Living Labs in Open Innovation Functional Regions

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Abstract

This paper presents the conceptual framework of a new emerging mechanism to support the innovation and product development processes for the European Industry: the "Living Lab". Living Labs are open innovation environments in real-life settings, in which user-driven innovation is fully integrated within the co-creation process of new services, products and societal infrastructures in a regional harmonized context (the "Open Innovation Functional Region") catalyzing the synergy of SMEs Collaborative Networks and Virtual Professional Communities in a Public, Private, People Partnership. In recent years, Living Labs have become a powerful instrument for effectively involving the user at all stages of the research, development and innovation process, thereby contributing to European competitiveness and growth. This paper aims at identifying the conceptual framework for Living Labs implementation within Open Innovation Functional Regions, highlighting the various different phases of the implementation cycle as well as the expected benefits and impact for Industry and Society.

Keywords

Living Labs, Functional Regions, Living Labs Processes

1 Introduction and Motivation

In the recent history of the European Industry, a strong focus has been set on technological excellence of the developed products and services and on their usability and relevant demand. Even though Europe is continuously producing the highest number of patents world-wide, which it is indeed a clear indication about knowledge and technology excellence of European industry, especially in the most advanced industrial sectors and in the Information Technology one in particular, an insufficient capability of translating such an excellence into successful business cases with significant commercial and societal impacts has been observed. Moreover, the large European SMEs Industrial base, characterized by dynamic players, with low overheads and the ability of forming partnerships on a peer-to-peer basis, could exploit the opportunities of providing new, added-value product and services to Customers, End-users and, especially, Citizens. However, this huge potential is not fully expressed for the following reasons:

- Insufficient ability of vertical integration of complementary competencies at SMEs level. SMEs must be organised in collaborative networks, which can aggregate pools of complementary resources and competencies relevant to the identified market.
- Lack of mechanisms and processes for the use validation of business opportunities originated by the industry;
- Insufficient capability of accessing new, complementary competences, especially at international level, suitable for completing the project team with the needed partner;
- Lack of legal competencies necessary to manage IPR created during the project and to leverage the background;
- Scarce availability and/or difficult access to knowledge resources, necessary to support the innovation processes within SMEs.
- Insufficient readiness to collaboration of SMEs personnel, which in general is not used to collaborate in an effective and optimized way with people belonging to other SMEs;
- Lack of consolidated processes for allowing the involvement of Customers, End-users and Citizens in the development process of new products and services. Such processes can help the European Industry (and SMEs, in particular) to manage and minimise the risks associated to the development of new products and services them.

In this scenario, there is the need to adopt a new model for regional development, the "Open Innovation Functional Region", which goes beyond traditional Clusters and Incubation approaches and is suitable for supporting the innovation process in Industry, and particularly in SMEs, by overcoming the above mentioned gaps. This can be done through the integration of the revolutionary potential of individuals, powered by the Internet. in peer to peer professional communities and in user driven innovation communities. As a matter of fact, we believe that a successful development of the European Industry (and SMEs, in particular) depends upon the ability of amalgamating all the different stakeholders in the development processes of new products and services, from SMEs to Customers, from Regional Development Agencies to Citizens in the new model of the "Open Innovation Functional Region". User-driven innovation can play an important role in enhancing the creation of actual value from the innovation processes through addressing the actual user needs.

The objective of this paper is to illustrate the Open Functional Region Model, with specific focus on the Living Lab set-up and operation process and the relevant integration philosophy with the other elements in the Functional Region (forming the Concurrent Innovation structure, see ref (1)). It will be also explained how the "Functional Region" model will also play a role in bridging the gap between Industry and users, which suffer an insufficient awareness of the use potential scenarios permitted by new, added-value products, services and technologies. In this context, a paramount role will be played by the European Network of Living Lab (ENoLL), a European User Driven Movement with exceptional momentum which was launched in November 2006 by the EU Finnish Presidency and supported by the subsequent ones. ENoLL is an association aimed at supporting the wide adoption of the Living Lab paradigms, to address the above mentioned objectives. 129 Living Lab sites, grouped under the ENoLL umbrella (see **Error! Reference source not found.**Figure 1), are already operational in different domains, including eHealth, Energy Optimisation, Intelligent Mobility, Inclusion of disadvantaged people and Rural Development.
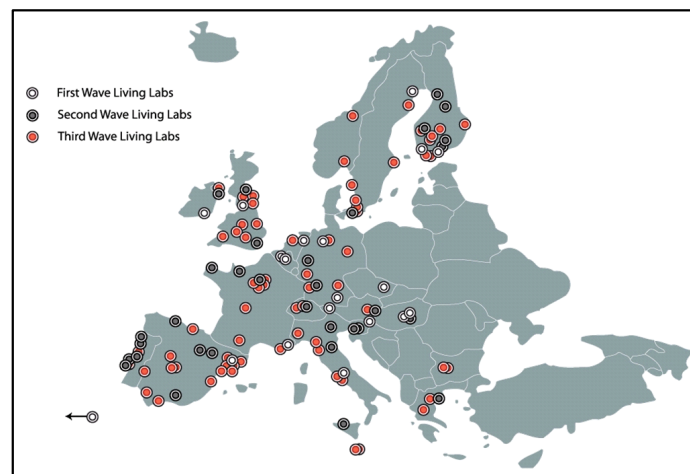

Figure 1: The European Network of Living Labs

ENoLL is addressing the collaboration across the Living Labs network to share common and complementary resources, and connect local user communities and companies, in order to create a wider market and provide services that are viable. ENoLL is providing SMEs, including micro-entrepreneurs, with networked services, to develop, validate and integrate new ideas and rapidly scale-up their services and products from their local region to other regions with different characteristics. The 129 Living Labs network represent an impressive partnership of:

- **Hundreds** of **public bodies**, including **Municipalities**, **Innovation and Development Agencies**, and **Universities** and **Research institutes;**
- **Thousands** of **companies**, especially SMEs often organized in industrial clusters;
- **Hundreds of thousands** of final **users** organized in user communities.

2   Implementation Approach: The Open Innovation Functional Region Model

The motivation for establishing Livings Labs as a support tool to the innovation process of the European Industry is to overcome the barriers and challenges previously described by leveraging the potential of SMEs' clusters acting in user-driven contexts. The Concurrent Innovation / Living Lab paradigm can be implemented at local level by exploiting the synergies existing between Public Administrations, Regional Development Agencies, Industry and Citizens, which have complementary objectives that can be fulfilled by such an initiative. This will allow for bringing together all the necessary ingredients (financial resources, technology providers, societal stakeholders, customers) along the value chain of the identified product / service, needed for the successful establishment and sustainable operations of full Living Labs settings in the so called Functional Region environment. This can be implemented through the following integrated steps:

- To organize the regional/local economic context in **thematic collaborative cluster** for delivering products and services in specific sectors. This would give SMEs the opportunity of integrating complementary technologies and competencies in an operative way, following pre-defined processes and templates. These consist of the following elements:
  - a cooperative model for the commercial and operational governance of the cluster, including roles, responsibilities and operational scenarios;
  - an organisational model designed ad-hoc, including collaboration and operational processes among the cluster members;
  - an ICT infrastructure, providing a share space for data repository and allowing for operating and tracking the status of the main processes, and;
  - a legal framework to regulate collaborative contracts and deals.

  This would provide for a mean to overcome the lack of technical and financial resources SMEs usually suffer, by giving them the opportunity to complement their own resources with external ones, on a peer-to-peer basis, to be in the position of delivering new, innovative, added-value services and products.

- To establish **professional communities** on specific areas and themes, suitable for providing the collaborative cluster with additional competencies and skills which are required for setting up and supporting collaborative projects. The Professional Community is a human-centric business entity, which is designed to maximize the impact of knowledge workers and to best support innovation cycles within the related socio-economic environment. It is an association of individuals characterized by a specific knowledge scope with an explicit business orientation, aimed at generating value through members' interaction, information sharing and collaboration. This interaction among the members is optimized by the synergic use of ICT-mediated and face-to-face mechanisms. Generated value consists of:
  - Advanced Knowledge (i.e. the creation of new knowledge relevant to the community knowledge scope);
  - Professional services (i.e. the collaborative business activities performed by the members exploiting the community knowledge);
  - Social cohesion (i.e. the social relationships among the members that enable their collaboration readiness and foster knowledge sharing and co-creation).

  Business activities of a Professional Community are performed by Virtual Teams (temporary aggregation of Community members for addressing specific business opportunities). Those activities consists of professional knowledge services (consultancies, studies, etc.) typically exploiting the "frontier" knowledge developed by the community. Expert communities are suitable for managing the risks associated to collaborative projects

and for transferring and increasing the knowledge level within the clusters, including Universities and R&D centres in the business arena.

- To set up a Living Lab, supporting a specific collaborative cluster, with the aim of providing an innovation platform (the Living Lab itself) that brings together and involves all stakeholders, such as end-users, researchers, industrialists, policy makers, etc., at the earlier stage of the innovation process. A Living Lab is a user-driven open innovation ecosystem based on a business – citizens – government partnership which enables users to take an active part in the research, development and innovation process by:

  - bringing the users early into the creative process in order to better discover new and emerging behaviours and user patterns;

  - bridging the innovation gap between technology development and the uptake of new products and services involving all relevant players of the value network via partnerships between business, citizens, and government;

  - allowing for early assessment of the socio-economic implications of new technological solutions by demonstrating the validity of innovative services and business models.
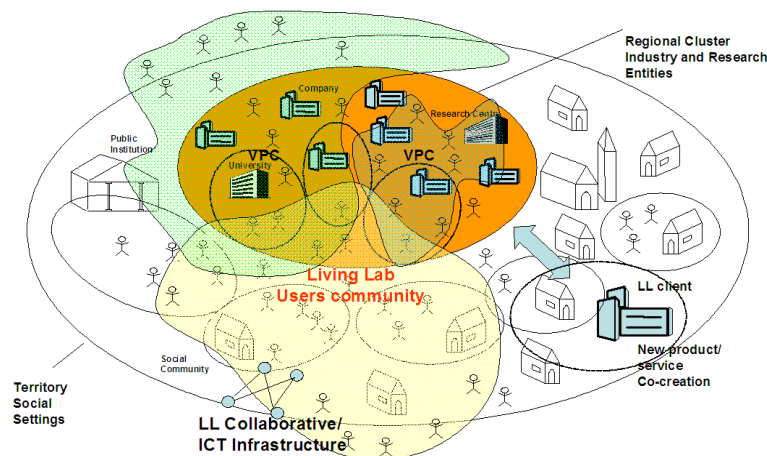

Figure 2: The conceptual framework of Open Innovation Functional Regions

3   Living Labs Processes

The issues relevant to the set-up and operation of Collaborative Clusters and Professional Communities have been dealt with in a number of projects and initiatives, a selection of which is reported in the attached Reference paragraph.

In this section, the focus is put on the implementation activities of Living Labs. The input to this section is derived by the work done by a number of 6th FP RTD projects in the ICT domain as well as from the experience collected from the various Living Labs, currently running throughout Europe. The result is a implementation reference process for Living Labs, which can be assumed as a baseline for facilitating the replication of Living Labs experiences in other contexts. The overall and general concepts and processes reported need to be instantiated in the specific context. As a matter of fact, the establishment and operation of a Living Lab depends upon a series of factors, including the specific sector which the Living Lab is serving, the local and regional context in which the Living Lab operates and the nature of the economic texture involved, just to mention a few. However, every Living Lab follows the following main steps which are hereafter listed, which are grouped according to two main phases:

- Living Lab set-up;
- Living Lab operations.

3.1 Living Lab Set-Up

The set-up of a Living Lab in a regional context implies the capability of establishing the main mission objectives of the Public, Private Partnership, the identification of the main stakeholders active in the regions, in the specific domain and sectors and the overall collaborative scenario for linking the various groups in an effective and optimized way. The following process is at the base of the set-up of a Living Lab:

- **Establishment of the community of service/technology** developers in the collaborative cluster, in charge of designing and make available innovative products and services to be tested within the Living Lab environment. They are providing usable prototypes to be given to a specific user group within the Living Lab or setting up services which can be utilized in real life contexts. Service/technology developers include both the initial developers of the prototyped product or service under trial in the Living Lab and additional companies and organizations, suitable for further developing them with a view of the final product/service launch;
- **Establishment of the community of public / social stakeholders**, which are the originators of the Living Lab in that region, with a view of generating economic value from the service/product ideas under trial, of providing better/added value services to their constituency (citizens, local social communities, groups and associations) and of showing returns for the invested money;
- **Establishment of communities of professionals** (from academia, public administration, industry and consultants), willing to provide advice and support to the definition and experimentation of the proposed service/products when available);
- **Establishment of communities of users**, willing to experiment and use provided product and services, possibly grouped according to specific interests and use intentions, such as:
  - the final users of the proposed product and service (for instances, citizens, impaired people, associations, enterprises groups);
  - the organizations which will make them available to the public (service providers, public administration, municipality, utilities, Civil protection, Fire brigades).
- **Definition of the legal entity** representing all the Living Lab categories of actors previously mentioned and suitable for implementing, updating and maintaining the Living Lab mission, thus providing a suitable ground for discussion and collections of their various instances and needs;
- **Set-up of a supporting IT Collaborative platform**, suitable for:
  - Facilitating the communication among the various components of the Living Labs, with Web2.0 tools (blogs, wikis, polls, working spaces – both public and restricted –, collaborative and communication tools, social networking);
  - Collecting and framing the trial outcomes in an objective and usable way (track of product/service usage, support for market product surveys and requirements, collection of suggestions to enhance the prototyped service/product performances and usability);
  - Supporting the co-creation processes among the various Living Lab groups, by adopting for instance serious gaming approach and tools and providing virtual reality tools to support the experiencing and sensing of innovative products (when applicable).
- **Identification of a Living Lab performance model**, suitable for collecting, assessing and evaluating the performance of the public money invested in the Living Labs in terms of social outcomes, such as number of jobs created/safeguarded, additional contribution to GDP created, number of talents attracted, development of new typologies of jobs etc.

All the different elements previously mentioned are supported by the availability of an integrated set of tools and methodologies, which have been addressed during a number of projects and initiatives recently conducted (see ref).

3.2 Living Labs Operation

It is within the Living Lab Operation Phase that an idea is evolved to a usable solution through the interaction between the different Stakeholders of the Living Lab. In this phase, the Living Lab processes allow the Market Demand evolving from latent user needs to validated experience of solution use in real life environment, for large scale customers. The objective is to establish a so called "Innovation Vortex", through which the product and/or service is finalized as a concept, developed in the Living Lab context, deployed for a reality check trial and evolved on the basis of the use feedback collected from the various Living Labs stakeholders. The Llab Innovation Vortex accelerate concurrent development of qualified business ideas into applications and services, through the:

- **User Driven service/product development**, bringing in the requirements originated in real life settings. This allows for a dramatic reduction of the iteration cycles during the service / product development and for a significant reduction of the investment costs associated, thus optimising the use of the resources available;
- **User Driven Market demand creation**, through the structured request to potential users categories for additional services and/or products which have a huge commercial potential since the outset;
- **User Driven Collaborative enterprise start-up**, suitable to support the single entrepreneur in identifying complementary resources and competencies, needed to refine the business ideas and make it compliant to the users expressed needs and requirements.

The product/service life cycle described is completely supported within the Living Lab / Functional model region shown in the next figure, which includes the main actors and their roles previously described in the open innovation process.
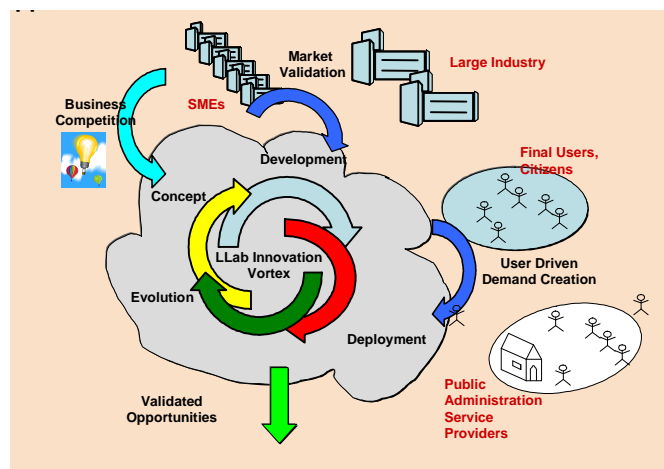

Figure 3: Living Lab Operation phase: Actors and roles around the innovation vortex

The following process is at the base of the operation of a Living Lab:

- Identification of demand creation mechanisms, suitable for providing new ideas to be tested within a Living Lab. The following mechanisms are present in a Living Lab:
  - **Spontaneous proposal from the community of service/technology developers**, which can propose a business idea autonomously developed;
  - **Request from the user community** (both from public administration and service providers, which may follow public procurement initiatives, especially in the Lead Markets and final users), which can express a need not yet fulfilled;
  - **Business / Idea competition and awards**, in which the regional development agency (generally the main stakeholder of the Living Lab) organizes a competition relevant to innovative business ideas.

- **Identification of a specific group of service/technology developers** (Virtual Enterprise), willing to subject a specific product/service to a Living Lab trial, for either market validation or co-creation / open innovation design purpose, with a view of optimizing in both cases the development costs and increase the usability in a real life context;
- **Identification of the Living Lab trial tutor**, in charge of coordinating and facilitating the implementation of the trial inside the Living Lab. This role will be presumably covered by the leader of the Virtual Enterprise, in order to harmonise both the outcomes in terms of requirements on the VE product/service and the finalization of Virtual Enterprise team;
- **Identification of the Living Lab trial requirements** by the trial tutor, by analyzing the product / service features and interpreting users expressed needs;
- **Identification of a specific user group** by the trial tutor, extracted by the overall user constituency, willing to conduct the experiment activities and to provides feedback on the relevant outcomes;
- **Identification of a Virtual Team of experts** by the trial tutor, representative of the disciplines and competencies needed to support the trial, in charge of providing suggestions on how to operate the service or to adapt it to practical/real life situations;
- **Establishment of the Living Lab trial plan**, including the preparation of it, the activities to be performed by the various actors and the operational metrics, to measure the market validation level of the proposed product and services (both qualitative and quantitative);
- **Set-up of the Living Lab trial IT environment**, specific to support the operation of that specific trial, including a specific set of tools provided from the IT Collaboration Platform to support the interaction among the various players, integrated with available IT tools from the IT Service Platform (i.e. providing access to specific trial technology such as for instance LBS or satellite data, information on energy consumption etc. etc.);
- **Conduction of the Living Lab trial**, under the supervision and coordination of the Living Lab trial tutor ;
- **Results analysis of the Living Lab trial**, by the Living Lab trial tutor. This can be an iterative process, depending upon the strategy of the specific Living Lab trial and the level of accuracy of market behaviour prediction required by the service/product developers.

4   Benefits, Impact Metrics and Conclusions

Living Labs are indeed moving research out of laboratories into real-life contexts to stimulate innovation. The benefits for the different types of stakeholders to deploy user-driven open innovation and Living Lab methodologies can be summarized as follows:

- For the users in their role as citizens and the community: to be empowered to influence the development of services and products which serve real needs, and to contribute to savings and processes improvement through their participation in the innovation lifecycle.
- For the SMEs: to be capable of developing, validating and integrating new ideas and rapidly scaling-up their local services and products to other markets.
- For larger companies: to make the innovation process more effective by partnering with other companies as well as end-users, which are rooted in active user experiences, increasing 'right the first time' rate.
- For research actors, the economy and the society: to stimulate business-citizens-government partnerships as flexible service and technology innovation ecosystems; integrating technological and social innovation in an innovative 'beta culture'; increasing returns on investments in ICT R&D and innovation.
- For Policy Makers and Regional Development Agencies. to harmonize national and regional initiatives in the domain with a view of optimizing public and private investments in the targeted market, to deliver common process for validating market offer in the

targeted market and supporting innovation and additional demand creation and to attract further investments, especially private equity and venture capitals

Functioning as Public-Private Partnerships, especially at regional and local level, living labs provide advantages over "closed labs": they stimulate new ideas, provide concrete research challenges and allow for continuous validation of research results. The successful implementation of Living Labs approach can be monitored on the basis of the following metrics:

- Number of SMEs mobilized;
- Number of citizens involved in the activities of the Living Lab;
- Number of new, innovative, added-value products and services validated at local level;
- Amount of funding mobilized, additional with respect to the initial investments done by the local Development Agency and suitable for ensuring long term sustainability;
- Number of Venture Capitals and Private Equity Funds involved;
- Number of links established outside the specific Functional Region, in view of promoting the access to both new competences and markets for the specific industrial sector targeted;
- Number of stakeholders involved, relevant to the specific targeted market and to SMEs involvement in the development of the relevant products and services.

This white paper is contributing to the establishment of a conceptual framework for a new Open Innovation Functional Region Model, capable to overcome the barriers observed by SMEs to take active part in the Innovation Cycle within current settings. In particular to overcome a lack of access User and Demand Creation Mechanisms, in the co-creation of ICT based services meeting key socio-economic challenges. The interaction of the Collaborative Networks of SMEs and Professionals enables:

- User Driven service/product development, bringing in the requirements originated in real life settings. This allows for a dramatic reduction of the iteration cycles during the service / product development and for a significant reduction of the investment costs associated;
- User Driven Market demand creation, through structured request to potential users categories for additional services/products with huge commercial potential since the outset.

A successful development of the European Industry (and SMEs, in particular) depends upon the ability of amalgamating all the different stakeholders in the development processes of new products/services, from SMEs to Customers, from Regional Development Agencies to Citizens in the new model of the "Open Innovation Functional Region", as user-driven innovation can play an important role in speeding up actual value creation from the innovation process through addressing the actual user needs. The 129 members of the European Network of Living Labs can provide an outstanding environment for the adoption and refinement of the proposed model.

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