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Cities as Collaborative Innovation Platforms

Taina Tukiainen, Seppo Leminen, and Mika Westerlund

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

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

Introduction

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

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

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

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

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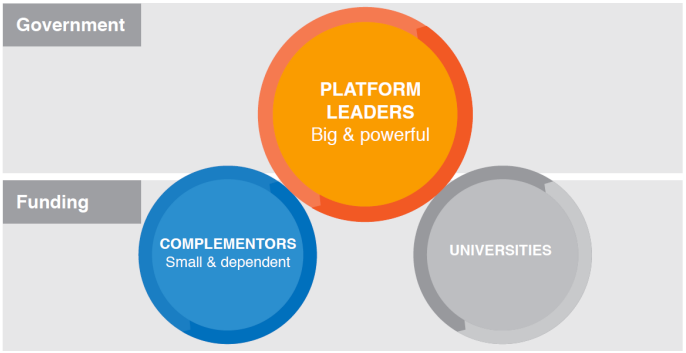

Figure 1. The key stakeholders in business ecosystems (modified from Tukiainen et al., 2014)

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

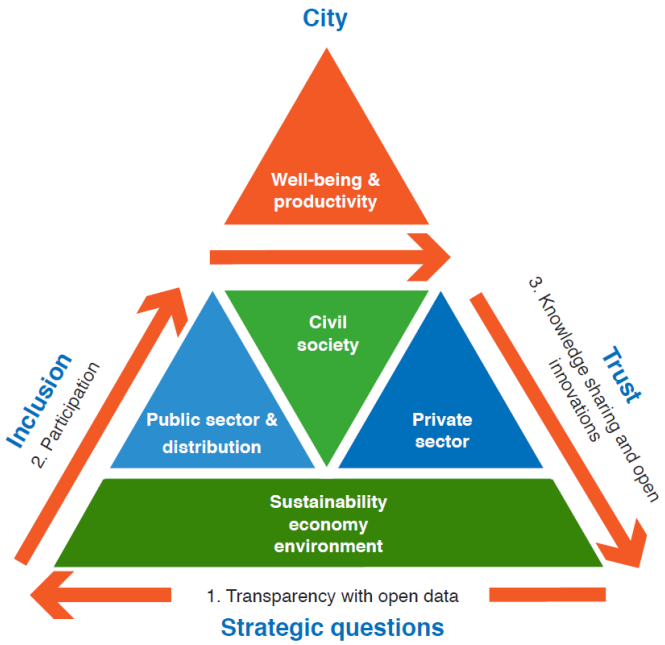

Figure 2. The model for the cities to accelerate open innovation (Tukiainen & Sutinen, 2015)

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

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

Living Labs and Collaborative Innovation Platforms in Cities

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

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

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

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

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

Research Design

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

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

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

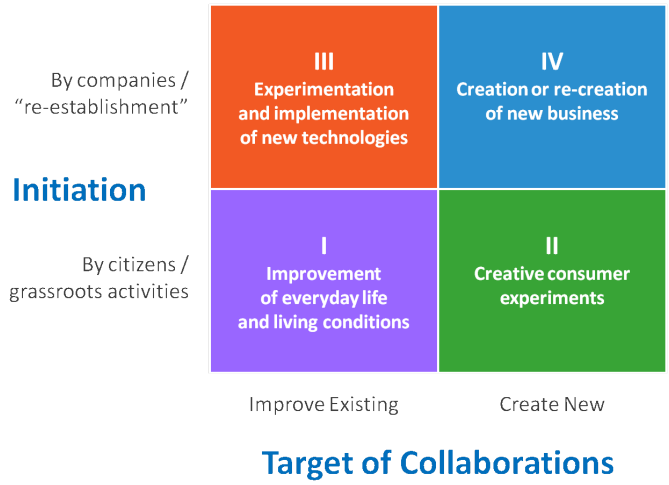

Figure 3. Collaborative innovation in cities (modified from Leminen & Westerlund, 2015)

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

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

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

- An extensive literature review on ecosystems and living labs

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

Case Study: Espoo City

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

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

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

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

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

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

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

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

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

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

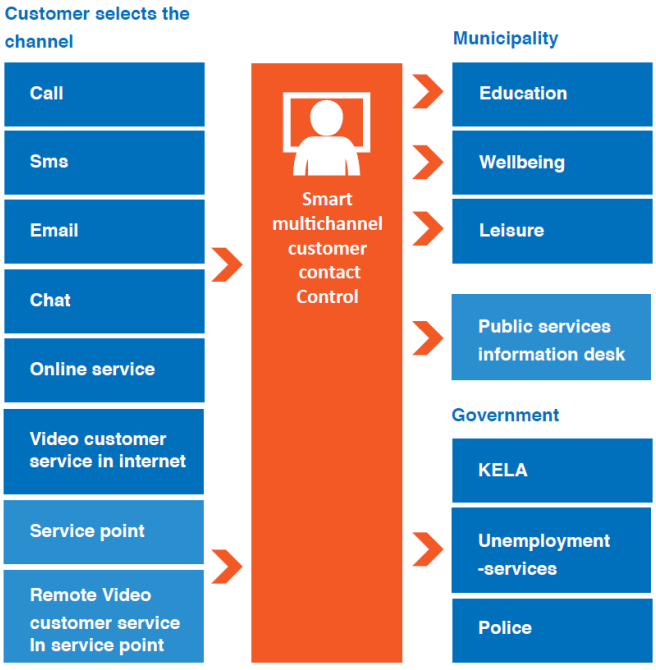

Figure 4. Multichannel customer services (Tukiainen & Sutinen, 2015)

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

Conclusion

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

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

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

About the Authors

Taina Tukiainen is a Senior Researcher at Aalto University in Espoo, Finland, and she is a Cabinet Member of the President of the European Union Committee of the Regions (CoR). She has worked for over 20 years within industry and universities and for over 10 years at Nokia Corporation as a senior manager, and she has worked on various projects with international university and industry collaboration. She was, until 2014, Director of Digibusiness Finland. Her research interest is strategic research including innovation, technology management, and entrepreneurship. Taina's doctoral dissertation was T*he Unexpected Benefits of Internal Corporate Ventures: An Empirical Examination of the Consequences of Investment in Corporate Ventures* (2004), and the topic of her latest book was *The Finnish Startups in Globally Evolving Ecosystems: Value for Finland* (2014). She has recently published papers in *Organization Science* and *MIT Sloan Management Review.*

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