Living Labs and Open Innovation in European Context

Albertina Dias and Bror Salmelin

Abstract The article elaborates the background thinking and path for Open Innovation 2.0 conceptual innovation model. It is based on virtual enterprises, Holonic enterprises and fractal enterprises theory, combined with MIT Living Lab concept developed by Bill Mitchell (Me++: the cyborg self and the networked city. MIT Press; 2003). Combining this with the internet/connectivity revolution the need to have faster pace and more successful innovation rate led to the thinking of the quadruple helix, including the citizens as active agents in the innovation process, not only as verificators as they were used to be in the previous triple helix thinking.

Based on the work of New Club of Paris (Lin and Edvinsson. National intellectual capital: a comparison of 40 countries. Springer; 2011) the structural intellectual capital (IC) is a key for national prosperity. Open innovation integrating the crowd into the innovation process seamlessly seems to increase the structural IC. Hence, integrating all these components: quadruple helix, non-linear innovation, fractal and dynamic organizations into innovation processes in real world with real market creation with the users who become co-creators seem to be the key for future success.

The new open innovation 2.0 paradigm seems to be serving the innovation needs very well in time—if we dare to take it on board.

Keywords Innovation ecosystems • Open innovation • Living labs • Innovation models • Policy modelling • Quadruple helix • Complex systems

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1 Introduction

European Union has set innovation as high priority as part of the Europe 2020 strategy. Europe is focusing on jobs and growth through innovation. Innovation Union is one of the key flagships to target this ambitious goal for Europe to become a leading region in the world of modern innovation.

By focusing on both quantitative (3% of Gross Domestic Product) and qualitative goals in innovation policy this has led to a good mix of instruments supporting modern innovation systems.

In the Horizon 2020 (H2020) framework research and innovation are seamlessly integrated, and entirely new instruments for funding are created. In the text we will describe those in the context of European Innovation Ecosystem thinking, linking that to the experiences we already have from Living Labs and Open Innovation, since 10 years. This article also describes the background thinking and the developed Open Innovation 2.0 perspective on modern innovation Systems.

2 Living Labs in European Context

The origin of Living Labs thinking was in Massachusetts Institute of Technology (MIT) where the approach was to construct test and verification environments in laboratory settings to develop and experiment different technology solutions with real users invited to visit those environments. This led to early prototyping with real users again with the probability to have faster scale-up of the results. Bill Mitchell was one of the key drivers in this new research and prototyping approaches. Since then, the concept has been widely spread among different concepts within new projects and programs in different parts of the world. Thus, there is no unique definition for the Living Labs' concept; each concrete definition approach is defining its major and specific aspects related to the objectives of a program or project. It is not the purpose of this article to carry out a review of the state of the art of the concept and definition of Living Lab; still we recall some of the latest or most generally known definitions:

- according to Niitamo, V. P., Kulkki, S., Eriksson, M. & Hribernik, K. A. (2006, pp. 26-28) "Living Labs are an emerging Public Private Partnership (PPP) concept in which firms, public authorities and citizens work together to create, prototype, validate and test new services, businesses, markets and technologies in real-life contexts, such as cities, city regions, rural areas and collaborative virtual networks between public and private players";
- Based on the components and principles of a Living Lab, a Living Lab is a citizen-centric innovation milieu built on every-day practice and research, with an approach that facilitates user influence in an open innovation environment engaging all relevant stakeholders—business, academia partnership, citizens and government—in real-life contexts, aiming to create sustainable values (Bergvall-Kåreborn and Ståhlbröst 2009, pp. 356–358);

- Yet the opinion for the contextual definition and purpose of a Living Lab within the South African context (rural area) is foreseen as "a real-time experimental environment that enables different role players with some or other common interest within a domain to collaborate in the use and development of innovative ideas to solve current and real world problems in a unique and integrated way" (van der Walt, J. S., Buitendag, A. A. K., Zaaiman, J. J. & van Vuuren, J. C. J., 2009, p. 430)
- more recently Lucassen, I., Klievink, A. J., & Tavasszy, L. A. (2014, p. 5) suggest that a Living Lab consists of a "Test environment for cyclical development and evaluation of complex, innovative concepts and technology, as part of a real-world, operational system, in which multiple stakeholders with different background and interest work together towards a common goal, as part of medium to long-term study".

When discussing such variety of approaching Living Lab from European perspective it soon became evident that from innovation system perspective end-user involvement could be THE key factor for renewing European Innovation System. We have the most demanding but also very diverse user communities for our products and services; the question stands for how to harness that to increase success rate and speed of the innovation processes in Europe.

The work of Niitamo et al. (2006, pp. 26-28) cannot be enough appreciated when developing the strategy but also practicing it in large and small scale, and again also in practice. This vision still recalls to the linear innovation policy understanding instead of more recent debate on Europe's understanding and practice of an holistic view of the innovation policy (Edquist 2014).

At the same time "Democratization of Innovation" driven by Von Hippel (2005) triggered the thinking of co-creation and user involvement in the innovation processes.

The industrially led think-tank for Living Labs strategy in Europe was established in liaison with European Commission, DG Information Society and Media Directorate (DG INFSO, currently DG CONNECT) in 2003 to conceptualize the European approach. Further this Living Labs think-tank focused on Open Innovation becoming the Open Innovation Strategy and Policy Group (OISPG).

Soon it became evident that the European approach should be focusing on creation of innovation hubs which would build on the quadruple helix innovation model, i.e. strong and seamless interaction of the industry, public sector, research institutions and universities, and finally also the "people".

The target was to create attractive environments, which would be attractive for industrial and research investment due to better innovation dynamics. This dynamics would be supported by the public sector and one of the focus areas would be public sector service, which could be co-developed with the user communities, in real world settings. Part of this thinking was based on the idea to stretch the boundaries of societal behavior as well, as we saw the connectivity and ICT shared environments (with emerging social media) to change the society as well. The quest was to push the boundaries with real world projects including strong technological development too. Only by doing the research and development with citizens we

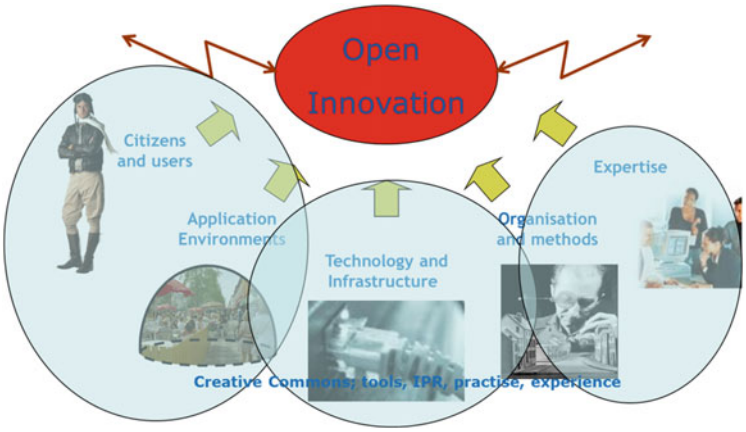

Fig. 1 Living Labs as European concept

could see what finally would be acceptable and thus scalable to products and services.

This led to the first concept of Living Lab in European context; a real world site, not an extension of laboratory. Important was also the scale as it was seen that for scalability we needed the "sample users" to be large enough, at least in hundreds.

In Fig. 1 we have all the components needed for European Living Labs: Citizens, application environments, technology infrastructure, organizations and experts. Important to see is the later addition of societal capital into the picture as functioning Living Labs build strongly on the idea of spill-over effects back to the society, giving motivation for all of the stakeholders, including citizens to contribute to the common goal, making Living Lab a winning game.

Based on these conceptual thoughts European Commission and the Finnish EU presidency launched in 2006 the first wave of European Living Labs which built a network—European Network of Living Labs—which became later the ENoLL movement. From the first wave the network grew fast under the following EU presidencies to the substantial scale it has now, 340 sites even beyond European borders (ENoLL 2015). And, the network is still growing. What we can say that the Living Labs have now a strong foothold in all European regions, and is being applied as important component in regional innovation systems too.

On European level the networking of Living Labs is of utmost importance. Using Living Labs methodology to find common, scalable solutions with different user environments is essential when driving to common European services based on common architectural approaches. I am happy to see that the thematic cross border networking of the sites is speeding up, enabling the most interesting Living Labs to collaborate as partners e.g. in the H2020 projects, especially in smart city or public services context.

3 Open Innovation as Part of Living Labs' Thinking

As starting point when developing Living Labs in the European way was openness; in sharing platforms for services but also open mind set for collaboration amongst all stakeholders. The thinking stems from the early 1990s when the hot topic was virtual and holonic enterprises, which were as group creating both agile and scalable structures for operations; by sharing common operating architectures and by collaborating strongly on task-driven basis (Leitão 2004). Good examples of holonic/fractal/virtual enterprise theory was developed e.g. in the IMS (Intelligent Manufacturing Systems) initiative among the leading industrial economies in the 1990s (Tharumarajah, Wells & Nemes, 1996). Scaling up this thinking we come very close to the foundations of Living Labs by adding the public and societal components to it.

Combining the approach by von Hippel about the user-driven and co-creativity in innovation processes with the approach Chesbrough introduced in 2003—open innovation—we come to the two fundamental of modern innovation theory. The definition of open innovation by von Hippel focuses on creation of public goods whilst the one by Chesbrough builds on sharing, cross licensing and in that way being a market and product driven approach.

Open platforms, sharing and seamless interaction of all stakeholders is essential in Living Labs. Quadruple helix has thus been central as innovation model from the very first beginning onwards.

Open Innovation Ecosystems are increasingly becoming the synthesis of Living Labs and open innovation processes. We see real new paradigm evolving when combining these. Open innovation has become much more than cross fertilization of ideas between organizations, it has become a flow of colliding ideas, raising sparks for new innovations in real world settings.

4 Open Innovation 2.0 and Ecosystems

Following the research of Lin and Edvinsson (2011) there are clear indications that intellectual capital, and especially structural intellectual capital drives competitiveness and innovation. This means in turn that from innovation policy perspective the interaction fluidity is a critical feature of any successful innovation system.

Fluidity in this context means frictionless interaction, experimentation in real world, and a lot of unexpected, non planned collisions of ideas, problems and of course competencies to collide, giving the spark. It is not only about single excellent components in the system, it is centrally about collisions and connectivity.

It was already shown in 2004 that the diversity of research teams increases significantly the probability of breakthroughs, and actually we can also say that mediocre inventions are not enough. We need to combine the best. Cross-fertilization of ideas is nothing new as such, but what ecosystem thinking does is

embedding diversity and serendipity in the innovation process more systematically than ever before.

It is important to move from clusters to ecosystems in our innovation system design. It's nothing wrong with clusters, but they tend to be rather monolithic focusing on one sector only. Of course the clusters reinforce the sector they work in, but the tendency more towards improving, extrapolating than to create something new. Hence the emphasis on modern innovation systems need to be increasingly on the "in-between" areas where creation of new is likely, and as consequence also the fast growth.

To substantiate the potential for new market creation the end-users need to turn to be active drivers together with the other stakeholder in jointly creating the new. Quadruple helix innovation model gives clear roles to all stakeholders, including the users as active agents from the first beginning. Earlier the users were objects in the process, not co-creators. By taking the users actively on board we see immediately which solutions can be scaled up and which will fail due to various reasons. Scaling up fast the emerging successes is key to maintain the dynamics in the innovation system. There are also indications that those organizations which cut failing projects at earlier stage will be more successful in the longer run.

Again, we come to the ecosystem when we think about where the experimentation and early prototyping is to be done. In real world settings one can at early stage see the potential and also identify the paths for fast enter into the full scale markets. Seamless user involvement is thus essential. It is important also to understand that properly designed innovation ecosystems provide a safety net from the ideation to the market. Failing fast means also often failing small, and experimentation and early prototyping in turn means faster results to be brought to the market, even incrementally.

Business model experimentation in these open innovation ecosystems is also essential. Due to the dynamics in the economy and technology it rarely is possible to write the old fashioned extensive business plans. Often it is enough to have a business model idea and develop it continuously further in the real world settings, to finally see what works and what not. Fast adjustment and experimentation is the way forward.

Here legislation can play also a remarkable role if it is a catalyzing one. Restrictive legislation again is a strong hinder for business model innovation. Proper legal framework is one of the important factors for the fluidity of the innovation space we spoke about earlier.

Innovation has moved from linear processes to mash-up processes where diversity, speed and experimentation are the fundamentals.

We have moved from closed innovation to open innovation and further towards open innovation 2.0 which highlights the interaction, fluidity and mash-up nature of innovation processes, including all stakeholders in quadruple helix innovation (Fig. 2).

Open Innovation ecosystems can be regional or thematic, or both. They are built on strong interaction between the competencies illustrated in the picture by different coloured dots. The ecosystem itself has tens or more projects (funnels in

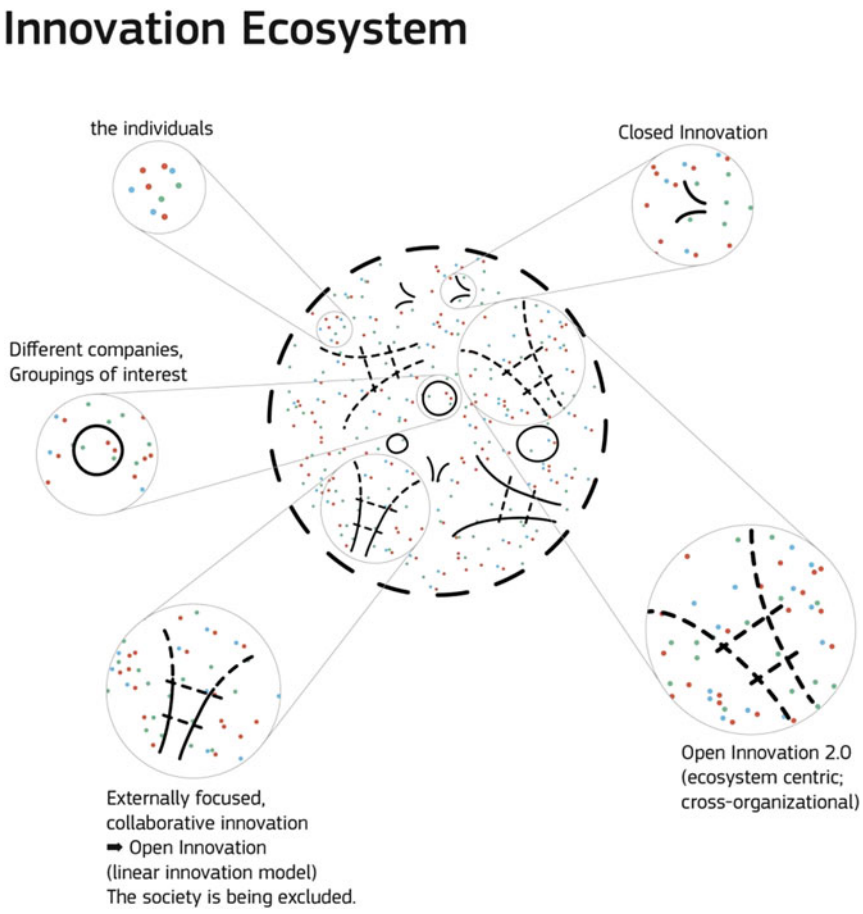

Fig. 2 Open Innovation 2.0 view on open innovation ecosystems (OIE)

Chesbrough sense) which can be more or less leaking to broaden the competence base of each action. The funnels in this context represent development projects, not organizational boundaries. Spill-over effects to the whole ecosystem by the projects should increase the societal but also knowledge structural capital enabling continuous rise of the value proposition of the new activities.

Sharing infrastructures but also experience and knowledge is a key of the trust to be built within the ecosystem itself. The trust is of very high importance because of the interdependence of all stakeholders in this mutual win-win process. Cross-fertilization and sharing does not happen without trust.

In ecosystems it is, as previously stated, very important to allow collisions to spark the real innovations, even disruptive ones. Hence the creation process requires courage to design a governance structure for the ecosystem to let it grow

organically. Prototyping and experimentation of policies is one of the important components in this development too.

5 Open Innovation 2.0 in 20 Snapshots

In the white paper from 2013 manifesting the Open Innovation 2.0 paradigm Martin Curley and Bror Salmelin highlight 20 key elements as the transformative factors for the modern innovation approach.

The OI2 approach emphasizes the importance of Quadruple Helix innovation where the private, public and research institutions collaborate seamlessly and in which from the very beginning the user(s) communities co-create the new products and services. This leads to win-win approaches as the users get products and services they need, and the suppliers get scalable products and services. If this co-creativity and prototyping in real world settings would not take place there would be a real risk that the development work would lead to a win-lose setting between the existing players in the market, and no new markets would be created either.

Cross-disciplinary innovation together with prototyping and experimentation is bringing forward the required dynamics. Failing fast and getting directions to potentially successful solutions at early stage is essential. Traditional piloting or test bed approaches are not sufficiently scalable to verify the market potential of the inventions.

In this palette of 20 drivers for Open Innovation 2.0 (Fig. 3) one needs to highlight both societal and technological innovation which enable business model (more generally value creation model) innovations. The area of business model innovation together with the new markets emergence is clearly dimensions/realms in which we Europeans can do/perform much better.

How to achieve the fluidity and frictionless environments for multi-stakeholder trials, including legal and policy elements is the key to root in the European mind-set. We need to speak about openness for innovation, innovation 2.0 culture, to complement the view.

New types of leadership, new processes and new approach to ecosystems—paradigm change is real.

The paradigm has changed. Table 1 illustrates some aspects to concretize this change and illustrate its drivers. Of course these factors are interrelated in complex systemic manner and lead to the need of looking at successful innovation ecosystems and innovation processes together.

Closed innovation reflects the traditional linear paradigm, often based on brilliant individuals or performing industrial labs. Open Innovation, as introduced by Henry Chesbrough, is a move towards collaborative innovation structures, where those ideas not used by oneself can be seen as tradable assets to those who might have need for specific technologies.

Fig. 3 20 drivers for Open Innovation 2.0

Table 1 The change and drivers of the innovation paradigm

Closed innovation	Open innovation	Open innovation 2.0
Dependency	Independency	Interdependency
Subcontracting	Cross-licensing	Cross-fertilization
Solo	Cluster	Ecosystem
Linear	Linear, leaking	Mash-up
Linear subcontracts	Triple helix	Quadruple helix
Planning	Validation, pilots	Experimentation
Control	Management	Orchestration
Win-lose game	Win-win game	Win more-Win more
Box thinking	Out of the box	No boxes!
Single entity	Single discipline	Interdisciplinary
Value chain	Value network	Value constellation

When we began to analyse the innovation processes and the success closer, we realized that one of the critical elements is the scalability of the work, which naturally results in increased success rate. But how to achieve this?

We need to break out from the traditional linear models; we need to dare to do more experimentation in real world settings as only then we learn very fast what is scalable, successful, as opposed to what is simply not worth going forward with. Traditionally we see pilots and validation in many projects, but. . .often they come too late to have any influence of the project work itself. This triple helix approach which excludes end-users from the actual innovation process is by far too slow. Only by moving to the quadruple helix model where the innovation process

happens "out there" with real people in real environments we can speed up the successful results and kill the bad ones in time.

Another dominant element of the open innovation traditional cross-licensing process is the cluster thinking. Cluster operations reinforce well the competitiveness of sectors. However, the challenge is not only to stay competitive in the existing field, but also to find entirely new areas for value creation. We need to have interdisciplinary manner actions between the clusters in the open innovation ecosystems to strengthen cross-fertilization. And, taking the users on board and integrating them into the innovation process from the very beginning will lead to the creation of new markets. If we target only traditional clusters and traditional industries we easily end up with a win-lose game.

Organizational changes and collaboration changes are also clearly moving towards this mash-up, mixed disciplines approach. Value chains with subcontractors highlight the linearity in innovation processes together with control approach which is typical for the manufacturing and traditional industry era. When products integrate into services and get more complex, we have seen networking between suppliers to be established, e.g. in the automotive sector, where independent component manufacturers deliver to many brands simultaneously, based on their special competencies. In open innovation 2.0 we go even further into dynamic value constellations where the links are not a priori determined, but more task driven. Competencies and resources are combined based on the tasks, not as earlier when the services were determined by organizational structures. In turn, this also means that the end users will be much more dominant in the innovation process for modern products and services, especially on their functional level.

The innovation process change affects also radically the management styles of successful companies. We have plenty of examples where an authoritarian control-type of management is replaced by strong leadership. However, we need to go into even further metaphors when we move to open innovation 2.0. The successful leadership will be mentoring, catalyzing, inspiring: it will be orchestration of fluid resources to perform their best. And, what makes all interesting is that the orchestration conducts not only the known players, but also the audience to create fantastic joint experiences with the interaction internally AND externally; Like in a successful concert where the ambience and success is all about the interaction and not just the play, even professionally.

6 Conclusion

Open Innovation 2.0 is a new mind-set; it is openness for innovation. It is the courage to experiment and prototype. It is the courage to fail and scale. And, as a consequence, it builds up a growing spiral of performance built on success and motivation.

Living Labs, networked society, democratizing innovation, open innovation, disruptive innovation. . .many words, which are fluently used without often thinking

about the reality behind. The reality is however in the courage to change the behavior, including the governance structures to create something new. The reality is also to turn these buzzwords into a functioning innovation ecosystem with new dynamics.

ICT provides connectivity and the shared space of knowledge, meaning that the new paradigm of open innovation ecosystem is more doable than ever before. In the rich connectivity we need to see the new role of all players in the spirit of quadruple helix innovation, and move due to the dynamics needed to an experimentation and prototyping culture. This shows the options for success earlier and significantly reduces the risk for big failures too.

The fundamentals are developing in Europe. Our challenge is to make these fundamentals to work together, to fully use the potential we have as the single biggest market in the world.

The paradigm has changed.

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