, usability tests, focus group interviews, to-scale or full-size mockups, computer visualization, and slideshows, as well as the activities of testing and visiting other workplaces. Participatory approaches are also linked to the principles of open innovation, where both internal and external actors are included in the innovation process (Chesbrough, 2003). Furthermore, Chesbrough (2007) argues that setting up relationships with different organizations such as suppliers, competitors, complementors, research institutes, and end customers is crucial for scalable, practical, and effective innovation. Additionally, in line with the service-dominant logic, innovation development should always be targeted at a customer need (Vargo & Lusch, 2004).

Study Design

In this section, we outline the overall design of our study and introduce the two cases before detailing the new Cuckoo's Nest approach, which is designed to overcome the shortcomings of existing participatory approaches, as described in the previous section. The research was conducted as action research with observation as the main data collection method. Data was collected from two workshop sessions, where the research team participated as facilitators. All workshop discussions were also recorded and transcribed for research use. The study is qualitative and exploratory, and it focuses on two different campus development projects. Selecting two cases for the workshops gave a better indication of how the Cuckoo's Nest approach can be applied and how the results may vary in different contexts. The following subsections introduce the context and basic characteristics of the two cases and workshops.

Case 1: Otaniemi Metro Centre

The first case for the Cuckoo's Nest was a future shopping centre located on the Aalto University campus in Otaniemi, Espoo. Aalto University is the leading university of technology, business, and arts in Finland. Most existing buildings on campus date back to the 1950–60s and were designed by the renowned Alvar Aalto, after whom the university is now named. The campus attracts architecture enthusiasts from around the world, in addition to students, faculty, and visitors to the university. The shopping centre will be de-

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veloped in connection with a new university building and a metro station. The new metro line of the city of Espoo will have several new stations, and new shopping centres are planned at almost every station. It was therefore seen as crucial for the Aalto University station shopping centre to be unique and attractive enough to compete with other new shopping centres in nearby stations.

Local businesses were invited to join the workshop. It was decided that the focus would be on retail chains that would have experience in operating in a shopping centre setting. Preliminary discussions were held with 40 people, of whom 20 agreed to participate and eventually 17, representing the public (2) and private (15) sectors, were present in the workshop. The owner-developer of the shopping centre was also present, however, the research team was solely responsible for the organizing the workshop and sending invitations to the organizations. The workshop was held on March 13, 2015, in a newly developed social learning environment on the university campus. The place was purposefully selected because it allows for group working and offers relaxed surroundings. The participants were divided into three groups so that the groups were as diverse as possible, representing different fields of business, profession, gender, and age (Table 1).

In addition to the facilitators for the overall workshop, each group had a separate facilitator and a secretary who focused on taking field notes and pictures. Altogether, eight researchers from the research team were present at the workshop.

Case 2: Ruskeasuo Health Park

The second campus development project was initiated when the owner of a hospital campus signified interest in improving the vacancy rates on campus and energizing the campus with new activity. The campus hosts a rehabilitation hospital and a few smaller organizations, such as retailers of assistive devices. The hospital campus has a long history, dating back to the 1940s, when injured veterans returning from the war needed to be treated and rehabilitated in Helsinki. The campus is located centrally in the Ruskeasuo area of Helsinki, with great recreational opportunities due to the nearby Central Park. Currently, senior citizens represent the main customer segment, and the owner wishes to develop the campus into a full-service "wellbeing campus" with a wide range of offerings from the health and wellbeing industry. The workshop, therefore, focused on finding the right type of service compilation for the new campus.

Table 1. Cuckoo's Nest workshop participants for the Otaniemi Metro Centre

Group	Participant's Field of Business	Sector
Group 1	Grocery retail (large scale)	Private
	Clothing retail	Private
	Clothing retail	Private
	Private planning agency	Private
	Espoo city planning agency	Public
Group 2	Grocery retail (large scale)	Private
	Pharmacy	Private
	Hardware and gardening retail	Private
	Restaurant	Private
	Real estate developer	Private
	Owner/developer	Private
Group 3	Finnish Post	Public (state owned)
	Movie theater	Private
	Restaurant	Private
	Liquor retail	Public (state owned)
	Grocery retail (small scale)	Private
	Real estate developer	Private

For this workshop, the researchers invited many public and third sector organizations to participate in the workshop, because these sectors are active in the health and wellbeing industry. The owner also participated in the workshop, but not in a leading role. Invitations were sent to 21 individuals, and 13 participants representing the public (4), private (3), and third (6) sectors took part in the workshop on June 5, 2015. It was decided that the workshop would be held on the campus, and the most suitable place was a large meeting room in the hospital. The participants were again divided into three groups so that each group would have a diverse set of individuals (Table 2).

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In addition to the facilitators for the overall workshop, each group had a separate facilitator and a secretary who focused on taking field notes and pictures. Altogether, seven researchers from the research team were present at the workshop.

The Cuckoo's Nest Approach

The Cuckoo's Nest approach takes its name from Ken Kesey's (1962) novel *One Flew Over the Cuckoo's Nest,* and it highlights an entrepreneurial focus that encourages all individuals to think freely and differently from others. Just like the patients in Ken Kesey's book, who sought to advance the good for everyone, our workshop participants are encouraged to consider the ecosystem as a whole. Furthermore, like in the Cuckoo's Nest approach, the thinking of individuals should not be constrained by the ideas of single strong organization such as the designer or developer – or "the giant moon" referenced in the opening quotation to this article – using its power to draw the attention of others for the advancement of this one strong organization's goals only.

This section introduces the final form of the workshop method for the Cuckoo's Nest approach, which was developed further from its original form based on the experiences from the first workshop. The workshop format includes five consecutive phases as illustrated in Figure 1 and described below:

1. *Memory Lane:* The workshop is initiated with all participants in one group, and everyone is asked to recall and share a positive personal memory related to the theme of the workshop. This exercise is meant to create inclusiveness and prime the participants to the workshop and upcoming tasks. It also functions as an introduction. After this first phase, the participants are divided into groups. The number of groups and group size can be adjusted depending on the context. Based on our experience from the two Cuckoo's Nest workshops described here, we suggest that a group size of four to six individuals can enhance appropriate variation in results while still integrating knowledge for innovative ecosystem design among the group members. Regarding the number of groups, we see that the number can potentially be constrained by the availability of facilitators and secretaries assigned to each group separately, and the available workshop space.

2. *Actor Domino:* The second phase of the workshop creates the ecosystem design by suggesting an appropriate business and service mix. Each group is given a pack of "actor cards" from which they can select the best business ecosystem compilation by suggesting a set of business actors that would make an appropriate whole (as an ecosystem). The cards are of different colour based on the business sector (e.g., café, restaurant, grocery store, clothing store, hardware, recreation, or services provided by banks or libraries). Some of the cards include specific brand names; some only indicate the sector. The task is first done individually and participants are not allowed to choose their own businesses in the mix. This task forces participants to compromise and to think about the good of the whole business ecosystem, not just their own organizations. Following the individual task, the Actor Domino process is restarted, but this time as a group activity. The groups are asked to combine the best suggestions from each individual to come up with a new unique set of business ecosystem constituents.

3. *Doll House:* The third phase of the workshop is the only phase that focuses on the layout of the ecosystem in relation to space. The name Doll House refers

Table 2. Cuckoo's Nest workshop participants for the Ruskeasuo Health Park

Group	Participant's Field of Business	Sector
Group 1	Private planning agency	Private
	City of Helsinki healthcare unit	Public
	Secondary Education provider	Public
	Association for osteoporosis	Third
Group 2	Diabetes association	Third
	Association for people with disabilities	Third
	Local school administration	Public
	Wellbeing association	Third
	Real estate owner/developer	Private
Group 3	Health association	Third
	City of Helsinki planning department	Public
	Local Lutheran congregation	Third
	Real estate owner/developer	Private

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to a miniature house that is modelled and decorated according to a child's or family's own liking. The rooms can be of different size and be located in different parts of the house. For this assignment, the participants are provided with a toolkit including miniature figures, wall partitions, cardboard, and tape. The number and placement of buildings, the number of floors, the choice of building materials, as well the location of the different business facilities are decided within the group. Given that the ecosystem in terms of its business and service compilation has been designed already (in the previous phase), the co-design process innately becomes activity-based. The name Doll House refers to a physical space, but this phase is not necessarily constrained by a requirement to position the ecosystem in a specific location (because the idea is to design the location and space without unnecessary constraints). Therefore, if the business ecosystem designed in the workshop is virtual, we suggest that the Doll House phase includes a positioning of the ecosystem as based on the mutual relationships and connections of its members by other parameters than the physical location only.

4. *Loyalty Card:* The fourth phase of the workshop is inspired by the many loyalty programs initiated by retail chains that seek to reward loyal customers and promote brand identity. Each participant is invited to suggest a name and a slogan for the ecosystem based on the outputs of the previous phases, and earlier discussions with the group. The group then decides upon their joint suggestion for name and slogan that would appear on the hypothetical loyalty card for the ecosystem. This simple task plays an important role in determining the identity for the business ecosystem, which would represent an integrative force for the existence and purpose of the ecosystem by the ecosystem members.

5. *Speaker's Corner:* In this phase, each participating individual is asked to think about their own personal views about the idealized ecosystem that the individual wishes to see in the future. Based on this individual and idealized view, each individual is asked to step to a spot called the Speakers' Corner and give a three-minute speech to others on the theme of "my ecosystem" to describe the kind of ecosystem that, in their mind, constitutes the perfect business ecosystem, and would bring them joy. The idea behind this Speakers' Corner phase is to allow for individuals to establish a personal connection to the ecosystem of "their own", and also to share different views and opinions, and also expose and encourage variation among the participants' opinions.

Figure 1. The five phases of Cuckoo's Nest workshop

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During the entire workshop, the participants are reminded that they are not restricted by any existing physical, economic, or emotional constraints. The logic is that the sense of freedom will produce a range of "outside-the-box", altruistic ideas. The feasibility of the suggestions is not assessed at all in the workshops.

Findings

In this section, we present the key outcomes of the two case workshops. The findings are based on the extensive written and photographic documentation that was collected by the researchers during the workshops, as well as the outputs created during the workshops (Actor Domino compilations, Doll House layouts, and Loyalty Cards).

The two workshops were conducted similarly but with minor differences. First, the locations for the workshops were different, even though both were located on the respective campuses. The setting on the university campus was a modern social-learning environment whereas the other workshop was held in a more traditional meeting room. However, the atmosphere in both workshops was relaxed. Particularly for the Health Park workshop, the opening phase of Memory Lane – where participants were asked to recall a positive experience related to healthcare – clearly helped create a sense of trust among all participants.

Second, some modifications were made in the latter workshop based on experiences in the first workshop. During the first workshop, the research team noticed that the Speaker's Corner – where individuals were asked to present their own idea of an ideal shopping centre – drew the participants "back to reality" in an unfortunate way. Despite very innovative and even radical outputs from the first phases of the workshop, the individual speeches comprised rather traditional shopping centre compositions. In a way, the participants started to question the feasibility of their own ideas and started to speak on behalf of the organizations they represented. This phase was therefore changed for the second workshop so, that the facilitators presented the ideas created by the group. However, this modification resulted in a bleak, less exuberant atmosphere. For good or bad, the Speaker's Corner phase utilized in the first workshop forced the participants to step out of their comfort zone. Despite the minor, brief uneasiness for the participating individuals, the Speaker's Corner phase should remain an integral part of the Cuckoo's Nest approach in the future.

Furthermore, the Doll House phase did not produce any radical or even very detailed layouts during the first workshop, and the groups spend much more time pondering on the identity of the shopping centre. Therefore, the phase was changed in the second workshop so that the participants were not asked to come up with building layouts but rather focus on the activities on the campus. Interestingly, however, the groups did actually come up with a rather detailed layout for the campus anyway. For future workshops, the Doll House phase will be introduced so that the groups are provided with the basic design toolkit, as described in the previous section. This way, the groups may themselves decide how detailed their layout design will be.

Below, we share specific findings of the two case workshops.

Otaniemi Metro Centre

The shopping centre will be developed in connection with a university building and the metro station. These two prerequisites were the only ones given to the participants. No restrictions on the facilities, number of tenants, purpose of use, or other characteristics of the shopping centre were given in advance.

The participants wished to see the Otaniemi Metro Centre as very tech savvy and boast an ecological conscience. A consensus was reached on the importance of the building design, including façade and materials, in depicting the ecosystem identity. The participants actively discussed the salient features of the ecosystem, starting from the beginning of the workshop when justifying their choices for Actor Domino, and throughout the Doll House phase when deciding the layout. As a result, the identity of the shopping centre, and how it would be created, became a key topic. The campus surroundings and the university community had a major impact on the identity.

Many participants drew from their own unique shopping experiences abroad and were, therefore, contemplating what Otaniemi campus and Finland as a country could offer that other countries could not. Nature on the one hand and technological advancements on the other were discussed as potential niche attractions. Interestingly, a traditional shopping centre in terms of layout and service compilation was not preferred by anyone, even though everyone admitted to visiting shopping centres for the ease of finding everything under one roof. However, the new shopping centre should be a contemporary version of a traditional village that highlights the tech-savvy identity of the university campus.

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The participants' suggestions also strongly reflected their own experiences and needs as consumers. Few participants saw themselves as the target group for shopping centres, and shopping centres in general were thought to have a slightly outdated feel, even a stigma. As a result, many novel and innovative suggestions could be found in the outputs of the workshops. Instead of traditional shops, the shopping centre would include pop-up stores and showrooms. Traditional shops in the future might just become places for testing a product before ordering it and having it delivered directly to your home. The suggestions reflect the megatrends of urbanization and digitalization, which are affecting patterns of consumption. Traditional large retail units located outside cities and out of reach of public transport were thought to no longer be viable. Shopping centres in the future will likely not require owning and driving a car.

Every group highlighted the role of technology and art students as the creative class that appreciates technology on the one hand and sustainability on the other. Therefore, each group came up with ideas that support digitalization, alternative transport, alternative means of consumption, and diverse evening entertainment. Even the facades of the building were thought to represent sustainability and the technological identity, with wood and glass as the main material. The outcomes from the three groups' work are summarized below:

1. The first group wanted to focus on the offering, not on specific brands. Not unlike current shopping centres, large grocery stores open 24-hours per day would function as a basis, and other retailers would then follow. The group suggested restaurants and pubs that are open late at night for the creative class, and some facilities should be reserved for pop-ups. Additional services would include showrooms with warehouse pick-up locations for specialty stores. Ecological solutions in the design and services of the Metro Centre would define and strengthen the identity of the university. Ecology was even reflected in building design and emphasis was placed on building adaptability and an attractive façade. A hall for public lectures and other university events should be located centrally and be visible from the metro station entrance.

2. The second group also chose to focus on the offering, not on specific brands. It was clear that no specialty stores would be operated on campus, only supermarkets with good offerings. Restaurant services were thought to be best represented through a food court with "street food". The centre would also include art and entertainment, such as a gallery or a community centre. Some key concepts that were widely accepted within the group were fast, easy, entertainment, buzz, and flexible opening hours. As for the layout and structure of the centre, modularity and adaptability were marked as important. The building would boast a wooden façade to highlight the sustainability preferences of the creative class, and digitalized services in the centre would highlight the technology signature of the university. However, the new building should not undermine the architectural legacy of the university campus or the heritage of Alvar Aalto.

3. As with the other two groups, the third group also wanted to focus on the service offering, instead of specific brands. The student-customer segment brought about the suggestion of a discount supermarket to fit student budgets. Evening entertainment was also seen important for students, as were new digitalized services and other new types of services, such as sporting gear rental and a recycling service. A pop-up marketplace was also discussed. University and student services should be visible in the lobby, for example, in the form of an information desk and various course projects presented on walls. This group focused on accessibility and good visibility with a glass façade in their building design. City bikes and bike racks would be available to accommodate the students' most popular means of transport.

Ruskeasuo Health Park

This section presents the outcome of the second case, Ruskeasuo Health Park. Once again, the participants were not given any prerequisites regarding budget, layout, or types of services that would be welcomed to campus. The participants were provided with some basic information about the site and location but were asked to overlook any other physical constraints, such as the existing buildings on site.

The campus was envisioned as an accessible and inclusive community with lush green surroundings. A sense of community between the different organizations on campus was the driving force behind all three groups' work. Although the main user group was thought to be senior citizens, the groups were interested in making the campus easily accessible and attractive to other user groups as well. Accessibility was another key concept that was repeated in the outputs with regard to buildings and recreational activities. The role of the

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third sector, mainly different health associations, was also emphasized in providing a wide range of services beyond traditional public and private healthcare service providers.

Compared to the outcome of the Otaniemi Metro Centre, the Ruskeasuo Health Park workshop focused on the site, rather than a building. Therefore, building material choices were not discussed during the workshop. However, green roofs and walls were mentioned as a means to highlight the nature-friendly identity of the campus. Access to alternative transport, such as nearby bike routes and a bus line to the campus, was also seen as an important part of the new image of the Health Park. The campus is located adjacent to Helsinki's Central Park, and the park was included in all the group's outputs as a major source of recreation. Additionally, locally grown and organic food was discussed, and it was suggested that a community garden should be included in the design. The outcomes of the three group's work are summarized below:

1. Similar to the previous workshop, the first group wanted to focus on services, particularly the service offering of the whole campus, not of individual service providers. The group saw a strong sense of community as the guiding principle. Wellbeing is a sum of many parts, including recreation, dining, sports facilities, and culture. A number of third sector organizations would complement public health services. Hotel services for long-distance guests were also among the suggestions. Also, a "community feel beyond generations" could be achieved, it was suggested, by locating student dorm rooms inside a nursing home. This type of arrangement has been successfully implemented in the Netherlands and Finland before. The neighboring Central Park of Helsinki, with its nature and recreational opportunities, was seen as a major asset.

2. The second group wanted the campus to provide healthcare and experiences to the future customers. They saw senior citizens, children, health tourists, researchers, businesses, and local citizens as the key customer groups. The long cultural history of the campus was thought to be an attraction. This group also wished to see third sector organizations and smaller health technology startups in a central role. The environmental friendliness was depicted with a grocery store with organic food, and a restaurant serving harvest from an onsite rooftop garden. Additional green roofs and wall would further demonstrate green roofs, green walls to demonstrate environmental friendliness. The group also designed and accessible theme park or adventure park. The recreational activities should exploit the full potential of the nearby Central Park. Hotel services could be provided for long distance guests in a new building, and an event hall and information centre should be located centrally on the whole campus.

3. The third group saw community feel as the guiding principle of the new campus and wished to co-create a warm and welcoming to everyone. Both the local community and international health tourists were expected to belong to the future customer segment. The role of third sector organizations was deemed important in complementing public services, which may reflect both the context and high level of third sector participation in this workshop. The group wished to see a wide service offering including retail, pharmacy, spa, and cafes. Accessible recreational activities and sports halls were also among the design suggestions. As a niche offering, the group expressed interest in providing wellbeing services, including social services, mental health, and even spiritual guidance. Finally, the group thought that a new tramline running through campus might increase opportunities for passersby to discover the campus and its service offerings.

Discussion

Based on the feedback, everyone who took part in the workshops were extremely satisfied. In addition to co-creating innovative ideas, the workshops provided an opportunity to meet and talk with other potential future tenants, owners, and city officials. That way, even if the smart city project will not be relevant for their business in the future, they have opened communication channels with other businesses in the area.

Typically, co-design processes in the built environment have engaged a limited group of pre-determined users (e.g., Broberg et al., 2011), the design process has been led by a designer (e.g., Kyrö & Artto, 2015), and efforts have focused on facility design (e.g., Kjolle & Blakstad, 2014). These processes stand the risk of turning into a "barrel of wishes", where the lead designer tries to comply with the users' wishes only to the extent that it does not jeopardize the outcome desired by the owner of the project (e.g., a real estate developer or a city). The key difference in the Cuckoo's Nest approach to existing participatory methods is that the individuals are from a

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wider group of business representatives. It was clear from the very beginning that not all of the organizations would have tenancy on the campuses. Compared to the idea of service-dominant logic (Vargo & Lusch, 2004), the included individuals were not the end customers. Furthermore, because the participants are all professional users, the outcome is different from that of a layman or citizen engagement group. The way that the complementing and competing organizations are brought together to ideate, with no direct benefit to their own organization, allows for the development of joint, system-level goal that benefits business as a whole. These two features make it more likely that the outcome is not about optimizing individual performance, but rather an optimal compilation with regard to the general understanding of what constitutes a functional business ecosystem.

As a result, the actor compilations were versatile, and smaller actors were well represented in the outcomes. For example, shopping centres in Finland typically host one or both of the two largest retail chains in the country, the national alcohol monopoly, and a Swedish clothing retailer, by default, and all other actors are fitted around these major players. Even though both of the largest retailers, as well as the national alcohol monopoly had their representatives at the Cuckoo's Nest workshop, none of the groups suggested this traditional compilation. This is not to say the final shopping centre will not host these major players; in all likelihood, it will. However, in the business ecosystem created in the workshop, the smaller actors had equal weight as the larger players, despite the existing power relations.

The strong focus on the technological identity of the Otaniemi campus and the unwillingness to place traditional shops in the shopping centre was made possible by the principles described above. Meanwhile, the diversity of workshop participants likely contributed to the focus on small pop-up services and startups in the Health Park workshop outcomes. Within the conservative field of healthcare, radical innovations tend to come from smaller actors outside the field.

Conclusions

Although neither of the two projects will be realized exactly as envisioned in the workshops, some ideas have translated into reality in the projects. The Otaniemi Metro Centre workshop participants met again one month later for a follow-up discussion. The research team presented the key outcomes of the workshop and future trends in shopping centres in general. The construction of the Otaniemi Metro Centre has started, and discussions with potential tenants are ongoing. For the Ruskeasuo Health Park case, the research team met with the owner and the owner's consultant after the workshop to discuss the outcomes. Inspired by the workshop, the Health Park now hosts third-party associations and small startups based on new health technologies.

Finally, based on the two Cuckoo's Nest workshop cases, it seems that when the individuals are given freedom and independence to ideate without any constraints, or without the need to directly benefit their own organization, they innately focus on the "common good". The end-result of the process is a value-creating business ecosystem, which has the capacity to create value even for decades, adapt to ever-changing context by renewing itself, and initiate new value-creating activities in the future.

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Integrating Open Innovation Platforms in Public Sector Decision Making: Empirical Results from Smart City Research

Jukka Ojasalo and Lassi Tähtinen

> *"A new mode of innovation is emerging that blurs the lines between universities, industry, governments and communities. The challenge is how to execute and govern the new mode."*
>
> Martin Curley
> Vice President at Intel Corporation
> Director of Intel Labs Europe

The purpose of this article is to increase knowledge of integrating an open innovation platform into public sector decision-making processes. Many of the distinctive characteristics of public sector decision-making processes pose a challenge for innovation collaboration with external actors. Often, external actors are not aware of these distinctive characteristics, or they find it very difficult to adapt to them. Particularly SMEs and startups find it difficult to adjust their operation to public sector decision-making processes. The existing literature includes very little knowledge of how such an innovation platform, which is an intermediary between a city and external actors, relates to the city's decision-making processes. Still, this is an important issue considering the prerequisites of the success of an innovation platform. This qualitative explorative study is based on data from in-depth interviews and co-creative multi-actor workshops with participants from city governments and other organizations. It proposes a model of open innovation platform for public sector decision making in a city. The article contributes to the literature dealing with innovation intermediaries as well as public sector decision making in enhancement of innovation. It identifies and introduces three different kinds of relationships that are present and partly interwoven in open innovation platforms and intermediary organizations: governing, sparring, and collaborative. The prosed model shows a practical way of organizing the three types of relationships of an innovation platform with the city's decision making and external actors. The model also helps in combining different decision-making cultures between the public, private, and third sectors in the context of collaborative innovation.

Introduction

Innovation platforms and innovation intermediaries exist to enhance open innovation and collaborative innovation in cities (McPhee et al., 2015). An innovation platform is defined as an approach that systematically facilitates external actors' innovation with the purpose of developing solutions to the platform owners' problems and needs (Ojasalo, 2015a). In the context of cities, the platform owner is typically a city, and thus the innovation platform functions between a city and external actors, and facilitates their collaborative innovation. Collaborative innovation in cities addresses several areas covering improvement of everyday activities and life conditions, creative consumer experiments, experimentation and implementation of new technologies, and creation or recreation of economic opportunities (Leminen & Westerlund, 2015), digital solutions (Tukiainen et al., 2015), sustainable solutions (Oksanen & Hautamäki, 2015), and spatial solutions (Niemi et al., 2015).

Integrating Open Innovation Platforms in Public Sector Decision Making

Jukka Ojasalo and Lassi Tähtinen

Several research reports refer to the governance and management of open innovation platforms in cities. However, there is a clear research gap, because they do not offer knowledge of how innovation platforms are or could be connected to the public sector decision-making processes in cities. According to Markkula and Kune (2015), the success of such platforms "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". Ylikoski, Oksanen-Ylikoski, and Hero (2015) refer to a flexible, silo-breaking culture in multi-actor collaborative innovation in smart regions. Tukiainen, Leminen, and Westerlund (2015) argue that cities should act "as orchestrators that connect various parties to create and maintain sustainable ecosystems". Smith, Nuutinen, and Hopkins (2015) report on Espoo City's governance structure for orchestrating the innovation collaboration of a multi-stakeholder network with the regional centres of expertise. In this case, the governance structure includes: i) the management team, which supervises the strategic guidelines, ii) a steering group, which is an advisory group consisting of representatives of key organizations and partners, and iii) working/interest/project groups consisting of all organizations, institutions, and businesses committed to implementation. They also refer to the governance structure of Portland's regional centre of expertise in the United States, which similarly includes governance, programs and events, research and development, outreach and communication, a coordinating committee, a shareholder advisory group, and working groups. Ojasalo (2015b) identified four options, and their pros and cons, for how an open service innovation platform relates to the city administration and how it is governed: i) the innovation platform is subordinated to the central administration of city, ii) each department has its own innovation platform, iii) each department has its own innovation platform plus there is a connecting round table, and iv) the innovation platform is external.

Moreover, the existing governance and management structures of innovation platforms have several problems and shortcomings. According to Tukiainen and Sutinen (2015), they are based on bureaucratic administration and decision making, and governance or professional silos. The administrative structures are not customer-, action-, or process-based. Consequently, they are not interoperable with other cities or with companies, meaning that they are unable to reuse the other cities' innovation capability. Moreover, cities are unable to effectively utilize citizens' contributions or new emerging technologies such as digitalization. Ahonen and colleagues found that a city may have the basic infrastructure for innovation collaboration and experimentation with external actors, while not being very active. Hämäläinen (2015) argues that cities have to deal with "wicked problems", which cause several challenges for the governance of regional innovation ecosystems. The key challenges are caused by multiple stakeholders (their frames, values, and goals), lack of shared and holistic understanding of the problem, coordination difficulties, complexity gaps, and path dependence. Consequently, new governance solutions are required 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" (Hämäläinen, 2015). In general, the nature of decision making in public administration, such as city government, and private organizations is notably different (Nutt, 2006). Private companies have smoother decision-making processes whereas public sector organizations experience more turbulence, interruptions, recycles, and conflict (Perry & Rainey, 1988; Rainey et al., 1976; Ring & Perry, 1985).

In conclusion, the importance of facilitating effective and efficient governance of open innovation platforms for cities is recognized. Also, several difficult challenges have been identified in this context. Some guidelines and approaches have been introduced; however, these approaches do not explicitly address the different types of relationships between an innovation platform and city administration. Moreover, the existing approaches recognize the problem of silos in city organizations but give only vague ideas of how to overcome this problem in the governance of open innovation platforms. Moreover, they do not make a distinction between permanent and project-specific roles of persons and organizations involved in the activity of an innovation platform.

Thus, clearly, the existing knowledge of how innovation platforms can relate to public sector decision making in a city is scarce. Indeed, there is an evident need to increase knowledge in this area as well as to provide pragmatic approaches. The present study addresses this knowledge gap. It aims to increase knowledge of how an open innovation platform addressing a city's needs can relate to the public sector decision-making processes of the city and propose a model for real-world application in this context.

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The rest of this article is organized as follows. First, based on the literature introduced already, we discuss innovation intermediaries and platforms, as well as the special characteristics of public sector decision-making processes. Then, we describe the methodology used for this research. Next, based on the current empirical study, we propose a model of an open innovation platform and public sector decision making in a city. Finally, we offer conclusions.

Innovation Intermediaries and Platforms

The innovative ideas and solutions to the problems of government and city halls can be provided both internally and externally through collaboration within the public sector and with other organizations (Fung & Weil, 2010). This external knowledge space can be supported by public sector open innovation intermediaries (Bakici et al., 2013). The concept of "innovation intermediary" is used in the scientific literature and has been defined by several authors. However, the closely related term "innovation platform" is widely used by practitioners, particularly in public government (including the European Union), regional bodies, and cities. Despite the frequent use of these terms in various contexts, their meanings remain rather vague. In this section, both these concepts are discussed more closely based on the existing literature.

Innovation Intermediaries

In discussing innovation intermediaries, Bakici, Almirall, and Wareham (2013) identify three related roles, which they define as follows:

1. An *intermediary* is a third party, a firm or a person that acts as a mediator and offers intermediation services between two other parties (Braun, 1993; Gassmann et al., 2011; Seaton & Cordey-Hayes, 1993; Stankiewicz, 1995; Stewart & Hyysalo, 2008; Watkins & Horley, 1986). Intermediaries may be private organizations, individuals, experts, or advisors in the form of retailers, distributors, wholesalers, platforms, media companies, agencies, and financial institutions (Aoki, 2001; Howells, 2006).

2. A *knowledge broker* is an organization that spans multiple markets and technology domains and innovates by brokering knowledge from where it is known to where it is not (Hargadon, 1998; Hinloopen, 2004; Hussler et al., 2010; Ramirez & Dickens, 2010; Verona et al., 2006).

3. An *innovation intermediary* is an organization that acts as an agent or broker in any aspect of the innovation process between two or more parties (Howells, 1999; Klerkx and Leeuwis, 2009; Lichtenthaler & Ernst, 2008; Nambisan et al., 2012; Sieg et al., 2010; Tran et al., 2011).

Bakikici and colleagues (2013) describe the function and role of public sector innovation intermediaries. A public sector innovation intermediary is positioned between a city and public/private organizations to enhance their innovation collaboration and the innovativeness of the city in general. The collaboration makes it possible to accomplish objectives that neither entity is able to achieve alone. Public sector innovation intermediaries have a significant role as key enablers in the innovation strategy of city halls. They build networks of organizations and then attract all the project ideas from these networks. City halls are at a distance from the latest technologies, developments, and innovative ideas, as well as the demands for new services and products. Innovation intermediaries reduce the cognitive distance by bridging various actors. They collaborate with other public and private organizations, citizens, and universities to promote innovation and economic development based on a range of sectors. They also participate in grassroots innovation projects and execute programs. Often, the projects involve SMEs and startups.

Innovation intermediaries and platforms are needed because the systemic setting for innovation runs only with the necessary intermediaries in place to make the interactions and matching of partners possible (Katzy et al., 2013). They help to minimize asymmetric information between actors related to innovation on the market (cf. Spulber, 1999). In many cases, it has become a public priority to encourage innovation intermediaries to provide support to companies – especially SMEs, who often have limited resources. For example, SMEs often face great barriers to participation in the European Union's R&D programmes, such as administrative, financial, internal, and external barriers (Gilmore et al., 2013). Innovation intermediaries are often strongly publicly funded and have a non-profit structure. However, there are some examples of innovation intermediaries that have a commercial structure and operate on the basis of reward fees that they receive in exchange for deals negotiated between customers and knowledge or technology suppliers (Katzy et al., 2013). Both innovation intermediaries and platforms typically utilize ideas related to open innovation (Ches-

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brough, 2003), innovation networks (Ojasalo, 2008), public–private partnership (Abadie et al., 2004), and technology transfer (Bessant & Rush, 1995).

According to Katzy and colleagues (2013), innovation intermediaries have three strategic capabilities: i) innovation process management capability – innovation partners need continuous support for collaboration and process management, ii) matchmaking capability – this is needed in the early, development, and late stages of the innovation process, and iii) valuation and portfolio management capability – this refers to the capability of the intermediary to translate the combined value of a portfolio of individual deals into individual benefits of the stakeholder in several ways. Various living labs, such as those driven by utilizers, enablers, providers, or users (Leminen et al., 2012), are examples of innovation intermediaries.

Innovation Platforms

The concepts of "innovation intermediaries" and "innovation platforms" are closely related. The function of innovation platforms are based on the fact that networks are loci of innovation given that collaboration favours access to a broad set of complementary technological competencies and becomes an opportunity to recombine existing resources held by individual firms into new knowledge (Patrucco, 2011). Indeed innovation platforms utilize the basic advantage of networks. Through networks, an actor may have an access to resources that it does not possess internally (Ojasalo, 2004). In the case of innovation, knowledge and capabilities are the most important resources. Thus, innovation networks (Ojasalo, 2008, 2012) are all about knowledge creation and governance for economic value through interaction in networks.

Patrucco (2011) describes the evolutionary phases of institutional change in the organization of knowledge and innovation in the automotive industry, moving from isolated in-house innovation into innovation platforms:

1. *The firm* (1970s): characterized by vertical integration of production, internal accumulation of R&D, internal accumulation of capabilities in the design, and internal accumulation of capabilities in technology design. Innovation took place in isolation.

2. *The centralized network* (1980s): based on outsourcing of components production, central coordination of suppliers by the focal actor in the network, and exclusive supply from small suppliers to the focal actor. Innovation had an ex-ante and top-down nature, and it was undertaken by the focal actor, in other words, the central actor of the network.

3. *Decomposed organization* (1990s): suppliers benefit from economies of specialization and learning, first-tier suppliers emerge as innovators at the local and international levels, outsourcing of components production, outsourcing of design in both components and modules, and modular product and system architecture design. Innovation is based on outsourcing of R&D and design as well as bottom-up (supplier-driven) innovative process.

4. *The innovation platform* (2001–): in-sourcing of innovative and value adding activities, acquisition of external resources built in the previous phase, vertical cooperation between the focal actor and its suppliers, horizontal cooperation between the focal actor and its suppliers, horizontal cooperation between the focal actor and its suppliers, and internal to the focal actor product and system architecture design. Innovation includes integration of top-down and bottom-up processes, as well as co-design and co-innovation.

The literature includes a handful of definitions for innovation platforms or platform organizations in general. The European Commission (2004) refers to "technology platforms" in its common research agenda, but its characterization seems not to refer merely to a technical solution, but rather to a means of facilitating the emergence and effectiveness of multi-stakeholder innovation networks in which stakeholders are united around "a common vision and approach for the development of the technologies concerned" (European Commission, 2004). In this context, technology platforms are seen as a way of making public–private partnerships more effective by bringing together public sector research, industry, financial institutions, users, regulatory authorities, and policy makers. Furthermore, "technology platforms provide important forums in which stakeholders can formulate their views and provide policy-makers with advice on ways to develop coherent and effective policies and programmes to tackle the challenges in the technological areas concerned" (European Commission, 2004). Also, the participation of SMEs is emphasized.

Consoli and Patrucco (2008) define "innovation platforms" as systemic infrastructures for the organization and coordination of distributed innovation processes

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that feature high degrees of complexity. The creation of an innovation platform consists of the design and establishment of architectures for interorganizational coordination of information and knowledge, and the extent of exchange across organizations. The design of an innovation platform determines the objectives for the creation and the use of knowledge beforehand but evaluates (and eventually adapts) them afterward. Patrucco (2011) defines innovation platforms as "directed networks, that is, networks where interactions do not emerge and evolve spontaneously, such as in traditional clusters and districts, but where key nodes have a driving effect on the behaviours of the other actors and shape the evolution of the system and its aggregate performance". Patrucco (2011) also characterizes them as organizational innovations themselves and forms of knowledge governance.

In the context of developing a smart city, "innovation platforms" are also called "participation platforms", referring to something through which governments, businesses, and citizens can communicate and work together, and track the evolution of the city. They are typically driven by local municipalities on behalf of platform users and reflect the full range of city actors, including individuals, civil society groups, small businesses in the retail service, and manufacturing sectors and larger businesses established in the city (Manville et al., 2014).

Ojasalo (2015a, 2015b) empirically examined open innovation and innovation networks in smart cities and positioned an "innovation platform" as an approach that systematically attracts, facilitates, and orchestrates innovation with external actors with the goal of developing solutions to the platform owners' own problems and needs.

An innovation platform is primarily a way to organize, rather than being a virtual or physical space, even though it may be means used to facilitate the innovation of external organizations. Indeed, both Consoli and Patrucco (2008), as well as Ojasalo (2015a, 2015b), emphasized that innovation platforms are *not* technological platforms, but rather strategic approaches to building, organizing, and enhancing innovation networks. Indeed, an innovation platform differs from a technological platform. The latter refers to ICT-based innovations like virtual networks, and the associated infrastructures, and interfaces and standards (Gawer and Cusumano, 2002). Technology platforms facilitate interoperability and coordination between different firms and technologies (Console, 2005) as well as scientific clusters (Robinson et al., 2007). Consoli and Patrucco (2008) further clarify the difference between the concepts, as follows: "Innovation platforms are strategic organizational vehicles for coordinating specialized agents. ICTs and virtual networks are thus instrumental and yet subsidiary elements. Common to both technology and innovation platforms is the notion of directed and coordinated organization as opposed to 'spontaneous' organization typical of market processes."

Methodology

This article stems from a two-year research project on open innovation platforms in smart cities. The overall project addresses several objectives, but the one that is relevant to this article seeks to understand how an open innovation platform can relate to the public sector decision-making processes in a city. The research method is qualitative and is based on data from in-depth interviews and co-creative workshops (Gummesson, 2000). The interviews lasted between one and three hours and were audio recorded and transcribed for later analysis. Also, drawings made by interviewees during the interviews were photographed, collected, and interpreted in the analysis.

The 65 interviewees came from Finland (49), Spain (5), Netherlands (2), China (3), Italy (2), Denmark (1), the United States (2), and Australia (1). The interviewees represented city governments, private companies, third sector organizations, innovation intermediaries, as well as research institutions. The interviewees selected from city government had experience or expertise in innovation, urban development, and collaboration with private or third sector organizations. Interviewees selected from the private sector had experience or expertise in collaboration with cities. Similarly, interviewees from the third sector had experience or expertise in collaboration with cities. Interviewees from innovation intermediaries had experience or expertise in living labs or facilitation of collaborative innovation networks. The researchers interviewed were academics who have examined innovation intermediaries or urban development.

In addition to in-depth interviews, we collected material from four co-creative workshops addressing innovation collaboration between cities and external actors. The data from the workshops includes transcriptions, notes, photos of written and drawn material, as well as written summaries of the main conclusions of the work-

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shops. The data were analyzed by open coding and selective coding, following a grounded theory method (Glaser, 1978). The purpose of the "open coding" or initial coding in this study was to discover a potential initial solution to be proposed for the existing knowledge gap, in other words, how to connect a city government and external actors for innovation collaboration. We identified a potential to propose an open innovation platform that contains an intermediary round table as a key element. With this initial idea or interpretation in mind, the focus shifted to "selective coding", which included finding empirical clues from the material in hand to determine the nature and structure of a proposed innovation platform model, as will be described in the next section.

An Open Innovation Platform for Public Sector Decision Making in a City

Based on the analysis of the data from the interviews and workshops in the current empirical study, we propose a model illustrating an approach for linking an open innovation platform in public sector decision making of a city (Figure 1). The model includes three main actor blocks – the city government, external actors, and the open innovation platform – and three types of relationships between them. The city government is simplified in the model to consist of only the central government and the city departments (e.g., health and well-being, education, real estate, culture). The open innovation platform facilitates and enables collaborative innovation between the city and external actors. External actors refer to private companies, third sector organizations, research institutions, citizens, as well as other cities.

The city is the sole platform owner or at least one of the main owners, and it has the main power in the innovation platform's decision making. Most of the platform's budget comes from the city and other public sources (Ojasalo, 2016), but the innovation platform still acts as an independent, self-organizing mechanism. Therefore, its activities should be transparent. And, it needs an effective information-transfer mechanism for sharing and gathering information from the city government's internal and external environments in order to facilitate and enhance collaborative innovation. In the model, we refer to this information transfer mechanism

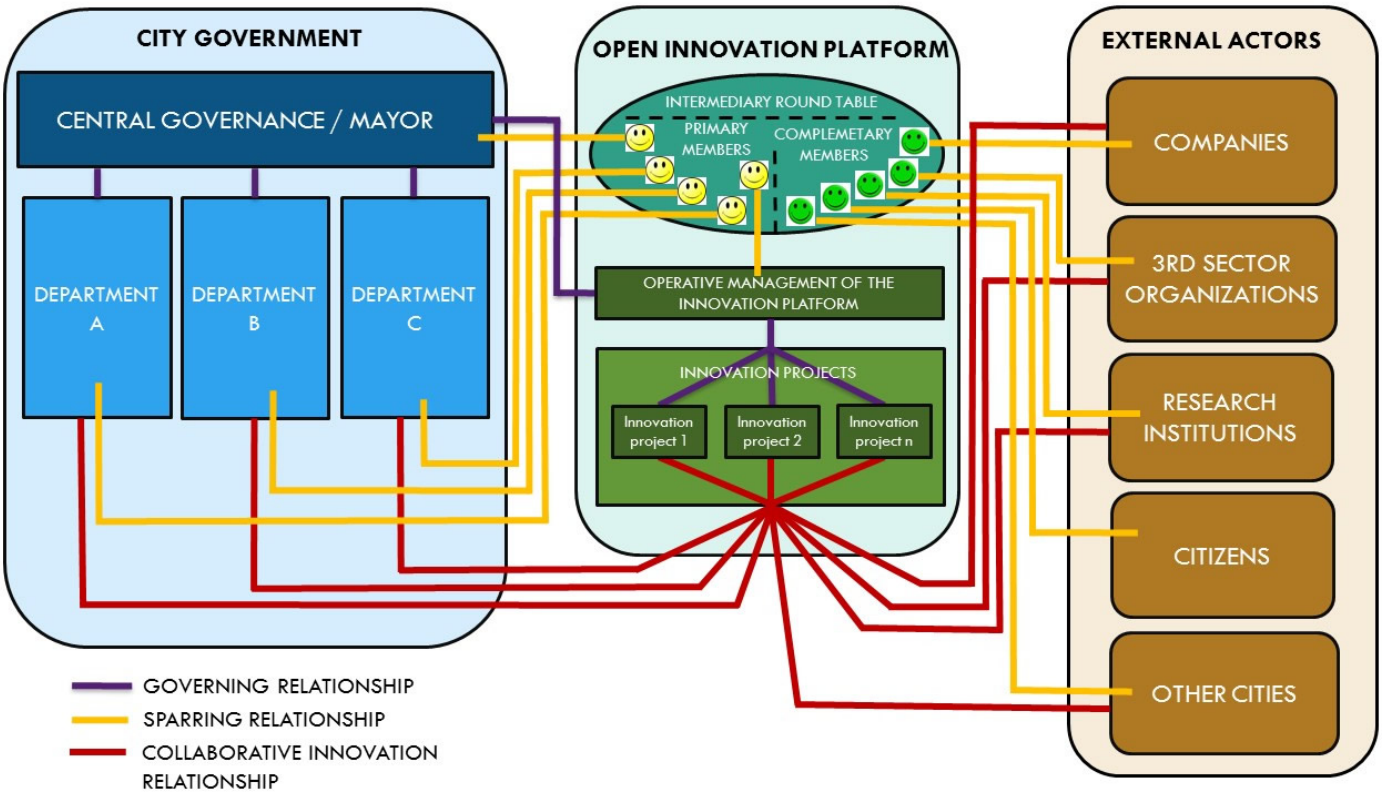

Figure 1. Model of an open innovation platform for public sector decision making in a city

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as an intermediary round table. The intermediary round table includes primary members and complementary members. The primary members are carefully selected city personnel who come from the city departments and possibly the central government. They intermediate information between their own departments and the innovation platform. They also interpret the information and communicate it in the way that it is usable at the both arenas. Primary members have long-term involvement in the intermediary round table.

The intermediary round table also has complementary members. Their involvement is usually case- or project-specific, and they are invited by the primary members. For example, the innovation platform may be a city hospital that allows companies from the health and well-being industry to develop and test their products and services in an authentic real-life context in the hospital environment. The permanent members of the intermediary round table come from the city government, particularly from the health and well-being department. In addition, different complementary members are also invited, depending on the need, to participate in different meetings to bring valuable, case-specific insights.

The model includes three types of relationships between the actors: governing relationships, sparring relationships, and collaborative innovation relationships. Governing relationships are based on formal coercive power. Its justification is grounded on the democratic system, legislation, and rules of city government. A governing relationship exists between the mayor's office and the different city departments subordinate to it. A governing relationship also exists between the mayor's office and the innovation platform.

Earlier research has examined four options for how the innovation platform may relate to the decision-making processes of the city government (Ojasalo, 2015b). First, the innovation platform can be subordinate to the central government of the city. Second, one or several of the city departments may have their own innovation platform(s), which are subordinate to them. Third, a connecting entity is added to the previous option within the city government. The purpose of this connecting entity is to share ideas, practices, and visions of the service innovation of each department's innovation platform. Fourth, the innovation platform is externalized so that a governing relationship does not exist with the city or it is weak. All these options are possible and they each have their advantages and disadvantages.

On the whole, the empirical material of this study suggests that the first option is the most suitable and the fourth one is the least suitable. Thus, our model is based on the first option: having the innovation platform subordinate to the city's central government. The main reason for why this option seems to be the best one, based on our empirical material, is that the open innovation platform requires a mandate to efficiently affect the city government and its practices. Therefore, it should be subordinate to central government and the mayor of the city. Even though the platform is subordinate to the mayor's office, the hierarchy should not interfere with the innovation platform's activities through a strong commanding policy. Our empirical material suggests that the mayor should act as the sponsor of the innovation platform and bear the overall responsibility, but that the intermediary round table should be responsible for the platform's strategic management and the platform director or coordinator should be responsible for the operational management of the platform. According to Ojasalo (2015b), with this option, the innovation platform is likely to have more freedom and it can develop and experiment with various visionary and future-oriented services. The success of this option highly depends on the support and vision of the city's top management team. However, with this option, there is a risk that the city departments may feel as though they are "outsiders".

Sparring relationships are based on sharing knowledge and networks. Those who spar share their knowledge, experience, and contacts of their networks to improve the professional performance and the effectiveness of the one being sparred. Sparrers are invited based on their professional expertise and knowledge or their position in a certain organization. They may have their own interest to gain something from the sparring relationship or they may function altruistically. In the present model, a sparring relationship exists between the open innovation platform and the central government of the city, city departments, companies, third sector organizations, research institutions, citizens, and other cities.

A collaborative innovation relationship aims at new solutions, which are new services, tangible products, or processes. Whereas the activity of sparring relationships is service or product development, the purpose of collaborative innovation is to develop new solutions that solve the city's problems. Both the city government as well the external actors have their interests in the innovation collaboration. The city seeks services and products that will solve its problems effectively and effi-

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ciently. The private companies are interested in new business opportunities and selling solutions to the cities. The third sector organizations aim to promote their own mission, and research organizations are interested in creating new knowledge. Citizens are interested in improving the quality of the public services and infrastructure of their own city, and ultimately the quality of the life in the city. Other cities are interested in knowledge transfer and learning about the best practices.

Conclusion

The purpose of this article was to increase knowledge of how an open innovation platform addressing a city's needs can relate to its public sector decision-making processes as it seeks to become a smart city. The article contributed to this objective by proposing a model for an open innovation platform based on a qualitative explorative study and the data from in-depth interviews and co-creative multi-actor workshops with participants from city governments and other organizations. It increased the knowledge of combining different decision-making cultures with the help of an intermediary organization in the context of collaborative innovation. It also proposed a practical approach for organizing three types of relationships of an innovation platform with the city's public sector decision making and external actors: governing, sparring, and collaborative innovation relationships.

The model has several practical implications. Following the ongoing global urbanization development and hype around smart cities, an increasing number of cities aim to brand themselves as "smart". Enhancing innovation networks and clusters lies in the heart of the smart city concept. Cities usually initiate a program or mechanism for this purpose: our model offers a simple starting point for cities and local actors to build one. It helps to clarify the roles and responsibilities of different actors by distinguishing governing, sparring, and collaborative innovation relationships. It makes explicit that effective innovation collaboration requires both permanent and case-specific expertise. It helps to connect the innovation platform to the city government in the way that gives it enough high-level sponsorship to back up its freedom and future-oriented approach, but at the same time involves the city departments in both strategic management of the platform as well as grassroots innovation projects. The model also shows the variety of external actors that need to be involved in co-creative innovation of any city wishing to break away from the traditional silo-based bureaucratic mode and truly be a "smart" city. The model offers a practical approach to orchestrate collaborative innovation of cities, which brings together viewpoints and goals of different stakeholders and enables in-depth and holistic understanding of problems. It helps the cities to learn, develop, and coordinate cross-departmental collaborative innovation, thus opening up mental locks of siloed organizations and removing administrative bottlenecks of urban innovation. It enhances grassroots democracy and social inclusion of minority groups in co-creation of new public services. It allows private companies to better understand the logic of public procurement and develop new business with high potential of scalability among cities home and abroad.

Opportunities for further research, experiments, and pilots emerge from the current empirical study. First, more knowledge is needed of public collaborative innovation in a multicultural context, because in metropolitan areas, the collaborating actors often come from diverse cultural backgrounds. Second, more research is needed on how different innovation platforms and intermediaries can collaborate more effectively with each other. Third, more knowledge is needed to explore special means to stimulate SMEs, startups, and young entrepreneurs for innovation collaboration with cities.

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Integrating Open Innovation Platforms in Public Sector Decision Making

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Collaborative Innovation with External Actors: An Empirical Study on Open Innovation Platforms in Smart Cities

Jukka Ojasalo and Heini Kauppinen

"*What is a city, but the people?*"

True, the people are the city.

William Shakespeare (1564–1616)
Poet, playwright, and actor
In *Coriolanus* (Act III. Scene I.)

Despite the rapid increase of public–private–people partnership (PPPP) programs at the global scale, the scientific knowledge of collaborative innovation in cities is scarce. All smart city initiatives emphasize collaborative innovation for better services and products to address the needs and problems of modern cities. Indeed, there is an evident need for both scientific and practical knowledge in this area. Based on an extensive empirical study of open innovation platforms in smart cities, this article seeks to address this knowledge gap by increasing the knowledge of opportunities and challenges of collaborative innovation between a city and external actors, including companies, third sector organizations, research institutions, and citizens. The opportunities relate to novel services, products, and solutions, as well as economic gains, regional development, and systemic and process improvements. The challenges relate to city governments and external actors.

Introduction

The role of the cities is expanding from the producer and buyer of services into an innovator of services. Increasingly, cities need to initiate, foster, and enable innovation that offers solutions to their needs and problems (Bakici et al., 2013). Urban innovation is at the heart of the concept of a smart city (Caragliu et al., 2011; Hollands, 2008; Komninos, 2002; Shapiro, 2003; Zygiaris, 2013). In today's dynamic and globally networked society, innovation increasingly takes place in collaborative networks. Indeed, cities are facing the challenge of stimulating and orchestrating collaborative innovation in multi-actor networks. Collaborative innovation relates to the larger concept of networked government, which in turn includes not only the effective coordination across government organizations, but also the possible integration of organizations from both the profit and nonprofit sectors into production systems designed to achieve public purposes (Moore, 2009). However, so far, both the scientific as well as pragmatic knowledge of this area is in its infancy. Thus, there is a clear need to increase the knowledge in this field. The present study responds to this need.

The purpose of our empirical study is to increase the knowledge of the opportunities and challenges of collaborative innovation between a city and external actors. External actors include companies, third sector organizations, research institutions, and citizens. This empirical study finds and reports on various opportunities and challenges of collaborative innovation in cities.

The rest of this article is organized as follows. First, based on the literature, we discuss strategies for collaborative innovation, as well as advantages and obstacles/risks of collaborative innovation in the public sector. Then, we explain the empirical method of our study. Next, we describe the opportunities and challenges of collaborative innovation between a city and external actors found in the empirical study. Finally, we draw conclusions.

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Strategies of Collaborative Innovation in the Public Sector

Collaborative innovation in a smart city context requires an effective strategy for bringing together diverse stakeholders to develop solutions to the city's problems. Harris and Albury (2009) propose four such strategies for opening up innovation in public services to a wider set of actors: i) developing new markets, ii) putting citizens at the heart of services, iii) creating and supporting local "social innovation zones", and iv) strengthening intermediary innovation organizations. Several other researchers have also emphasized the role of innovation intermediaries as a strategy for collaborative public innovation (e.g., Bakici et al., 2013; Braun, 1993; Fung & Weil, 2010; Stewart & Hyysalo, 2008). Similar to innovation intermediaries, innovation platforms (or open innovation platforms) represent a strategy for fostering collaborative innovation (Consoli & Patrucco, 2008; Ojasalo, 2015a, 2015b, 2016; Patrucco, 2011). Ojasalo (2015a, 2015b) positions an innovation platform as an approach that systematically attracts, facilitates, and orchestrates innovation with external actors with the goal of developing solutions to the platform owners' own problems and needs. In the current research, the platform owner refers to a city.

Eggers and Singh (2009) identify five strategies for public sector collaborative innovation – cultivation, replication, partnership, networking, and open source – that range in focus from generating innovation inside the organization to externally oriented strategies that seek out and leverage promising ideas from elsewhere. These strategies can be placed in a continuum where cultivation is the most internally oriented and open source the most externally oriented. The cultivation strategy engages employees at all levels of a public organization to exchange, develop, and test ideas together. The replication strategy enhances collaborative innovation with other public organizations. The partnership strategy fosters collaborative innovation between public and external partners, which include private companies and nonprofit organizations. The networking strategy utilizes the innovation assets of a diverse base of organizations and individuals to: i) discover, develop, and implement ideas within and beyond organizational boundaries; ii) better capture customer response to services; and iii) create learning organizations. The partnership strategy involves bilateral relationship, whereas the networking strategy is based on multi-actor networks. The open source strategy uses the Internet to attract and enable external and unknown actors to develop solutions to the public sector needs. Partnership, networking, and open source are the strategies that relate to the focus of this article.

Leminen and Westerlund (2015) introduced a four-option framework for collaborative innovation in cities, which features a matrix based on who is initiating the collaboration (citizen-initiated versus company-initiated) and what is the target of the collaboration (improving what already exists versus creating something new):

1. **Improvement of everyday life and activities:** this option is initiated by citizens and aims to improve what already exists. It is supported by offering tangible and intangible resources such as tools and knowledge rather than interfering or steering the activities. Citizens have their own motivations. Innovation outcomes include the ideas and knowledge created by citizens and user communities in real-life contexts.

2. **Creative consumer experiences:** this option is initiated by citizens and aims to create something new. It is supported by offering tangible and intangible resources such as tools and knowledge. It involves creative and learning activities, as well as novel forms of collaborative activities. The innovation outcomes cover knowledge of emerging needs of citizens and novel forms of open collaboration.

3. **Experimentation and implementation of new technologies:** this option is initiated by companies and aims to improve what already exists. It is supported by experiments and implementations by offering context, knowledge, and tools. The innovation outcomes of this option are validation of new ideas and prototypes of novel technologies.

4. **Creation or re-creation of new business:** this option is initiated by companies and aims to create something new. It is supported by using the city as a platform for creating new ideas, where the plurality of stakeholders, knowledge, and ideas come together. The city is a source of ideas as well as a collaboration method between systems and communities. The innovation outcomes are new business opportunities.

Tukiainen and Sutinen (2015) brought forward the model of a city as means to accelerate open innovation. This model offers a holistic view to use collaborative innovation to address several of a city's general

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objectives. Similarly, Tukiainen, Leminen, and Westerlund (2015) discuss the orchestration of a city as a collaborative innovation platform.

Finally, the literature shows that collaborative innovation in the public sector has several advantages compared to in-house innovation, but that – as shown in Table 1 – it also has several obstacles or risks (Bommert, 2010; Hennala et al., 2011; Krogh & Torfing, 2015; Sørensen & Torfing, 2011).

Method

The present empirical findings are based on a study-in-progress dealing with open innovation platforms in smart cities. The research method is qualitative and is based on 32 in-depth interviews (Gummesson, 2000). The interviews were audio recorded and later transcribed. The interviewees were also given the opportunity to make drawings to help express their ideas during the interviews; these drawings were photographed,

Table 1. Advantages and obstacles/risks of collaborative innovation in the public sector

Author(s)	Advantages	Obstacles/Risks
Bommert (2010)	• Idea generation is strengthened • Idea implementation is facilitated • Idea diffusion is facilitated • May influence the broader socio-political environment • Helps to overcome organizational and cultural restrictions of the innovation cycle	• Potential for one party to impose their own interest and undermine the pursuit of public value • Distribution and lack of clarity regarding accountability for public value
Hennala et al. (2011)	• Crossing the borders and distances in an innovation network with expertise, motivation, and creative thinking skills	• Securing the commitment of network collaborators • Creating a situation in which all parties perceive benefits from the collaboration • Use of brokers in the innovation process
Sørensen & Torfing (2011)	• Generation of ideas is spurred • Selection of ideas is improved • Implementation of the selected ideas is enhanced • Dissemination of innovative practices in the public sector is propelled	• Cultural barriers • Institutional barriers • Interorganizational barriers • Organizational barriers • Identity-related barriers
Krogh & Tornfing (2015)	• All phases of the innovation process can be strengthened • The definition of problems and challenges will be more accurate • Creativity increases in multi-actor collaboration • The cost/benefit analyses and risk assessments of new solutions is better • Implementation of the selected solutions is strengthened • Participating stakeholders act as innovation ambassadors in their own networks	• Difficulties encouraging relevant and resourceful stakeholders to engage in collaboration • Inability to collaborate productively • Stakeholders have different professional approaches • Stakeholders are unable to produce innovative solutions to the problem at hand and the collaborative process becomes "locked"

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collected, and interpreted in the analysis. The informants of the in-depth interview came from Finland (24), Spain (1), Netherlands (2), China (3), Italy (1), and the United States (1). The informants were selected based on their expertise or experience in innovation in cities, public procurement, living labs, or other types of innovation intermediaries in a city context. The interviewees include individuals from city administration, private companies, third sector organizations, innovation intermediaries, as well as from research institutions. Interviewees selected from the city administration had experience or expertise in innovation, urban development, and collaboration with private/third sector organizations. Interviewees selected from the private sector had experience or expertise in collaboration with cities. Interviewees selected from the third sector had experience or expertise in collaboration with cities. Interviewees from innovation intermediaries had experience or expertise in living labs or facilitation of collaborative innovation networks. The researchers were academics who have examined innovation intermediaries or urban development. The interviews each lasted between 1 and3 hours.

In addition to in-depth interviews, we collected material from four co-creative workshops addressing innovation collaboration between cities and external actors. The data from the workshops includes transcriptions, notes, photos of written and drawn material, as well as written summaries of the main conclusions of the workshops. The data were analyzed by open coding and selective coding, following a grounded theory method (Glaser, 1978).

Empirical Findings: Opportunities and Challenges

Our study identified a number of challenges that arise when a city engages in collaborative innovation with companies, third sector organizations, research institutions, and citizens. In addition to self-evident opportunities and benefits, such as revenues and profits to companies, more efficient services to the cities, and benefits to the society as a whole, we found several unexpected results. The key results are summarized in Table 2 and are described in greater detail in the subsections that follow. The opportunities and benefits relate to novel services/products/solutions, economic gains, regional development, as well as systemic and process improvements. The challenges relate to city government and external actors.

Table 2. Opportunities and benefits and the challenges of collaborative innovation with cities

Opportunities and Benefits
A. Novel services/products/solutions
1. Unforeseeable innovation potential 2. Open data innovations 3. Sustainable solutions through long-term innovation partnerships
B. Economic gains
1. Cost savings to cities 2. Scalable solutions and services 3. Raising private money for public innovation 4. Better joint proposals for public funding of innovation
C. Urban and regional development
1. Favourable publicity and branding of cities and regions **2.** Emergence of regional and national innovation clusters
D. Systemic improvements and process improvements
1. Learning and knowledge sharing 2. Citizen participation and bottom-up innovation 3. Innovation from the interfaces between actors from different sectors and industries 4. Fostering public–private–people partnerships 5. Potential of coopetition for companies 6. Change of attitudes and enrichment of jobs 7. Sharing city's infrastructure with external actors 8. New opportunities for startups and SMEs 9. Turning the whole city into an innovation platform
Challenges
E. Challenges of city government
1. Silos in city organizations 2. Slowness of city processes 3. Lack of a systematic approach for cities to foster innovation 4. Reluctance of city organizations and employees to take risks 5. Resistance to change in city organizations 6. Lack of resources in cities
F. Challenges of external actors
1. Negative attitudes of companies towards cities 2. Rivalry set-up of actors 3. Complexity and size of innovation projects

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A. Opportunities and benefits: Novel services/products/ solutions

1. **Unforeseeable innovation potential:** Our data show that external input to any innovative process increases the potential to see things from a fresh perspective, which in turn can create unpredictable value and benefits. Cities have large pools of data and knowledge of almost all areas of life. However, the data and knowledge are often buried in organizational silos and they are not exploited most effectively. Often, it is easier for an external party to pinpoint the areas requiring development. These areas may be unforeseeable to the city personnel, but they represent potential innovation. Indeed, innovation platforms enable unexpected encounters, which in turn may lead to new business opportunities, innovation, or at least new perspectives, learning, insights, and ideas. Through collaborative innovation, it is possible to create connections that the parties did not even know might be useful for them. Also, through collaborative innovation, the development ideas from the front-line employees of a city can be utilized more efficiently. Moreover, the establishment of new customer relationships and new revenues becomes possible. The current economic crisis makes way for changes and opportunities to create something new. As the economically difficult times call for transformation, collaborative innovation encourages stakeholders to renew their thinking and actions and provides opportunities for better visibility. The rapid development of technology also enables unforeseen innovation. Furthermore, our data show that students and young citizens are also a potential source of unforeseeable innovation.

2. **Open data innovations:** Cities receive and store large amounts of various kinds of data as part of their public services. Often, the quantity of the data is large enough to function as "big data" for various digital services. Therefore, the data possessed by a city has great potential to enable a large number of new innovations.

3. **Sustainable solutions through long-term innovation partnerships:** Scalable solutions, services, and processes foster sustainability. Collaborative innovation enhances the usage of resources and, in the long term, enables resource savings. Sustainable and profitable services that consider the interest of all stakeholders can be designed more easily through collaborative innovation. Collaborative innovation enables the city to develop various preventive services and thus create sustainability. It also enables them to think differently about the production and consumption of public services, and to innovate services that will reduce costs and save resources over time. Long-term collaboration would enable better partnerships and more efficient production of services while adding to customer understanding.

B. Opportunities and benefits: Economic gains

1. **Cost savings to cities:** Collaborative innovation in cities brings about cost savings in several ways. First, if the innovation network developing the solution involves several cities, they can share the development costs. Second, if several cities adopt the same innovation, it increases the production volume, enables economies of scale, and is likely to decrease the price. Third, if several cities adopt the innovation, they can also share the maintenance costs.

2. **Scalable solutions and services:** Collaborative innovation has a clear potential to result in solutions and services with substantial scalability. This also applies to process innovation and best practices. Scalability means more business opportunities, even internationally. With good scalability, the benefits of the innovation can be disseminated within the same city to different departments or different parts of the city, to other the cities home, or even abroad. The public sector has potential to act as a dynamic engine of scalable innovation because it does not have a commercial interest itself. In contrast, scalability in the private sector may remain modest and diffusion of innovation may be slow because companies tend to hide information and carefully protect their intellectual property rights and innovations through patents and other mechanisms. The public sector may, therefore, be a forerunner of scalable innovation. Many of a cities' problems and needs are universal. Consequently, an innovation developed for the needs of one city has potential for substantial scalability. If one of the cities of the collaborative innovation network adopts the innovation, this functions as a favorable reference with other potential cities. Already, the fact that the solution was developed in collaborative innovation involving a city is a good reference. A city may also offer its contacts to enhance the diffusion of the innovation to other cities.

3. **Raising private money for public innovation:** It is in the interest of cities if new services and solutions can be developed without tax money. The current politic-

al mindset in most Western countries is that the cities should not strive to develop and produce everything themselves, but rather should aim to trust external partners to develop an increasing share of service innovation and production. Collaborative innovation represents a clear opportunity for this development.

4. **Better joint proposals for public funding of innovation:** Various funding opportunities exist for innovation for in cities. If an innovation project receives external funding from national or international sources – for example from the European Union's Horizon 2020 programme (https://ec.europa.eu/programmes/horizon2020/) – the city will save its own tax money. Better funding proposals with higher likelihoods of acceptance are likely to emerge from collaborative innovation networks. Networking and co-operation create stronger joint ventures by combining the different perspectives and strengths of each party. This approach may lead to more impressive projects and better innovation.

C. Opportunities and benefits: Urban and regional development

1. **Favourable publicity and branding of cities and regions:** Successful collaborative innovation allows favourable publicity and branding. People make the change happen. Positive word-of-mouth communication can lead to an improved city brand, and it does not necessarily require large investments moneywise. Taking part in cutting-edge collaborative innovation "gets the city noticed" through favourable publicity. This approach can be a means to brand a city, create a certain image for the city, and increase its reputation. Innovation network partners can evoke publicity that benefits all parties through, for instance, social media. Success stories can even receive international attention and thus help in internationalization and investors attraction. Advocates of collaborative innovation can be used for enhancing the attractiveness of all parties. Good publicity on forerunner innovation will boost the marketing efforts of all parties involved: the city, the companies, and the research and education institutions.

2. **Emergence of regional and national innovation clusters:** Larger innovation clusters enable the expansion of markets. Any technical interface can be similar between the cities, making them easier for external actors to embrace. Similar interfaces to city systems make business planning and benchmarking between the cities easier for companies. Thus, cities can join forces and create common interfaces for services, which consequently enhances the emergence of regional and national innovation clusters. An innovation platform facilitating collaborative innovation can be owned by several cities instead of one. Several owners provide more efficient, larger-scale learning, enhanced scaling of operations, and more efficient organization of activities. Also, the social responsibility of all the stakeholders can be more easily addressed. Combining forces also means that structural funding could be exploited more efficiently.

D. Opportunities and benefits: Systemic improvements and process improvements

1. **Learning and knowledge sharing:** Our empirical data suggest that a city could function in a sparring role, thereby enabling dialogue, confluence, and experimentation with different actors in order to create innovation. A culture of experimentation leads to learning and the growth of experience. Experimenting enables the creation of a working model of how the innovation process could function for collecting best practices and lessons learned. Experimental test cases show what works and what does not in reality. Learning from observed failures in the pilot phase represents an opportunity to improve an innovation. Also, sharing the knowledge eases the burden that each party would otherwise have to bear on their own. The incentive to collaborate comes from the realization that everyone benefits, at least in terms of learning and new insights. The parties learn from and with each other. Those who are involved in collaborative innovation have the potential to get one step ahead of those that are not. In addition to the learning gains to actors involved in collaborative innovation, all of society is eventually the beneficiary. Benchmarking the competing service providers enhances one's own services as well.

2. **Citizen participation and bottom-up innovation:** An open innovation platform enables the involvement of user communities on a larger scale and offers visibility, thereby creating opportunities for bottom-up innovation. The more the citizens are enabled to affect the outcomes, the more interested they become in participating. Although citizens may not think about the business opportunities for innovations, they are often very interested in developing and renewing their own urban living environment, which motivates them to contribute to the innovation process. Our data show that citizens and third sector organizations can also be trusted to lead their own projects.

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3. **Innovation from the interfaces between actors from different sectors and industries:** Often, the most fruitful innovations emerge through interactions and collaboration between different kinds of actors. Innovation projects for a city's needs often involve companies from different industries, including both large and small companies, third sector organizations, universities and other research institutions, citizens, and other cities. Such multi-actor innovation consortia have great potential for creating entirely new kinds of services, products, and solutions – even disruptive innovations.

4. **Fostering public–private–people partnerships:** There is an evident need for different options for public services and their future innovation and production. Public–private–people partnership (PPPP) is an increasingly popular approach for this purpose. Collaborative innovation enhances PPPP in general, which in turn may bring several benefits to all parties. It is important for the parties to understand each other's differences and make use of them. Encounters have to be regular and open in nature in order to build trust. Collaboration needs to be nourished and clear approaches for innovation through PPPP are required. Such approaches may be innovation platforms and intermediary organizations that systematically facilitate innovation in such partnerships.

5. **Potential of coopetition for companies:** Coopetition refers to a situation where two organizations both compete and cooperate with each other (Bengtsson & Kock, 2000). Collaborative innovation may give an opportunity to companies as well as the cities – that usually compete with each other– to engage in mutually beneficial collaboration. Coopetition between companies and between cities can lead to vitality and new innovations, creating benefits for the cities, regions, and nations. Coopetition can push actors to higher levels of performance.

6. **Change of attitudes and enrichment of jobs:** Collaborative innovation can change attitudes and create a more enthusiastic atmosphere in the daily work of city employees. Constant communication and co-operative work may positively affect working capacity in a positive manner and make people more efficient. Increasing knowledge and learning new things can lead to the realization of innovations as opportunities for a better future. Through collaborative innovation, city workers can be involved in innovation work and in implementing their own goals. Such activities can make them feel that they are doing something more relevant than their usual day-to-day tasks. Participating in co-creative workshops, for instance, can give the feeling of success as the real problems (from their point of view) are being tackled.

7. **Sharing city's infrastructure with external actors:** Many companies and third sector organizations are interested in learning, knowing, and utilizing their city's infrastructure. Sharing their city's infrastructure provides them with new resources for their existing and potential business. It also allows them to learn about the city, which has the potential to increase their competitiveness when serving their private sector customers as well as the city itself.

8. **New opportunities for startups and SMEs:** Startups and SMEs are often overshadowed by larger companies. Collaborative innovation creates more opportunities for smaller companies and enables them to show and prove their skills as well as to exploit of their niche know-how. Smaller actors are usually more agile, flexible, and open-minded, which fosters an experimental culture. Startups also tend to be more willing to experiment in innovation. An innovation platform and networks can offer support, mentoring, assistance in marketing and sales-oriented operations, and other resources, which are often scarce in small companies. Partnering opportunities and matchmaking are vital for smaller actors, and innovation platforms can help connect them with larger actors. In turn, smaller companies stimulate the larger ones to do things differently.

9. **Turning the whole city into an innovation platform:** A city as an innovative platform offers opportunities for developing new solutions in an agile manner and is a basis for competitiveness. The city infrastructure, processes, and special events can be designed to allow experimentation and innovation. This approach affects the attractiveness and economy of the city as well as the whole region. Successful cities attract people, companies, and investors. Different challenges and competitions with prizes and awards arranged by the city are a great way to engage people and businesses to innovate for the city. New business opportunities can arise through competitions. Embracing an innovation atmosphere lowers the barrier to external actors to recognize and take part in solving a city's challenges.

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E. Challenges of city government

1. **Silos in city organizations:** Cities have the historical and legislative burden of being organized into departments, which tend to "protect their own turf" from outsiders. Thus, other departments within a city as well external actors outside that city may have very little influence on the decision making and function of the department. Also, the role of professions and the professional identity of employees is often strong within city organizations. This also enhances the silo effect. Consequently, this all may prohibit the innovativeness of a department in several ways:

- The department may not be aware of the end user needs and may lack deep customer understanding. Most importantly, they may not see existing problems and needs holistically from the customer perspective. They may often see just one aspect or symptom of the problem. For example, when citizens and companies deal with a city, they often have to go from one department to another to get all the aspects of their problem covered.

- Several innovations require multi-sectoral collaboration. If the collaboration between the departments is stiff, their innovation potential remains modest.

- The department may have an extensive body of data and knowledge that has accumulated in their area. However, the department may not understand the potential value of the information for innovation. If an external actor – a company, for example – or some other city department had access to the data or knowledge, they may be able to exploit it for innovation.

- City employees are often obligated to primarily think about the objective of their own department and secondarily think about the larger objectives and needs of the city. Thus, their job encourages them to “think inside the box.” This limitation often results from the “management by results” approach implemented in cities, which has resulted in sub-optimization.

- Attitudinal reluctance to disturb the existing status quo within the city cements the stagnation that limits innovation. Collaboration between departments is difficult because people make sure not to "step on each other’s toes" and cause additional trouble. This reluctance stems from the existing culture in public administration, which has long historical roots.

- Actors outside one's own department are often perceived as “enemies” rather than potential partners for collaboration. This is a large obstacle to innovation and a lost opportunity because the most fruitful innovation activities often take place at the interface of silos.

2. **Slowness of city processes:** The decision making and processes of a city are perceived to be too slow for the requirements of dynamic innovation in general. Slowness is often referred as “bureaucracy”. The public sector must operate in terms of legislation in their decision making because of their regulatory responsibilities. Regulatory responsibility might require longer decision-making processes. Often, companies do not understand that cities are obligated to move slowly. In this sense, they are different by their nature. For a city, a year may be a normal or even considered a short timescale for decision making, but for a startup company interested in collaborative innovation, it may be an eternity.

3. **Lack of a systematic approach for cities to foster innovation:** Our study found that city employees recognize the need to foster innovation. However, the methods for doing so are still lacking. City officials often see problems that might be promising starting points for commercial innovation. However, there are no systematic approaches for how to turn the problem in hand into an innovation process that would hopefully result in a commercial service or product. In other words, city officials lack methods to help turn problems into products. The knowledge of the problem remains within the city hall and an opportunity for innovation is lost. City officials would need a systematic approach to deal with this issue. The approach should address the following questions: What is the process for dealing with a problem representing a potential innovation? How is the problem defined? Who covers the costs? What resources are required? Who takes the risk? Which city departments exploit the result? Consequently, the following challenges arise in the city hall in an attempt to turn a problem into a product: i) goal sharing challenges between city departments, ii) process management challenges, iii) organizational challenges for cross-departmental collaboration, iv) resource allocation challenges, and v) reporting challenges.

4. **Reluctance of city organizations and employees to take risks:** Risk aversion is often caused by the fear of failure, the fear of losing one’s job, or the fear of ruin-

ing one's reputation. The logic is that, if risks are not taken, then failures will not occur. City employees might not be willing to take risks for fear of misconduct. It is easier to stick to old habits and procedures. Also, a company's willingness or ability to take risks might also be low. Positioning relative to the competition is one of the forces that leads to reluctance. Moreover, the willingness to take risks depends on how much money and resources are needed. A city's ability to take risks can also be affected by the regulatory responsibilities it has for the success of a service. If a service is seen as a failure, a city might be responsible for taking corrective actions immediately. Furthermore, ambiguity around risk sharing can have an effect on the willingness to take risks.

5. **Resistance to change in city organizations:** Change resistance is often mentioned as a significant challenge to overcome, and it can even override good change leadership. This resistance concerns the attitudes of employees and is linked to above-mentioned fear and reluctance to take risks. There are also mental barriers to overcome. Strong bureaucracy and silos add to this phenomenon. The existing mode of operations is very hard to change. Additionally, change resistance can add to the impression of slow city processes. Our study findings call for a change of attitudes, a culture change, and efforts to reduce resistance to change. However, even though change leadership is often needed, it may not be effectively implemented.

6. **Lack of resources in cities:** Resources, mainly human or monetary, are perceived to be limited. Development and innovation work is seen as dependent on humans. Scarcity of resources and cutting existing resources is seen as a common challenge. Additionally, lack of resources is seen as a limitation to any innovation work. Recruiting more resources is banned on many occasions. Resources allocated for development work are small and continue to diminish. At the same time, the use of external consultants is often criticized. Working hours are always expensive and represent a large part of any project's budget. Lack of resources is often used as an excuse for not investing in innovation or development. Resource allocation is a challenge on its own. There is also a lack of knowledge about how to use the resources wisely. Reorganizing resources could help solving this problem.

F. Challenges of external actors

1. **Negative attitudes of companies towards cities:** In our study, some companies appeared to hold peculiar attitudes towards city organizations. Cities are often seen as less attractive partners for collaboration. Companies might lack understanding about a city organization's processes and functionality. Additionally, smaller companies or startups might not be interested in solving problems for cities due to perceptions about city processes being too stiff and slow. Often, companies do not realize that cities are partners of a different kind than private companies. They do not know or do not like the fact that cities need to follow legislation and policies in their decision making and processes.

2. **Rivalry set-up of actors:** Both cities and companies tend to compete against each other, meaning that cities compete against other cities and companies against other companies. Cities are facing very similar challenges and it seems unnecessary that all of them would "reinvent the wheel" time after time. Currently, it is not an easy job to establish collaboration, either between cities or between companies. This rivalry set-up appears to be affecting opportunities for open collaborative innovation. However, it is commonly recognized that collaboration and sharing would, indeed, yield more benefits and create more opportunities for innovation.

3. **Complexity and size of innovation projects:** Large and complex projects may turn out to be a barrier to innovation and exclude smaller partner candidates. Trying to implement large ensembles can also turn out to be slow and strenuous while making the holistic viewing of the overall project more difficult. Complex projects could be split into smaller parts instead. Also, attempts to forecast the future and make perfect plans without possibilities for flexibility or changing the plans are blocking innovation possibilities. This challenge is also faced by the city governments.

Conclusion

The purpose of this empirical article was to increase the knowledge of the opportunities and challenges of collaborative innovation between a city and external actors. Several practical implications stem from the present empirical findings. On one hand, our study shows that the city, as well as the external actors, may

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receive several significant and novel gains from collaborative innovation. Cities have subtantial hidden potential to enhance services for their citizens, generate new business for companies, and grow competitive regional ecosystems. On the other hand, it shows the variety of challenges and risks that need to be overcome to materialize the benefits.

The findings encourage cities to orchestrate and enable co-creative interaction between actors from different backgrounds and industries. Our study shows that cities should enhance networking in general, even if there are no clear goals in mind at the outset. Such multi-actor networking holds potential to eventually result in novel, unforeseeable innovation. Moreover, cities increasingly open up their data to be freely used by anyone. The data itself is raw material, but it enables innovation for various new services. In addition to opening up the data, cities should actively facilitate and stimulate external actors for collaborative innovation to exploit the opportunities of their data for profitable business and new services. Also, most cities are committed to supporting sustainable development. Cities can have a great impact on sustainable development in many ways, for example, due to their high procurement volumes. However, effective sustainable solutions often require holistic approaches and innovative multi-actor collaboration, both within the city government and with external actors in the region. However, to be effective, the collaborative innovation needs to be undertaken over the long term. Indeed, cities should more actively orchestrate large-scale and long-term sustainable innovation in multi-actor settings.

Orchestrating collaborative innovation requires effort from the city, however, our study suggests that the resulting gains are likely to exceed the costs of such efforts. Collaborative innovation has the potential to result in cost savings of service development and production. If the companies see the opportunity as attractive, they will invest in the innovation and thus share development costs. Similarly, consortia with reliable and innovative partners are more likely to receive public funding for the development and experimentation costs. Potential for scalability is a major gain from collaborative innovation with cities, while cities have similar problems and needs. A breakthrough solution in one city may easily be scalable in many other, both home and abroad. This is a clear incentive for companies to participate in collaborative innovation.

Cities such as Amsterdam and Barcelona have successfully branded themselves as leading smart cities. Collaborative innovation is always one of the most important building blocks of the smart city story and brand. Indeed, real-life success stories on collaborative innovation significantly help a city in building up its brand. A strong city brand gives several advantages to a city: it attracts companies, talented people, and research institutions, thus creating more jobs and economic growth. As a result, new industries and knowledge clusters may emerge in the region.

Collaborative innovation has the potential to make several systemic and process improvements within a city. Traditionally, the products and services procured by the city from companies are already in the commercial phase, in other words, they are ready to be used. Through collaborative innovation, the role of the city changes from buyer into stimulator and orchestrator of innovation. This means that the city expands its activity to the pre-commercial phase. This shift enables the culture of learning, knowledge sharing, and experimentation to grow in the city government. Fostering participatory democracy at the grassroots level is an increasing systemic change of modern urbanization development. Indeed, even though the collaborative innovation did not result in commercial product or service, it gives citizens the opportunity to improve their quality of life in concrete ways. Moreover, involvement in bottom-up innovation gives citizens a sense that they are listened to and can directly make a difference in mundane issues. In addition, digitalization and multichannel communication open up new ways to organize citizen participation in collaborative innovation and public–private–people partnership projects.

Cities are responsible for many large-scale issues that require holistic solutions, which typically require input from different industries. When actors from different industries come together in collaborative innovation, there is potential for novel solutions. With the right orchestration of collaboration, cities can catalyze radical and future-oriented innovation. This approach may include coopetition (where competitors collaborate), which may take place both between companies and between cities. As a result of collaborative innovation, the attitudes of people in city government may change from bureaucratic into innovative and experimental. This may enrich their jobs and increase their job satisfaction.

Cities possess plenty of valuable and multi-functional infrastructure, such as public spaces, hospital infrastructure, and recreational facilities. However, typically, the capacity of city infrastructure is just partly

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utilized. Through collaborative innovation, the opportunities of the sharing economy can be materialized to increase the capacity utilization of the city infrastructure. SMEs, third sector organizations, and citizens may develop business models and services based on renting the infrastructure, instead of extensive investments. Eventually, the whole city can be turned into an innovation platform with a new attitude of collaborative innovation and experimentation in the city government.

Several avenues for further research and policy recommendations emerge from our study. First, new governance system for cities should be developed and experimented with in the context of collaborative networked innovation. This should be conducted with both scientific research and piloting. Second, cities should develop and experiment with new ways of lean and agile collaborative innovation based on rapid testing and learning (Ojasalo & Ojasalo, 2015a, 2015b). Third, more research is required to develop approaches and scenarios for open innovation platforms and innovation intermediaries facilitating the collaborative innovation of cities.

About the Authors

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Heini Kauppinen is an experienced service design professional who holds an MBA from Laurea University of Applied Sciences in Finland. As a student, she was a member of the research group for this study the opportunities and challenges of collaborative innovation between a city and external actors. Her work and research interests include service innovation and design, co-creation, and project management.

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Q&A

Hanne Melin, Samuel Laurinkari, and Taina Tukiainen

Q. How Can Online Platforms Contribute to Smarter and More Prosperous Regions in Europe?

A. Commerce has always depended on connections. The difference today is how the online platform model is enabling connections that are cheaper, more evenly spread, and more accessible. Indeed, the online platform model has revolutionized commerce by reducing the cost of serving consumers over a large geographical area. This has effectively opened up commerce to any entrepreneur anywhere, and it is driving the emergence of new economic hotspots throughout Europe.

Traditional forms of commerce over distance carry costs related to transportation and logistics chains, regulatory and administrative red tape, different legal systems, communication and marketing, uneven access to information, difficulties in matching supply and demand, trust, and enforcement. Economists have for years confirmed that these costs increase as distance increases. So, the further away market participants are from each other, the less likely they are to engage in commerce with each other (Allen, 2013; Chaney, 2011; Disdier & Head, 2008; Lendle et al., 2012)

Due to the costs that come with distance, small enterprises have traditionally been confined to commerce within limited areas, such as the size of a city or the distance that a consumer would be willing to travel to the enterprise's place of business. Another way to think of it is that most traditional commerce models came with the cost of establishing certain facilities and firms were able to capture commerce only within a range of their facilities.

Being limited to small markets in this way is an impediment to building a viable and sustainable business as there might simply not be enough demand available, or a local economy might suffer from economic shocks or tail winds that depress demand. This is exactly what happened during the recent financial crisis. Between 2008 and 2013, domestic demand dropped by about 4% across the European Union (EU), while foreign demand grew by approximately 7% (Muller et al., 2014; European Commission, 2015a).

Today, in 2016, the more remote and less prosperous regions across the EU are hosting communities of active online small businesses selling across national borders (eBay, 2015). They leverage the online commerce platform model for direct access to European and global markets, and that enables them to contribute to the local economy and society. Extending commercial activity to a market the size of the EU's Single Market brings into play a potential customer base of 500 million people (European Commission, 2015b). This creates an opportunity for "[a] lot more businesses … starting up and existing companies … flourishing by finding new market niches thanks to the 'long tail' effect" (European Commission, 2011). This opportunity signals a potential for the EU to reduce imbalances between regions through digital market-driven growth, making all regions "smarter" in the process.

Overcoming the Cost of Distance

One of the fundamental revolutions brought about by the Internet and digital technologies comes about through online commerce, where the cost of transacting over distance has fallen dramatically. The chief reason is how much easier it is online to overcome uneven access to information and difficulties in matching supply and demand. A 2013 report by the European Commission's Joint Research Centre (Gomez-Herrera et al., 2013) concludes that distance matters far less online, explained primarily by the decline in communication costs.

Research by a team of economists at Sidley Austin confirms that distance indeed has a much less negative impact on firms transacting across borders in the online marketplace (Lendle et al., 2012). For example, based on a global dataset of transactions through eBay – the employer of the current article's first and second authors – Sidley Austin concluded that distance matters 83% less for international transactions compared to traditional transactions (eBay, 2013).

Even within the EU, geographical distance has a negative effect on cross-border activity. However, the detrimental effect of geographic distance on trade within the EU is more than four times lower when commerce is conducted leveraging the online commerce platform model, as compared to traditional cross-border trade.

This effect can also be seen in the 61% growth rate of EU cross-border commerce over the eBay Marketplace for the period 2010 to 2014, compared to the modest growth of 15% for traditional commerce (eBay, 2015).

But overcoming distance to the extent where small businesses and entrepreneurs start engaging in international commerce takes more than simply adding the Internet to retail.

Although recent years have seen an increase in the use of the Internet as a sales channel among retailers in the EU, there has been no clear upward trend in the level of cross-border activities (European Commission, 2013). The European Commission reports that, in 2014, only 12% of firms in retail sold online across borders within the EU (European Commission, 2015c). This situation is strikingly different to what is happening on the eBay Marketplace where 93% of firms, predominately microfirms with less than 10 employees, engage in cross-border sales (eBay, 2015).

The difference can be explained by how the online commerce platform model acts as an "e-commerce booster" (European Commission, 2015d). It provides access to both the Internet's global reach as well as to relevant technology tools that further mitigate commerce costs, such as fulfillment services, website design, sales insights and research tools, search optimization, and paid search marketing. In contrast, retailers selling online using their own website, which represents 80% of online retailers (TNS, 2015), must themselves make the investments required to attract consumers from abroad.

Regional Variation

The European Commission has since 2000 recognized the important role online commerce could play for economic, social, and territorial cohesion: "new technologies … provide an opportunity, by overcoming geographical obstacles, for bringing the outermost regions closer to the heart of Europe and combating various forms of exclusion" (Erkki Liikanen in Press Release IP/00/1477: European Commission, 2000). The Commission has called out the so-called Information Society as a real opportunity for regional development as it could help "even the remotest regions to network with the rest of the Union and beyond" (Michel Barnier in Press Release IP/03/396: European Commission, 2003).

Nevertheless, in 2008, the Commission let it be known that, in terms of economic activity, there "continues to be heavily congested urban areas and other areas with untapped potential" across the EU (European Commission, 2008). So, whereas in 2000, there was confidence that "through the internet and e-commerce we can achieve the 'death of distance'" (European Commission, 2000); eight years later, the pattern of economic activity was still "more concentrated across the EU than population" (European Commission, 2008) .

This disappointing conclusion aligns with the literature and research where strong correlation is again and again confirmed between regional entrepreneurship or competitiveness and population density, GDP per capita, and proximity to metropolitan and capital areas, as the following examples show:

- Entrepreneurial activity is traditionally greater in densely populated regions. Research into regional entrepreneurship has concluded that the number of entrepreneurs is often linked to population growth and density (European Commission, 2013b). Bosma and Schutjens (2011) found that "urban regions, indicated by high population density, are characterised by many nascent entrepreneurs per inhabitant".

- Regional entrepreneurship and competitiveness are traditionally connected to economic growth. Research presented by the Regional Entrepreneurship and Development Index (REDI) displays a close connection between entrepreneurship and economic development as measured by GDP per capita (European Commission, 2013b). The same research also found a strong correlation between GDP per capita and regional competitiveness – as measured by the Regional Competitiveness Index. Furthermore, the literature has argued that regions with persistently high economic growth are characterized by positive attitudes towards entrepreneurship (Bosma & Schutjens, 2011).

- Metropolitan and capital regions traditionally hold higher degrees of entrepreneurship and competitiveness. For instance, the regions of Berlin, Ile-de-France, and London top the national REDI ranking on entrepreneurship in Germany, France, and the United Kingdom. Similarly, these metropolitan and capital regions also have some of the highest levels of competitiveness (Bosma & Schutjens, 2011; European Commission, 2013b). The literature on regional entrepreneurship describes cities as "the centres of diversity, creativity and new ideas" and argues that urban areas attract people with a more positive attitude to entrepreneurship (Bosma & Schutjens, 2011).

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New Economic Hotspots Emerge

eBay Public Policy Lab and Sidley Austin have analyzed the impact that the online commerce platform has on the EU regions, finding that the traditional ties between entrepreneurial success and population density, GDP per capita, and proximity to metropolitan areas are getting weaker (eBay, 2015). While the ties have proved strong for decades – they have even been described as "persistent" (Bosma & Schutjens, 2011) – a closer look at the digital economy reveals an ongoing shift at the regional level with new "economic hotspots" emerging outside of the conventional ones.

The analysis covered the level of online small business activity in 2014 across EU regions, as defined by Level 2 of the Nomenclature of Territorial Units for Statistics (NUTS 2; tinyurl.com/8cutsh9). By combining two indicators – i) the number of eBay small businesses (for the purpose of this research limited to those with at least $10,000 USD in annual sales on eBay) per 100,000 inhabitants and ii) sales by eBay small businesses per 100,000 inhabitants – a so-called "digital density" of each European region at the NUTS 2 level was calculated (eBay, 2015).

The digital density assessment shows that metropolitan regions or regions holding a higher GDP or a larger population, or both, are not necessarily the ones with the greater community of active online small businesses when analyzed on a per capita basis: many of the more remote and less privileged regions are also participating in the digital economy at very meaningful, even surprising rates. The findings suggest that, when costs associated with commerce over distance are slashed as they are on the online commerce platform, economic opportunity expands to not only more enterprises but also more places. Herein lies a great potential of delivering on the EU's ambition of "equal opportunities for citizens and enterprises, wherever they are located" (European Union, 2011).

A Shift from Regional Variation to Regional Integration

This digital density assessment is not the first attempt to understand how the digital economy touches the regions of the EU. But, to our knowledge, it is the first to detect a shift away from small business success being dependent on setting up operations in a metropolitan region with a large population and high overall economic activity. eBay Public Policy Lab has produced an interactive map of digital density compared against national GDP and population, with analyses for each EU country (see screenshots in Figure 1 and full interactive map at ebaymainstreet.com/digital-density-europe/country.htm). This map highlights that, in many places across the EU, the online commerce platform model is weakening the long-lived linkage between entrepreneurial success and population density, GDP per capita, and proximity to metropolitan areas. When distance is reduced as an impediment to building and sustaining operations in remote locations, small businesses have a greater chance to emerge outside of the previous "must-be-in" cities and areas: enterprises are no longer confined to consumers in their very proximity but can cover an immense range at little extra cost. Close to 100% of the eBay small businesses in the regions represented in eBay's map sell across borders and most of them sell both within the EU as well as to countries outside of the EU. In traditional commerce, this is something only fairly large enterprises located in economic hubs or with wide-spanning networks of facilities could dream of doing. Now, small business owners can remain in their hometowns irrespective of where these are situated and they can contribute to the local economy and society thanks to their ability to access European and global markets.

These research findings suggest a potential for economic progress that is more inclusive. The prospect of economic growth is becoming geographically more balanced in the digital economy than in the traditional economy, where thriving central hubs have been found to dominate.

Conclusion

As the online commerce platform model reduces the costs of commerce over distance, it helps create economic activity and entrepreneurship in less populated, less prosperous, and more remote regions. This is a force for enabling a great diversity of businesses across the EU and supporting the rise of smart regions irrespective of location and their preconditions.

The entrepreneurs showcased in the map are all emerging leaders in "a new commerce geographic". They show that there is an alternative to market consolidation and uniformity; they prove that self-employment is not only a viable option to traditional employment but a way of making ends meet with a deep sense of fulfillment and accomplishment; and they suggest to us that efforts making the EU's regions and cities smart will support more inclusive growth.

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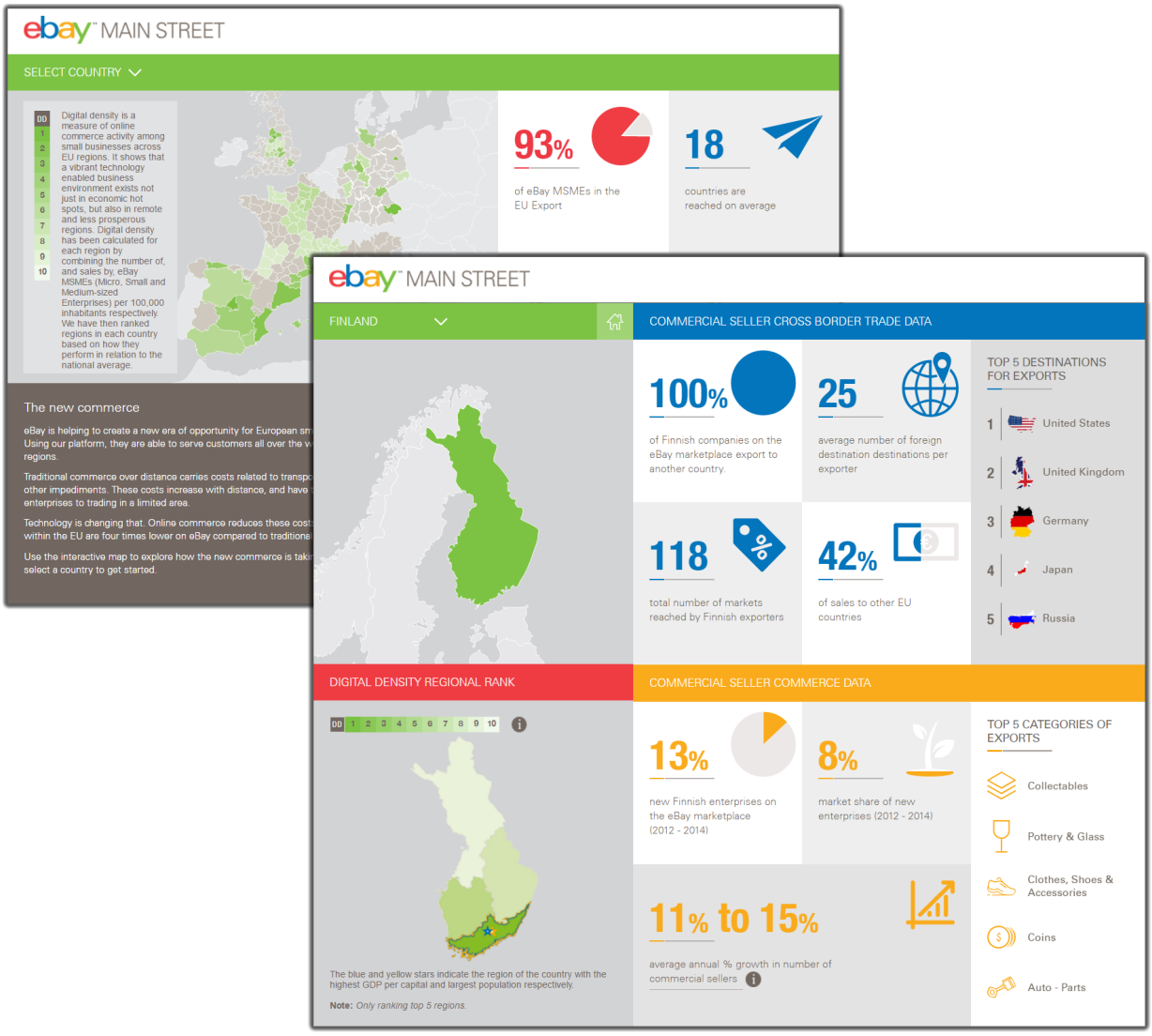

Figure 1. Screenshots of the eBay Public Policy Lab's "Digital Density" interactive map, including an example of a country-specific analysis (Finland). Full interactive map available at: ebaymainstreet.com/digital-density-europe/country.htm

This is good news in view of the recent downturn. Already in 2010, the European Commission warned that a continuing decline of small businesses due to competitive pressure from large merchants raises territorial and social cohesion concerns. And recently, the Commission reported that "[t]he legacy of the crisis is still particularly acute, in particular on labour markets with unemployment remaining very high at EU level" (European Commission, 2015c). Moreover, there remain great variations in terms of achieving the targets set by the EU 2020 Strategy, in particular, the employment target, between regions as well as between, on the hand, cities and, on the other hand, towns, suburbs, and rural areas (European Commission, 2015e).

Supporting online, small, yet international, businesses is thus central in ensuring inclusive growth and job creation; and promoting the online commerce platform model to that end should form a central part of efforts making regions smarter within the EU.

An example of how this could look is the pilot project initiated by the private sector development authority in Mönchengladbach, Germany, in 2015. The authority contacted eBay for help with bringing local businesses online, and eBay assisted with establishing online presence for the businesses and advising them on marketing their products to local as well as foreign customers. The pilot phase ran for nine months, and during that

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period the 79 participating businesses sold a total of 87,000 items online, generating more than €3.2 million in additional sales (eBay, 2016).

The project's primary objective was to bring the town's merchants online. But, the project also led to the majority of participating businesses starting to engage in exports. During the pilot phase, a total of 84 different countries were served out of Mönchengladbach, suggesting that a program for close liaison between a city, town, or region; its businesses; and an online commerce platform can make a successful foundation for enterprise expansion.

Such a structure introduces the workings of an online commerce platform to a group of merchants, thereby creating social ties between the participants; it connects them with similar businesses that are already engaged in platform-based internationalization; and it effectively provides a network for sharing of knowledge about entrepreneurial opportunities and practicalities. This is a three-legged structure for supporting the making of smart regions across the EU.

About the Authors

Hanne Melin is Director of Global Public Policy at eBay, where she leads eBay's Public Policy Lab for the Europe, MiddleEast, and Africa region (ebaymainstreet.com/lab). Hanne is also a member of the European Commission's Strategic Policy Forum on Digital Entrepreneurship, and she represents eBay as a member of the World Customs Organization's Private Sector Consultative Group. Before joining eBay, Hanne was an associate at the law firm Sidley Austin LLP based in Brussels, where she practised competition law for five years. Hanne holds a Master's degree in International Business Law from King's College London, she is a guest lecturer at the law faculty of Lund University (Sweden), and is a frequent speaker and writer on the topic of online commerce and trade policy.

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