



Wiring up multiple layers of innovation ecosystems: Contemplations from Personal Health Systems Foresight



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ABSTRACT

Many foresight exercises have been undertaken with the aim of improving the performance of innovation ecosystems. These ecosystems extend across different layers including the organisational, sectoral, regional, national and international dimensions. The interconnectedness of these layers has not received much attention in foresight literature and practise. However, both the development and diffusion of innovations are subject to framework conditions not only within, but also across, multiple layers of innovation ecosystems.

The design and management of foresight exercises are thus liable to addressing and serving these different layers — especially when the goal is to improve the performance and impact of such “interconnected and interdependent systems”. This paper develops further the concept of ‘multi-layered foresight’ by addressing multiple layers of innovation ecosystems in foresight design and management. We explore the implications of applying this type of foresight on improving systemic understanding, enhancing stakeholder networking and developing innovation capacities across the layers of ecosystems. The theoretical underpinnings are tested through a case study of the ‘Personal Health Systems (PHS) Foresight’ project. This project explored international future developments in the health sector, which is characterised by multiple disciplines, communities of practise, technologies, and geographical contexts. In the case of PHS the emerging innovation ecosystems are often conditioned by fragmented development communities, major barriers to market development, and duplication of efforts. The project combined analytical, social networking, online envisioning and scenario building methods to address complexity and create impact in multiple layers. Possible futures for personal health systems were explored through intense dialogues with stakeholders and a desirable future state was sketched through the success scenario methodology. The implications and strategic issues for different groups of stakeholders were outlined, enabling these stakeholders to articulate their efforts as part of a broader agenda at the multiple layers of innovation ecosystems.

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1. Introduction

Foresight has been long recognised as an instrument that can be applied to “wiring up” innovation systems (Martin and Johnston, 1999). Activities have been undertaken with the aim of addressing the weak points in innovation systems (or ecosystems¹) — such as poor

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¹ While the authors recognise that there are certain differences between the concepts of innovation systems and ecosystems, for the sake of simplicity, we refer interchangeably to these two concepts. While the concept of innovation systems is widely used in the innovation policy literature pinpointing the interdependences among innovation stakeholders (e.g. Carlsson et al., 2002), the concept of innovation and entrepreneurial ecosystems have its roots in management literature (Moore, 1993) and is increasingly used also in innovation policy laying emphasis on the dynamic co-evolutionary nature of the system of innovation actors. The elaboration of the crossroads of these two concepts we leave for another paper.

connections between those concerned with scientific research and with the commercial exploitation of knowledge (Smits and Kuhlmann, 2004). Foresight processes can help to diagnose weaknesses in innovation ecosystems by bridging some of the gaps in innovation networks through interaction between stakeholders in participative and inclusive processes. While a number of large-scale foresight activities are concerned with national innovation systems (Georghiou et al., 2008; Könnölä et al., 2009; Havas et al., 2010), many others have been conducted at regional and city levels (Dufva et al., 2015; Gavigan et al., 2001; Keller et al., 2015) as well as corporate level (Rohrbeck and Gemünden, 2011; von der Gracht et al., 2010). There are also a number of international studies with an innovation focus (Cagnin and Könnölä, 2014; Brummer et al., 2008). This is understandable, given that innovation ecosystems can be considered as combining different layers — including organisational, sectoral, regional, national and international dimensions. However, the interconnectedness of these layers has not

received sufficient attention in foresight literature and practise (Dufva et al., 2015). This may be problematic, given that innovation processes (including both the development and successful diffusion and adoption of innovations) are subject to framework conditions within and across multiple layers of innovation ecosystems.

Some of these linkages were highlighted by Miles and Keenan (2002), who looked at some of the rationales of linking regional foresight activities to those undertaken or underway at the national level:

1. To conform to national requirements to undertake an exercise, or to disseminate the results of a national foresight exercise into the regions
2. To utilise information from national foresight activities
3. To access the networks established in national foresight exercises
4. To become part of an ongoing national exercise
5. To stimulate regional foresight activities, or to reinforce those that are underway
6. To participate actively in the design of foresight programming and implementation.

Similar rationales apply when international, national, regional and organisational foresight exercises are linked – and not only from a broader geographical area but also to a more narrow one. Since much innovation occurs at relatively local levels, understanding the processes here can be vital for activity at broader levels. Interconnection between foresight exercises – at the same level or across layers – can increase their dissemination, ownership and chances for the implementation of recommendations (Saritas, 2006).

Herein, this paper is empirically-based theory building rooted in the observations the authors made during the FP7 (7th Framework Programme of the European Union) “Personal Health Systems Foresight” project (PHS Foresight). This project explored future developments of a field characterised by multiple disciplines, communities of practise, technologies, and geographical dispersal. The emerging innovation ecosystems here are often confronted by fragmented development communities, major market barriers and severe duplication of efforts. Within such a challenging context, the authors realised the need for the foresight community to pay further attention to the multiple layers of innovation ecosystems in foresight activities.

The paper is structured as follows. In Section 2, we construct the conceptual framework for the multi-layered foresight design and management for wiring up multiple layers of innovation ecosystems.

In Section 3, we demonstrate the value of this framework by applying it in the analysis of the PHS Foresight project. While the project was not designed at the outset as a multi-layered foresight, the application of the framework in the project illustrates its analytical value and helps identify further implications on the design and management of multi-layered foresight.

In Section 4 we discuss the lessons learned from the analysis. For instance, we consider the measures enhancing the take-up of results in multiple layers, and the importance of recognising both the expected and unexpected outcomes when maximising the impact of foresight. Section 5 concludes the paper.

2. Multi-layered foresight design and management

Foresight contributes to the governance of innovation ecosystems through its emphasis on the exploration of long-term developments (which often transcend immediate differences in point of view), and in the formulation of common visions, which indicate joint actions across multiple layers of innovation ecosystems. These ‘boundary objects’ provide common ground for different stakeholders to exchange understandings and suggestions for action, learning both about the topics of foresight and the likely strategies of other agents.

In line with the Theory of Change (Connell and Kubisch, 1998), we position a foresight process as an intervention across multiple layers of innovation ecosystems with specific objectives and inputs to address

challenges and to improve coordination. It produces both tangible and intangible outputs, with short and medium term outcomes that should impact upon the different layers of innovation ecosystems.

2.1. Multiple layers of innovation ecosystems

Foresight activities are themselves conducted with different scopes, and at different layers of innovation ecosystems. Dufva et al. (2015) introduce the concept of multi-layered foresight, identifying four layers in innovation systems: individuals, organisations, innovation systems and landscape. An innovation ecosystem is embedded in the societal developments of the landscape layer, and consists of different organisations, which in turn consist of individuals. The layers thus form a hierarchical system (Saritas, 2013).

We elaborate on Dufva et al. (2015) and open up the layer of innovation system entailing multiple layers of systems. This clarification may have considerable implications on the positioning of the foresight project as a systemic instrument for wiring up not only one system but the multiple innovation ecosystems. Indeed, discussing the challenges of managing innovation ecosystems in Europe, Schoen et al. (2011) argue that the conduct, funding and strategic orientation of research and innovation involve multi-level and multi-actor arrangements consisting of local, regional and (inter-) national levels. Innovation activities need to be understood to take place at different levels and between different actors.

In practise, though, the clear cut categorisations of different layers of systems are rarely possible. Not only systems in one layer overlap or interact in multiple ways with other layers, but there are systems that are per se multi-layered; often with particular scope of technology, industry or organisation (Hekkert et al., 2007; Carlsson, 2006). Furthermore, the layers of multiple systems are context specific, hence we do not advocate the use of specific set of layers but refrain to typify for the purposes of the paper some archetypal layers of local, regional, national and international ecosystems (Table 1) widely addressed by foresight and innovation (eco)systems literature.

2.2. Issues: societal challenges and coordination

When addressing innovation ecosystems, foresight processes may point to opportunities involving novel combinations of technologies, organisational partnerships and institutional arrangements. These dimensions are similar to those addressed when future-oriented analysis is directed at grand societal challenges (Weber et al., 2012), where major systemic changes are bound to cut across established disciplinary and professional, institutional and organisational boundaries. Addressing grand societal challenges, which in some cases can be paralleled to initiating substantial technological change, requires particular attention to the multiple dimensions of the coordination of joint efforts. Könnölä and Haegeman (2012) elaborate four coordination dimensions in the context of transnational research, innovation programming and foresight management, including (i) horizontal, (ii) vertical (iii) temporal and (iv) intersystemic coordination). Taking account of the coordination of multi-layered innovation ecosystems, these dimensions can be recapitulated as follows:

- *Horizontal coordination between innovation and other policy and professional areas.* Könnölä et al. (2011), and, earlier LLA, PREST and ANRT (2002), note that successful research and innovation processes can be facilitated by (and often require) horizontal coordination with other policy areas (such as competition, regional, financial, employment and education policies). In more general terms, the OECD (2003) has called for horizontal coherence as a general governance objective—ensuring that individual objectives and policies developed by various entities are mutually reinforcing. Efforts at horizontal coordination must seek opportunities for collaborative policy formation while recognising the relevance of multiple perspectives in relation

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