

MASTER

Models for living lab's financial sustainability a Dutch-Italian case study

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Models for Living Lab's Financial Sustainability: a *Dutch-Italian* case study

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Abstract

Living Lab is an emerging innovation methodology which has the potential to reduce the gap between research and development, bringing together every actor of the innovation process: public administrations, education institutes, businesses and citizens take part of a shared collaborative process which aims at the realization of better solutions to diffused social problems.

Indeed, the Living Lab is either part of, or constitutes an innovation network of people, private firms and public institutions. Living Lab has the potential to convey value to the entire network, but it requires the support and commitment of its stakeholders to operate at full regime and ensure long term viability. For this reason, financial sustainability is one of the main challenges for any Living Lab.

With this research, the objective is to understand how long-term viability can be reached through a sustainable business model based on the right collaboration mode in a multi-stakeholder environment.

This thesis proposes a twofold approach: on the one hand, by developing a comprehensive theoretical framework, we enrich Living Lab literature of a holistic perspective. On the other hand, we contribute to the practical understanding of Living Lab's dynamics through the analysis of the evidence from the empirical research. Indeed, while most of Living Lab research is at academical level, we propose a perspective that integrates the theoretical study with the practical insights obtained by involving three virtuous Living Labs in our case study.

Hence, the analysis of Amsterdam Fieldlabs (the Netherlands), Stratumseind Living Lab (the Netherlands) and Textile&Clothing Living Lab (Italy) sheds light on several under-researched aspects, clarifies some ambiguities and reveals promising paths for future developments. Based on that, we build two concrete models, the *full sustainability model* and the *funding mix model*, which facilitate the identification of a financially self-sustainable business models for Living Labs.

In conclusion, this thesis gives a comprehensive overview of present Living Lab theory and practice and proposes two models which translate the main findings of the research in concrete and functional guidelines for Living Lab's scholars and practitioners.

Management Summary

The last decades marked a radical shift in the traditional conception of organizations and market. Concepts such as open innovation and user-centered design begins to be fundamental drivers of business success, while the development process is opening to more participative and collaborative approaches. In addition, the idea of value is moving away from pure economic return, and an increasing number of organizations is interested in generating public value and social impact alongside with profit.

In this context, several approaches based on co-creation, open innovation and user-centered design are emerging. In *chapter 1*, we introduce the concept of Living Lab, an innovation methodology which has the potential to address social challenges and market needs thanks to a participative and multi-stakeholder approach to innovation. After a preliminary analysis of the available literature, we realized that most of the theories do not refer to a common research paradigm and, thus, there is still a high degree of ambiguity in the understanding of the concept of Living Lab. Indeed, we propose the following operative definition:

Deeply rooted in real-life environments, Living Lab is either part of, or constitutes an Innovation Network of people, private firms and public institutions. Living Lab is a methodology based on knowledge and observation and guided by a practice driven approach; these elements combined, in the form of innovation projects, concur in the realization and implementation of innovative solutions that are user- or community-driven, co-created by the customers, and tested and validated in real-life settings.

Living Lab has several distinct fields of application (i.e. healthcare, rural communities, ICT development, advanced technology research etc.) each one with peculiar implications. Indeed, we decide to focus on Urban Living Lab, in which the Living Lab methodologies are applied to city environments to solve diffused social problems and develop products, services and policies which improve living conditions for the citizens.

The present conception of Living Labs was introduced in 2006, when the European Network of Living Lab (ENoLL) was established, and, thus, it is still relatively novel. For this reason, Living Lab's theory and practice, still face several challenges and criticalities.

This master thesis focuses on the challenge of Living Labs to become financially self-sustainable and viable in the long-term. We regard to sustainability as one of the most diffused problems: Living Labs often struggle to adequately fund their activities and, thus, present an unintended temporary nature. Indeed, at the end of *chapter 1*, we illustrate the two main research questions that guide this thesis and address the problem of sustainability for Living Labs operating in urban environments.

Which are the characteristics and interrelations among Living Lab's network, activities, outcomes, value creation and value delivery and how do they compose a holistic model that enables the achievement of financial sustainability and long-term viability?

How can a Living Lab, based on a concrete model, exploit the economic, business and public value generated and ensure that stakeholders and other sources provide the necessary funds to achieve financial sustainability?

In *chapter 2*, we explain in detail the methodologies that we adopted in this thesis. As stated in the research questions, the goal is to develop two concrete models which can give an important contribution to the general understanding of Living Lab's sustainability. Since the models are developed based on the combination of theoretical insights and practical evidence, we designed the research in two distinct parts: First, in the literature study, with the objective to delineate a holistic theoretical framework, we perform an extensive analysis of available literature. Then, based on the theoretical framework, we design a case study to obtain practical evidence from three virtuous examples of Living Labs across Europe. For the case study, we primarily relied on interviews with a broad panel of stakeholders of the three Living Labs and on direct in-field observation.

Therefore, in *chapter 3*, we present the theoretical framework, which is based upon 79 heterogeneous academic articles, previous literature reviews, practical studies and other materials. In the framework, we delineate the basic elements and characteristics which constitute a Living Lab, and we analyze their interrelations and implications with the financial sustainability. We expand the understanding of the

role of the network in the creation of value, and the importance to adequately demonstrate and deliver it to the stakeholders. We noticed that there is a high availability of literature about Living Lab, but it lacks consistency and does not refer to a common research paradigm. Moreover, many aspects are still under-researched. Therefore, our literature framework has the objective, not only to set the basis for the empirical research, but also to contribute to a coherent research paradigm about financial self-sustainability, especially for Urban Living Labs. In addition, Living Lab research often lacks practical perspectives and mostly relies on academical studies. Hence, the literature review also reveals promising aspects that are worth of a further in-field validation.

In *chapter 4*, we report the evidence from the three Living Labs participating to our case study: Stratumseind Living Lab in Eindhoven (the Netherlands), Amsterdam Fieldlabs (the Netherlands) and Textile&Clothing Living Lab in Palermo (Italy). Indeed, we analyze the collected information case by case, structuring the insights according to the theoretical framework and reporting the materials and coding schemes in the *appendices*.

Based on the same structure, in *chapter 5*, we perform a comprehensive cross-case analysis of the three Living Labs. For every aspect of Living Lab, we confront the most important empirical evidence of each case and we connect it to the theoretical framework. In this way, we find confirmation to certain theoretical insight, we resolve some contradictions in the literature and we shed light on under-researched topics. The analysis of the empirical evidence performed in this thesis contributes to certain aspects of Living Lab theories and practices.

Furthermore, at the end of the chapter, we propose two models, the *full sustainability model* and the *funding mix model*, which cover and include the most important findings of this research. We decided to represent the results as models to optimize the combination of theoretical implications with the efficacy of operational and practical insights.

The *full sustainability model* is a holistic view of the several characteristics that determine the activity of the Living Lab and its financial sustainability. The different elements constituting the Living Lab are visualized, together with the complex system of interrelations and connections, and are related to the four main funding options, which we defined as *pay per service*, *subsidy*, *out of network funds* and *cross-financing*. The *full sustainability model* is intended as practical tool that can be used by Living Labs to design and finetune their activities based on the visualization of virtuous practices and dynamics and with their integration with theoretical perspectives. The *funding mix model* is an extension of the *full sustainability model*. The *funding mix model* deepens the analysis of the most critical parts of the previous model, like the interrelations between value creation and the four funding options. In the *funding mix model*, pay per service, subsidy, out of network funds and cross-financing are analyzed to provide Living Labs with a comprehensive view on every possible financing opportunity.

In *chapter 6*, we discuss in detail the two models and we link the discussion with a broad set of theoretical and practical suggestions. Indeed, to preliminarily introduce this thesis' results and present the finding of this research in a nutshell, we provide a brief overview of the implications of the two models.

The *full sustainability model* strongly focuses on the network of the Living Lab and sets it at the center of the model. In fact, the actors of the network not only are the enabler of value creation when involved, but also have the responsibility to finance the Living Lab's activity. For this reason, when designing a viable model, any practitioner should start from the identification of the right network, based on the context, mission, assets and capabilities of the Living Lab. Then, also the processes, activities, projects and outcome of the Living Lab should be defined consistently with the available network. Based on that, the Living Lab should identify the way to maximize the creation of value and, more important, to successfully deliver it to its stakeholders. Finally, the aspects of value creation and delivery are connected to the four funding options.

With the *funding mix model*, our objective is to expand the last part of the *full sustainability model* in order to provide practitioners with an effective tool for defining the right funding mix to make the Living Lab financially self-sustainable. Indeed, the model integrates economic, business and public value with a practical framework of the different sources of financing and funding options. Indeed, based on the model, a Living Lab can develop an optimal funding mix which combines pay per service, subsidy, out of

network funds and cross-financing on several dimensions. Consistently, financial self-sustainability is the result of different forms of funding at project and strategic level, depends on partners internal and external to the network and relates both to core and side activities.

The implications of the two models, together with the practical and theoretical recommendations, have the objective to accurately represent the researches conducted in this thesis project. We believe that our theoretical and empirical study results in a concrete contribution to research and makes it a bit easier for Living Labs to become viable and sustainable in the long-term. This is a very important goal for this thesis: in fact, Living Lab has the potential to become an important innovation which can have a role in solving the big challenges of our time. Nevertheless, we are aware that Living Lab is still in its early steps and has to face many difficulties before to establish as leading methodology and unleash its full potential. For this reason, we conclude this thesis with a set of limitations and proposals for future research (*chapter 7*).

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1. Introduction

The last decades marked a radical shift from the traditional conceptions of organization and market. While the second half of the past century has been characterized by a stronger focus over quality, nowadays firms face more demanding customers. Consequently, orientation toward customer and customer value delivery have become the major sources of competitive advantage (Woodruff, 1997).

In addition, the increasing global competition and the dynamic nature of current markets accelerated the pace at which new products and services are launched, and shortened product life cycle. Involving the users in the innovation process has become a suitable way to intercept their complex needs and to reduce time to market. Thus, many firms collaborate with customers to improve the effectiveness of product development which often results in considerable financial benefits (Nijssen et al., 2012).

Furthermore, customers are valuable sources of product and service innovation, since it is easier for them to know exactly what they want when they design it themselves (von Hippel et al., 2011). This enhanced and more central role of the user is made possible by two main factors: first, the ability of users to develop high-quality new products and services is rapidly increasing and, second, the refinement of communication tools and collaboration mechanisms allows consumers to be easily and efficiently involved in the innovation process. That results in a shift away from the traditional division of labor, in which manufacturers create and produce while customers only consume (von Hippel, 2005). Indeed, the pattern of consumers-as-innovators empowers consumers to have a central and active position and pushes many organizations and companies to rethink their product development system and build upon this innovation paradigm (von Hippel et al, 2011).

Moreover, users are not the only actors involved by firms in their innovation process: the need for always new and complex products and services paved the way for many organizations to draw from a broad set of external sources of knowledge. Many are the factors – such as the drop of the cost for collaboration and networking due the diffusion of ICT and of the web - that drastically knocked down the distance between the several actors of the innovation process.

Thanks to these new favorable conditions users, customers, suppliers, partner and competing enterprises, universities, research centers and governmental institutions can concur to a shared objective. It is based on these premises that Chesbrough's (2003) developed the concept of Open Innovation. Indeed, an increasing number of innovations are the result of joint ventures, strategic alliances, shared R&D projects and joint-development processes. Universities established as knowledge hubs while policy-makers, from local entities to international communities, support the development of innovative services and direct progress toward novel and sustainable goals.

Living Lab is an emergent methodology that has the potential to fulfill the role of bridging the gap between User-Innovation and Open-Innovation (Schuurman, 2015). The objective of this master thesis is to shed light on some of the aspects that have the potential to make Living Lab a leading methodology to co-create and shape the future of innovation.

Living Lab is a recent concept: although the first record of the appellation can be tracked down in the 18th century, when Knight (1749) coined the term living laboratory referring to the human body as a combination of elements and conditions that work together and offer opportunities for experimentation, the modern conception of Living Lab took shape only in the last decades. MIT's professor John Mitchell forged the term in MIT Media Lab, where a realistic home-like environment was artificially recreated to allow researchers, not only to observe and manipulate routine activities and interactions, but also to test new technologies. In Europe, the diffusion of Living Labs accelerated in 2006 when, thanks to the Finnish European presidency, the European Network of Living Labs (ENoLL) was constituted. From that time, the concept and thus its definition has been continuously evolving: despite Living Lab is still in an embryonic phase, it is a prominent reality in the field of innovation.

In this chapter, we preliminary introduce the concept of Living Lab from an academical perspective reporting the most acknowledged definitions (*section 1.1*). Then, we explain the scope of the research and present two challenges for Living Lab, which constitute the common threads of the thesis (*section 1.2*). Finally, in *section 1.3*, we present the problem definition and the relative research questions.

1.1. Definition

Among the most used definitions, the following one is reported on the official website of the European Network of Living Lab [1]: “Living Labs are defined as user-centered, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real-life communities and settings.” This definition leaves space for interpretation: in fact, it is a combination of a set of common innovation practices and approaches. Therefore, scholars and Living Labs often adapt to specific situations. This is because, being it still in its infancy, it faces continuous developments and a rapid evolution. Furthermore, the generalized conception of Living Lab has several contexts of application and operates in disparate frameworks. Thus, it can be customized to be more respondent to the needs of the applicative settings.

In this section, we elaborate an overview of the most common definitions keeping into account the perspectives adopted in the several cases. The objective is to understand whether there is space for a theoretical definition with general significance.

1.1.1. Current definitions

The European Network of Living Lab focuses on open innovation and user-centered approach: the two aspects are integrated with research and innovation in real life communities and settings (ENoLL, 2016). Accordingly, Living Labs are real life environments that allow observation and analysis of the innovation process, of the users and their environment; thus, they facilitate and foster user and open innovation, that results in user- or community-driven innovations. For ENoLL, a central aspect of Living Lab methodology is the practice-driven approach: on the one hand, it leads to opportunities for users to influence the development of solutions for problems affecting their everyday life. On the other hand, it contributes to translate developers’ capabilities in real-world solutions, and it is instrumental for the definition of territorial specific policies (ENoLL, 2016).

In parallel with the practical approach, Mulder (2008) defines Living Lab not only as a network of infrastructures and services but especially as a network of people with their experiences. The Living Lab is thus considered a research methodology for sensing, prototyping, validating and refining complex solutions in multiple and evolving real-life contexts. This definition highlights the potential of Living Lab as a methodology: if correctly implemented, it can relate the measurement on a large scale of the dynamics of user behavior with the ability to produce valuable innovations. In fact, in Living Labs the uncontrollable dynamics of everyday life are accepted and, by becoming central part of the innovation process, they enable designers to develop novel products and services jointly with the users (Frissen and van Lieshout, 2004). This aspect is defined by Mulder as social experience, and the ability to successfully implement it, is what makes a "Living Lab living".

The previous definitions put in the spotlight the methodological nature of Living Lab. Consistently, it can be seen as a research approach to study the impact of technology on society and vice versa (Mention and Torkkeli, 2015). Accordingly, at the center of Living Lab there is a set of approaches and techniques that enables the development of innovative solutions in a real-life context through a close observation of the users which represent a new element of the decision-making process and are invested of a co-creation role. Living Lab indeed serves as connection between research, citizens and the actual living environment (Franz, 2014).

The citizens are not the only actors involved: in fact, Living Lab can be also considered as a *public-private-people partnerships* in which not only users and producers, but also many other heterogeneous stakeholders such as firms, public agencies, universities, and institutes participate in the co-creation process of innovations (Leminen et al, 2012; Niitamo et al., 2006). Present theory invests Living Lab of different roles with regard to such partnerships, which are also defined *quadruple helix collaborations*:

Westerlund and Leminen (2011) consider Living Labs as either physical regions, or virtual realities, or interaction spaces in which several stakeholders can establish a public-private-people partnership to

[1] <https://enoll.org/about-us/>

collaborate at the creation, prototyping, testing and evaluation in real life contexts of new products and services. Alternatively, Almirall and Wareham (2008) argue that Living Labs work as intermediaries between the several actors of a quadruple helix collaboration, in which they primarily capture and codify users' insights in real-life environments.

More in general, Living Lab has a role of innovation intermediary: it functions as an aggregator of various external inputs that are then translated into requirements and design parameters (Mention and Torkkeli, 2015; Almirall and Wareham, 2011). Another peculiar inflection of the mediation purpose of Living Lab is given by Franz (2014): by integrating users in real life environments with a co-creator role, Living Labs can be considered as intermediaries in the shift from a product-based to an innovative service-oriented economy.

Among the other perspective tackled by scholars, Living Lab can be seen as an innovation milieu, built on every-day practice and research, which provides a semi-partitioned space: an arena integrated in real-life environments but structured in the form of an innovation project to cultivate user-led insights (Almirall and Wareham, 2011). In such arena, the existing relationships between different stakeholders are supported, while it is given the opportunity to new partners to meet and collaborate to develop and bring to market new products and services (Bergvall-Kåreborn et al., 2009). Almirall and Wareham (2011) also recognize Living Labs as infrastructures founded on knowledge where tacit, experiential and domain-based knowledge is collected, codified and stored to be further employed and communicated.

The definitions presented above prove that Living Lab is a concept still far away from its maturity: in fact, there is not uniformity in providing a general definition. Some characteristics are frequently reported but often different weight and importance is given to them. Indeed, the same aspects can be analyzed and interpreted from distinct perspectives. This is mainly due to two reasons: first, Living Lab is an interdisciplinary concept, with implication in study field ranging from social sciences to innovation management, from urbanism to research in high-tech. Thus, the diverse educational background and research purpose of each author lead to diverse framing and analysis of the Living Lab concept. Second, the applicative contexts of Living Lab are various and heterogeneous, from agriculture in rural areas to urban regeneration, from elderly care to ICT development. The same can be said about the theoretical basis upon which each Living Lab is built. Therefore, empirical researches over Living Lab's activities and prevailing processes can have very different outcomes.

It is possible to group and organize the most relevant definitions to have a clearer understanding of the most frequent attributes of Living Labs. In *table 1* it is presented an overview and a summary of the most recurrent characteristics acknowledged in previous researches.

1.1.2. Operative definition

Combining the central and more characterizing aspects highlighted in *table 1* it is possible to propose an operative definition:

Deeply rooted in real-life environments, Living Lab is either part of, or constitutes an Innovation Network of people, private firms and public institutions. Living Lab is a methodology based on knowledge and observation, and guided by a practice driven approach; these elements combined, in the form of innovation projects, concur in the realization and implementation of innovative solutions that are user- or community-driven, co-created by the customers, and tested and validated in real-life settings

In this definition we consider the most recurrent elements present in renowned Living Lab studies: first, we underline the importance of being embedded in a real-life environment, which makes it actually "living". Then, we put in the spotlight the concept of innovation network, proposing the two main theoretical approaches according to which Living Lab is either part of a network or constitutes such a network itself. Furthermore, we acknowledge the methodological nature of Living Lab, which is practice-driven and enabled by the mechanisms of observation, co-creation and experimentation. Finally, we highlighted the main objective acknowledged in previous definitions, the development of user- and community-driven innovations.

Real-life environment	
Real-life environments that allow the observation of the innovation process and of the users Real-life contexts in which is possible to prototype, validate and refine complex solutions Real-life context that allows the development of innovative solutions through the observation of the users Either physical regions, or virtual realities in which several stakeholders can establish a PPPP Arena integrated in real-life, structured as an innovation project, to cultivate user-led insights	(ENoLL, 2016) (Mulder, 2008) (Mention and Torkkeli, 2015) (Westerlund and Leminen, 2011)
Methodology	
Methodology guided by a practice-driven approach Research methodology for sensing, prototyping, validating and refining complex solutions A research approach to study the impact of technology on society and vice versa Infrastructures founded on knowledge	(ENoLL, 2016) (Mention and Torkkeli, 2015) (Almirall and Wareham, 2011)
Mechanism	
Foster user and open innovation, by translating developers' capabilities in real-world solutions Observation of users and innovation process Co-creation, sensing, prototyping, testing and evaluating novel products or services in real-life contexts Measurement of user behavior is combined with the ability to produce valuable innovations jointly with the users	(ENoLL, 2016) (Mulder, 2008) (Frissen and van Lieshout, 2004) (Mention and Torkkeli, 2015) (Franz, 2014) (Leminen et al., 2012) (Westerlund and Leminen, 2011)
Partnership and Network	
Network of infrastructures, services, people and experiences. Connection between research, citizens and the actual living environment PPPPs in which users, producers, and many and heterogeneous stakeholders participate in the co-creation process of innovation Intermediaries within the several actors of PPPPs Support for existing and establish relationships between different stakeholders	(Mulder, 2008) (Franz, 2014) (Leminen et al., 2012) (Niitamo et al., 2006) (Westerlund and Leminen, 2011) (Almirall and Wareham, 2008) (Mention and Torkkeli, 2015) (Bergvall-Kåreborn et al., 2009)
Objective	
Development of innovative solutions in a real-life context Development of novel products and services jointly with the users Development of user-driven and community-driven innovations Development of real-world solutions instrumental for the definition of territorial specific policies	(ENoLL, 2016) (Frissen and van Lieshout, 2004) (Mention and Torkkeli, 2015)

Table 1 - Summary of most acknowledged Living Lab characteristics

1.2. Scope

In this section, we introduce the scope of the research in terms of the main themes that are covered and investigated through the entire thesis. The preliminary research presented in *section 1.1.* showed that Living Lab is a multidisciplinary topic, whose research is still far from maturity. For this reason, there is abundance of studies but there is very low consistency among different researches. Therefore, it is important to define upfront the scope of the thesis to clearly delineate a research strategy and limit the research efforts to a set of concrete goals. Indeed, we give to this thesis a prevailing focus on a typology of Living Lab (Urban Living Lab) and on a major problem (Financial Sustainability). These choices are explained in the following paragraphs.

First, current literature shows that Living Labs have been established in many different fields (i.e. healthcare, rural communities, ICT development, advanced technology research). Consequently, Living Lab practices and theories are in part determined by the characteristics of the context of application. Thus, to develop this research in a coherent manner, we decided to investigate a specific category of Living Lab. Indeed, we focus on the application to the urban environment, where Living Lab seems to have a great potential to solve diffused social problems. In fact, the latest direction of ENoLL is to address *Sustainable Development Goals* and the number of Living Labs operating in urban context is increasing.

In *section 1.2.1*, we provide a detailed focus on Living Lab applications in urban contexts, that we refer to as Urban Living Lab. In general, the entire thesis is oriented toward this typology of Living Lab. Nevertheless, even though we privilege materials and sources referring to urban applications, we try not to limit our research. Indeed, we keep into account also insights about Living Labs from different contexts.

Second, the preliminary research showed that Living Labs deal with several problems and difficulties. Most of them relate to the fact that Living Lab is still an emerging innovation context and thus it faces the challenge of the pioneers. Indeed, many actors are still not familiar with the proposed concepts and the methodologies, which translates in severe obstacles for Living Lab to show their full potential. Commitment from the stakeholders, participation of the users, realization of concrete solutions are just some of the main struggles for many Living Labs. Among them, we identified financial sustainability as one of the most critical problems. For this reason, in *section 1.2.2*, we provide a detailed focus on Living Lab's sustainability and long-term viability. In general, the entire thesis is developed around the problem of financial sustainability. Indeed, we investigate a set of Living Lab's elements and characteristics that present some implications with this major problem, and financial sustainability of Living Lab constitutes the common thread of this study.

1.2.1. Urban application

More than half of the World's total population lives in urban areas, and this ratio is projected to constantly increase. For this reason, urban research has gained a central position in dealing with the complexity and global nature of the modern society: on the one hand, cities are vibrant loci of education, employment, social encounter and recreation; they established as the nucleus of economic growth and social change, and can be considered the engine of progress and innovation (Franz, 2014; JPI - Urban Europe, 2015). On the other hand, the escalation of social conflicts and intolerable environmental degradation raises the need to direct progress toward a new concept of sustainability to ensure quality of life. Indeed, urban society is not only at the root of global problems but has also a great potential to resolve them.

To address these challenges, European strategies foster the implementation of sustainable and smart cities. In addition, in the most recent years, urban research also focused on the social aspect of innovation to design solutions to improve living conditions in cities, especially by involving citizens in the co-creation of public services. Urban areas offer great opportunities to co-create innovation, implement novel infrastructures, and conduct research studies. Moreover, opportunities for future improvements can be identified, promising solutions to urban problems can be tested and the economic potential can be exploited (JPI - Urban Europe, 2015).

Recent tendencies shift towards participative societies and give increasingly value to user involvement and resident-driven development; an essential part of the innovation ecosystem of the cities is represented by platforms offering a mechanism to support collaboration between multiple stakeholders which share compatible objectives ranging from improving living conditions to systematic innovation (Tukiainen et al., 2015). In addition, due to the highly complex framework in which global society operates, it has become harder for a single entity to seek for valuable solutions. Therefore, there is a growing trend towards externalization of sources of knowledge. In this context, Living Lab has the potential to combine urban research and citizens' needs with innovative realities in multi-stakeholder settings.

Despite the primary approach of Living Labs remains focused on technology-based innovation processes, there is a small number of them successfully implemented in the field of urban research (Franz, 2015). Such examples of Living Labs are categorized under few different definitions:

Nevens (2013) defines as *Urban Transition Lab* a setting that allows the exploration of new governance approaches for the co-creation of development pathways. There, openness to diversity and the contribution of multiple stakeholders concur at the emergence of ideas to design a sustainable future. *Urban Living Labs* are forums of innovation where research results are validated in order to implement new solutions developed through the collaboration between researchers, cities and civil society (JPI - Urban Europe, 2015). For Noll (2011), Living Labs in urban context are instruments that foster the concept of cities as centers of innovation by identifying real solutions that can be developed and tested in conjunction with relevant stakeholders and citizens. Franz (2014) defines *Social Oriented Living Labs* these applications which focus on co-development of cities and living environments through an open, process-oriented and participatory setting.

Finally, Urban Living Lab can also be seen as a regional innovation network – in which firms and other organizations are systematically engaged in interactive and collective learning – with a strong emphasis on residents and their communities as users (Juujarvi and Pessa, 2013). According to Bakici et al. (2013), in the context of smart-city initiatives, Living Labs are tools and processes which foster user innovation and testing new technologies, and they can be employed for learning, conducting researches, gain insights for future markets and reduce risk.

1.2.2. Quest for sustainability

As explained in *section 1.1*, since Living Lab is still a relatively novel concept, it faces the challenges of pioneers since it has to create its own proper market positioning (Katzy, 2012). For this reason, Living Lab is often not financially sustainable and struggle to translate value into a sustainable business model (Brankaert, 2014). Indeed, sustainability is a crucial aspect for the future feasibility of a Living Lab: a significant number of Living Labs present an unintended temporary nature since they stop their activities when the funding ends, or they operate at extremely scarce resources (Leminen et al., 2012).

Also, Ståhlbröst (2012) noticed that some Living Labs are set-up for only one innovation project. In this case, it is even more problematic in terms of sustainability and of value being generated for the actors involved (Schuurman, 2015). The struggle to become financially self-supporting on the long term is even further testified by the fact that researchers often encounter a number of no longer existing Living Labs (Brankaert, 2014) and we experienced the same problem during the case selection of this master thesis.

Sustainability is the condition that allows a Living Lab to be permanent or semi-permanent, remaining operational in a long-term time horizon, becoming financially self-supportive (Veeckman et al., 2013). Per Bergvall-Kåreborn et al. (2009) sustainability, in the context of Living Lab, refers to two distinct aspects: first, it is considered viability as a pure economic condition which refers to the possibility to finance every-day activities respecting the planned standard. Second, the Living Lab has a responsibility to its wider community. Hence, the ability to implement solutions with a concrete social improvement of everyday life (Tukainen et al., 2015) must be supported and ensured during the entire life of a Living Lab.

Several researches found out that most of Living Labs that are adequately funded primarily rely on public grants and subsidies (i.e. Brankaert, 2014; Wu, 2012). Even if this seem a feasible financing option in the short-term, it does not ensure the viability in the long-term since many Living Labs stop their activities when the funding ends. Moreover, public subsidies programs are increasingly required to serve private markets, and thus grant agreements often require a revenue share from private sources (Katzy, 2012).

One concrete approach to the challenge of sustainability puts the network at the middle: Living Lab works together with and for a number of actors: thus, the collaboration model between these partners can be seen as a key to secure long-term relationship and funds on a constant basis (Niitamo et al. 2006). A second approach considers the potential market of the Living Lab as the key to generate revenues

from the services provided (Garcia-Guzman et al. 2013). Indeed, understanding what the market needs and can offer is the base upon which Living Labs should design their offering in terms of practices, resources and services (Rits et al., 2015).

Per Svensson and Erikssen (2009), one service that has a potentially high return is business modeling of innovation from the early steps, which can lead to novel opportunities for enterprises and entrepreneurs (Svensson and Erikssen 2009). Teece (1986) argues that innovation success highly depends upon a company's ability to link real customer needs with complementary assets and with the design of adequate services; Living Lab can give an important contribution to that (Rits et al, 2015). In practice, Living Lab can develop methods to better exploit the learning generated (Bergvall-Kåreborn et al., 2009) or systematically create investable projects to match with entrepreneurs or investors (Katzy, 2012).

Finally, Mastelic et al. (2015) state that many Living Labs do not make systematical use of business modelling techniques for themselves, and often do not consider critical aspects such as cost structure, customer segment and revenue streams. Moreover, sustainability becomes more feasible if Living Labs make good use of business modelling supports not only in the set-up phase, but in a continuous and dynamic process involving different stakeholders. Only in this way, the practices and infrastructures established in the first phase can be improved and transformed so that they can become scalable and useful in other expanded contexts (Rits et al., 2015)

1.3. Problem definition

The literature search conducted so far showed that financial sustainability is considered a crucial problem for Living Lab by many studies. Different researchers acknowledge the criticalities that Living Labs encounter in becoming self-sustainable, but they rarely propose solutions and point out concrete strategies. Moreover, almost no researchers systematically address this problem, and there is not a practical model on which a Living Labs can base and design a financially sustainable business model. Indeed, we identify the lack of a concrete model for Living Lab's financial sustainability as the major problem to be addressed in this thesis. Our objective is to develop such a model based on a combination of theoretical perspectives and practical insights.

Therefore, in *chapter 3*, we develop a theoretical framework on which to base the challenge of financial sustainability for Living Labs operating in urban environments. Then in *chapter 5*, the resulting literature framework will be confronted with the evidence from real cases. Finally, we want to integrate all the insights to develop a model of these Living Lab characteristics that have important implications with financial sustainability. Indeed, the resulting model not only includes a substantial theoretic foundation, which is given by the literature framework; on the contrary all the theoretical insights are cross-compared with the empirical evidence of real cases. Thus, the result is a holistic model through which Living Labs can understand the connections and implications of each element on the other and how they all concur in the achievement of financial sustainability. To address this objective, we based the empirical research on this research question:

Research question A - *Which are the characteristics and interrelations among Living Lab's network, activities, outcome, value creation and value delivery and how do they compose a holistic model which enables the achievement of financial sustainability and long-term viability?*

Moreover, out of the Living Lab characteristics that were investigated in the literature review the aspect of value creation and delivery lacks a concrete reference model. This, seems to be a big obstacle to the effective exploitation of the Living Lab's business model. For this reason, in the empirical research we also try to answer another research question. The objective of this last research question is to support the development of a concrete model which can clearly link the value created with the sources of financing.

Research question B - *How can a Living Lab, based on a concrete model, exploit the economic, business and public value generated and ensure that stakeholders and other sources provide the necessary funds to achieve financial sustainability?*

The two research questions are strictly connected to each other, share the same objective but have a different depth of focus. In fact, they both aim at the development of a comprehensive theoretical framework which is strongly linked to practice thanks to empirical models. At the same time, **research question A** considers the Living Lab as a whole, combining different elements and their interrelations in a holistic model. In contrast, **research question B** decomposes the Living Lab's activities and focus on few aspects which are more relevant to the financial sustainability.

It is important to notice that the research questions presented above are the result of an iterative design process. In fact, we first developed a preliminary question which guided the initial research and the literature review. Then, the research questions were further refined based on the theoretical framework developed. Therefore, **research question A** and **research question B** keep into account the knowledge and perspectives presented in *chapter 3*.

2. Methodology

In the previous chapter, we introduced the two research questions and thus we presented the main direction of the thesis.

Research question A - *Which are the characteristics and interrelations among Living Lab's network, activities, outcome, value creation and value delivery and how they compose a holistic model which enables the achievement of financial sustainability and long-term viability?*

Research question B - *How can a Living Lab, based on a concrete model, exploit the economic, business and public value generated and ensure that stakeholders and other sources provide the necessary funds to achieve financial sustainability?*

The objective of this thesis project is to develop two concrete models which can help the design of a viable business model for any Living Lab operating in an urban context. These models should be given by the combination of a comprehensive theoretical framework with observations and insights from real cases. The resulting models should cover a broad set of Living Lab elements and merge different sources of information. For this reason, we need to define an adequate mix of methodologies which allows the development of a holistic model. Indeed, in this chapter we present in detail the methodologies that are employed in the several sections of the thesis. The thesis research can be divided in two parts:

Theoretical framework - *Chapter 1* showed that across Living Lab theory there is a lack of consistency among the different definitions. Therefore, through a detailed analysis of the most renowned theories and studies, we have the objective to develop a comprehensive framework of Living Lab's characteristics, practices and approaches. Such a framework constitutes the base for any further investigation in this thesis. In *section 2.1*, we explain the methodology that guided the literature study.

Empirical research - Then, we apply the framework developed through the literature to real cases to obtain empirical evidence. The theoretical framework is cross-checked with the evidence from existing Living Labs. These cases also offer valuable insights over the best practices which have the potential to ensure financial sustainability to Living Lab projects. Therefore, in *section 3.2*, we explain the design of the empirical research.

2.1. Research approach

To precisely direct this master thesis towards the proposed research questions, it is necessary to develop an adequate knowledge base through a comprehensive literature review. Research over Living Lab is still in its early phases and this study wants to contribute to current research by delineating a coherent framework for Living Lab theories. Therefore, we compare and combine the several research streams which do not connect to a larger research paradigm. Moreover, from an accurate literature review, several stimulating gaps are identified.

The literature study keeps into account the main objective of this master thesis. Thus, at the center of the literature search are these elements which present a strong implication with the sustainability of Living Lab. The resulting framework will include, in a consequential manner, all the diffused characteristics that have a potential connection with the financial success of Living Lab.

The literature review is guided by this **preliminary exploratory question**:

Which diffused Living Lab characteristics and practices have a strong implication with financial sustainability and long-term viability? Which theories and practices constitute a coherent and holistic theoretical framework?

2.1.1. Literature search methodology

The main strategy that inspires this literature study is the snowball strategy (Wohlin, 2014) which is highly suitable for the development of a broad framework starting from a narrow topic. Hence, by

analyzing punctual characteristics of Living Lab, we can expand the research work on related topics with a more general meaning. In this way, notions about open innovation, co-creation, customer innovation, value creation and more, may contribute to shed light on the nature of Living Lab.

We combined the snowball strategy with complementary methodological guidelines to make the research holistic and objective. First of all, to prevent knowledge bias, we counted on different typologies of material to obtain a multi-perspective view. For this reason, we considered many diverse sources of information (i.e. academic articles, European policies, on-line presentations and records from specific Living Labs' websites and from ENoLL). Also, the choice of articles is based on the same variegated approach and the selected literature has a very diversified nature (i.e. academical comparison of existing theories, comparative case studies, reports of practical experiences etc.).

We tried to adopt a methodology which is the most feasible path in the theoretical context of Living Lab: the current conception of Living Lab was elaborated in 2006 and thus the available literature is limited to a short period of time, and only a limited number of authors deeply researched this topic. The risk of getting stuck on a specific view is high, hence, we structured our methodological approach with the goal to always maintain an open mind.

Because of the novelty of the topic and limited number of practitioners in the field, the criteria for article selection deviate from a standard research: the number of citations, the journal impact factor and the importance of the authors are kept into account, but they are not decisive. A fundamental aspect on which the choice is based, is the setting of the study. We privileged reviews of the available literature to build a general framework and provide an overview. At the same time, articles resulting from the observation of real Living Labs represent the main sources for determining many practical implications. Also, this latest typology of sources is the most reliable in reporting and representing the link between Living Lab theoretical foundation and the concrete outcome and success.

Finally, since the literature specifically addressing Urban Living Lab is very limited, we had to rely, besides general theories, also to studies inherent to different applications of Living Lab. Nevertheless, certain fields of application are extremely sectorial, and the resulting Living Labs present characteristics different from the topic of this research. For this reason, in the selection of the articles we also consider articles of journals from different sectors (i.e. Healthcare, Agriculture etc.), but we privilege materials referring to a more similar context.

2.1.2 Identification of guiding topics

In order to address the literature study concerning the sustainability of Living Labs embedded in urban environment, we identified, from a preliminary screening of literature, a set of promising topics and potential research leverages. In *chapter 4*, it is presented the systematic research about five research topics: Living Lab's (1) innovation network; (2) characterizing activities; (3) outcome; (4) value creation; (5) value delivery.

We investigated systematically these topics on the main search engines (i.e. "ProQuest", "Google Scholar", "Science Direct", "ABI/IN-FORM"), starting with general keywords and gradually increasing the focus while keeping in mind the snowball effect of previous results. Consequently to this search, we selected the most promising titles and, after reading carefully the abstract and the methodology, we read completely the most inherent to the purpose of the literature study. After a preliminary read, all the most useful insights are noted and included in the literature review. From this process, 79 articles are selected to build the theoretical framework which constitutes the backbone of this Master thesis. We reported the complete list of keywords used in the systematic literature research in *appendix 2*.

2.2. Empirical research strategy

The research strategy chosen for this work is the case study. We selected this method after analyzing the adequateness according to the principles expressed in the handbook by Yin (2003). In fact, the author provides a set of conditions upon which it is possible to understand the methodology that is most adequate for the intended research purposes.

First, this study aims to perform a more in-depth exploration of the possible strategies that can be adopted by Living Lab to sustain itself. It also has the ambition of provide a description of the actual state-of-the-art and of some meaningful examples. Indeed, exploration is the primary and traditional context in which case study is employed; in addition, Yin advocates for its suitability also for descriptive purposes. Second, while question such as “what” and “how much” are better answered by surveys and archival analysis, case study is one of the preferred methodologies (together with experiments and history) with the question “how” that is more explanatory. Third, case study is a better choice than experiments since in this research there will be no control over behavioral events, or at least it cannot be done either directly or precisely or systematically. Fourth, it is more adequate than history since through direct observation and systematic interviewing we can maintain a focus over the contemporary events.

2.2.1. Case Study Design

The objective of this master thesis is to confront a comprehensive theoretical framework with real cases with a prevailing qualitative approach. In order to get the most reliable results from a case study, it is fundamental to define beforehand the characteristic of the case study. Therefore, in the next sections we present the motivations leading to the selected design for the case study. First, we illustrate the choice to employ a multiple-case study. Then, we introduce the concept of embedded design approach to the single cases. Finally, we explain the selection procedure for the Living Labs that are involved in the research.

Single-case vs multiple-case – In his book, Yin (2003) identifies four relevant categorizations for case study research. The first distinction is made between the choice between a single-case and a multiple-case design. Single-case is the most common type of case studies under certain circumstances – that is when the case is either a critical or an extreme and unique or a revelatory one. On the contrary, for this research it is more appropriate a multi-case design: in fact, with the current study the objective is to obtain evidence from more cases. In this way, the objective is to give to the results a more compelling nature and thus ensure higher robustness, which is a fundamental measure of the quality of the research design.

Holistic vs embedded design – The second discriminant is whether to adopt a holistic or an embedded design. In a multiple-case study it means that in the analysis of each selected case, it is either involved only one unit of analysis (holistic design), while in the other attention is also given to one or more subunits (embedded design). In this research the unit of analysis is the single Living Lab, which is studied in its entirety. The choice of the unit is in line with Gerring and McDermott (2007), according to which the unit of analysis must be at the same level of the research proposition. Indeed, an embedded case study design appears to be the best choice for the current research. The main reason behind this choice is the use and interpretation of the collected data and results: these data are to be part of the finding for each specific case and not pooled across with statistical purposes. In this way, each individual case study consists of a self-sufficient study, in which convergent evidence pushes to a conclusion for the single case. Only after that, being the insights elaborated and interpreted, it will be possible to confront the results.

Selection of the cases – The choice of an adequate number of cases to analyze is of fundamental importance but does not include the possibility of application of the typical criteria for the size of samples. Yin (2003) states that the choice of the number has a strong relationship with the purpose of the investigation and thus it is to be defined by the practitioner coherently with the adopted replication logic. In fact, the cases can be selected in such a way that they either predict similar results or provide contrasting results but for predictable reasons – named literal and theoretical replicability respectively. In an exploratory study it can be beneficial to have multiple perspectives and examples coming from discording section of the range of possible choice.

Thus, in this investigation consider a limited number of cases (3), sufficient to allow a theoretical replication logic and cover better the complete context. Moreover, conducting a study with this approach is also an advantage in allowing generalizations, which is one of the main ambitions of the current research.

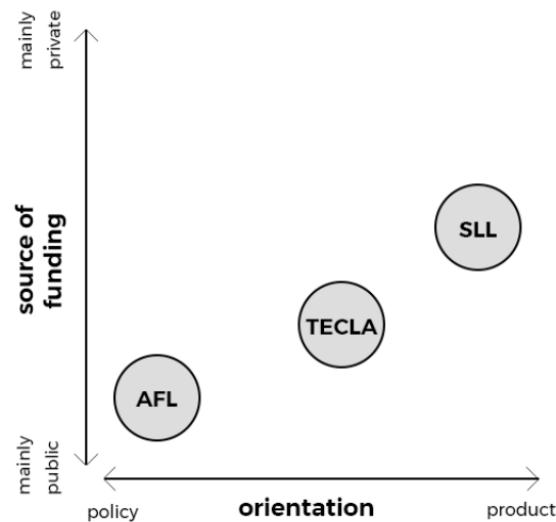


Figure 1 – Selection dimension and framing of Amsterdam Fieldlabs (AFL), Stratumseind Living Lab (SLL) and Textile&Clothing Living Lab (TECLA)

The literature search provides the domain in which the cases can be selected. The whole domain of Living Labs with a social or urban orientation is the main subject of the study, and thus the cases are selected from this category. To better identify relevant cases, which can lead to generalizability, it was used the framework developed in our previous studies (Gualandi and Leonardi, 2018). There, the entire spectrum of Urban Living Labs is represented on two dimensions (*figure 1*).

The main axis on this domain is the source of financing: mostly public on one extreme and mostly private on the other. This dimension was selected to frame every potential case according to the major purpose of the study, financial sustainability. In fact, entirely private and entirely public funds are two extreme possibilities for monetary inflow, and every Living Lab financing approach is contained between these extreme positions. Moreover, this dimension gives good chances of identifying common and contrasting interpretations of a Living Lab’s business model.

The other axis is the Living Lab prevailing orientation which can be policy-oriented or product oriented. Again, every Living Lab’s approach is included between these two extremes, and the orientation toward product or policy is a distinctive characteristic of Living Lab in practice. Therefore, combining the dimension of source of financing and practical orientation, it is possible to have a comprehensive and meaningful representation of a sample of Living Labs.

An additional discriminant in the choice is the national perspective. In fact, this thesis wants to, on the one hand, develop a model for Living Lab sustainability that has general validity and, on the other hand, obtain general insights over the difference between applications of Living Labs in Northern Europe and Mediterranean countries. That is due to our interest in applying these methods to South Europe, where Living Labs seem to have the potential to solve endemic problems and support national development. Based on this scheme were identified two cases from the Netherlands and one from South Italy. A final aspect of investigation that we keep into account is the maturity of the Living Lab. Indeed, we decided to compare two mature cases with a diametrically different positioning with one still in its startup phase. In this way, the objective is to investigate whether emerging Living Labs acknowledge the increasing importance to design a sustainable business model.

In order to select the cases, around 50 Living Labs from all over Europe were analyzed based on different sources of information (websites, newspaper articles, academical studies) to preliminarily understand their positioning about orientation and source of funding. Then, 24 Living Labs that were considered consistent with the research purposes were contacted. Only a limited number of them replied, and among the respondents several were not available for research purposes or were no longer active. A

complete list of the suitable Living Labs can be found in *appendix 1*. From this screening, we identified three promising cases:

- (1) the Amsterdam Fieldlabs (**AFL**), founded by the Amsterdam University of Applied Sciences, policy oriented and mostly funded with public resources.
- (2) Stratumseind Living Lab (**SLL**) in Eindhoven, mostly product oriented and with an important percentage of funds coming from private sources.
- (3) Textile&Clothing Living Lab (**TECLA**) in Palermo, Italy which has an intermediate positioning between the other two cases and is still in a startup phase.

2.2.2. Sources, materials and research protocols

The analysis of SLL, AFL and TECLA constitute the back bone of the empirical research. The data were collected counting on a wide variety of sources. In this section, we first discuss in details the employed data collection methods, then we present the sources for each specific case. To better motivate the design choices, we describe our research methods referring to the book by Esterberg (2002).

2.2.2.1. Data collection

Interviews are the primary source of data collection. For this research we decided to rely on in-depth interviews either individual or in small groups. In fact, the objective is to collect information from actors with different perspectives, without letting the dynamics and social pressure of being in a group influencing the answers. Interviews are often used since they allow the researcher to retrieve experiences, behaviors, opinions, values, feelings, factual knowledge, and personal background (Esterberg, 2002). We opted for semi-structured interviews, which means that we began with few preset questions to then follow the respondent's tangent of thoughts. That seems an adequate choice in an exploratory study in which the research direction is not completely defined upfront and new unexpected information can raise.

In *appendix 3*, we attach the general interview protocol. Moreover, for the two main interviews held in English we included a transcript in *appendix 4* and *appendix 5*. Finally, it is important to notice that interviews ensure high depth of responses, but at the same time may transmit some biasing cues.

Next to the interviews, we employed the observation of Living Lab practices directly on the field. Because of the exploratory purpose of this thesis, we preferred simple observations to structured information. The observations become important in complementing the interviews with practical demonstrations. Also, from the observation it is easier to obtain sensitive data, not influenced by the personal perception of the respondent, and to record non-verbal insights and behaviors. The employment of such techniques is considered adequate for every study which has a predominant discovery nature.

Furthermore, we employed also a heterogeneous set of complementary sources of information and methods. The three Living Labs provided us with additional study material, ranging from handbooks to the official applications to ENoLL, from video-interviews of important partners to official PowerPoint presentations. Moreover, we could count on two focus groups to obtain additional insights. One concerned precisely the theme of making a Living Lab sustainable and involved 25 experts active in the Living Lab field (*appendix 9*). These sources did not deliver a substantial addition alone but were fundamental complements and supports of the data collected through the interviews and observations.

Finally, out of the empirical observations obtained from AFL, SLL and TECLA, this research benefitted also from the enlightening conversations with several important representatives of the Living Lab's world. In fact, we presented some preliminary results of this research the Open Living Lab Days 2018. Indeed, participating to the annual plenary conference of ENoLL was not only an important achievement and acknowledgment for this research work, but especially an incredible opportunity to hear stimulating contributions about Living Labs from the most prominent people in the field. All these inputs substantially enhanced our understanding of Living Lab and resulted in a fundamental addition to this thesis.

2.2.2.2. Data analysis and quality of the research

To ensure the quality of the research it is fundamental to elaborate and employ the collected data in an adequate manner. In order to do so, we combined ex-ante and ex-post coding, and content analysis to process the entire set of collected data. Ex-ante coding means that the coding is designed and structured before the data is collected. In this case, the keywords are the main topics identified in the literature search. Indeed, the collected material is analyzed and structured according to the keywords.

The same process is iterated, after having collected the data, with new keywords which constitute the ex-post coding. This second approach to coding is particularly adequate in these cases where the interviews' questions are mainly open-end, and thus it is harder to predict the data. Finally, content analysis, based on thematic unities, is the systematic process in which data, coding and text are interconnected. We employed thematic content analysis since it is an adequate method to represent sentences and topics referring to the questions of the research. Coding and content analysis were performed iteratively over time over the different data.

For this reason, we present one of the coding iteration directly on the material. The interview transcripts (*appendix 4* and *appendix 6*) and TECLA's application form to ENoLL (*appendix 7*) still report an exhaustive example of the coding scheme we employed.

A structured approach to data analysis is a fundamental step to ensure the quality of the research, which is proven by four main indicators: *construct validity*, *internal validity*, *external validity* and *reliability*.

Construct validity is the extent to which the measurements and metrics employed are adequate and thus they result in a valid model. This aspect is fundamental for our research and thus we evaluate it according to Yin (2009): triangulation between different sources of materials is considered a key for construct validity, as well as having the interviewee revising the elaborated theories. Indeed, we kept these suggestions into account.

Internal validity refers to the causation links between observed phenomena: since our research has the objective to develop a holistic model based on qualitative data, only a few causation links are made explicit. Nevertheless, we are aware that such model needs further confirmations and validation on a larger sample.

On the contrary, external validity refers to the extent to which it is possible to generalize the results and applied them to other cases. As for internal validity, the models require further validation to have statistical generalizability. Despite that, the models resulted from a multiple case study, and thus they are adequate to apply to each of the three Living Labs we analyzed. Since these cases are different from each other, we can state that the developed models have a good degree of analytical generalizability and thus external validity.

Finally, reliability is the characteristic which ensure that any researchers conducting the same experiment should obtain the same results. Given that Living Labs are constantly going to rapid improvement and have a dynamic life cycle, any researcher should be able to verify the models on AFL, SLL and TECLA.

In conclusion, we can state that the research and the resulting models present a good degree of quality of research thanks to the employment of heterogeneous sources of information and by systematic triangulation of the results. At the same time, the nature of the research, based on qualitative methods and on an exploratory approach, is a limit to the external validity of the results.

Nevertheless, this thesis has the primary objective to develop a coherent framework gathering several aspects which are not investigated in a systemic manner in current literature. Furthermore, since this thesis is an exploratory study, internal validity is less crucial. Indeed, our objective is to show the path to future researchers about promising novel approaches rather than developing robust models.

2.2.2.3. Case specific sources

Stratumseind Living Lab - For what concerns SLL, first of all we visited the location of the Living Lab. There, the founder, Tinus Kanters, showed us the assets and spaces of SLL. During this visit, we were able to observe some routine activities and the functioning of the technical equipment. Afterwards, we

had a formal conversation with Tinus Kanters. Hence, we provide the transcript of the interview in *appendix 4*. Also, Gaby Rasters, an employee from the municipality of Eindhoven, one of the main stakeholders of SLL, was present to the meeting and offered us the perspective of an important actor of SLL's network.

In addition, Tinus Kanters provided us with a PowerPoint presentation about the Living Lab that was made for the Dutch Institute of Technology Security and Safety, another of the main stakeholders. Then, we were suggested to watch some video interviews of commercial partners of the Living Lab. In *appendix 4*, we also provide a list of the additional materials.

Amsterdam Fieldlabs - We met two of the professors from Amsterdam University of Applied Sciences (AUAS) involved in the Fieldlabs: Alex Straathof and Elke van der Heijden. We conducted an interview with them and the transcript can be found in *appendix 5*.

Then, we were invited to a formal meeting of *House of Skills* one of the main projects of the Fieldlabs. Several actors participated to the meeting representing the main stakeholders. Among them, there were members of the municipality of Amsterdam, of labor unions, advisors from Deloitte and field experts from other Dutch Universities. We include the list of participants (without names, since we have been asked to ensure confidentiality about them) and the report of the meeting in *appendix 6*.

Moreover, they provided us with the book "Lab Amsterdam" (Majoor et al, 2017) which is a comprehensive analysis of the first years of operations of the Fieldlabs, and "Facilitating Social Innovation in Urban Living Labs" (Switzer et al, 2016) an article written by some of the main professors involved in the Fieldlabs.

Finally, during the Open Living Lab Days 2018, the annual conference of the European Network of Living Lab, we had some informal interviews with Sandra Bos and Marie Morel, two researchers of the Fieldlabs who also presented their work in several workshops at the conference.

Textile&Clothing Living Lab - For what concerns TECLA, we conducted several interviews with Luca Leonardi, the co-founder of the Living Lab. Together we visited the location of the Living Lab and he presented us in detail the context in which TECLA is embedded and the implication deriving from being based in Palermo. In addition to it, we spoke with several members of ARCA, the incubator which is the main stakeholder of TECLA. There we had a set of meetings with Umberto La Commare, the chairman, Fabio Maria Montagnino, the CEO, Anna Sangiorgi, the technological transfer and enterprise network manager, and Silvana Di Bono, manager in planning and coordination of European Union projects.

Then, we spoke with some other stakeholders from the network of TECLA: Maurizio Carta, the director of Alta Scuola Politecnica of Palermo University, and Vincenzo Italiano, one of the manager of Cre.Zi. Plus, the innovation environment and co-working space where TECLA is located. Moreover, we conducted an interview with Jesse Marsh, project manager for TECLA and also special advisor of ENoLL presidency.

These interviews were held mostly informally, therefore it is not available a transcript. In *appendix 7*, we included the application form which was submitted by TECLA to enter the European Network of Living Lab.

3. Literature review

In this chapter are presented the most interesting insights obtained by the systematic literature review. The objective is to delineate a comprehensive framework of the most important Living Lab characteristics and to connect them with the challenge of sustainability. Therefore, for each topic identified in *section 2.1.2*, we elaborate a coherent overview of the most acknowledged research streams and theories.

In *section 3.1*, we investigate the existing literature to delineate a consistent classification of Living Lab's actors. In *section 3.2*, we systematically research exploration, co-creation, experimentation and evaluation, which constitute the base of Living Lab's activity. Then, we analyze the output of a Living Lab intended as the output of its practices and activities (*section 3.3*) and in terms of value created for the stakeholders (*section 3.4*). Finally, in *section 3.5* we connect the economic, business and public value generated with the Living Lab's ability to successfully deliver and demonstrate it to the network.

3.1. The Living Lab's Innovation Network

The concept of innovation network is crucial to understand Living Lab. In fact, Living Lab is not only a network of infrastructures but especially a network of people with their experiences. (Mulder, 2008). Per Franz (2014) Living Lab indeed serves as connection between research, citizens and the actual living environment. Living Lab is a network of different stakeholders in which the existing relationships are supported, while it's given the opportunity to new partners to meet and collaborate to develop new products and services (Bergvall-Kåreborn et al., 2009).

Living Lab has a role of innovation intermediary in a complex network of different stakeholders: it functions as an aggregator of various external inputs that are then translated into requirements and design parameters for valuable social innovation (Mention and Torkkeli, 2015; Almirall and Wareham, 2011).

Moreover, Living Lab often does not insert itself in an already established network, but contributes to the creation of an ad-hoc business ecosystem (Peltoniemi and Vuori, 2004; Veekman et al., 2013). The innovation network is one of the main resources of a Living Lab, but it requires a systematic approach to produce the desired outcome. Therefore, a deep understanding of the actors and of the dynamics involved is crucial for the success of Living Lab (Nyström et al., 2014). Also, the role of users within the innovation network is important, and thus it needs to be acknowledged.

The actors of a Living Lab are a set of many heterogeneous stakeholders (Leminen et al, 2012; Niitamo et al., 2006) from different parts of society (Coenen and van der Graaf, 2014), spanning across the entire innovation chain (Mulder, 2008), which often have different backgrounds and interests, and come from a history of interrelations in which roles and expectations are already defined.

There is quite uniformity across the literature about most recurrent stakeholders: the majority of researchers acknowledge the inclusion in the Living Lab's innovation network of three main categories of actors besides the users:

(1) private companies such as large firms, industrial partners, small and medium enterprises, start-ups, entrepreneurs and professionals like developers, exploiters, designers and artists; (2) public bodies, such as administration at local, regional, national and European level, public agencies, public organizations, NGOs, associations, policy makers; (3) knowledge centers such as universities, research institutes, research organizations and knowledge hubs. (Katzy, 2012; Veekman et al., 2013, Westerlund and Leminen, 2012; Leminen et al., 2012; Wu, 2012; Coenen and van der Graaf, 2014)

To fully exploit the potential of the innovation network, it is fundamental to understand what keep actors motivated and engaged (Ståhlbröst and Bergvall-Kåreborn, 2011) and to develop an adequate collaboration mechanism.

One of the key principles in Living Lab theory is that the innovation process, and thus the actors of the network should be as open as possible. Open innovation is fundamentally a self-organizing model, where the different perspectives brought by the stakeholders speed up the development process and bring in more innovative ideas (Bergvall-Kåreborn et al., 2009). To ensure that, each participant is considered

to have a similar role and relevance in the network (Leminen et al., 2012). In fact, inequalities can endanger openness and thus restrain SMEs and startups from accessing the critical assets (Veeckman et al., 2013). Per Katzy (2012), the results of open innovation in networks is strongly connected to well-established innovation processes characterized by good coordination between the several actors. Indeed, Living Lab need to understand the complex nature and the dynamics of the innovation network in order to develop adequate context-specific strategies. (Schuurman et al., 2016).

But above all, in a network the main enabler of successful collaboration is value creation across the several actors. In fact, in an innovation ecosystem it is indispensable to create and share value to attract and retain members (Iansiti and Levien, 2004). This means that every partner involved should be put in the condition to seize a portion of it to create long-term engagement and identification with the Living Lab (Veeckman et al., 2013).

If these aspects are adequately implemented, the several actors of the Living Lab's innovation network can share their knowledge and expertise, helping to achieve boundary spanning knowledge transfer (Ståhlbröst and Holst, 2013) and collaborate at the creation, prototyping, testing and evaluation of new products and services (Leminen et al, 2012; Niitamo et al., 2006). Therefore, the relationship between partners across different sectors can lead to a strengthened innovation system where innovation occurs spontaneously (Wu, 2012).

The involvement of users in the entire innovation process is a peculiar characteristic of Living Lab and can convey value to its network. In fact, users, if equipped with the right tools, can be the best candidates to design a product or service based on their needs and expectations. Indeed, Living Labs added value is tightly related to the creative power of user communities and their ability to bring the innovation process in a direction based on real humans needs and desires (Bergvall-Kåreborn and Ståhlbröst, 2009).

In the Living Lab, users are sources of information, testers, developers, and designers of innovation (Nyström et al, 2014). More specifically, Leminen et al. (2014), based on the degree of involvement in the innovation process, four categories of users, namely informant, tester, contributor and co-creator. Juujarvi and Pessa (2013) distinguish three different roles of the citizens based on the typology of Living Lab: (1) the users are only marginally involved, and their role is often limited to feedbacks and sensor-based methods when the city is considered a technology-assisted research environment. (2) Users are involved as co-creators of urban artifacts and local services. (3) Users are engaged with the objective to facilitate the vision-making of urban planning and foster the access to mutual learning of various stakeholders.

In conclusion, we have seen that the majority of literature acknowledges the classifications of actors between (1) public organizations, (2) education institutions, (3) private businesses and (4) people. Each category includes heterogeneous actors, which can provide different contributions to the Living Lab.

Despite a high degree of uniformity, we still identified certain topics that can be further investigated: first, it is not clear how these actors take part to the dynamics of the Living Lab in practice, and which are concretely their needs and expectations. For example, in certain cases users are actively involved while in other their role is rather passive; second, the size of the network and the number of stakeholders from each category is not reported consistently. Finally, current research is mostly theoretical. Thus, with this thesis the objective is to combine theory with the observation of real cases.

3.2. Living Lab & Activities

Several distinct sets of characteristics and activities are proposed as the backbone of Living Lab. This research is based on four characterizing principles that appeared for the first time in 2008 in the original definition of Living Lab proposed by the ENoLL (2016), namely:

- Exploration
- Co-Creation
- Experimentation
- Evaluation

These are accepted and further developed by a substantial portion of the existing literature in the field, but often the interpretation given by distinct authors is partially different. This research combines the activities of Experimentation and Evaluation in the same category: in fact, they are strictly related to each other. In conclusion, in this section the objective is to provide an extensive coverage of these concepts to understand their part in the activity of Living Lab.

3.2.1. Exploration

Exploration is defined as an activity that allows to obtain, in the several steps of the development process, information that are meaningful in terms of search, variation, risk-taking, experimentation, flexibility, discovery and innovation. (March, 1991).

Shuurman et al. (2014) defines exploration as a set of innovation activities through which a Living Lab can capture new knowledge from external sources to enhance technological development. Almirall and Wareham (2011) identify two recurring practices of Living Labs that address the purpose of exploration of new knowledge and discovery of new opportunities. According to their findings, “Living Labs observe user-led practice in diffuse social contexts” and “Living Labs recognize and codify tacit and practice-based knowledge”.

A clear example of the exploration dynamics and their importance for Living Lab is given by the case study of the SML project by Svensson (2012); there, exploration supported the innovation process by clearly identifying needs and values of specific user groups. In fact, different user groups have a wide array of needs, and the first ideas for solutions were proposed by performing exploration side-by-side with the users themselves.

In many research streams over Living Lab, the exploration activities identified by March are often categorized under different classifications. Pierson and Lievens (2005) define as contextualization the exploration of technological and social implications. In this case, exploration enables a first confrontation of what is technologically possible with what is socially feasible and vice versa. Følstad (2008) identifies two separate concepts comparable to exploration: (1) Context research is the investigation of the context of use, the users and their environment. (2) Discovery is rather an informal activity in which, setting apart structured methods, new insights and unexpected uses or opportunities can be obtained.

For Ballon et al (2005), these thoughtful insights often emerge from the observation of potential users dealing with prototypes and demonstrators of a new technology early in the development process. Almirall and Wareham (2011), when describing the Living Lab approach to exploration, adopt the concept of venturesome consumption - “the willingness and ability of intermediate producers and individual consumers to take a chance on and effectively use new know-how and products” (Bhidé, 2008). Accordingly, Living Lab embodies a process in which businesses and users explore novel manners of integrating existing basic research into new products and services.

Research of the context of use, user-led practices, and technological and social implications	(Pierson and Lievens, 2005) (Følstad, 2008) (Almirall and Wareham, 2011)
Acquisition of new tacit and practice-based knowledge. Development of a knowledge base and integration of it in new products and services	(Almirall and Wareham, 2011) (Schuurman et al., 2016)
Identification of users' needs and values, discovery of opportunities for new products/services or unexpected uses of existing ones	(Ballon et al., 2005) (Følstad, 2008) (Svensson, 2012)
Assessment of technological and social feasibility of new solutions; feasibility of new business models and complex services	(Pierson and Lievens, 2005) (Almirall and Wareham, 2008)

Table 2 – Main interpretations of Living Lab's activity of Exploration

In conclusion, the importance of exploration in the development process is acknowledged by most researchers and it is always included among the principal activities of Living Labs. Nevertheless, it came to light that both scholars and real examples of Living Lab have partially different interpretations of this activity. In *table 2*, the four main approaches to and objectives of exploration are summarized. Thus, a research effort should be allocated in understanding whether these approaches are exclusive and tightly linked to the typology of Living Lab, or whether they are complementary and have the potential to be included in the same development process.

3.2.2. Co-Creation

In today's rapidly evolving and increasingly competitive market it is of crucial importance to respond in a timely manner to customers' changing and hyper-differentiated demands. At the same time, the newly available sources of information make it possible to firms to adapt their offer to the mutating behavior, preferences, demands, and desires of the users (Clemons et al., 2003; Arakji and Lang, 2007).

Because of the rapid pace to which demand and preferences change, many companies decide to externalize the design aspect of product development instead of grasping the details of customers' needs and their use experiences. In alternative, the role of customers as a valuable external source of ideas is becoming rooted inside many organization. Furthermore, technology is enabling novel forms of producer-consumer collaboration in the product and service development process (Leminen et al., 2011). Consequently, it is gaining popularity to bring the users into the innovation process and to involve them as co-developers of new products and services. (Edvarsson et al., 2010).

Involving customers in the development process enables a company to understand users behavior, actual preferences and future trends in a more accurate and cheaper manner (Leminen et al., 2012). In the context of Living Lab, co-creation does not involve only the final consumer of a specific good of service, but it aims at bringing together all the actors and stakeholders that constitute the innovation ecosystem (firms, public agencies, institutes and users).

User involvement is common to several different applications and other forms of collaboration. Indeed, the difference with the Living Lab approach can be found in the way the users are involved (Feurstein et al., 2008).

ENoLL stresses the importance of co-creation as one of the fundamental tasks of Living Lab: according to it, Living Lab is an innovation ecosystem based on systematic co-creation. A further testimony can be found in its founding Manifesto: "The European Network of Living Labs establishes a European platform for collaborative and co-creative innovation, where the users are involved in and contribute to the innovation process" (Finland EU Presidency, 2006). By the inclusion of the user at the center of the development process it is possible to meet specific needs and aspirations of local contexts with the proposed solutions (ENoLL, 2016).

An interesting observation is provided by Følstad (2008): even though the fundamental role of co-creation is unanimously recognized, many Living Labs do not acknowledge it as a core activity. The author suggests that it could be due to the division of Living Lab approach to co-creation in two different branches: Living Labs as extensions to testbeds and Living Labs supporting context research and co-creation. The second typology is well-suited to support the innovation process, focusing on the early development phases of needs analysis and early design. Based on these principles, Living Lab can be seen as an optimal way of enabling users to contribute in the early stages of innovation processes (Pierson and Lievens, 2005).

A final remark over the aspect of co-creation is provided by Thiesen Winthereik et al (2009). Accordingly, two different perspectives over co-creation must be considered in the context of Living: one concerns the specific activities in which the users are involved during the innovation cycle, while the second tackle the issue of representation of the users within the development process.

In conclusion, from this literature review it emerges that co-creation itself is a well-defined activity with expected outcomes and clear objectives. Involving the users in the development process allows to (1) understand users' behavior, actual need and preferences, and future trends, (2) meet needs and aspirations of local contexts and (3) benefit from users as a valuable external source of ideas.

While the concept of co-creation itself is exhaustively investigated by the present literature, there are some challenges to be addressed in relation to Living Lab. Despite the importance of this activity is acknowledged by the majority of academical research in the fields and by the ENoLL, a relevant number of Living Labs does not include co-creation among its core activities. Thus, there is a need to research and understand if (1) this is a mindful choice due to a bad fit of co-creation in the specific context or (2) co-creation is ignored but its inclusion would be beneficial for the specific LL. Second, there is no uniformity in the literature nor in the analyzed examples of the most suitable phase of the development process for co-creation and joint development. A clear majority of the literature identify the early stages of the process as the most suitable for the inclusion of users and other stakeholders in the design. A different approach proposes that each development stage is adequate for co-creation if the appropriate methods are employed. A further validation of this second approach seems a promising path for research.

3.2.3. Experimentation and Evaluation

Complex and multi-stakeholder new products and services require a massive experimentation with a broad set of users and service providers. Despite a big variety of test and experimentation platforms - facilities and environments that allow testing, prototyping and use case simulation – Living Lab appears to be a privileged context: thanks to its focus on open-innovation and to the involvement of several technologies, users and stakeholder, Living Lab represents an optimal setting for experimentation (Ballon et al., 2005).

Therefore, experimentation is one of the crucial components of Living Lab. The ancestors of it were mainly given by the combination of experiments both in the real world and in simulated laboratory settings. Despite the concept has considerably evolved, Living Lab still presents this dualism of diverging perspectives. Generally, the phases supported by the experiments are iterative design, prototype and evaluation. This is made possible by a correct development of prototypes and demonstrators which deliver a high user value (Svensson, 2012)

Almirall and Wareham (2011) identify two main advantages brought by the implementation of context-based experiments of products and services: on the one hand, it is possible to generate local modifications within the existing socially negotiated meanings; on the other hand, novel socially generated meanings can be discovered and integrated. Often, Living Labs can be intended as pre-commercial and research-oriented platforms for experimentation. Thus, they are also empowered of the ability to reduce the technological risk related to both technological availability and to suitability of the desired application. In such an open engagement platform, new possible conditions for the societal embedding of a technology may emerge (Ballon et al., 2005) and new business models can be experimented (ENoLL, 2016).

A final remark is presented by Følstad (2008): from it study, it appears that only a fair number of Living Labs supports both co-creation and experimentation, while in several cases these two characteristics are mutually exclusive: some focus on technical experiments and testing in realistic environments, while others consider the users as co-creative resources only through context research and co-creation. These findings are partially refuted by other researches in the field (e.g. Almirall & Wareham, 2011; Ballon et al., 2005) but might be noteworthy of a further analysis.

Apart from this last conflict, it seems that experimentation is exhaustively covered in the reviewed literature. In fact, the origin of Living Labs can be found in the context of either simulated or real-life experimentation. Nevertheless, previous researches are mainly addressing singularly one out of the following three aspects of experimentation: context, subject and purpose/outcomes (see *table 3*). Each one of them is deeply analyzed but there is a less intensive coverage about the interconnections between the three.

Evaluation is the assessment of an innovative solution according to economic, cognitive and ergonomic criteria (Westerlund and Leminen, 2011). It is an activity that is tightly related to experimentation: in fact, by allowing user experience and by testing innovative concepts, products or services, it is possible to obtain valuable insights through a feedback system. The acquired user-feedbacks have a formative

purpose and thus are processed and returned to the development process in an iterative manner (Følstad, 2008).

Finally, four different stages can be identified in the evaluation process of Living Lab (Pallot, et al. 2010). The first step is reliability, in which the objective of the functional test is to understand if a feature is implemented correctly and works properly. Second, with the usability analysis the main purpose is to evaluate user friendliness, intuitiveness and ergonomics. Then, adaptability assesses the personalization capacities; lastly, the users might be stimulated to suggest and even create themselves new features to compose their own service.

The importance of relying on a structured process for obtaining users valuation is under-estimated by a fair number of scholars and examples of Living Labs. It seems that in many cases evaluation it is tacitly implied by the other activities, but the lack of a systematic measurement system might compromise its effectiveness.

Context	
Experiment in real-world situation is essential part of LL development process. For complex and sophisticated systems, a simulated semi-realistic environment might be the only feasible option	(Følstad, 2008) (Schuurman, 2015)
Subject of experimentation	
Prototypes and demonstrators able to deliver high user value (primarily) and concepts, ideas and new business models in earlier phases of development process (secondarily)	(Svensson, 2012) (ENoLL, 2016)
Purpose/Expected Outcome	
Modifications or radical innovations in accordance with socially negotiated or newly generated meanings. New conditions for embedding a new technology. Reduction of technological risk	(Almirall and Wareham, 2011) (Ballon et al., 2005)

Table 3 – Contextualization and definition of experimentation activities of Living Labs

In conclusion, we can state that the majority of researchers recognize in a coherent manner the basic activities of the Living Lab, namely (1) exploration, (2) co-creation and (3) experimentation and evaluation. We noticed that a research effort should be allocated to explore the connection between the actors of the network and the actual performance of Living Lab activities. It can be meaningful to develop a concrete framework that acknowledges for the role of the actors in the activities and link them with the resulting outcome.

3.3. Outcome

This research adopts the terminology “outcome” to indicate the result of Living Lab activities and operations seen from the inside. In contrast, in *section 3.4* we introduce the concept of “value creation”, which is how the external stakeholders perceive the result of the Living Lab. In contrast, the “outcome” is the internal perception of the result (i.e. how internal objectives are met).

The activities analyzed in the previous section, constitute the entire set of practical operations of Living Lab. The actors, by participating to the activities enable the realization of innovation projects. Indeed, actors and activities result in the realization of the Living Lab’s outcome. With a cross-comparison of some of the most cited studies it is possible structure the outcome of a Living Lab in the three macro-categories that can be employed as leverages for conveying value.

Knowledge Valorization (KV) - An important contribution of Living Lab to innovation process is fostering knowledge generation and sharing across its network by promoting research and theory development (Leminen et al., 2012). According to Boisot et al. (2007), knowledge starts as experiential and informal knowledge and through a social learning cycle becomes codified and exploitable. Living Lab is a privileged context to support the learning cycle with context-based experimentation and other

knowledge cultivation methods: in fact, the Living Lab first observes diffused user-led practices; then, it identifies tacit and practice-based knowledge and transforms it into ad hoc innovation (Almirall and Wareham, 2011).

Moreover, in an open innovation setting it is possible to distinguish between inflows and outflows of knowledge (van de Vrande et al., 2009) and Living Lab is a suitable context for both exploring and exploiting it (Schuurman et al., 2016). In fact, a Living Lab can explore and capture an inflow of knowledge coming from external sources and subsequently share it across the network. In this way, different actors can exploit such a knowledge outflow.

Typically, knowledge is a scarce resource in the early phase of product development. The systematic approach of the Living Lab towards learning makes a consistent knowledge base available for firms and organizations already in the first phases of development, which ensures a substantial advantage to the innovation process (Mulder, 2008). Moreover, the knowledge collected over time by Living Lab can provide meaningful insights over the evolving patterns of the market and thus can suggest novel application of concepts and technologies (Følstad, 2008).

Exploitation of Network (EN) - As reported in *section 3.1*, Living Lab creates an innovation arena that involves relevant stakeholders, users and technologies. The Living Lab orchestrates and coordinates the activities, supports the interaction between innovation actors, and mediates the collaboration between users and commercial parties (Hakkarainen and Hyysalo, 2016). In this way, the concept of technology transfer is advanced, not only by incorporating the user-based experimentation, but also by engaging firms and public organizations in a learning process (Almirall and Wareham, 2011).

Thanks to the shared knowledge of actors with diverse backgrounds, creativity is boosted and new ideas are generated and turned into valuable innovations. Then, the several participants of the innovation process combine their market perception and thus facilitate the identification of reachable targets and market opportunities (Svensson, 2012). In addition, they can concur in the creation of a pre-commercial demand.

The co-development and experimentation between users and commercial organizations provide firms with better products and services which translate in higher user value. Moreover, the important synergies between numerous upstream actors from complementary fields and industries, lead to substantial improvement to the entire new product development process: per Feurstein et al. (2008) the implementation of Living Lab's collaborative practices substantially contributes to every phase of the innovation process, from idea generation to market launch.

Social impact - To succeed with innovations, it is important to inspire usage, meet personal desires, and fit and contribute to societal and social needs. However, in line with the general sustainability and environmental trends in society it is of equal importance that Living Labs also take responsibility of its environmental, social, and economic effect (Bergvall- Kåreborn et al., 2009).

Often, Living Labs are initialized by various public-sector actors, non-governmental organizations, and financiers, such as towns, municipalities, or area-development organizations and are typically projects that pursue societal improvements (Leminen et al., 2012). Their direct contribution to the wider community can be various: government-led Living Labs aim at the regeneration of business, local economies or the well-being of communities (Wu, 2012).

Consistently, per Katzy (2012) policy-makers initiated Living Labs want to reach national or regional policy objectives increasing innovation performance for job creation, growth and wealth. For these Living Labs, activating collaboration between the key partners, and establish a novel innovation ecosystem, is a purpose by itself since regional development requires multi-stakeholder cooperation (Leminen et al., 2012).

Social impact, is not a prerequisite only for public-driven Living Lab but is necessarily extended to other typologies since user involvement is a necessary characteristic of every Living Lab. Therefore, the needs and problems of the citizens are always central. Thus, Living Lab focuses on improving users' everyday life, not only in a way that is consistent with the values of users and user communities, but also to allow the entire network to benefit from it. (Leminen et al, 2012).

Furthermore, per Ståhlbröst (2012) the innovation processes supported by Living Lab must address environmental and social issues while considering the economic impact: in fact, it is a methodology that can potentially contribute to sustainable growth while improving productivity, lowering costs and strengthening revenue for the stakeholders.

Moreover, when binding innovative firms to solve societal issues, innovative services and novel infrastructures are developed with a positive impact across the entire ecosystem (Pascu and van Lieshout, 2009). Indeed, applying technology and infrastructure to real-life situations generates images of potential societal impact of innovation (Frissen and van Lieshout, 2004) and the alignment between social and technical constituencies can convey significant opportunities for research, business and the community as a whole (Wu, 2012).

Living Lab's outcomes is rather a challenging topic. Despite it is evident that the purpose of the activities and of the collaboration between actors is to have a concrete result, it is not possible to find a shared model to assess and describe such outcome. Therefore, we developed the classification of Living Lab outcome between *knowledge valorization*, *exploitation of network* and *social impact*. This framework was built cross-comparing the different perspectives proposed by the main research streams about Living Lab with important social and economic theories.

For this reason, the objective with this study is to determine if this classification can be adequate in representing the entire spectrum of Living Lab outcomes. Moreover, we want to observe in practice which are the main enabler of such outcomes, understanding the role of the actors and common practices in the accomplishment of knowledge valorization, exploitation of network and social impact.

3.4. Value creation

In this research, we have noticed that in most of researches assume that when certain mechanisms (i.e. the involvement of a vivid innovation network and the systematic performance of activities) are enabled, then value creation is given per granted. For this reason, research on this topic is scarce compared to others.

The value created by the Living Lab varies in terms of nature, effected actors and implications. Despite that, there is not a shared model for Living Lab's value creation, neither an acknowledged classification. In addition, the prevailing research streams approach the aspect of value creation at a theoretical level, while the practical implications are often under represented. Therefore, in this section we propose a classification of Living Lab's value creation into three categories, obtained through an extensive comparison of previous studies and broader economic theories:

Economic Value – Economic value covers aspects that are highly tangible from different stakeholders' perspectives such as growth of the companies that collaborates, an increased competitive advantage or the extent to which new business are generated and survive (Baccarne et al., 2014). When the activities and outcomes generate economic value, the contribution of Living Lab can be assessed through economical metrics. (Bergvall-Kåreborn, 2009).

The innovation process inside Living Lab can add value to the whole value chain in the form of better products and services. (Stahlbrost and Holst, 2012). In fact, a single Living Lab project can create value for specific industry sectors, enterprises, research institutions and society (Mulder, 2008). There are several recurrent ways acknowledged by most research streams for economic value creation:

Living Lab often creates new market opportunities through insights on new applications of knowledge and unexpected uses of available technologies (Følstad, 2008), which can be exploited by entrepreneurs and startups. Indeed, Living Lab is a valuable support for SMEs which are provided with context knowledge and tools that they could not have afforded otherwise. Companies have the chance to gain the access to the resources of the network and perform user interaction processes in a privileged setting receiving and providing information related to their product from and to their envisioned customers (Ståhlbröst, 2012).

Moreover, the innovation process performed inside the Living Lab can have commercial value for companies by helping them alleviate the development risk through user-centered research, experimentation and co-development. (Leminen and Westerlund, 2015). Furthermore, Living Lab has the potential to speed-up the commercialization process and upscale an innovation to wider markets thanks to well established synergies with different stakeholders (Leminen et al., 2012)

Business value - Economic value can be extended to include other forms of value such as employee value, customer value, supplier value, managerial value and societal value. (Bergvall-Kåreborn, 2009) This is referred as business value, and Living Lab can generate and spread it across the innovation network (Ståhlbröst and Holst, 2016) in several forms:

First, it has the potential to increase the innovative capacity of the involved firms and organizations by offering knowledge and assets transfers (Svensson, 2012). Also, firms can improve their innovation capacity by collaborating with other actors such as academia, the public sector and more established enterprises (Eriksson., 2010). In addition, Living Lab operations provide its stakeholders with inputs for their market strategy (Schuurman et al., 2016).

Furthermore, it is worth to consider the importance of open innovation practices inside Living Lab. Indeed, opening the internal innovation process yields extra value (Chesbrough et al., 2006): in an open setting companies can combine both technology exploitation and exploration in order to obtain maximum return from their capabilities and assets (Chesbrough and Crowther, 2006). Thus, an important enabler of value creation for Living Lab is its potential to introduce and integrate in the involved firms' business models open innovation (Schuurman et al., 2016) and other user-driven innovation practices.

In conclusion, the generated business value can bring relevant benefits to the various actors of the innovation ecosystem. Nevertheless, we have seen that it is often a hard task to have a direct explanation tightly linked to Living Lab's activities, and an accurate assessment. Thus, it is challenging to obtain a financial return for its generated business value.

Public value - Finally, public value is generated by a Living Lab when it supports and promotes the implementation of solutions responding to local challenges and opportunities and contribute to the achievement of public policies at various levels (Cosgrave and Tryphonas, 2012). Despite this principle is often considered the most important for Living Lab, it is also the least mature (Ståhlbröst, 2012). In fact, the Living Lab concept should not be valuated just in financial and operational terms, but especially in terms of its outcome for users, citizens and communities.

There is no comprehensive and unanimous definition of public value, but it generally refers to non-financial impacts of interventions to the wellbeing of individuals and communities and the environment (Mulgan, 2010). These wider not-financial outcomes are typically described as 'soft' outcomes and are often difficult to quantify and measure (Wood, 2010).

Living Lab offers a mechanism to support stakeholders collaboration and generation of innovation outcomes in social environments, ranging from improving everyday living conditions to systematic citizens innovation (Leminen and Westerlund, 2015). Living Labs dedicated to public value can effectively increase cohesion in society (Schuurman et al., 2016) or improve users behavior with the respect of issues like environmental awareness (Ståhlbröst and Holst, 2016). Furthermore, Living Lab. Despite that, assessing the generated public value using classical economic metrics is not adequate. At the same time, when supported with public resources, public value itself can be a project legitimation (Baccarne et al., 2014).

In conclusion, similarly to what we observed in *section 4.3*, value creation for a Living Lab seems to be a topic with important contradictions characterized by the lack of a shared reference model. Most Living Lab theories do not assess the aspect of value creation in a systematic manner. With this thesis the objective is to compare this model with the actual observation of Living Lab practices, to better understand if economic, business and public value represent adequately the various declinations of value creation. Moreover, we want to determine which actors benefit from each kind of value generated.

3.5. Value delivery

The main purpose of Living Lab is to create value and share it with every actor of the network. Despite that, due to missing links throughout the value chain, several stakeholders fail in perceiving the advantage that they could seize from the Living Lab. That is one of the main reasons why Living Labs often struggle to ensure financial sustainability and perform accordingly to the planned standard. In fact, when there is not full commitment by the relevant stakeholders then Living Lab's value is hindered by the lack resources, knowledge, equipment, mentorship, or guidance (Leminen et al., 2012).

In fact, to see the results of the learning process and to be able to apply the collected knowledge in the form commercial innovations, a long-term perspective is required. Sometimes, the purpose and mechanisms lack of clarity and for stakeholders becomes difficult to take commitment on the long run (Wu, 2012). Indeed, not every stakeholder acknowledges that, even if value is created mainly for the user community, companies also can benefit directly and indirectly (Leminen et al., 2012). Therefore, a clear thematic focus together with common objectives can be a valid enabler of collaboration within the Living Lab and ensure important financing options (Veeckman et al., 2013). Also, a clearer understanding of the mechanisms by which Living Lab facilitates enterprises and other actors to capture the generated value (Schuurman et al., 2016).

Moreover, for many actors the potential of open innovation is not clear, and they do not realize that opening their internal innovation process can yield to consistent extra value (Chesbrough et al., 2006). Thus, the Living Lab itself should spend efforts in spreading such an awareness across the innovation ecosystem, through information sharing and demonstrations. (Leminen et al., 2012).

Another feasible option is to employ a different approach to the selection of actors to involve in the network: adopt a business model designed upon end-to-end delivery of value to determinate stakeholders that are upfront willing and able to pay for the contribution of the Living Lab (Katzy, 2012). Finally, a promising and emerging path suggest developing adequate methods such as structured metrics to account the different kinds of value generated, especially the public one (Wood, 2010). Indeed, by efficiently measuring the created value and precisely communicating it to the stakeholders have the potential to defend the role of Living Lab in the delivery of public value and can justify funding more effectively.

In conclusion, the aspect of value delivery seems to be the most undefined topic of this literature framework. In fact, while outcome and value creations lack a consistent reference model but are acknowledged by most of literature, value delivery is only rarely included in researches about Living Lab. Despite that, we believe that value delivery is the key to link the activity of the Living Lab with the several forms of funding from different actors.

In fact, not only the concept of Living Lab, but also emerging tendencies in innovations are still ignored by many realities. For this reason, many potential financiers do not see the advantage of being part of the Living Lab's network, or do not recognize to it funds adequate to the benefits received. Therefore, one of the main objective of this research is to observe and evaluate what actual Living Labs do to demonstrate the generated value to the correct stakeholders. In this way, we can propose some experimental suggestions on economic, business and public value delivery, based on real experiences

3.6. Conclusions of literature review

In this chapter we have addressed the main topics connected to the sustainability of Living Lab in a systemic manner. As explained in the methodology, the literature study was the result of an iterative process. The iterative analysis of the different elements showed interesting interconnections. The way the different topics are organized in the literature review recall the complex system of interrelations, which constitutes our theoretical framework. To make the framework clearer, in this section we summarize the main structure in a schematic manner.

We have begun from a detailed analysis of the network of Living Lab. Indeed, the actors can be distinguished in four main categories: (1) public organizations, (2) educational institutions, (3) private

businesses and (4) people. All together, they contribute to the network and participate to the activities of the Living Lab, namely (1) exploration, (2) co-creation and (3) experimentation and evaluation.

We have seen that about Network and Activities, there is a considerable amount of literature. In addition, there are not substantial differences between scholars and practitioners about these topics and thus we identified a shared understanding of these aspects of Living Lab. On the contrary, consistency between researchers lacks for what concerns the other topics.

The outcome of the Living Lab is the results of the interaction of different actors participating to the main activities. We tried to classify the outcome as (1) knowledge valorization, (2) exploitation of the network and (3) social impact. The implications of this categorization are not clear, since there is not a sample of studies and cases based on this classification. Indeed, one of the objective of the empirical research is to understand if the outcome of a Living Lab is adequately represented by the categories identified.

Then, we proceeded from the outcome to the generation of value. Again, in Living Lab literature there is not a uniform classification of value. Therefore, we developed it based on different sources, and we proposed the model according to which the value can be decomposed in (1) economic value, (2) business value and (3) public value. The empirical research might provide insights over the adequateness of such distinction. Moreover, the link between outcome and value is not evident, and the observation of real cases might also provide meaningful insights about it.

Finally, we addressed the topic of value delivery: in fact, many Living Labs despite creating value are not able to link it with an adequate revenue. Many researchers state that the main limit of Living Labs so far has been to not systematically demonstrate and deliver the generated value to the stakeholders. Despite that, this topic is under-researched and with this thesis one of the objectives is to shed light on the process of value delivery.

In the next chapters will be presented the observations of three Living Labs. In this way, we gain a more concrete understanding of the several Living Lab characteristic, shedding light on these aspects which resulted under-researched from current literature streams. By doing so, the framework developed in this chapter will be further expanded and will be more robust through the application to practical situations.

Answering the research questions will provide this thesis with a more complete and reliable framework. This framework, will be then applied to develop a concrete understanding over all the elements which determine the financial sustainability of the Living Lab. Indeed, in the literature review, we addressed the topics of Living Lab's (1) network, (2) activities, (3) outcomes, (4) value creation and (5) value delivery.

These elements are present in Living Lab's literature, but there are no studies that try to connect all of them in a consistent framework. With this research, we want to give a contribution to this aspect, by developing a holistic model which connects Living Lab's elements with its sustainability model. Moreover, our practical approach and the inclusion of insights from real cases is by itself a further contribution to Living Lab literature, which is mostly detached from in-field research.

4. Evidence

In the literature review in *chapter 3*, we developed a solid theoretical framework based on which we can evaluate practical cases of Living Lab operating in urban environments. Indeed, in this chapter, we present the most meaningful insights obtained in the empirical research over the three Living Labs selected. The outcome of the in-field observation and of the several interviews conducted with relevant stakeholders is presented consistently with the structure of the literature framework.

The literature framework is fundamental to better contextualize the empirical results. Indeed, we analyze point by point the three participants to our case study: thus, we report the most salient evidence about Stratumseind Living Lab (*section 4.1*), Amsterdam Fieldlabs (*section 4.2*) and Textile&Clothing Living Lab (*section 4.3*).

4.1. Stratumseind Living Lab

The municipality of Eindhoven in the last years developed various Living Lab initiatives with the support of several actors. SLL, which is part of the Stratumseind 2.0 & Smart City project, is one of the most successful examples. Stratumseind is a pubstreet about 300 meters long that hosts around 50 pubs in the center of Eindhoven. Every week more than 20.000 visitors enjoy the nightlife but also around 800 incidents a year are recorded.

Stratumseind Living Lab is an instrument to measure the influence that can be created on behavior through the application of diverse solution based on light, fragrance and design. The Living Lab is a test facility for new sensors, data harvesting, privacy, smart interfaces, smart lighting systems, design and gaming. The mission of SLL is to support companies and institutions in the development of innovative products, services and policies which can foster the economic environment of the region and structurally improve the economic and social functioning on the Stratumseind. Indeed, Eindhoven is a special context in which open innovation is highly supported by companies in the tech field.

4.1.1. Network

Thanks to the highly technological content and to fervid innovation environment of Eindhoven, SLL involves a massive number of partners, which are distinguished between strategic and project partners:

Public - Some public entities have a central role in the Living Lab and are part the board of directors. To this extent, SLL involves city administrations such as the municipality of Eindhoven, Tilburg, and regional authorities (i.e. the province of Noord-Brabant); also, public organizations, like the Dutch Institute of Safety and Security (DITSS) and the Police Department have a similar role. These can be defined as the strategic partners.

Then, many other public authorities and organizations participate to some activities of the Living Lab as project partners: among them, the municipality of Amsterdam and the ministry of internal affairs. Also crucial for the network is the role of Brainport Region, a quadruple helix collaboration with the objective to make Eindhoven a smart, sustainable and vibrant city where innovation and economic wealth is stimulated

Research - The Eindhoven University of Technology (TU/e) represents one of the main sources of knowledge, but several other universities, not only from the region, are involved to a different degree. The university of Tilburg, together with TU/e, is also part of the board of directors. Also, the research units from public organizations, like the Police Department, participate to a process of knowledge sharing.

Business - Many private companies take part to the activities and the projects of SLL. The degree of maturity of these organizations is various: technological startups, often created by students coming out of the main technical universities like Vinotion, e as well as multinational well-established companies like Atos and Philips, can find the right compromise to use the services of the Living Lab. The services of

SLL are open to any interested companies, so often competitors coexist in the same environment (i.e. in the Stratumseind are tested at the same time cameras from Axis and Bosh, two competing companies). Moreover, the Living Lab collaborates with realities from outside the region, like the automotive industry which has its core in Helmond, or the sport and health industry. Furthermore, SLL is a unique testing environment in Europe and thus it attracts also international businesses.

People - The Living Lab activities involve hundreds of thousands of citizens every year, but the role of the majority of them is passive. Indeed, only pub owners, policemen and residents of the street actively participate to the Lab, share their ideas and discuss about common problems. On the contrary, the visitors (more than 15k each weekend) often ignore the existence of the Living Lab despite serving it as a subject to observe and allow experimentation and evaluation of new technologies.

4.1.2. Activities

Exploration - SLL mainly performs data-driven exploration activity. From the several measurements the Lab and its partners can recognize common problems, identify patterns and opportunities for the development of new products and services. The Living Lab collects all the relevant material, also real-time, concerning the dynamics of the street, measures sound and employs smart cameras and social sensors for gathering quantitative information. Data from the breweries is also collected, like volume of supplies and waste production. The data is heterogeneous in nature and thus the range of applications can be broad. These datasets are not only made available to the several partners, but the Living Lab is also involved in an important project to make the collected data open to the public.

Co-creation - Every project sees the participation of Tinus Kanters, the founder of the Living Lab, who is a technology “guru”. Therefore, he represents a valuable support for the several companies willing to develop a new product. Moreover, he serves public administrations and organizations to co-develop privacy policies and improve security services. Also, the pub owners and other residents are often willing to be involved in the innovation process of the Living Lab, in order to co-design services responding to their needs.

Moreover, inside SLL, businesses can find complementary skills and technologies and thus they often undertake development projects jointly. Therefore, the Living Lab also functions as an aggregator of companies, policy makers, people and competences. Also, the universities are often included in the co-creation process. Finally, products, services and policies are not the only objects of co-creation: in fact, inside SLL all the actors also participate in the co-creation of goals and objectives.

Experimentation and Evaluation - SLL is a privileged context of experimentation: in fact, for companies being involved in the Living Lab means that they can easily make in-field experiments on real people in a real-world environment. Moreover, the substantial number of sensors and cameras available in the street are an excellent way to keep track and measure the outcome of the experimentation. Also, being part of the Living Lab facilitate the testing of new technologies, lowering down the required bureaucracy. Moreover, in Stratumseind can be applied and tested insights still in an embryonic form, in order to develop and evaluate models that can be applied also in other context at a later stage. Finally, in the Stratumseind can be accurately evaluated the influence of the several developed products and services on the behavior of people.

4.1.3. Outcome

SLL facilitates the combination of knowledge, experience, competences and technologies from different actors to develop better co-created products, services and policies which, not only have substantial competitive advantages, but also improve living conditions in the Stratumseind.

Knowledge valorization - Public organizations, companies and research institutions share with each other their knowledge and competences which results in a self-reinforcing learning process. In this way, they can better analyze and employ the data coming from the different sensors and measurements. A systematic data screening can result in new challenges and opportunities to transform knowledge in

meaningful innovation. The interactions of actors with different backgrounds and capabilities leads to new applications of technology and to the improvement of existing ones. Moreover, the SLL is a pioneer in the field of light, fragrance and design influence on behavior and thus novel research directions result from the activities of the Living Lab. Finally, the application of theory to a real-life situation validate and enrich the knowledge with empirical and practical implications.

Exploitation of Network - The integration of different actors allows the innovation process inside SLL to be always on the edge of the time: thus, partners of the Living Lab benefit from an enhanced pioneering approach to their activities and are able to be ahead of the market in terms of technology, data ownership and privacy. Moreover, projects run by the Living Lab always require the participation of actors beside the commissioner. In this way, the commissioner obtains contributions to its own product or service, while other actors have the chance to make such projects beneficial also for them.

For example, when CityBeacons turned to SLL to test its smart city object, it started a collaboration, not only with the Living Lab itself, but also with the municipality and with sensors providers. Indeed, the joint development resulted in better product features and more advanced technological contents for CityBeacons while the municipality of Eindhoven could count on new kinds of sensors for real-time data collection. In the same way, the collaboration between Philips and SLL not only resulted in better products but was also a fundamental step for the development of an innovative open data policy.

Another important effect of the network relates to the emergence and exploitation of unexpected market opportunities: for example, Sorama's market was limited to industrial application of sensors while together with the Living Lab new applications for its technologies were identified. Finally, small enterprises and startups usually can focus only on their core business and cannot afford many assets and equipment. Inside the Living Lab they can identify partners to complement their business: for example, Vinotion a startup launched by students of TU/e is specialized on video images analysis and found its complement in Axis an established producer of cameras.

Social Impact - The intended social impact refers to three main aspects: (1) the use of technical equipment to improve the life of the street, with a consistent focus on the security and safety of the area, through the development of new services for the police department. (2) A concrete role in the municipal, local and national policies, especially for what concerns privacy, safety, data ownership and ethics. (3) The contribution to the innovation goals of the Eindhoven region to create employment through more profitable business and the creation of new startups

4.1.4. Value creation

Economic – Many actors obtain direct economic return from being part of Stratumseind Living Lab. Through the exploration and systematic analysis of the collected datasets, any company can valorize its existing knowledge and integrate it with the one of other partners. Indeed, knowledge valorization and network exploitation enable the discovery of new market opportunities, the ideation and development of new products and services and the improvement of existing ones.

Since the Living Lab is embedded in a real-life environment, the co-created products and services, have an enhanced user value and tangible product and competitive advantage, which also helps to reduce market risk. Also, the network helps companies to identify a better market positioning and reduce market risk and development time with substantial monetary benefits.

Moreover, the exploitation of the network is a fundamental strategic advantage for small enterprises and startups which, thanks to the Living Lab can draw from a wide range of competences and assets which they could not afford otherwise. In addition, the Living Lab also gives them the opportunity to connect with potential funding (i.e. government grants) and investors. Also, the public sector is a beneficiary of economic value when obtains free licenses for products and services developed in the Living Lab.

Finally, having a social impact and collaborating side-by-side with the administrations, not only drastically reduces the time and cost of bureaucracy, authorizations and permissions, but also allows

organizations to obtain economic value from the development of products and services with a public utility.

Business - Knowledge valorization also conveys business value in a longer time horizon: in fact, the systematic exploration of diffused problems and opportunities paves the way for new promising research directions. Knowledge valorization and network exploitation improve the innovation capacity of involved companies, which learn to include in their processes concept such as open innovation and user-driven design. Furthermore, the companies' organizational structure is enriched by the confrontation with SLL's pioneering approach to innovation. The companies also obtain long term benefits from the network effect by increasing their degree of involvement in the virtuous business ecosystem of the region.

In addition, the social impact that can be achieved through the participation to the projects of Living Lab, can provide to companies with a better reputation and positive image in the market. Furthermore, also commercial activities in the street obtain important business value such as higher integration in the local urban environment, better living conditions and the availability of data and other meaningful insights about the dynamics of the Stratumseind. In general, the massive amount of data, available for every actor, can result in many heterogeneous business options or improvements.

Public – Social impact is one of the intended outcome of the majority of SLL projects. The systematic exploration activity is performed with continuous observation of the citizens which constitutes the base of any initiative of the Living Lab. The activities of experimentation and evaluation stress even further the importance of the citizen as recipient of innovation and thus public value. Moreover, Eindhoven's idea of smart city is not exclusively about technological improvement, but also about making the city more livable, with an active and healthy citizenship and a vibrant social life.

Furthermore, the involvement of the administration and other public authorities guarantees that the interests of the citizens are kept into account. Indeed, the municipality of Eindhoven always put at the center of Living Lab projects. In addition, the central role of the Police Department and the DITSS bring constant improvement to security and safety of the area. Also, knowledge valorization and network exploitation are applied to the improvement of living conditions in the area. Finally, the identification of novel applications of technology and new market opportunities favor the creation of new companies and spin-offs which result in employment.

4.1.5. Value delivery

Economic value is delivered to private businesses and organizations which can ideate better products and services. Business value is delivered to companies and organizations which benefit from the experience of the SLL and of the other parties. They gain new knowledge, establish relationships with research institutions and improve their business model and innovation capacity. Public value is delivered to governmental institutions that obtain the knowledge necessary for the development of better policies while citizens obtain a safer and more livable street for nightlife.

Despite this general framing, the aspect of value delivery is not addressed in a systematic manner by SLL. Nevertheless, the strong product orientation of the Living Lab facilitates the demonstration of economic value to the stakeholders from the business sector. Similarly, the highly technological nature of the network helps SLL in spreading the importance of business value creation.

Then, the institutional and educational partners capture the business and Public Value created thanks to a high degree of involvement in the activities, which is further testified by the fact that they are also part of the board of directors. In this way, they can co-design with SLL goals and objectives and evaluate the Social Impact of the Living Lab through the accomplishment of them.

For what concerns the citizens, Public Value is not demonstrated clearly. Indeed, only the residents and the pub owners are made aware of the impact of SLL through a continuous process of building trust: in fact, the parties talk to each other on a regular basis and participate to meetings and events. On the contrary, the majority of the visitors of the Stratumseind ignore the existence of the Lab. The several attempts to involve them through information sharing and questionnaires failed.

4.1.6. Funding and revenue streams

SLL was initiated by the municipality of Eindhoven as part of Stratumseind 2.0 and SmartCity project. It is also one of the innovative elements of the Brainport Region. At present, the basic activities of the Lab, as well as the physical assets and the employees, are financed by the municipality of Eindhoven and other regional authorities, the Police Department, the Dutch Institute of Technology Safety and Security, which, together with the Universities of Eindhoven and Tilburg, also constitute the board of directors.

These actors primarily recognize to the Living Lab the public value that is generated, and its contribution to their different policies. Moreover, such institutions, can obtain economic and business value in the form of savings for research and development activities. Other organizations, private companies and citizens can participate to the activities of the Living Lab for specific projects, and their economic contribution is limited only to such projects.

With this combination of strategic and project partners, SLL can count on a regular budget that ensures the daily routines, so it is completely independent from private companies. This allows the lab to remain open to any project and initiative, so that also competing enterprises can be assisted in the same time. Any business is welcome to be involved in the process and network of the Living Lab but has to provide an adequate funding for its intended project.

Other than the constant budget that the strategic partners provide, Stratumseind Living Lab can count on the direct payment from the business involved in the project. The economic and business value generated by the Lab, due to its technological nature, is tangible to several companies, which find being part of the Living Lab advantageous and thus are willing to pay. This is made possible by two main reasons: first, the Living Lab is able to offer different agreements to different companies, based on their level of maturity and liquidity, and can also help in raising the necessary money from other partners. Second, SLL is not interested in retaining any intellectual property rights nor shares of the companies, which makes the decision process and the transactions easier.

4.2. Amsterdam Fieldlabs

In the last years, the municipality of Amsterdam started an ambitious plan of reorganization with the objective to operate in a “locality-oriented” manner, with a prominent focus on social innovation. Amsterdam University of Applied Sciences formalized a knowledge alliance with the city district of Amsterdam and together they have engaged a creative process to address diffused social issues. With this purpose, AUAS as part of its department of Urban Management initiated a set of Living Lab activities named “Fieldlabs”.

In the period 2013-2016 three Fieldlabs were established in areas at the edge of the city center of Amsterdam: Nieuw-West; Zuidoost and Oost. The Fieldlabs focus on developing area-based solutions together with local stakeholders. In 2017, due to a reorganization of the political structure in the city, AUAS was able to upscale its Living Lab to a metropolitan perspective: while for the Fieldlabs AUAS mainly referred to the neighborhood council, in this new phase is collaborating directly and working side-by-side with the central administration. Therefore, this section is going to integrate the evidence from the first phase of the Fieldlabs with the new declination. The characteristics of the Living Lab do not present substantial differences between the two phases. Therefore, we use the terminology AFL and Fieldlabs with the same meaning unless where made it explicit otherwise.

4.2.1. Network

For the Fieldlabs, it was AUAS who took the lead in the creation of a vivid innovation environment. In fact, it gathered around diffused social problems a network of public bodies, knowledge centers and social organizations. AFL provides a distinction of the actors between strategic partners and project partners. The project partners participate only to one or few specific initiatives, while the strategic

partners also share the organization of the network at a higher level and are involved in the definition of goals and objectives.

Public - The Municipality of Amsterdam is the main partner and shares with AUAS the organization. In the first phase of the Living Lab, the neighborhood council also had a central position. They guaranteed a better grip on the local context but had less autonomy compared to the metropolitan administration. Depending on the specific projects, AFL involves the Dutch central government and other policy makers. Moreover, also several different public organizations, such as the labor union Federatie Nederlandse Vakbeweging are part of AFL's network.

Research - Amsterdam University of Applied Science is the initiator of the Fieldlabs and has a central role in it. The university is not involved only as an educational institution, but also as a group of professors, students and practitioners: three faculties, ten professors and hundreds of students and practitioners ensure the quality of processes and research and are responsible for creating a reliable organization. They all have different roles, tasks and degree of involvement from time to time. AUAS is not the only educational institution involved: University of Amsterdam participated to several projects, especially with his faculty of Economics. Also, lower level educational centers (i.e. Hoogeschool van Amsterdam) are involved, both in the activities and as consultants.

Business - Because of the social purpose of AFL, gathering a consistent business ecosystem is a challenging task. Most of businesses involved are public-private enterprises like BOOT Nieuw-West and Grip op je Geld Slotermeer/ Geuzenveld, two organizations providing low-threshold assistance on issues including financial matters. Businesses are represented in the Fieldlabs by business associations, (i.e. VAZO). Also, entrepreneurial networks are involved in some of the projects. Other typologies of social companies often participate to the activities of the Living Lab, such as housing organizations (i.e. Lingotto, a building regeneration specialist which took part of the project "World of Food) or public services providers like Waternet, a waterworks company which took part of Klimaatbestendige Wijk in Middenmeer ("Climate-proof Neighbourhood") in Amsterdam Oost. Finally, business consultants (i.e. Deloitte) are engaged to develop stronger business models for AFL projects.

People - The citizens play a fundamental part in the activity of AFL. In fact, researchers from the University and employees from the public administration conduct their researches and activities closely to the citizens, which are considered the main sources of knowledge about the actual social problems to address. The citizens are actively involved in the entire innovation process of AFL and are the main beneficiaries of the solutions developed. The citizens involved often derives from challenging social situations and contexts: the Fieldlabs often address the problems of unemployed and low-educated people. Also, several initiatives have immigrants and refugees as a target. Finally, also representatives of user groups, such as coordinators of civic initiatives, interact with the labs and facilitate the participatory activities

4.2.2. Activities

Exploration - Exploration is performed systematically by the researchers from AUAS together with policy makers and local inhabitants. AFL performs an extensive analysis of local issues in collaboration with residents, experts, market parties, civil society organizations, and the government. Connecting citizens with members from public administration results in the identification of actual problems and represents the starting point to develop context-specific solutions. Afterwards, AFL sets up a 'coalition for change' with a small group of deeply involved representatives of the strategic partners. In this way, the topics identified in the first analysis are further expanded through field research.

Co-creation - Together with administrators and strategic partners, AFL first identifies the problems and then begins a co-creation process. Co-creation is not only about the specific solution: in fact, also the direction, goals and objectives of Living Lab projects are developed in a collaborative manner. Different actors participate in various combinations at every stage, and co-creation becomes more intensive and structured in the start-up phase, when a wide range of partners draft and develop new potential solutions and identify financial options. It is important to notice that in AFL the citizens are empowered

of the role of co-creators. Finally, in a minority of the projects, partners also have the opportunity to co-develop actual business cases and co-create spinoffs and commercial interventions.

Experimentation and evaluation - The researchers of AUAS participate to the entire process: they concretely follow the experimentation and perform evaluation. Then, the results are systematically and iteratively applied to the projects. Experimentation and evaluation also concerns directly the model for AFL projects and initiatives: the co-created solutions are identified and implemented on a small scale. There, they are tested exhaustively to assess the impact of a potential upscaling to the rest of the city. For example, in the House of Skill project, several business cases to help unemployed people to enter back the workforce are designed. Subsequently, the cases are experimented in a small scale before to derive business models with general validity. The results of the evaluation and monitoring process are systematically assessed in constant consultation with the strategic partners.

4.2.3. Outcome

Knowledge valorization – AFL’s objective is not solving problems, but rather developing knowledge, methods models to combines research, practical application and education. This sets the basis for future interventions, policies and solutions. The Living Lab activities bring research to a higher level: academical research, through the development of models and narratives, is translated into actual research, with a substantial grip on the real-life environment.

The Fieldlabs are continuous learning environments focusing on the development of knowledge, but also on the improvement of practice through direct application of acquired knowledge in tangible interventions. In AFL, knowledge from multiple sources is systematically gathered and the idea of a continuous learning process is supported. Thanks to the involvement of diverse actors, knowledge is made more tangible and training and research are connected with the development of policies and social services.

Network exploitation - Thanks to the direct involvement of politicians and administrators, the Fieldlabs can count on a broad network of public and private organizations. These parties focus on stakeholders’ potential to work together towards finding robust solutions to social challenges in a collaborative manner. The role of Fieldlabs is essential to drive public and private institutions to work together with an innovative and user-centered approach.

Moreover, the Fieldlabs helps the several actors of the network to expand their competences and expertise towards an integrated way of developing social policies. The Fieldlabs act as coordinators and intermediaries between a traditional policy-driven approach to social challenges to a participative society and provide a lasting contribution to the administration dynamics. In fact, through a distributed approach to innovation and better interaction between parties, Fieldlabs facilitates the institutional optimization and professional development

Social impact - In the city of Amsterdam there are several realities that are encountering difficulties connected to radical societal changes. The city is dealing with unemployment, poverty, immigration, lack of integration, excess of tourism, sustainable development and environmental challenges. The administration, public and private organizations and the traditional actors are not always able to respond efficiently to emerging societal challenges. For this reason, AFL’s approach can drastically improve the social impact of policies and interventions.

The public administration requires new perspectives to the define novel strategies and solve critical social problems. AFL provides to policy makers new inputs, directions, knowledge, methods and citizens involvement techniques. For example, with the project “learning at the kitchen table” integration is tackled directly at the root: researchers worked side-by-side with many kids from immigrant families to develop initiatives to improve integration among students. With the “House of Skills” project, many stakeholders and citizens collaborate to find new business cases to reduce the barriers to employment for the less-educated social classes. In conclusion, AFL substantially improves the quality of local policies which lead to a positive impact on society.

4.2.4. Value creation

Because of the primary interest of AFL in generating knowledge for the development of social policies, it becomes hard to produce easily sellable solutions. In fact, AFL's research does not have a commercial value by itself but mostly social value. Moreover, AFL is not interested in providing business consultancy. Despite that, the social impact is already a project legitimization for the Amsterdam University of Applied Science.

Economic - Only few projects presented some opportunities for business development and commercial spinoffs. Some projects, such as "World of Food" gave the opportunity to refugees and other unemployed immigrants to become self-employed: AFL partners helped the citizens to set up their own restaurants, provided them location and funding to help them in the startup phase. Indeed, AFL can help linking unemployed people with potential employers, or entrepreneurs with investors. Moreover, the public and private organizations can benefit from the research performed by the Fieldlabs increasing their chances of business success.

Business - The stakeholders of AFL, as well as the involved citizens, can obtain business value through circulation of knowledge and expertise development. For instance, thanks to the "House of Skills" projects unemployed people with a low level of education, had the chance to learn new competences and a new profession, which made them more suitable for the job market. At the same time, the labor unions learn new approaches for dealing with workers' difficulties.

Furthermore, the public-private social enterprises participating to the Living Lab initiatives learn how to apply new methods inside their innovation process and can enter a network constituted of important institutions. Finally, Amsterdam University of Applied Science can legitimate its role in the city ecosystem and AFL represents an important addition to the didactic offer.

Public - Social impact is the primary objective and, thus, public value is the main value created by AFL. The generated social value concerns the identification of problems and potential solutions to a full range of diffused social challenges.

Social cohesion is central for the Fieldlabs and it is addressed with projects such as "Mijn Straat" (my street), a spatial research project in which urbanist, policy makers and citizens collaborated in the definition of a more livable neighborhood. With the same purpose, AFL ran the project "Improving resident participation in Amsterdam NieuwWest". From these initiatives, AFL not only obtained meaningful insights adequate social policies, but also developed a tool to map the line of thoughts of different citizens group. This tool was proven to be useful in assessing the degree of cohesion of the inhabitants of an urban context also beyond the border of the single AFL project.

"World of food" addressed the problem of unemployment and integration providing immigrants and refugees with the competences and finances to open a small restaurant. Projects like "Klimaatbestendige Wijk in Middenmeer" ('Climate-proof Neighbourhood') in Amsterdam Oost have the objective to identify feasible solutions to concretely improve living conditions in specific areas. All these initiatives, not only are forerunners of social improvements, but also allow public administration and social companies to increase their ability to respond to diffused social problems.

4.2.5. Value delivery

The Fieldlabs mostly focus on the creation of public value, which is the hardest to clearly demonstrate to stakeholders. For this reason, the researchers of the Amsterdam University of Applied Science put special effort in the aspect of value delivery.

Indeed, the activities of the Fieldlabs require substantial and continuous involvement of the stakeholders. Since it is not directly produced a monetary value, it becomes fundamental to establish a long-lasting relationship with the strategic partners based on trust. Therefore, the researchers of AFL systematically invest time and efforts at every step of the collaboration to explain their mission. Indeed, the trust building process with the stakeholders begins before the commitment to specific projects and continues during the entire duration of the project.

Communication is fundamental to build trust: information about progresses needs to be communicated regularly to the stakeholders and to the citizens. In this way, partners are able to seize the public value generated and then judge the projects integrally. The public awareness about the importance AFL initiatives is supported also by a positive press communication, which praises the value of the Fieldlabs in the current reorganization of the public administration. The Fieldlabs are currently considered in the public opinion as a potential actor with an external perspective which substantially contributes to the definition of the city's strategy and facilitate the accomplishment of social impact.

To make the demonstration of public value more efficient, AFL also employs measurements tools and techniques. With the support of the Economics department of University of Amsterdam, public value is translated in economic and financial indicators. Thus, the civic benefits are translated in monetary drivers. Tools like multi-stakeholder analysis are employed to make the Living Lab's outcome more accountable.

Finally, an important driver of success in ensuring the commitment of partners is the definition of clear roles, goals and expectations. In this way, the outcome of AFL can be assessed based on the successful goals-reaching. The projects of AFL have always met the intended objectives and respected the expectations of the stakeholders. In this way, AFL obtained new adhesions and ensured commitment of the important partners. The new phase which deeply involves the central administration of Amsterdam is a proof of prior success of the Fieldlabs.

4.2.6. Funding and revenue streams

The Amsterdam University of Applied Science and the municipality of Amsterdam are the main strategic partners and they have the responsibility to provide finances to the main activities. Therefore, they provide between 50% and 75% of the overall budget, while smaller partners finance the remaining part at a level of individual projects.

This structure ensures the stability of AFL and allow to fully exploit the potential of the Living Lab. A typical Fieldlabs project requires between 50k and 100k euros per year, depending on the project size, which covers the activities of the researchers. In the new phase of AFL, the municipality of Amsterdam committed to provide funding in the range of 1M-2M euros per year, which clearly demonstrate the intention to bring the Living Lab activities to a higher level. In contrast, only few projects had a commercial vocation and were able to attract business partners willing to invest in the Living Lab.

Despite that, professors and researchers systematically try to expand the network and identify new financiers. Since AFL does not have the objective to produce tangible products or commercial services, but rather knowledge for better social policies, the majority of organizations which commits to finance part of AFL activities shares with AUAS and the public administration social objectives. For these realities, the generation of concrete public value is by itself an investment legitimization. Moreover, for many public-private organizations involved in the network investments in social initiatives are often required.

Finally, searching for independent sources of financing can be highly time consuming and frustrating, and might cause clashes with the mission of AFL. For this reason, and for the substantial funding ensured by the university board and by the municipality, AFL is not trying to develop a more self-sustainable business model.

4.3. Textile&Clothing Living Lab

TECLA represents one more component to the vivid innovation environment of Palermo, one of South Italy's biggest cities and crucial node of the Mediterranean basin. The Living Lab started in the context of Horizon 2020 Textile & Clothing Business Lab (TCBL) project. TECLA is hosted by Consorzio ARCA which manages a university business incubator and has already ran other Living Labs in Sicily, such as, the Solar Living Lab and Madonie Territorial Living Lab.

TECLA is an initiative of industrial (micro and small enterprises) development to exploit the endogenous potential of Palermo region reinforcing the innovative capacity of many actors to accelerate the creation of new user-centric solutions. TECLA is a physical space that encourages to discuss ideas and projects, meet partners, develop cooperation methodologies where textile and clothing manufacture meets technologies and advanced multimedia tools. TECLA supports the entire process and the actors involved developing co-creative models for the design of new products and services and linking them with successful business models.

4.3.1. Network

ARCA has developed a fruitful collaboration with stakeholders from the quadruple helix and key players of the innovation ecosystem. It has experimented models of participative behavior and active citizenship and democracy to develop urban and rural sustainable systems from the economic, social, governance and environmental side, where technologies, know-how and innovative solutions have acted as enabling forces.

Public – because of the novelty of TECLA, the involvement of the public sector is still in an exploratory phase. Indeed, the involvement of policy makers at regional and local level is mainly passive: The Living Lab tailored its mission based on the public administration agenda and embraces a prevailing focus on creating employment and fostering innovation in the region. Despite that, local authorities are not deeply involved in the activities of the Living Lab, but rather offer institutional support and facilitate projects and activities.

In contrast, the European Community has a big role within the Living Lab via a number of horizontal and vertical projects which shapes the direction of the Living Lab. Among them, TCBL is the most important. It allows TECLA to organize events and favor the participation of field experts in the Living Lab's activities. Also, TECLA has been awarded of the title of Hub Leader of H2020 project WEAR (Wearable technologists Engage with Artists for Responsible innovation), which involves a consortium of 7 Institutions in 6 countries and it is coordinated by IMEC in Brussels.

Research – The activities of the Living Lab involve a substantial number of students and professors from fashion and design schools and universities from the region. They are mostly committed at a project level, while only partially participate in the definition of mission, goals and objectives. The involvement of the University of Palermo, despite the physical proximity with the Living Lab seems to be particularly difficult. Moreover, TECLA is sensitive to the latest advancements in the field and involves researchers and research centers in some projects.

Businesses – There is a heterogeneous business ecosystem around TECLA, both inside and outside the textile field. In fact, TECLA inherits the innovation network which is established around ARCA, which represents the main stakeholder of the Living Lab. Indeed, TECLA has the opportunity to involve in its projects enterprises from different sectors and with different backgrounds.

Moreover, TECLA puts systematic effort in gathering players of the textile field especially startups, SMEs and traditional companies. Business realities such as Sartoria Sociale, a sewing cooperative, or Sartoria Crimi, a micro traditional enterprise, are engaged in testing and developing new products. Furthermore, being part of the TCBL ecosystem allows TECLA to involve other textile labs and companies from all over Europe, which are engaged in joint projects and initiatives.

People – Individuals are involved in the Living Lab to various extent and at different degrees. Industry professionals, fashion designers, makers and fashionistas give their contribution in projects and activities and turn to TECLA for tutoring and services. Many citizens are also engaged as test panels both singularly and as associations and communities of users and igniters.

4.3.2. Activities

Exploration - the textile and clothing industry is explored to find desirable long-lasting alternatives to traditional products, services and business models. Systematic exploration of new technologies and materials aims at the identification of innovative and environmentally sustainable applications.

TECLA, not only investigate the technical domain, but also focuses on consumers, workers, designers and industries to discover promising trends and innovations. Moreover, the Living Lab explores the emerging opportunities of the new “Making Economy” (e.g. personal robotics, home production, etc.).

Also, important attention is given to the endemic problems of the current state of the textile industries. Indeed, TECLA tries to identify novel solutions to make the textile attractive to entrepreneurs and innovators, in order to activate a spontaneous process to renew the industry.

Co-creation – The objective of TECLA is to design novel solutions and innovative products and services using the skills and knowledge of all the actors involved in the several Living Lab’s projects. Indeed, TECLA tries to create a holistic system based on co-design that considers the many different perspectives of partners and stakeholders. In this way, it is possible to speed up and to deliver effective co-creative models for the design of new products, services and successful business models. This is done by employing a full range of models of participative behavior, web information, tutorials, co-design round tables, exhibitions and workshops.

Co-creation does not only concern the realization of new textile products, but also the definition of environmentally sustainable goals: this is done by including in the decision process the confrontation with the other pioneering realities of the TCBL network. Moreover, together with ARCA, the Living Lab co-create models and strategies for facilitating and fostering entrepreneurship and organizes several acceleration programs.

Experimentation & evaluation – Experimentation is a central activity of TECLA. On the one hand, it concerns the testing of novel products and services. That is done either inside the Living Lab, where experimentation and evaluation is performed by questioning and rapid prototyping, and outside, through the involvement of a test panel of volunteers and citizens. Through these activities, companies are able to collect feedbacks and impressions about their products and seize eventual directions for improvement. On the other hands, since TECLA still has not reached its maturity, experimentation and evaluation concerns the organization of the Living Lab itself and of its activities. To this purpose, it is of crucial importance the role of TCBL network. In fact, many innovative textile business labs gather few times per years and exchange feedbacks about their experiences and projects. From the confrontation of such innovative realities often emerge promising directions for further improvements.

4.3.3. Outcome

Knowledge valorization – Thanks to the experience in the textile field of the founder of the Living Lab and to the involvement of actors with diverse backgrounds and assets, TECLA can count on a well-sorted and heterogeneous knowledge base. Indeed, industry specific knowledge is combined with technical and technological expertise. Moreover, TECLA couples the artisanal know-how of traditional workers with a deep understanding of Future Internet technologies for the T&C global supply chain (diffused e-commerce networks, IoT tracking systems, virtual warehouses, customer engagement, etc.). In this way, the Living Lab allows the integration of different skills and competences to produce innovative ideas and business models.

Moreover, TECLA has the ambitious goal of digitalizing and transmitting traditional and tacit knowledge and facilitating the application of innovative techniques and practices to unexpected business opportunities. By mixing tradition and novel ideas, TECLA wants to support the innovation of old practices in the textile and clothing field and the delivery of effective co-creative models for the design of new products, services and business models.

Furthermore, TECLA coaches its partners to take full advantage of new customer-driven approaches and of market intelligence. Within the Living Lab technologies, know-how and innovative solutions act as

enabling forces for improvement of the traditional textile and clothing industry. Finally, the knowledge of TCBL partners about novel environmentally-sustainable directions can allow traditional players to improve their offering and market positioning.

Network exploitation – TECLA has the objective to develop a common innovative approach shared across the network to favor scientific and technical cooperation. In this way, many actors can accelerate the co-creation and diffusion of new user-centric solutions. The cooperation between diverse players reinforces everyone's innovative capacity and results in the emergence of novel business opportunities and industry advancements.

Moreover, thanks to the systematic coupling of traditional heritage with innovative practices from actors at both regional and international level TECLA can convey mutual benefits to small traditional players, textile and clothing industry and to consumers. That is made possible by the role of EU projects such as TCBL and WEAR in shaping the Living Lab mission and objectives, which reduce both technological and geographical gap with Europe.

Furthermore, TECLA reduces the gap between SMES and R&D. Indeed, startups, entrepreneurs and micro enterprises can count on the technological equipment of ARCA and the technological asset and expertise of well-established actors. In addition, one of the duties of TECLA as hub leader of the WEAR project is to coordinate the development of the WEAR Sustainability Toolkit which will support future projects in this area of innovation.

Moreover, within the Living Lab any actor can obtain guidance from a full range of professionals and experts. Finally, social challenges, both at local and international level, can be addressed in a co-creative manner by a coalition of diverse actors.

Social impact – The impact of TECLA on society can be well represented in a twofold classification. On the one hand, TECLA aims at improving the innovativeness of Palermo region by implementing a systemic and integrated approach to local sustainable and inclusive development. Indeed, through co-creation and collaboration between local and international actors, TECLA has the objective to produce a lasting impact on the territory: key social players and innovators can interact to generate products, services and processes and to boost technological applications which fit crucial societal challenges, such as endemic unemployment and industrial under-development. On the other hands, TECLA wants to contribute to the European Community mission to develop ethically acceptable and socially and environmentally sustainable innovations in the textile and clothing sector, challenging problems such as pollution, mistreatment of workers in the Third World and extreme exploitation of natural resources.

4.3.4. Value creation

Economic – The activities held inside the Living Lab allow organizations and enterprises to improve the value of their products and services. Through co-creative processes the knowledge of different actors is valorized and applied to concrete product features. In the same way, systematic testing and evaluation translates in higher product value and competitive advantage.

The valorization of knowledge and exploitation of diverse competences present in the network leads to the application of innovative technologies and traditional expertise to new and existing products and services. Actors can translate emerging and unexpected opportunities in business concepts. Systematic investigation of socially, ethically and environmentally acceptable alternatives can turn into marketable innovations. Micro and small enterprises can develop technologically advanced products and services thanks to the equipment made available by TECLA and its partners and turn their ideas in concrete business items.

Moreover, the projects held inside the Living Lab can benefit from innovative tools such as demonstrations through AR tutorials and CAD systems. Moreover, the actors of the network can obtain substantial savings on development costs thanks to TECLA and other partners, like ARCA, which share their equipment (i.e. 3D printers, sewing and cutting machines, pattern maker software) and on several workshops (i.e. mechatronics workshop, about 250 sqm, with the digital fabrication and rapid prototyping laboratory, the electronics laboratory, the mechanical laboratory; the IT lab, including

machinery for processing metal, measuring scientific instruments, equipment for the shared design and production assistance).

Business – TECLA counts consistently in the generation of business value for its partners. In fact, the Living Lab activities are coupled with incubation and acceleration services offered by ARCA. In this way, entrepreneurs, startups and micro enterprises are supported in Studying project feasibility and sustainability, risk reduction, market positioning and differentiation. Moreover, thanks to these programs TECLA mitigates the challenges of unknown potential business outcome, the lack of prototyping and knowledge facilities.

In addition, TECLA provides services ad due diligence consulting, training modules, entrepreneurial training, access to a digitalized archive and demonstrations of new profit ways. Moreover, bringing together different actors of the network helps traditional companies to overcome the main fears connected with a lack of familiarity with open innovation (i.e. fear of working in silos, fear of tacit high up-front expenses). In addition, being part of a vital network gives to the participants better visibility of the businesses, R&D and creativity of the Sicilian territory. Finally, attention to societal needs introduces actors to new user-driven approaches and to market intelligence.

Public – TECLA tries to generate substantial public value through the accomplishment of economic and business objectives. In fact, the economic and value creation is intrinsically connected with the inclusion of the two main aspects of social impact presented in the previous section. Indeed, on the one hand the local community can benefit from an activation of virtuous innovative practices in the textile and clothing sector: TECLA privileges these projects which has the potential to valorize the Sicilian territory for its traditions and cultural and industrial heritage. Moreover, the creation of new ventures, startups and enterprises, as well as the realization of new products and services, can result in new investments in the region with a consequent creation of jobs opportunities. TECLA serves both the academic community and the productive system, with a potential economic and social development of Palermo region through innovation, co-creation and creativity. On the other hand, TECLA wants to have a small but concrete impact in the international dynamics within the textile and clothing sector. In fact, TECLA, together with its partner projects TCBL and WEAR, aims at valorization of knowledge in a socially, ethically and environmentally sustainable direction.

4.3.5. Value delivery

Businesses are the main beneficiaries of the economic value, and the prevailing product orientation of TECLA makes this process smooth. Indeed, enterprises can easily size the generated value in form of new products and services co-developed together with the Living Labs and its partners, and of improved product's features and enhanced competitive advantage and user value.

Business value demonstration is less straightforward and thus TECLA identified a set of possible supports for such activities. Indeed, TECLA's objective is to develop a common language and understanding of Living Lab concept and dynamics and share it across the entire network. In fact, local textile industry has not encountered substantial innovations in the last decades and thus, TECLA needs to shape a certain culture through which to build 'a movement' towards an alternative approach for the textile and clothing industry. In this way, the importance of open innovation and user-led practices can be shared among local industry players. Indeed, by cultivating a culture step by step and developing a common language, it becomes easier to share a state of mind with new people connecting to the network.

Moreover, the assessment of the outcomes of TECLA activities is reported to its partners through the traceability of the process (documentation, interpretation of data, application of a standardized methodology), the quality and effectiveness (appropriateness of the approach, the method, the sampling strategy, the communication tools), the relevance to the multi-actor target (users' satisfaction and responsiveness, synergies generated, knowledge mobilized, agreements drawn up).

Finally, public value is demonstrated to the European partners of the TCBL and WEAR projects, by co-designing with them goals and objectives. The participation to important EC projects can also be seen as a demonstration for other stakeholders of the generated public value.

Value delivery (economic, business and public) to local authorities and to Palermo University appears a very challenging task. The main reason seems to be in the institutional culture of Italy, and especially of the Sicilian region: public authorities and institutes are often culturally unable to respond timely to the emerging needs and directions of the market. The public administration often lacks employees with competences to understand the latest trends in innovation and collaboration models. Moreover, they operate at very scarce resources and thus they are often unable to take financial commitment in innovative projects and initiatives. Finally, and unbelievably, public administration in Sicily is not able to exploit the EC funds, the majority of which often is returned to EC.

4.3.6. Funding and revenue streams

The first setup of the Textile & Clothing Living Lab has been built thanks to funds from the European Commission under the Horizon 2020 Textile&Clothing Business Labs project. At present, this represents the main source of financing. In the next future, TECLA will have the chance to access other kinds of funds at different level (municipal, regional, national and European level) such as the ERDF funds in the Regional Operational Plan 2014-2020.

Indeed, national and international authorities make available several funds directed to under-developed regions. These funds are often intended as supports to the generation of innovative solutions to specific societal challenges and open innovation environments such as Living Labs adequately respond to these purposes. In order to accomplish this objective, TECLA can count on the experience of ARCA, its main stakeholder, which already has successfully carried out several EU funded projects. Moreover, ARCA has developed a good capacity in fund raising, both through its investors' networks (venture capital, finance and credit system).

Besides these structural funds, which ensure TECLA with the right budget to finance its basic activities and in equipping with the necessary assets and machineries, the Living Lab has the objective to develop a catalogue of services to guarantee full operation at project level. Support packages for innovative SMEs, technology transfer, access to EU finance, advice on EU law and standards, Intellectual Property Rights (IPRs), speak up on EU law, research funding, internationalization, training modules for entrepreneurs, researchers and experts in technology transfer on the topics of open innovation are among the possible services to be carried out to obtain operational budget.

Moreover, TECLA has developed a set of bootstrapping techniques and cross-financing methods to sustain its activities in the set-up phase. Indeed, TECLA is located in Cre.Zi. Plus, a creative co-working space which includes also a bar and a restaurant. In this way, it is possible to obtain cost savings while being embedded in a vital environment. Moreover, TECLA makes its equipment available also for interested businesses and organizations which are not part of the Living Lab network, in exchange of a restrained monetary payment.

5. Cross-case analysis

In this chapter, we analyze the main findings of the empirical research by comparing AFL, SLL and TECLA point by point. In this way, we highlight common and diverging Living Lab practices and characteristics. In addition, we structure the insights obtained in the empirical research into tables to facilitate the confrontation and we discuss the most salient aspects. Based on that, we distinguish evidence with high potential and general validity from context-specific features, and we develop a comprehensive framework of Living Lab practices.

For this reason, in *section 5.1*, we present the confrontation of Living Lab characteristics. Then, the cross-case comparison shows that the main differences between AFL, SLL and TECLA can be traced back to the composition of the network. Therefore, in *section 5.2*, we introduce an extra level of analysis with the network at the center. There, the connections between the characteristics of AFL, SLL and TECLA are put in close relation with the composition of their innovation network.

Then, in *section 5.3*, we iterated the cross-case comparison in order to concretely examine the aspect of financial sustainability. Hence, we compare and combine evidence from AFL, SLL and TECLA over funding and revenue streams.

Finally, in *section 5.4* and *section 5.5*, we integrate the previous steps of the cross-case analysis with the literature study of *chapter 3* and we propose two practical models which can support Living Labs to determine an adequate financially self-sustainable business model.

5.1. Characteristics

5.1.1. Context

In *table 4* are summarized the most important characteristics that emerged from the observation of the context in which AFL, SLL and TECLA are established. The empirical evidence is also supported with data from the Eurostat Regional Yearbook 2018 [2].

Accordingly, are considered “more-developed regions” regions with a GDP above the 90% of European average, and Amsterdam and Eindhoven areas fit in this category. Moreover, Eindhoven region has the fame to be among the smartest regions of the world, which is further testified by the value of R&D intensity reported in the Eurostat study. This does not come as a surprise, since the interviewees explained how the regional administration pay substantial attention to technological progress and innovation.

Despite the Eurostat study collocate Amsterdam among the areas with a higher GDP per capita, the interviews revealed that the city is encountering the emergence of new severe social problems, especially related with the disunity between the wealthy neighborhoods of the center and the suburbs. For this reason, the public administration decided to allocate efforts and funding in addressing diffused urban challenges with an innovative approach.

In contrast, the Province of Palermo is considered a “less-developed region” and the GDP per capita is far below the European average. This result in numerous endemic problems such as unemployment (i.e. 54% of youth employment). Another severe challenge is mass immigration and emigration: indeed, not only Sicily has been one of the main arrival points of refugees, but also many of the most educated inhabitants move away to find better job opportunities. For this reason, the public administration lacks resources and competences to develop effective solutions despite having a vision for territorial valorization through new models of social innovation.

[2] <http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer>

Amsterdam Fieldlabs	Stratumseind Living Lab	Textile&Clothing Living Lab
Transition phase for the Municipality of Amsterdam	Focus of public administration to high tech	Interest by local administration territorial transformation
<ul style="list-style-type: none"> ▫ Reorganization of the public administration ▫ Willingness to operate in a locally-oriented manner ▫ New resources to allocate 	<ul style="list-style-type: none"> ▫ Investments in technology research ▫ Technology application ▫ SmartCity projects ▫ Previous LL initiatives 	<ul style="list-style-type: none"> ▫ Innovation ▫ Employment ▫ Digital transformation ▫ Urban regeneration
Emerging new social problems	Established quadruple helix collaborations	Vivid innovation environment
Refugees	Eindhoven area one of the smartest region of the World	Culturally lively area
<ul style="list-style-type: none"> ▫ Overpopulation ▫ Social disunity ▫ Tourism management 	<ul style="list-style-type: none"> ▫ Abundance of high-tech businesses ▫ Multinational high-tech companies ▫ Startups and Spinoffs 	Availability of EC funds
New policy focus	Important University of Technology and research centers	Lack of structural processes
<ul style="list-style-type: none"> ▫ Citizen-centered solutions ▫ Social innovation 	Integration of Education, Public sector and business	<ul style="list-style-type: none"> ▫ Difficulty in coordinating public and private sector ▫ Difficult access funding
High integration between Education and Public sector		Lack of competences
More-developed region: Amsterdam	More-developed region: Noord Brabant	Less-developed region: Province of Palermo
GDP Per Capita: 64k	GDP Per Capita: 44k	GDP Per Capita: 18k
Inhabitants: 1,32M	Inhabitants 0,75M	Inhabitants 1,3M
Unemployment 4,5	Unemployment 4,2	Unemployment 21,5
R&D intensity 1,72	R&D intensity 2,78	R&D intensity 0,99

Table 4 – Overview of the context in which AFL, SLL and TECLA are established

5.1.2. Assets and Capabilities

The three Living Labs did not start completely from scratch but are based on some fundamental tangible and intangible assets and capabilities. A schematic overview of the initial capital of tangible and intangible assets and capabilities is shown in *table 5*.

Amsterdam Fieldlabs were started by the Urban Management department of the Amsterdam University of Applied Science. Therefore, they can count on a structural knowledge base about urban problems and governance modes, and on systematic research methods and models. Moreover, the University can provide Fieldlabs with a consistent number of professors, students and researchers which constitute important workforce, and of spaces that be used for the activities of the Living Lab.

SLL is started by Tinus Kanters, who is directly employed by the municipality of Eindhoven, and is considered in the high-tech field one of the maximum experts of his sector. Therefore, SLL can count on his expertise, reputation and connections with relevant players of the high-tech sector. Moreover, the Living Lab was started around a project commissioned by the DITSS. The initial project was unsuccessful, but the employed methods showed the potential of the Living Lab and, thus, SLL was reconverted to broader purposes.

Finally, TECLA was founded by ARCA a renowned business acceleration hub which had already run few Living Labs. The organization of the Living Lab was assigned to Luca Leonardi who had several years of experience in the textile and clothing industry. From the accelerator, TECLA inherits a vivid innovation ecosystem, important technical equipment and the possibility to operate in a dedicated space.

Indeed, AFL, SLL and TECLA suggest that the activation of the virtuous mechanisms of the Living Lab and of its network are facilitated by prior experience, key assets, competence and capabilities.

Amsterdam Fieldlabs	Stratumseind Living Lab	Textile&Clothing Living Lab
<ul style="list-style-type: none"> ∴ Founder: Amsterdam University of Applied Science, Urban Management dept. ∴ Begin with predefined project ∴ Institutional role ∴ Availability of spaces inside the University ∴ Abundance of personnel <ul style="list-style-type: none"> ▫ Professors ▫ Students ▫ Researchers ∴ Systematic research models and methods 	<ul style="list-style-type: none"> ∴ Founder: Technology “guru” hired by municipality ∴ Begin with predefined project ∴ Follow-up of previous project <ul style="list-style-type: none"> ▫ Preexistent network ∴ Institutional role ∴ Dedicated physical location ∴ Technical equipment <ul style="list-style-type: none"> ▫ Sensors ▫ Cameras 	<ul style="list-style-type: none"> ∴ Founder: industry expert hired by Acceleration Hub ∴ Dedicated physical location ∴ Preexistent network ∴ Technical equipment <ul style="list-style-type: none"> ▫ 3D printers ▫ Textile machineries ▫ Textile software ∴ Other technological supports <ul style="list-style-type: none"> ▫ Mechatronics workshop ▫ Rapid prototyping laboratory ▫ IT laboratory ▫ Equipment for shared design

Table 5 – overview of the initial assets and capabilities of AFL, SLL and TECLA

5.1.3. Mission

The improvement of economic and social conditions of the area is central to the mission of AFL, SLL and TECLA. Nevertheless, the three analyzed cases are trying to achieve this objective in diametrically different ways, which are schematically presented in *table 6*.

Amsterdam Fieldlabs focus on the collection of meaningful knowledge from the direct involvement of citizens, to apply it in a second phase to the development of social policies. In this way, AFL conveys new perspectives to the public administration to solve diffused social problems.

In contrast, SLL has a strong orientation towards the realization of concrete high-tech products and services. Its role is to activate collaboration and couple research and development with public needs. Indeed, SLL ensures that joint innovative projects, not only bring benefits to business partners, but also accomplish with local policies and goals. Indeed, the joint efforts of innovative businesses, public sector and research institutions support the innovativeness and technological attractiveness of the region.

Finally, regional development is also the core mission of TECLA. Indeed, TECLA reduces the gap between SMEs and research, stimulates entrepreneurship and enlarges the community of artisans by enabling an inclusive and integrated approach to local development. Besides producing a lasting impact on the territory, TECLA has the broader objective to contribute to research over ethically, environmentally and socially sustainable development in the textile and clothing industry.

Amsterdam Fieldlabs	Stratumseind Living Lab	Textile&Clothing Living Lab
<ul style="list-style-type: none"> Collect knowledge about social issues Apply Urban Management research to real-life Improve life quality in the city Co-develop social policies Citizen involvement in policy development Facilitate participative society Deliver new governance arrangements 	<ul style="list-style-type: none"> Apply technology to urban security and safety Improve life quality in the area Develop new data policies Support innovativeness in the region Facilitate co-creation of high tech products and services to serve the citizens 	<ul style="list-style-type: none"> Territorial valorization Favor environmentally, ethically and socially sustainable development Innovate traditional industry Spread open innovation and user-centered approach Reduce gap between research and SMEs Facilitate entrepreneurship and employment

Table 6 – Overview of prevailing aspects in the mission of AFL, SLL and TECLA

5.1.4. Activities

The empirical research showed that the three cases systematically addresses and perform the activities of exploration, co-creation, experimentation and evaluation. Therefore, it is confirmed that such activities are characterizing features of Living Lab. Despite that, there is not complete uniformity in the way that these activities are performed and in the choice of actors to involve. In *table 7*, we present the most relevant contributions of the empirical research to the understanding of Living Lab's activities. There, we can notice that SLL, AFL and TECLA share some common practices, but are also diverging under many aspects.

Exploration - common practices: The activity of exploration starts with the in-field observation of the citizens/users in their living environment. In this way it is possible to obtain valuable insights over recurrent problems and needs, and already identify promising alternatives and paths for potential solutions. Also, business models and business cases are explored preliminarily. All three Living Labs involve in this phase the strategic partners, educational institutions and public organizations.

Exploration - diverging practices: AFL primarily focuses on academic research which is conducted mainly by AUAS researchers together with the citizens. In contrast, SLL and TECLA have a high focus on technical exploration and on the exploration of potential business opportunities, keeping into account also the knowledge, competences and needs of the commercial partners. For this reason, SLL and TECLA involve in this phase project partners, enterprises, professionals and entrepreneurs. Moreover, SLL performs observation with the support of technological instruments. A final difference is in the type of user involvement: SLL includes the users and the citizens only in a passive manner, as subject of observation, while AFL and TECLA, involve them also actively.

Co-creation - common practices: From the comparison of the three cases, it emerges that goals and objectives are co-created with a holistic approach involving strategic and project partners, policy makers and users. Also, social policies and business cases are developed in a collaborative manner. Despite an overall diverging approach, AFL, SLL and TECLA give crucial importance to the activity of co-creation and dedicate considerable effort to it.

Co-creation - diverging practices: the main differences in the way co-creation is performed is due to the nature of each Living Lab. SLL has a strong focus on technologies and data. Thus, public organizations, private companies and entrepreneurs take part to the co-creation of high tech products and to privacy, safety and open data policies. Also TECLA has a focus on joint development of new technologies, commercial products and services which is mainly done together with business partners. In contrast, AFL involves directly researchers, students and citizens in the co-creation of social policies.

Experimentation and Evaluation - common practices: SLL, AFL and TECLA include in their activities testing and systematic evaluation. That is done in a real-life setting directly on the field. The experimentation generally consists in the testing of prototypes and pilot projects on small-scale to evaluate the quality of services co-created: in this way, it can be assessed the potential impact on larger city environments. In this phase, the three Living Labs involve beside the end users, strategic and project partners and the educational institutions.

Experimentation and Evaluation - diverging practices: The different focus of the Living Labs is reflected also in this phase: SLL tests commercial products and services with companies and policy makers and observe the reaction of the users in real-life setting. TECLA involves a test panel of users to test novel products and evaluate the experiments together with businesses and entrepreneurs. AFL primarily test the co-created policies, methods, models and theories, involving the citizens in an active way and evaluate the insights mainly with researchers. The public sector's participation to this phase is higher for AFL and SLL, since their institutional partners are more involved in the evaluation of the generated social effects.

Exploration: common practices	Exploration: diverging practices
Activities Problem identification Pattern for solutions and alternatives In-field research Observation User needs Business model research	Activities Data driven SLL Technological support SLL, TECLA Business opportunities SLL, TECLA Academical research AFL Technical domain SLL, TECLA Partners knowledge SLL, TECLA
Stakeholders Passive user involvement Strategic partners Educational institutions Policy makers Public sector	Stakeholders Active user involvement AFL, TECLA Enterprises SLL, TECLA Entrepreneurs SLL, TECLA Professionals SLL, TECLA Project partners SLL, TECLA
Co-creation: common practices	Co-creation: diverging practices
Activities Goals and objectives Public services Business cases Social policies Holistic approach Business model	Activities Open data policy SLL High tech products SLL Commercial products & services SLL, TECLA Methods, models & theories AFL
Stakeholders Strategic partners Project partners Users Policy makers A, E	Stakeholders Citizens AFL Private companies SLL, TECLA Entrepreneurs SLL, TECLA Students AFL, TECLA Public organizations AFL, SLL
Experimentation and Evaluation: common practices	Experimentation and Evaluation: diverging practices
Activities Real-World setting In-Field Small-scale and prototyping Impact on urban context Services test & evaluation Business case	Activities Product SLL, TECLA Policies AFL Methods, models & theories AFL, TECLA Social effect AFL, SLL
Stakeholders Passive user involvement Strategic partners Project partners Educational institutions	Stakeholders Private companies SLL, TECLA Entrepreneurs SLL, TECLA Students AFL, TECLA Policy makers AFL, SLL Public Organizations AFL, SLL

Table 6 – Overview of prevailing aspects in the activities of AFL, SLL and TECLA

5.1.5. Outcome

The empirical research proved that the three Living Labs also address systematically each of the three aspects of outcome presented in *section 3.3*, namely knowledge valorization, exploitation of network and social impact. Nevertheless, the same considerations about the activities can be done: each Living Lab addresses the outcome with a partially different approach. For this reason, we first provide a

schematic overview of the most relevant empirical evidence about Living Lab’s outcome obtained from the three practical cases (*table 8*). Then, we deepen the discussion of the most meaningful common and diverging practices of AFL, SLL and TECLA.

Knowledge Valorization: Common practices	Knowledge Valorization: Diverging practices
Learning process From theory to practice Application of knowledge to real cases Combination of different knowledge sources	Technology applications SLL, TECLA Technology improvements SLL, TECLA Framework for social problems AFL, TECLA Framework for user problems SLL, TECLA Application of methods and models AFL Application of policies AFL Market intelligence SLL, TECLA Innovation paths for traditional heritage TECLA Industry-specific knowledge SLL, TECLA Multiculturalism AFL, TECLA
Stakeholders Education Public organizations Users	Stakeholders Citizens AFL, TECLA Enterprises SLL, TECLA Professionals and industry experts SLL, TECLA
Network Effect: Common practices	Network Effect: Diverging practices
Shared benefits Shared capabilities Joint development Collaborative solutions Facilitate public-private partnership Shift towards participative society Distributed innovation Scientific and technical cooperation Expand the innovation ecosystem	Shared asset SLL, TECLA Market exploitation SLL, TECLA Business complements SLL, TECLA Joint developed products & services SLL, TECLA Joint developed policies AFL, SLL Institutional optimization AFL, SLL Reducing gap between SMEs and R&D SLL, TECLA Connecting industry and customers SLL, TECLA Connecting traditions and creatives TECLA Exploit a network of Living Labs TECLA Integration of international realities SLL, TECLA
Stakeholders Public administration Public organizations Education institutes Users	Stakeholders Citizens AFL Private companies SLL, TECLA Entrepreneurs SLL, TECLA Professionals and industry experts SLL, TECLA
Social Impact: Common practices	Social impact: Diverging practices
Better living conditions Higher value Address social problems Support (self)employment	Security and safety SLL Privacy and Open Data SLL Smart region SLL Efficacy of public administration AFL, SLL Methods for policy development AFL, SLL Sustainable and ethical innovation SLL, TECLA Environmentally sustainable innovation TECLA Territorial improvement TECLA
Stakeholders Public administration Public organizations Citizens education	Stakeholders Private companies SLL, TECLA Entrepreneurs and Innovators SLL, TECLA Professionals and industry experts SLL, TECLA

Table 8 – Overview of prevailing aspects in the outcome of AFL, SLL and TECLA

Knowledge valorization - common practices: AFL, SLL and TECLA have a systematic approach to learning and establishing an efficient learning process is thus a characterizing trait of Living Lab.

Through this process, theory is translated into practice and knowledge from multiple sources is combined and applied to real cases. Education institutions, public organizations and users are among the enablers of knowledge valorization for the three analyzed cases.

Knowledge valorization - diverging practices: SLL and TECLA gather substantial industry-specific and technological knowledge which is applied into concrete products and to bring technological improvements. This outcome, is enabled also by the involvement of enterprises, professionals and industry experts. In contrast, AFL privileges the application of knowledge to the solution of diffused social problems and to the development of policies. To this extent, the citizens represent an important source of knowledge. Finally, it's interesting to notice that both AFL and TECLA collect knowledge and experiences also from multicultural sources, having several projects that directly involve immigrants or refugees.

Exploitation of Network - common practices: In the three cases, different partners share knowledge, experience and capabilities which is applied to joint development of collaborative solutions. The actors' innovation process is often improved by collaborating with the other partners or with the Living Lab staff. AFL, SLL and TECLA showed that Living Lab brings together actors with different background (i.e. researchers, technicians, entrepreneurs) and enables the activation of shared processes. Moreover, AFL, SLL and TECLA play an important role in facilitating the establishment of public-private partnerships and in moving towards a participative society. Finally, it emerges that exploitation of network is a self-reinforcing loop: in fact, it establishes virtuous dynamics which allow the Living Lab to constantly expand its innovation ecosystem for new benefits for the actors involved.

Exploitation of Network - diverging practices: Exploitation of network seems to be even more important in these Living Labs which focus on the realization of tangible products and services. In fact, within SLL and TECLA, partners share their assets and find the needed business complements inside the network. In this way, partners, especially private companies, entrepreneurs, professionals and innovators, put their efforts together to reduce the distance between SMEs and R&D, co-develop products and services, connect with industry and customers and help each other in the exploitation of the market. On the contrary, AFL is more focused on optimizing public administration and helps it in the development of public policies side by side with the citizens and the establishment of joint ventures is rarer.

Social Impact - common practices: The typology of impact on society produced through Living Labs project can be very different in nature. That is due to two main reasons: (1) social problems can substantially vary from a specific urban environment to another; and (2) Living Lab usually prefer to choose a prevailing area of interest. Among the few common traits between AFL, SLL and TECLA, it is possible to state that they share the objective to improve the living conditions in the area they are embedded in, addressing diffused social problems and delivering solutions with a high user value. The involvement of public organizations and the community of users and citizens is an important enabler of this kind of Social Impact.

Social Impact - diverging practices: About the peculiar directions to produce a tangible social impact it was observed that: (1) SLL, in combination with the public administration and industry leaders, is developing important solutions for security and safety, building an innovative privacy and Open Data policy and supporting its partners in the success of Eindhoven as a SmartCity. (2) AUAS in close collaboration with the municipality of Amsterdam and the citizens is developing methods for social policy definition to increase the efficacy and innovativeness of the public administration. Finally, (3) TECLA puts important efforts in the inclusion of social aspects, such as sustainable and ethical development and territorial improvement, in each of its projects.

5.1.6. Value creation

In *chapter 2*, we presented the concept of value creation, as the external perspective over the Living Lab's outcome. For this reason, value creation is strictly connected to the approach that the Living Lab adopts for the composition of the network, activities and actors' involvement. These, all concur to

declinate the outcome and realize value. Indeed, we observe that AFL, SLL and TECLA adopt different strategies and procedures to create value for their stakeholders.

In particular, we noticed that, for what concerns economic value, AFL is substantially different from SLL and TECLA. On the contrary, business value creation does not present considerable differences. Finally, in the generation of public value, AFL, SLL and TECLA share several common traits, but also have some unique characteristics.

Economic value: common practices	Economic value: diverging practices
Connect with investors Self-employment Feasibility study and Business modelling Successful business cases Reduce cost for R&D Mitigate risk	Identification of market opportunities SLL, TECLA Exploit market, differentiation SLL, TECLA Time to market SLL, TECLA Added value to product & service SLL, TECLA Licensing agreements SLL Competitive advantage SLL, TECLA Cost reduction for assets and supply SLL, TECLA Exploitation of technology SLL, TECLA Venture creation SLL, TECLA
Stakeholders Public organizations Citizens	Stakeholders SMEs SLL, TECLA Private firms SLL, TECLA Professionals and industry experts SLL, TECLA
Business value: common practices	Business value: diverging practices
Stakeholders Knowledge base Innovation capacity Competence development Network effect Application of OI and user-centered design	Stakeholders Due diligence consulting TECLA Entrepreneurial training TECLA
Stakeholders Public administration Public organizations Education institutes	Stakeholders Private companies SLL, TECLA Entrepreneurs SLL, TECLA Professionals and industry experts SLL, TECLA Citizens AFL, TECLA
Public value: common practices	Public value: diverging practices
Better living conditions Social services Social goals Citizens needs Economic and social development	SmartCity SLL Safety and security SLL Sectoral policies SLL Social policies AFL Framework for diffused social problems AFL Social cohesion AFL Better government models AFL, SLL Territorial valorization TECLA
Stakeholders Public organizations Education institutes Citizens/ Users	Stakeholders Private companies SLL, TECLA Entrepreneurs and Innovators SLL, TECLA Professionals and industry experts SLL, TECLA

Table 9 – Overview of prevailing aspects in the value creation of AFL, SLL and TECLA

Economic Value - common practices: AFL, SLL and TECLA create Economic Value for education institutions and public organizations developing and evaluating business cases that can have a substantial social impact. Moreover, they assist citizens and innovators, who want to start an

entrepreneurial project, by connecting them with potential investors and helping them in developing a sustainable business model.

Economic Value - diverging practices: For SLL and TECLA, creating Economic Value for SMEs, private companies, professionals and industry experts is a crucial characteristic. These Living Labs support commercial projects and help companies to identify new market opportunities, to exploit technology and to differentiate their offering on the market. The activities of the Living Lab can also help to reduce the costs for R&D, assets and supply, and to speed up the development time. Moreover, SLL and TECLA can provide added value and increase the competitive advantage of the companies in the network. Finally, they also facilitate the establishment of new ventures. It is also interesting to notice that SLL allows the public administration to obtain favorable licensing agreements on the products and services developed inside the Living Lab.

Business Value - common practices: there is unanimity among the three cases on the most important features connected with business value creation. The contribution of Living Lab to the innovation capacity of every actor involved in the network is strongly supported by the empirical research. Thanks to the activities and dynamics inside the Living Lab, every actor can benefit from an improved knowledge base and develop new competences. In addition, AFL, SLL and TECLA facilitate their stakeholders to include concepts such as Open Innovation and User-centered design into their innovation processes. Moreover, entering a solid business and innovation ecosystem is an important value for every partner. Finally, be part of the Living Lab has a positive return on visibility and reputation.

Business Value – diverging practices: The main difference between Business value creation for AFL and SLL and TECLA is in the receivers of such value. Indeed, AFL mainly produces it for the Public sector and for the Amsterdam University of Applied Science, while SLL and TECLA direct Business value especially for the companies and for the professional figures of the innovation network. Moreover, it is interesting to consider that TECLA also offers to entrepreneurs and micro enterprises services as due diligence and entrepreneurial training.

Public Value – common practices: The observation of the three cases showed that Public Value is taken seriously into account during the entire innovation process of the Living Lab. AFL, SLL and TECLA address challenging social goals by understanding deeply what the most diffused citizens and user needs and problems are. They also benefit the surrounding society by developing adequate social services. Indeed, the overall objective of the three analyzed Living Labs is a concrete improvement of life quality and the economic and social development of the area they are embedded in.

Public Value - Diverging practices: AFL, SLL and TECLA all create Public Value especially for the administration, Public organizations, educational institutions and, of course, for the citizens and the users. SLL and TECLA also try to deliver public value to private business, entrepreneurs and professionals, while AFL creates public value mainly in the form of social policies which address problems such as social cohesion, unemployment, integration and migration. SLL's public value, which is technology-centered, mostly consists of sectoral policies such as SmartCity, safety and security, privacy and Open Data. Finally, TECLA focuses on territorial valorization through the regeneration of traditional professions, and by finding solution to the region's endemic unemployment by supporting entrepreneurship. Moreover, TECLA is the only to explicitly address environmental problems.

5.1.7. Value delivery

In the literature review it was observed that creating value does not necessarily come with the recognition of it by the stakeholders. Indeed, it is fundamental for a Living Lab, not only to create value, but also to deliver and demonstrate it to every actor of the network. In this section we compare the different techniques and methods that the three observed cases employ to make sure that the right stakeholders acknowledge the value that is created for them. At a first glance it was noticed that the three Living Labs share some common delivery methods, but the empirical research also highlighted several discrepancies.

Economic Value seems to be the easiest to demonstrate to the actors. In fact, it is related to development of new products and services, or with the improvements of existing ones. SLL and TECLA demonstrate the Economic value through traditional metrics and measuring product characteristics (i.e. added value, technology advancement, product advantage etc.). Also, the extent to which new businesses, startups and spinoffs are created is a direct demonstration of economic value. Furthermore, information sharing along the entire innovation process is also an important mechanism to deliver the created value. In addition, TECLA supports the demonstration of economic value through the traceability of the process is made explicit for the stakeholders. In general, economic value is spontaneously seized by the main actors. In particular, business partners autonomously recognize the benefits and advantages brought by the Living Lab.

Economic value delivery Common practices (min. 2 cases)	Economic value delivery Diverging practices (only 1 case)
Measurement of product and service characteristics Information sharing New business creation	Traceability of the process
Economic value delivery Common practices (min. 2 cases)	Economic value delivery Diverging practices (only 1 case)
Building trust Clear roles, goals and expectations Information about mission and processes Analysis from multiple-stakeholder perspective Long lasting relationship Shared definition of goals High involvement of stakeholders Personal communication	Traceability of the process Develop common innovation language Measurement of Synergies created Knowledge mobilized
Economic value delivery Common practices (min. 2 cases)	Economic value delivery Diverging practices (only 1 case)
Building trust Long lasting relationship High involvement of stakeholders Clear roles, goals and expectations Personal communication Recognition by important stakeholders	Traceability of the process Role into the board Press communication Public awareness Economic metrics for social impact

Table 10 – Overview of prevailing value delivery practices for AFL, SLL and TECLA

The demonstration of **Business Value** is more challenging. There are not explicit metrics, thus the business value delivery is part of a continuous process of interaction with the actors. AFL and SLL give high importance to involve deeply and to establish long lasting relationships with their most important partners. In this way, they build mutual trust, and enable virtuous information sharing processes which can demonstrate the business value.

Another feasible way to demonstrate business value, which is employed by all three cases, is to define shared objectives and goals with the main stakeholders. Reaching these goals is already a demonstration of value creation. Also, TECLA and AFL systematically perform multi-stakeholder analysis for every project to better understand the perception, needs and expectations of each actor.

Finally, an interesting path emerges from the observation of TECLA. The Living Lab is trying to develop a common innovation language with all the stakeholders involved. In fact, they noticed that several actors did not have a systematic approach to innovation and were not familiar with concepts such as Open Innovation or User-centered design. Thus, before they can understand that the Living Lab can concretely improve their innovation capacity, they need to become familiar with the latest innovation theories and directions.

Public Value is a central output of the Living Lab, a characteristic that distinguishes it from other innovation platforms, such as incubators, accelerators and FabLab. Moreover, it is the type of value that important stakeholders like public administrations are looking for. Indeed, to obtain the commitment of these partners it is fundamental for a Living Lab to account clearly the public value generated.

The main way that AFL, SLL and TECLA employ is the complete involvement of stakeholders in the entire process of the Living Lab. Indeed, these stakeholders contribute, not only to the definitions of project goals, but they also shape the mission of the Living Lab. In SLL these actors are even involved in the organization with several representatives in the board of directors. In addition to that, AFL and TECLA also employ special economic metrics which help the visualization of Public Value by translating it in a monetary kind of value. Finally, the Fieldlabs offer an interesting additional path which is press communication. In fact, the public awareness about the Living Lab, its activities and its mission facilitates stakeholders to acknowledge the Public Value.

The comparative analysis showed that the three Living Labs employ only some of the possible delivery methods. Despite that, these options for demonstrating economic, business and public value are not mutually exclusive, but rather complementary. Indeed, it is possible to guess that every Living Lab should consider employing the entire set of delivery strategies to maximize efficiency of value demonstration. In fact, contrarily to the discussion of the previous topics, it seems that the delivery methods can be employed independently from the peculiar characteristics that distinguish specific Living Lab cases.

5.2. Network

In the literature framework, we distinguished the actors that constitute the Living Lab network in four macro-categories: public sector, education, businesses and people. The empirical research showed that the stakeholders of AFL, SLL and TECLA are represented in the proposed classification. *Table 10* gives an overview of the main actors involved in the three cases: indeed, every Living Lab includes at least some actors from each of the four identified categories.

Public Sector	Education
Public administration Municipality Regional authorities Central government Public organizations (i.e. Labor unions, Police department)	Universities Other schools Research centers
AFL - involvement: high number: medium SLL - involvement: high number: large TECLA - involvement: low number: small	AFL - involvement: high number: small SLL - involvement: high number: large TECLA - involvement: low number: medium
Businesses	People
Social companies Multinationals SMEs Startups	Professors and Students Associations Professionals and Industry experts Entrepreneurs and Innovators Citizens User
AFL - involvement: low number: small SLL - involvement: high number: large TECLA - involvement: high number: large	AFL - involvement: high number: large SLL - involvement: low number: large TECLA - involvement: high number: medium

Table 10 – Overview of the composition of the network for AFL, SLL and TECLA

Same actors, different approaches – The networks of the three cases present several differences, especially for what concerns (1) the degree of involvement, the extent and the participation, and (2) the numerosness of the sample. Indeed, it is possible to notice that in the two cases from the Netherlands, the public sector and education are highly involved in the Living Lab network, while in TECLA the direct involvement of these actors is rather marginal. Then, SLL and TECLA gather a substantial number of businesses and private organization, which are almost absent from the network of the Fieldlabs.

AFL and TECLA involve deeply different kind of people, which participate actively to the activities of the Living Lab. On the contrary, the role of the individuals in SLL is mostly passive: users and citizens are often unaware of the existence of the Living Lab and serve it primarily as a subject to observe and as testing panel.

Indeed, the category “People” was the hardest to contextualize in the literature framework. Hence, several actors, which participate to the Living Lab network, represent their own business (entrepreneurs, startupper) or their professional position (industry experts, innovators). Thus, their classification partially overlaps with the category “businesses”. Similarly, students and professors, represent their University or Education institute, but at the same time they participate as individuals, contributing the Living Lab with their personal effort. Also, associations group speak for specific user or citizens categories and, thus, they partially overlap with the public or business sector.

Finally, the empirical research showed partial ambiguity in the distinction between users and citizens. Living Labs need to account for this division, since it has some substantial implication in delineating the network. Nevertheless, in the context of Living Lab, the definition of users and citizens often overlap.

Therefore, despite the ambiguity, entrepreneurs, innovators, industry experts, students, professors and volunteers are grouped under the same label “people”. Similarly, the category includes people involved in the Living Lab network both as citizens or users. In delineating the category “people” we relied on two main considerations:

- they do not have the possibility to substantially fund the Living Lab (i.e. entrepreneurs, innovators, industry experts) or do not have the authority to determine the investments (i.e. professors and students).
- They are the final beneficiaries of the public value generated (user value, employment, improved living conditions etc.)

Strategic vs Project partners - The different degree of involvement, the extent, the role and the sample size are linked with the differentiation of actors reported by AFL and SLL, which distinguish between strategic partners and project partners. To have a clear overview of this distinction, we now summarize the most salient characteristics which emerged from the empirical research.

Strategic partners constitute the backbone of the Living Lab: hence, they establish with the Living Lab a long-lasting relationship based on mutual trust. They are primarily interested in the generation of public value and are involved in the entire set of activities across several projects. Furthermore, strategic partners have an important role in the organization: they shape the mission and long-term objectives and finance the basic activities, the assets and the equipment of the Living Lab.

For the Fieldlabs, the AUAS and the municipality of Amsterdam are the only strategic partners. In contrast, SLL involves a broader set of stakeholders as strategic partners: the administration of Eindhoven and Tilburg, few regional authorities, two important public organizations (DITSS and Police department) and two universities (TU/e and the University of Tilburg).

In SLL, the strategic partners also constitute the Board of Directors of the Living Lab. Project partners have responsibilities in relation a single project. They have an important role in it and thus they shape the specific objective of the project and must contribute to the project’s budget. The Living Lab can establish an ad hoc partnership with them and is independent to make choices and deals. The project partners are primarily interested in the Economic Value created by the Living Lab.

It is important to notice that, from the interviews and researches about TECLA, it did not emerge a systematic distinction between project and strategic partners. This notwithstanding, it is possible to identify this dualism also among TECLA’s stakeholders: according to the empirical findings, ARCA and

the European networks (TCBL and WEAR) can be considered project partners since they helped the foundation of the Living Lab and participate in shaping TECLA's mission and objectives. The other actors of the innovation network have a more marginal role and are mostly involved at project level and, thus, fit in the definition of project partners. Making systematic use of this distinction seems a key factor to develop an adequate sustainability model for a Living Lab. Hence, it would be interesting to deepen this aspect with TECLA.

5.2.1. Network and Activities

Based on a structural understanding of the composition of each Living Lab's network and accounting for the distinction between strategic and project partners, we analyze the dynamics of AFL, SLL and TECLA. The cross-comparison of the activities of exploration, co-creation and experimentation and evaluation with the actual involvement of the network, provides several practical interpretations to the theoretical framework. Indeed, we give a practical overview of the prevailing practices constituting the activities of AFL, SLL and TECLA.

Indeed, we analyze the role of public sector, education, businesses and people in the Living Lab's activities and we connect it with the distinction between strategic and project partners. In this way, we give a structured form to the dynamics between different Living Lab's elements. This can be a concrete support in identifying virtuous financing practices. Indeed, having a clear understanding on the interrelations among network and activities is fundamental to identify the mechanisms that enable the creation of value and facilitate the collection of the necessary budget.

Actors present in AFL, SLL and TECLA		
Exploration Universities Other schools Citizens User	Co-creation Universities Other schools Professors Students Entrepreneurs User	Experimentation Universities Other schools Professors Students Entrepreneurs Citizens User
Actors absent from AFL's network		
Exploration Multinationals SMEs Startups Professionals Industry experts Entrepreneurs and innovators	Co-creation SMEs Startups Professionals Industry experts Innovators	Experimentation Multinationals SMEs Startups Professionals Industry experts Innovators
Actors absent from SLL's network		
Exploration Social companies Professors Students Associations	Co-creation Associations Citizens	Experimentation Social companies Associations
Actors absent from TECLA's network		
Exploration Public organizations Social companies Multinationals Professors	Co-creation Public administration Public organizations Social companies Multinationals	Experimentation Public administration Public organizations Social companies Multinationals

Table 11 – Overview of the involvement of actors in the activities of AFL, SLL and TECLA

From a structured analysis of the empirical evidence, we notice that, apart from few exceptions, the three activities involve the same actors. In general, both project and strategic partners take part to the activities of the Living Lab. Only AFL privileges the strategic partners, but only in the exploration activity, while co-creation and experimentation are still performed by a combination of strategic and project partners.

The distribution of partners across the fundamental activities seems to be the most common trait between the three cases. Indeed, the actors involved differ consistently from a Living Lab to another. We observe that AFL does not involve important commercial partners in its process, and the only representatives of the business sector are social enterprises. SLL has a strong business attitude and thus involves any kind of company, also multinationals. At the same time, the role of individuals in the process of SLL is very limited: citizens and user are involved only passively, while students and professors mostly participate to the testing part. Finally, in TECLA it is evident a difficulty to involve directly the public administration: indeed, with the public sector there is a common understanding on the mission and objectives, but the participation to the daily activities of the Living Lab is almost absent.

5.2.2. Network and Outcome

It was then performed a cross-comparison of the actors involved in the activities with the realization of the output. The empirical research showed that the actors taking part to the activities of the Living Lab are also the enablers of the realization of the outcome. Moreover, we notice that the all the activities concur in the realization of the three kinds of outcome. Indeed, the ability of the Living Lab to turn its activities into knowledge valorization, exploitation of the network and social impact is strongly dependent on the actors involved in the exploration, co-creation and experimentation.

Thus, to better understand the antecedents of the different types of outcome, we tried to infer the importance of each actor and the extent to which it results from the activities. Therefore, in *table 12*, it is possible to visualize the actors that enable knowledge valorization, exploitation of network and social impact in the cases of AFL, SLL and TECLA.

Knowledge Valorization	Exploitation of the Network	Social Impact
Public administration AFL, SLL	Public administration AFL, SLL	Public administration AFL, SLL
Universities AFL, SLL, TECLA	Public organizations AFL, SLL	Public organizations AFL, SLL
Multinationals SLL	Multinationals SLL	Universities AFL, SLL, TECLA
SMEs SLL, TECLA	SMEs SLL, TECLA	Social companies AFL
Professors AFL, SLL, TECLA	Startups SLL, TECLA	Startups SLL, TECLA
Students AFL, SLL, TECLA	Associations AFL, TECLA	Students AFL, SLL, TECLA
Industry experts SLL, TECLA	Entrepreneurs AFL, SLL, TECLA	Associations AFL, TECLA
Entrepreneurs AFL, SLL, TECLA	Innovators SLL, TECLA	Entrepreneurs AFL, SLL, TECLA
Citizens AFL, SLL, TECLA		Innovators SLL, TECLA
User AFL, SLL, TECLA		Citizens AFL, SLL, TECLA
		User AFL, SLL, TECLA

Table 12 – Overview of the actors contributing to the generation of outcome for AFL, SLL and TECLA

To reach the full potential of knowledge valorization, it is fundamental to involve many heterogeneous actors. Therefore, we suggest involving partners from the public sector, from academia and from private companies, together with the citizens. All these parties have different perspectives and heterogeneous knowledge which can be combined and valorized.

For this reason, SLL is getting the best results in valorizing the knowledge since counts on a multitude of actors. AFL lacks the business component: hence, the knowledge is translated in concrete social policies, but only rarely it is applied to commercial outputs. TECLA has difficulties in involving the local

administration whose territorial competence would be an important perspective for knowledge valorization and would facilitate the innovation process.

exploitation of the network requires the inputs from the public sector and the business sector to allow every actor to concretely benefit from a vivid ecosystem. In fact, Living Lab has the ability to mediate between these two sectors and enable private-public partnerships and similar synergies. Therefore, while SLL has a lively heterogeneous ecosystem, TECLA's ability to exploit the network is limited by the absence of the local administration. Also, the benefits from network exploitation are limited for AFL, since it does not have a business vocation.

Finally, social impact is primarily enabled by the synergies that can be created between the public administration, education institutes and the citizens. Indeed, SLL and AFL's social impact is evident and the two Living Labs count on important stakeholders interested in it, which are not present in TECLA. On the contrary, TECLA counts on the energies and synergies that can be collectively put together by the businesses of its ecosystem, by the realities of TCBL and WEAR networks and by the individuals participating to the activities of the Living Lab.

In conclusion, every stakeholder can benefit the realization of knowledge valorization, network effect and social impact: thus, Living Labs should systematically try to involve as many actors from public sector, education, business and people to maximize the outcome.

5.8.3. Network and Value Creation and delivery

In the previous section we showed which actors enable the realization of knowledge valorization, exploitation of the network and social impact. From a systematic analysis of the empirical evidence, we could see that generally each of the three types of outcome contributes to generating economic, business and public value. Therefore, while in the previous section we analyzed the role of the actors in the realization of outcome, in the last part of this network analysis, we link the stakeholders with the kind of value that the Living Lab generates for them.

Indeed, *table 12* shows the recipients of the value created by AFL, SLL and TECLA. In this we can present a comprehensive view on the interrelations between Living Lab's network and value creation with a twofold approach: first, we show which actors receive the economic, business and public value created. Then, we discuss their contribution to value creation considering their role in the activities and, thus, in the realization of outcome.

Economic value	Business value	Public value
Public administration AFL, SLL	Public administration AFL, SLL, TECLA	Public administration AFL, SLL
Public organizations AFL, SLL	Public organizations AFL, SLL, TECLA	Public organizations AFL, SLL
Social companies AFL	Universities AFL, SLL, TECLA	Universities AFL, SLL, TECLA
Multinationals SLL	Social companies AFL	Social companies AFL
SMEs SLL, TECLA	Multinationals SLL	Associations AFL, TECLA
Startups SLL, TECLA	SMEs SLL, TECLA	Entrepreneurs AFL, SLL, TECLA
Entrepreneurs E, TECLA	Startups SLL, TECLA	Citizens AFL, SLL, TECLA
	Professionals SLL, TECLA	User AFL, SLL, TECLA
	Industry experts SLL, TECLA	
	Entrepreneurs AFL, SLL, TECLA	
	Innovators SLL, TECLA	

Table 12 – Overview of the recipients of the value created by AFL, SLL and TECLA

Economic Value is received primarily by enterprises: public companies, multinationals, SMEs and startups can seize the economic value created by the Living Lab in form of new products and products advantage, of consistent savings for R&D, supply and assets, of user-value and of market risk reduction. Also the public administration can obtain savings for R&D and for licenses at a favorable price. In

addition, the Living Lab can provide entrepreneurs and professionals with consistent Economic Value, for example by linking them with the right partners or investors.

Therefore, the fact that AFL does not involve a substantial number of private companies is a partial justification for the deficient generation of economic value. On the contrary, SLL and TECLA, which involve several businesses, systematically generate Economic Value and share it across their network.

Business Value is also generated primarily for the businesses of the network and for public organizations: indeed, they can develop new skills, increase their innovation capacity integrating open innovation and user-centered design, and benefit from complementary partners. Differently than economic value, also the universities can benefit from business value, primarily becoming more integrated in the surrounding business ecosystem and developing synergies with the public sector.

AFL creates business value primarily for the main strategic partners, the municipality of Amsterdam and the AFL. TECLA realizes business value mostly for the several businesses involved and for entrepreneurs and industry experts. Finally, SLL succeeds in generating business value for all the main actors stakeholders: from entrepreneurs and startups to multinationals, from the universities to the public administration.

The empirical research suggested that the creation and demonstration of business value is less immediate compared to the process which leads to the generation of economic value: for this reason, business value creation and delivery is facilitated in long lasting partnership, when trust is continuously built the stakeholders. Therefore, strategic partners are the main beneficiaries of business value while project partners are generally limited to seize the economic value.

Public Value is generated to serve the citizens of the urban environment of the Living Lab. Thanks to the contribution of several actors, the citizens obtain better living conditions, innovative social policies and user-centered products and services which address their most diffused problems and needs. Also, the wider community of citizens beyond the local borders, can indirectly benefit from the public value generated, especially in these cases, like TECLA, in which a Living Lab has the objective to develop environmentally and ethically sustainable innovations.

Furthermore, other stakeholders can benefit from the generated public value: local administrations get a valuable support to reach their social goals and the universities become more integrated in the surrounding social context and can contribute to society. In AFL, public value is prevailing: indeed, public value stands alone as a project legitimization since it represents the main driver for the commitment and financial support of the strategic partners. In contrast, for SLL public value is created in parallel, sometime as a consequence or a side effect of the core process, which is more focused on economic and business value.

5.3. Financial Sustainability

While in the previous sections of the discussion, we used the literature framework developed in *chapter 2* to compare the three Living Labs topic by topic. In contrast, to address the issue of sustainability we need to develop a completely new framework. In doing so, we consider the different approaches of AFL, SLL and TECLA and we analyze their practices in detail. The objective is to develop a holistic overview of common and diverging aspects and to combine them coherently to set the basis for a complete model (*section 5.4.* and *section 5.5.*) with general validity.

In theory, AFL and SLL propose a similar approach, but the practical implications present several differences. There, the financing model is based upon the distinction between strategic and project partners. Strategic partners have the responsibility to finance the structure and the routines (i.e. employees, assets and materials) to allow the Living Lab to perform the activities respecting the intended standards. Nevertheless, the budget provided by the strategic partners should not be limited to that, but also allocated to the projects, to allow the Living Labs to be independent to choose other sources of financing without eventual constraints. In fact, thanks to that, AFL and SLL are free to undertake only the projects that are more inherent to their mission and are allowed to deal with the right stakeholders without being limited by budget constraints.

The empirical research showed that the strategic partners are deeply involved and, together with the Living Lab, they co-design missions and objectives. The strategic partners of SLL are mostly part of the Public Sector and Educational Institutions: the municipality of Eindhoven, other regional authorities, the Police Department, the DITSS and the Eindhoven University of Technology. The strategic partners of the Fieldlabs are the AUAS and the municipality of Amsterdam which together they provide up to the 75% of the overall budget.

The funds can either be provided on a constant basis or in form of a unique subsidy, and is given independently from the specific projects going on in the Living Lab. In fact, strategic partners primarily provide subsidies and funds for the Public Value created. The remaining budget is furnished by the project partners and is allocated to the relative project. It is on this aspect of financing that AFL and SLL present the biggest difference.

The project budget of SLL is remitted as a form of payment for the services that the Living Lab provides. Indeed, many high-tech companies turn to SLL to ideate, co-create and test new products, while other public organizations involve the Living Lab to jointly develop new policies and services. Therefore, SLL's project partners are willing to compensate the Living Lab with a monetary payment for the economic and business value that is delivered to them.

On the contrary, for AFL economic and business value creation is not central, and often project partners are public or social organizations, which are mostly interested in the public value. Therefore, similarly to strategic partners, project partners compensate AFL in the form of subsidy and funding. Moreover, the case of AFL showed that strategic partners often gain a central role in some project and, thus, they allocate extra budget.

To sum up, from the analysis of AFL and TECLA, we identified two main ways to ensure financial sustainability, and in the following parts we will refer to them as **Pay per Service (PPS)** and **Subsidy (SUB)**. Subsidies are mostly provided by strategic partners, which are prevalently from the public sector and from education, while PPS is ensured from project partners, especially private businesses and public organizations.

The observation of the third case, TECLA, provided some interesting insights both on the already identified financing options and on other possibilities. Before to introduce the financing scheme of TECLA, it is important to consider some crucial factors which determine a significantly different funding mix.

First of all, TECLA does not make a systematical distinction among strategic and project partners. Second, it does not involve to a high degree important partners which can provide considerable financial subsidies. Third, the public administration, which is the main financier of AFL and SLL, in South Italy is extremely less eager to commit physically and financially to similar projects.

For this reason, the innovation network can mostly compensate TECLA with Pay per Service options. Indeed, TECLA tries to maximize the effect of PPS offering to its partners a catalogue of services (i.e. support packages for innovative SMEs, training modules for entrepreneurs, and intellectual Property Rights and due diligence consulting).

PPS and SUB are financing options connected to stakeholders which are inside the network of the Living Lab. In parallel with that, TECLA presents a new perspective, which entails actors that are not directly involved with the Living Lab. Indeed, the first setup of the Textile & Clothing Lab have been built thanks to funds from the European Commission under the Horizon 2020 program. Moreover, TECLA counts on the capacity of its strategic partner ARCA in fund raising through investor networks and to access European Community and Regional funds through projects.

Therefore, the activity to apply systematically for subsidies coming from outside the innovation network, can be a good way for Living Labs to mitigate the absence of consistent budget deriving from strategic partners. Despite this financing option encompasses entities that cannot be considered part of the network, it is still inherent to the core activities and the mission of the Living Lab. We will refer to it as **Out of the Network Funding (ONF)**.

Finally, TECLA showed that also local actors from outside the Living Lab's innovation network can represent a potential source of revenue. That is done by integrating its activity in a different business context: indeed, TECLA shares its space with a co-working office and with a bar and a restaurant. These synergies can ensure some cost reductions and grant the Living Lab a small budget to cover practical and operational expenses. Finally, TECLA also makes available for people and companies which are not interested in being part of the innovation network, its technical equipment. We will refer to this option as **Cross-Financing (CRF)**.

Despite the potential return from CRF is limited, there are two main reasons which suggests that this aspect should be considered: (1) It can easily be applied to any existing or new Living Lab, and in certain cases the financial return might be more consistent than for TECLA. (2) It is an option which is not explored at all by current literature, but many experts in the field noticed the potential, which is testified by a workshop we attended.

The workshop was hosted by "Sustainable Living Lab", a recently founded Living Lab in Geneva, and had the objective of stimulating the confrontation between different actors on the challenge of making a Living Lab financially self-sustainable. The workshop was held during the Open Living Lab Days 2018, the annual plenary conference of ENoLL, and involved 25 different figures all active in the Living Lab field. Several were coming from the Academia, others from Public Institutions, others were the founders or employees of Living Labs initiatives.

The outcome of the workshop (*appendix 8*), is in line with the main financial options (PPS and SUB) and stressed even further the importance of involving the public sector among the main strategic partners. Besides that, several actors also agreed over the point that "Cross-financing like having a bar, a co-working, space rental" is a promising path for a self-sustainable Living Lab.

5.4. Full sustainability model

In the previous sections of this chapter, we further elaborated the result of the case study by systematically cross-comparing the evidence from AFL, SLL and TECLA. In this way, we delineated a complete framework, based on theory and practice, of the most important Living Lab elements and characteristic observed in real-life cases.

To better represent the insights developed in this research, we conclude this chapter presenting two models. We develop the full sustainability model as a structured view of the funding options, integrated in a holistic model covering the most important Living Lab's characteristics. By employing the full sustainability model, a Living Lab can begin the development of a financially viable business model keeping into consideration all the elements that have the potential to determine its financial success.

Furthermore, the full sustainability model, by providing a visualization of the interrelations among Living Lab's elements, facilitate the design of the entire business model, since it makes explicit how different decisions impact the funding scheme.

The full sustainability model represents a promising addition to current research on Living Lab. Indeed, many aspects, insights and theories, coming from diverse sources, converge in the sustainability model. Moreover, we have seen that one of the biggest crunch in Living Lab literature is the lack of a systematic approach to connect theoretical and practical research.

Hence, our sustainability model combines a strong theoretical base developed in *chapter 2*, with a privileged practical perspective (*chapter 4* and *chapter 5*) that has real cases at the center. In the next section, we introduce a second model, the funding mix model, and the full sustainability model can be interpreted as an extension and contextualization of it.

5.4.1. Overview

The explanation of every single block can be found in the next section, while we provide here a preview in a nutshell.

First, to design a viable business model, a Living Lab should evaluate its assets and capabilities, context and mission. These elements, not only can allow the Living Lab to cross-finance some activities and access out of network funds, but they also determine the composition of the network. Then, the Living Lab should structurally analyze the available or potential network. In fact, based on the composition of the network, a living lab can design and implement its activities. The combination of exploration, co-creation and experimentation and evaluation and the relative involvement of actors enables the realization of an outcome. Then, the Living Lab should determine the optimal mix of knowledge valorization, network exploitation and social to maximize the actual creation of value. Economic, business and public value are generated by the outcome mix of the living lab, but they must be demonstrated to the right stakeholders to ensure funds. Only by employing the right delivery methods economic and business value can result in PPS and public and business value can translate in SUB.

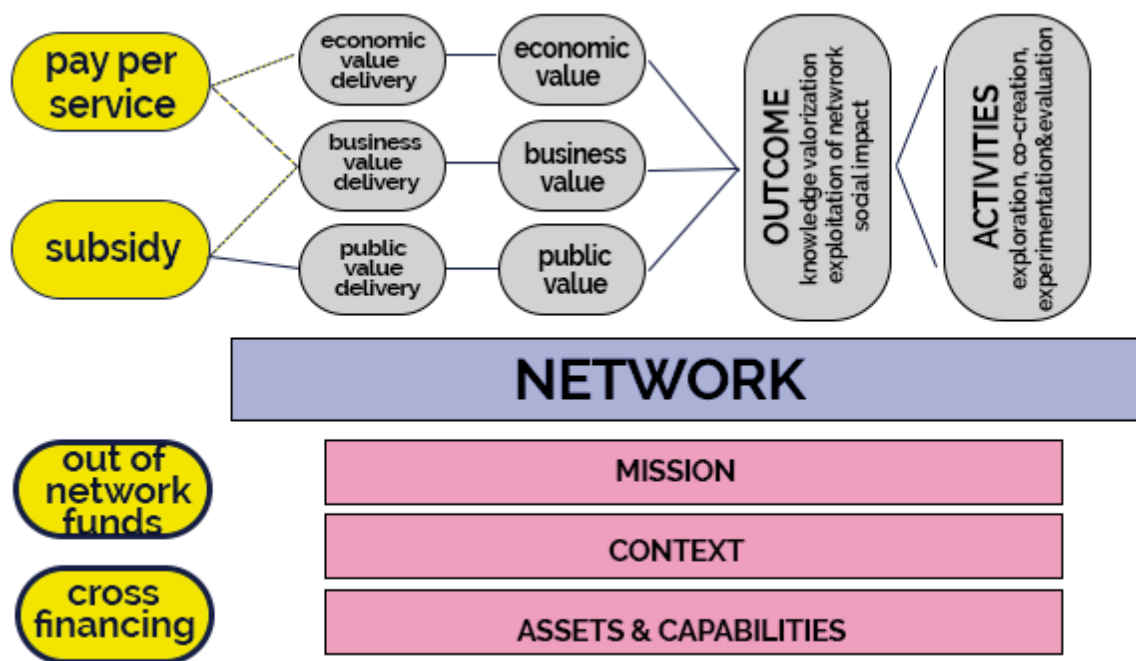


Figure 3 – Full sustainability model

5.4.2 Explanation

In this section, the objective is to present the Full sustainability model. Indeed, we introduce the blocks which constitute the model and we explain the interrelations among them.

Network - We have seen in the previous chapters that the innovation network has a central position, since it has an impact on every element of the Living Lab. Indeed, we represented it in a way that clearly shows the influence of the network on the other elements. In fact, Activities, Outcome, Value Creation and Value Delivery strongly depends from the typology of network and actors involved. For this reason, we suggest Living Labs to start the design of their business model from a substantial network analysis. Based on that, they should try to identify or constitute a network in such a way that can enable the intended Living Lab’s operations.

Context, Mission, Assets and Capabilities – These three blocks are the antecedents of the Network. Indeed, involving actors to constitute a vivid innovation network is not an easy task. First, the regional context in which is Living Lab is embedded has its characteristics. Depending on that, there might be a high availability of actors and absence of others. Then, the mission of the Living Lab can result appealing to certain potential stakeholders, but out of interest for others. Finally, background and capabilities of

the Living Lab's staff can facilitate the involvement of a particular kind of actors or the integration of an existing network. Also, the tangible and intangible asset of the Living Lab can be a pull-factor for new members.

Funding mix - On the left columns we included the four different financing options that were presented in *section 5.3*. In *section 5.5*, the aspect of funding mix is further developed and explained in detail through a specific model. For what concerns the full sustainability model, PPS, SUB, CRF and ONF are visualized next to their enabler. We can see that pay per service is related mainly to economic value delivery, and to business value delivery in more rare occasions. Subsidies are primarily linked to the demonstration of public value and with business value delivery, especially when involving strategic partners. Both PPS and SUB are related to the actors of the network. Then, ONF and CRF, which involve people and entities external to the Living Lab's network, are mainly determined by the context, mission and assets and capabilities.

Activities - Exploration, co-creation, experimentation and evaluation play a fundamental role in the Living Lab model and are conjugated in several different ways to maximize the impact. In the full sustainability model, we included all the activities in the same block: indeed, the activities cannot be performed independently from each other, but it is through their interrelations and iterations that they enable the generation of an outcome. Based on the innovation network, a Living Lab should determine for each project the right combination of activities in terms of actors involved to result in the intended outcome.

Outcome - In the full sustainability model we can see that the outcome is enabled by the right mix of exploration, co-creation and experimentation and evaluation, and by the involvement of the right actors from the network. Based on that, a Living Lab should design and finetune its operations in a way coherent to the intended mix of knowledge valorization, exploitation of the network and social impact. As for the activities, we represented the outcome as a single block in the model. In fact, the empirical research did not show clear causation links between a certain kind of outcome and the generation of value, which is rather the result of the combination of knowledge valorization, exploitation of network and social impact.

Value - In the model, we represented economic, business and public value as blocks independent from each other. In fact, we could identify distinct relations between economic, business and public value and the different funding options (PPS, SUB, ONF and CRF). Moreover, despite the classification among economic, business and public value is rarely adopted in Living Lab literature, it seems that the proposed categories adequately represent the full spectrum of value creation inside a Living Lab. Furthermore, it is important to keep economic, business and public value distinct, since they have a completely different nature and have unique characteristics. Finally, understanding how the affected actors perceive economic, business and public value is a key to design a correct Living Lab business model.

Value delivery - This research showed that each type of value requires different delivery methods to be demonstrated in an optimal way to every stakeholder. Indeed, the interrelation with the network is central to develop an adequate strategy for value delivery. Moreover, the way a Living Lab demonstrates the generated value to its stakeholders determine the most plausible financing options.

5.5. Funding mix model

The funding mix model is also intended as a practical and visual support for Living Lab's business model design. While the full sustainability model (*section 5.4*) has a broad perspective and represents the interrelations characterizing the entire activity of the Living Lab, the funding mix model has a clear focus on the mutual implications of value creation and funding options. Hence, by designing the right mix of PPS, SUB, ONF and CRF, a Living Lab has the chance to maximize the return from its activities.

We propose the funding mix model as a concrete tool to take better and more informed decisions in the development of a self-sustainable Living Lab model. We believe that if a Living Lab can have a more accurate view over the available funding options, then it becomes easier to finetune processes and activities in a way that can be more successful in reaching complete financial self-sustainability.

5.5.1. Overview

From the discussion emerged that Living Lab has the possibility to count on four different types of funding options: Pay per Service (PPS), Subsidies (SUB), Out of Network Funds (ONF) and Cross-Financing (CRF). The model presented here constitutes a visual support which helps defining the right mix of financing streams. This simple model keeps into account several dimensions of the financing streams and gives different keys of interpretation.

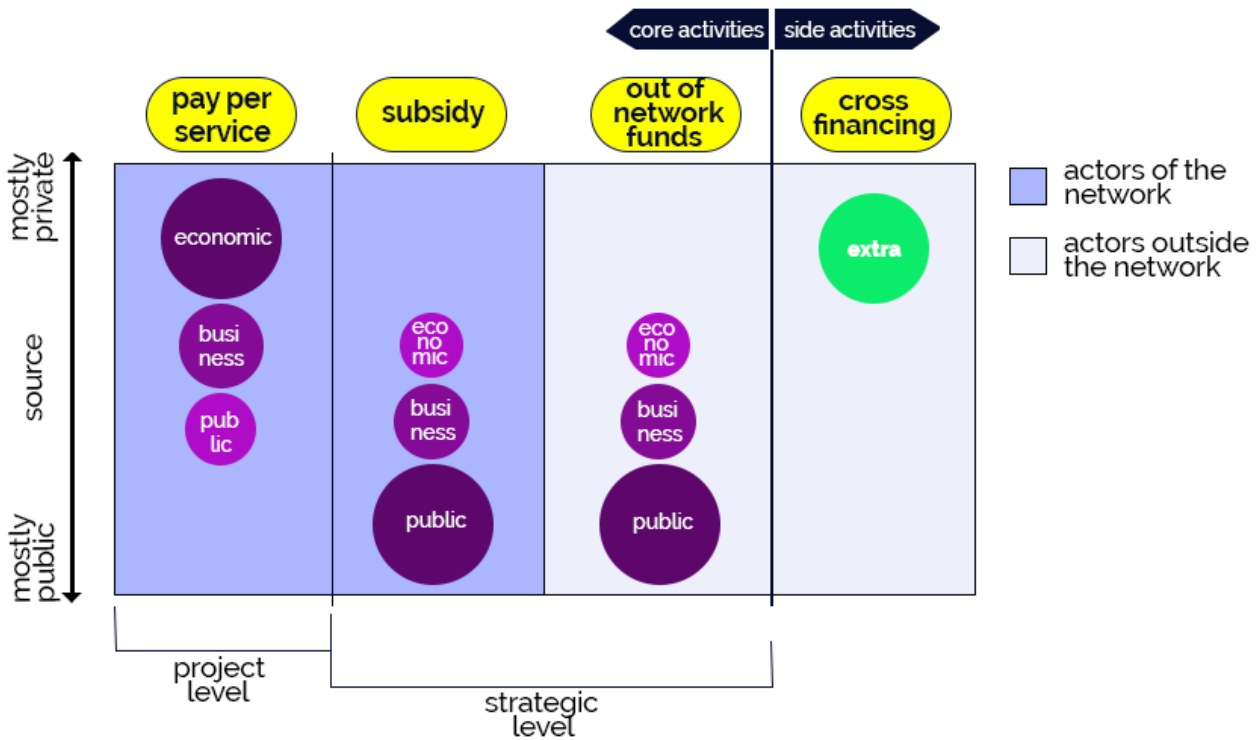


Figure 2 – Funding mix model

The funding mix model considers the kind of value created: we have seen that economic, business and public value have specific characteristics and differs from each other in terms of actors benefitting, delivering options and time horizon. For this reason, it is important to represent them as distinct elements. The model also accounts for the importance of each kind of value, which is represented by the size of the indicator.

The funding mix model considers the different sources of financing, which can be completely private, completely public or anywhere in the continuum between these two extreme situations. In addition, it deals with the origin of the funds: they can come from the stakeholders of the Living Lab, or they can be provided by actors which are not part of the network.

Finally, the funding mix model connects the financing streams with the process they relate to. Indeed, the funds are distinguished between project level, strategic level and side activities. Project and strategic level relates to the Living Lab core activities, while the side activities are not inherent to the mission but rather complements and contribute to the Living Lab only from an economic perspective.

5.2.2. Explanation

In this section, we elaborate the empirical evidence about the four funding options, namely pay per service, subsidy, out of network funds and cross-financing. Indeed, we delineate a basic conception of PPS, SUB, ONF and CRF and we frame it in a practical model. To discuss the model, we start from the four financing streams and we relate them with the other valuation dimensions.

PPS – Pay per service is the most immediate monetary recognition of the services offered by the Living Lab. For this reason, it can be considered the financial return for the economic value generated. Hence, economic value is primarily delivered to business partners which turn to the Living Lab for the development or improvement of commercial products and services. Indeed, the source of PPS is mostly private. In rare occasions, PPS can be related to business and public value. In these cases, the source can shift partially toward the public sector. The stakeholders that contribute with PPS belong to the Living Lab's the network. Finally, PPS is a funding option at project level: indeed, PPS relates to the services provided by the Living Lab in the context of a specific project.

SUB – Subsidies are the most frequent funding option connected to public and business value and are ensured by the strategic partners. In fact, public and business value is mostly recognized by actors committed to a long-lasting relationship, in which the interest is not limited to projects but aims at the development of shared goals and objectives. Public value is delivered to the citizens and to stakeholders from public sector and education, which compensate the Living Lab in form of subsidies. In addition, public sector, education and businesses are the main recipients of business value, if involved in long-lasting relationships, and compensate the Living Lab also with subsidies. Hence, SUB is a funding option that mainly relies on public sources. Finally, we noticed that SUB is a funding option linked with the entire innovation process and operations of the Living Lab and is provided by stakeholders and actors belonging to the network.

ONF - Living Lab's mission is generally in line with the United Nations' Sustainable Development Goals [3]. For this reason, Living Labs have the possibility to gather important funds by systematically applying for European Community, national and regional calls. Living Lab's projects are often compatible with public policies, and open calls are good options to finance the creation of public value. The funds are made available primarily by public bodies and, thus, are mostly coming from public sources. These calls can also be thrown by private entities, like banks and cooperatives, but is a way less common situation. The organizations issuing the funds are not directly involved in the Living Lab network, but they are only responsible to grant funds based on predefined criteria. Finally, the funds are a support for the mission of the Living Lab and, thus, relates mostly to the strategic level.

CRF - Differently from PPS, SUB and ONF, this financing option is not linked to the activities of the Living Lab, neither contribute to the network. In fact, cross-financing is rather an alternative way to profit from the Living Lab's assets, such as the physical location (i.e. the Living Lab can sublet permanently part of its space to a bar or to a co-working office, or temporarily to events, conferences, meetings) or the complementary equipment (i.e. the Living Lab can lease printers, software etc.). The source of CRF is almost exclusively private, and completely external to Living Lab activities.

[3] <https://sustainabledevelopment.un.org/sdgs>

6. Discussion, theoretical implications and practical suggestions

In the previous chapter, we proposed the Full Sustainability Model and the Funding Mix Model. These are developed based on the literature framework (*chapter 3*) on the empirical evidence (*chapter 4*) and on the cross-case analysis (*section 5.1, section 5.2 and section 5.3*). The two models, not only allow Living Labs to approach correctly their operations, enable value creation and ensure financial sustainability, but also have the ambition to gather relevant theories and bind them around real-life cases.

For this reason, in the current chapter, we have the objective to reflect on the research conducted for this master thesis, and to discuss the most salient theoretical and practical implication. Indeed, we firstly report a summary of the most meaningful aspects of our research (*section 6.1*). Then, we relate our findings to the literature framework and to the real-life practices of Living Lab. In this way, we come up with a set of practical and theoretical suggestions which can contribute to the state-of-the-art research, by constituting a novel theoretical framework, and to practitioners, which obtain concrete suggestions to make their Living Lab more successful.

Since our research is broad and covers many different aspects, we encompass our suggestions to what can be concretely connected with the proposed models. Moreover, the theoretical research and the case study conducted in this thesis can contribute both to Living Lab's theory and practice. In fact, through the two models, we provide a set of recommendations and suggestions to design a more financially self-sustainable Living Lab. The suggestions have both a theoretical and practical validity.

Thus, we present theoretical and practical recommendations and suggestions integrated in the same section. In fact, they are developed based on the cross-analysis of empirical evidence and on systematic confrontation with a solid theoretical framework. In this way, our objective is to combine the efficacy of practical advises, that can be immediately implemented, with meaningful theoretical implications. This choice is consistent with our objective to contribute to Living Lab research adopting a holistic approach, which has the potential to reduce the gap between theory and practice.

Indeed, we present the practical and theoretical suggestions together, taking the two models as a point of reference. Hence, in *section 6.2* we structure our theoretical and practical suggestion around the Full sustainability model, while, in *section 6.3* we refer to the Funding Mix Model.

Finally, to better frame and understand the results of this thesis, we recall the research questions that we defined in *chapter 1*. Indeed, the discussion of the models and the theoretical and practical implications give concrete answers to the two research questions and point out the way for future research and further improvements.

Research question A - *Which are the characteristics and interrelations among Living Lab's network, activities, outcome, value creation and value delivery and how they compose a holistic model which enables the achievement of financial sustainability and long-term viability?*

Research question B - *How can a Living Lab, based on a concrete model, exploit the economic, business and public value generated and ensure that stakeholders and other sources provide the necessary funds to achieve financial sustainability?*

6.1. Summary of the research

We started this master thesis with a preliminary exploration of present studies about Living Lab (*chapter 1*). It immediately emerged that, despite abundance of available sources, most of the theories do not refer to a common research paradigm and, thus, there is still a high degree of ambiguity in the understanding of the concept of Living Lab. For this reason, we decided that developing a coherent and holistic framework was a necessary starting point for this thesis.

First, we systematically analyzed and compared the most acknowledged definitions of Living Lab and proposed a novel definition which accounts for the major theoretical perspectives: accordingly, we state that *deeply rooted in real-life environments, Living Lab is either part of, or constitutes an Innovation Network of people, private firms and public institutions. Living Lab is a methodology based on knowledge*

and observation and guided by a practice driven approach; these elements combined, in the form of innovation projects, concur in the realization and implementation of innovative solutions that are user- or community- driven, co-created by the customers, and tested and validated in real-life settings.

Then, we decided to focus on a specific typology of Living Lab, for which we refer as Urban Living Lab, and we identified a major problem to be addressed: financial sustainability, which is still a big challenge for many existing Living Labs. Based on that, we performed an extensive literature analysis: the most interesting insights were merged into a consistent theoretical framework of the main characteristics of Living Lab (*chapter 3*).

Based on the literature framework, we designed a case study (*chapter 2*) in order to obtain empirical confirmations to the proposed theories. For this thesis, we collected data, mostly through direct observation and interviews, from three virtuous Living Lab cases: AUAS's Fieldlabs in Amsterdam, Stratumseind Living Lab in Eindhoven and Textile and Clothing Living Lab in Palermo. Indeed, we first reported the most important evidence (*chapter 4*) and, then, we compared them with each other point by point (*chapter 5*). After completing these steps, we had a consistent framework of Living Lab characteristics, inspired by the theory and validated through practice.

In summary, Living Lab is based upon (1) the context it is embedded in, (2) the mission intended as long-term socially, ethically and environmentally sustainable objectives and (3) the assets and capabilities, tangible and intangible, of the founders of the Living Lab.

Then, the conception of Living Lab revolves around its innovation network, which is composed by four categories of actors: public, education, business and people. These, are distinguished between strategic and project partners, depending on the degree of involvement and commitment. The role of the network is fundamental for the success, since the actors not only have the duty to finance it, but they also enable the innovation process by participating to the activities of the Living Lab.

Despite the lack of uniformity across theory, we identified exploration, co-creation, experimentation and evaluation as the characterizing activities. These, are the engines which allow the Living Lab to unleash its potential and result in the realization of three different kind of outcome, namely knowledge valorization, network effect and social impact. The outcomes can be considered the practical objectives and the means through which Living Lab can pursue its mission. Moreover, outcome firstly is generated by the actors participating to the activities but, then, it is translated in concrete value which is shared across the network and given back to the stakeholders.

Then, we deepened the concept of value and we proposed three categories of value: (1) economic, which is tangible, measurable and directly beneficial in a monetary way to the receiver, (2) business, which is intangible and indirectly benefits the receiver in form of advanced innovation capacity and (3) public, which is conveyed to the citizens mostly as social innovations aiming at improving living condition.

From the research, it emerged that, despite many Living Labs successfully generate value for their network, they often struggle in connecting it with an adequate form of financing. For this reason, we further investigated the aspect of value delivery: indeed, our initial assumption considered as one of the main criticalities the asymmetry between what the Living Lab produces and what its partners perceive. This aspect is still underdeveloped in Living Lab research, so it was mostly investigated through in-field research, but the empirical evidence clearly showed that, especially for business and public value, it is necessary to demonstrate it systematically in a continuous trust building process.

Finally, AFL, SLL and TECLA highlighted a set of financing practices. Thus, we propose an empirical classification of possible financing streams in four funding options: (1) pay per service is a direct monetary compensation for the services of the Living Lab and it is mostly provided by businesses and project partners; (2) subsidy is a budget furnished by the main strategic partners, mostly from public sector and education, and relates to the goals and mission of the Living Lab; (3) out-of-network funds are given through open calls by public authorities, which are not effective members of the Living Lab network, as a support both for projects and for the mission; (4) cross-financing is a monetary transaction with local players, which are not part of the network, and relates to side activities and services external to the core mission of the Living Lab.

Context, mission, assets and capabilities, network, activities, outcome, value creation, value delivery and funding options compose a holistic framework which can offer a comprehensive view on the functioning of a Living Lab. Based on that, it is possible to design a business model which maximizes the impact of the Living Lab and makes it financially self-sustainable.

In order to correctly examine the different elements and identify the most feasible organization type, we proposed two concrete models which facilitate the integration of profitable aspects. Hence, the full sustainability model (*section 5.4*) and the funding mix model (*section 5.5*) are concrete visualizations of the fundamental Living Lab's elements and characteristics, and of the interrelations among them.

In this chapter, we discuss the implications of the two proposed models, and we relate them with the major theoretical perspectives and with actual Living Lab practices. Indeed, we suggest a set of theoretical and practical recommendations for scholars and for practitioners, based on the full sustainability model and on the funding mix model.

6.2. Full sustainability model: implications and suggestions

As explained in this chapter's introduction, we combine theoretical and practical implications, since in our research the practical and theoretical approaches are strictly integrated. Nevertheless, the full sustainability model relates to aspects that are broadly covered in current literature, thus, in this section, we can refer to existing literature and elaborate existing theories. Indeed, the recommendations have a pronounced theoretical nature. In contrast, the funding mix models includes several aspects whose research is still under-developed. Hence, we could not systematically refer to existing theories and the nature of the suggestions in *section 6.3* is rather practical.

Network – The full sustainability model necessarily starts from a deep understanding of the network, which can be considered at the base of the prevailing financing options for a Living Lab. In fact, the several stakeholders not only contribute to the activities by participating, but they are also required to adequately fund it.

Therefore, we suggest that having a systematic approach to the network and understanding complex relationships and dynamics is fundamental for the success of a Living Lab (Nyström et al., 2014) (Schuurman et al., 2016). This is proven by SLL, which is able to efficiently involve a high number of diverse stakeholders which ensure a viable business model.

The typology of actors also determines the success of the Living Lab: in *section 3.1* we have seen that there is uniformity in the categorization of actors between public organizations, private organizations and education institutes (Katzy, 2012; Veeckman et al., 2013, Westerland and Leminen, 2012; Coenen and van der Graaf, 2014). The empirical evidence confirmed it, but out of the three cases analyzed, SLL is the only one that involves a high number of private firms and enterprises, which results in a substantial advantage for the financial model. Indeed, we suggest that Living Labs should not underestimate the importance of involving commercial realities in order to secure adequate funding.

The theoretical framework presented some ambiguity for what concerns the role of the people in the Living Lab. AFL and TECLA confirmed the role of users as sources of information, testers, developers, and designers of innovation (Nyström et al, 2014; Bergvall-Kåreborn and Ståhlbröst, 2009) while SLL appears more aligned with the passive involvement of users evidenced by Følstad (2008). This ambiguity, should be further investigated to understand whether the classification of user roles proposed by Leminen et al. (2014) and Juujarvi and Pessa (2013) between informant, tester, contributor and co-creator can be adequate.

Furthermore, we suggest to Living Lab not only to adopt an intermediating role between partners of the network (Bergvall-Kåreborn, et al., 2009) aggregating the various external inputs (Mention and Torkkeli, 2015; Almirall and Wareham, 2011), but also to coordinate them and keep them motivated. Moreover, the evidence from AFL and SLL suggests that Living Labs should ensure that each participant is considered to have a similar role and relevance in the network (Leminen et al., 2012; Veeckman et al., 2013)

Activities – ENoLL (2016) considers the activities of exploration, co-creation, experimentation and evaluation as defining elements of Living Lab. This aspect is confirmed by the evidence collected in the

empirical work, since AFL, SLL and TECLA all include these activities in the core of their innovation process. Moreover, from the literature search it emerged that practitioners often give different interpretations to the basic activities: the case study shows that these interpretations can co-exist and are often complementary and not alternatives. For example, while Følstad (2008) distinguished between Living Labs interpreting exploration as context research or as discovery, our research showed that AFL, SLL and TECLA perform exploration to both extents.

Indeed, depending from specific projects and needs we suggest to Living Labs to research the context of use, user-led practices and technological implications (Pierson and Lievens, 2005; Almirall and Wareham, 2011) identify user needs and discover opportunities for new products and services (Ballon et al., 2005; Svensson, 2012), acquire new tacit and practice-based knowledge (Almirall and Wareham, 2011; Schuurman et al., 2016) and explore the feasibility of new solutions and business cases (Pierson and Lievens, 2005; Almirall and Wareham, 2008).

The empirical research contradicted also for the activity of co-creation the dualism presented by Følstad (2008) according to which not every Living Lab involves the users in the development. For the author, user involvement is a necessary condition for co-creation, but the case of SLL confirmed that users are not always involved in the development but showed that co-creation can also happen between partners without involving the users. The ideal situation seems to be in these projects in which co-creation takes place, not only with users or partners singularly, but combining the two.

Furthermore, we noticed that SLL and TECLA are able to involve a higher number of partners in the co-creation phase compared to AFL. This is often due to the higher employment of technological tools as enabler of novel forms of collaboration (Leminen et al., 2011) and thus we advise Living Labs to facilitate co-creation in this way. Moreover, most of literature focus on the co-creation of products and services, while in line with the evidence about our real cases, we suggest approaching also the development of Living Lab's mission and objectives in a co-creative manner.

Finally, AFL, SLL and TECLA perform experimentation. In contrast with most of the theory, not only technology is tested within the Living Lab (i.e. Følstad, 2008; Ballon et al., 2005) but also business cases and models (ENoLL, 2016; Svensson, 2012).

Outcome – The combination of the activities, connected with the involvement of the right actors, enables the Living Lab to generate an outcome. The empirical research showed that the proposed categorization between knowledge valorization, exploitation of the network and social impact, seems adequate to represent the entire spectrum of possible outcomes. Therefore, we suggest future researches to take this distinction as a reference.

In line with Shuurman et al. (2016) and Van de Vrande et al. (2009), the evidence from AFL, SLL and TECLA suggests that knowledge is best valorized when there is a systematic exploration of knowledge inflows and exploitation of knowledge outflow. Then, to fully benefit from the exploitation of network a Living Lab should not only mediate between partners (Hakkarainen and Hyysalo, 2016) but also foster the engagement of new actors (Almirall and Wareham, 2011) and make sure that they acknowledge the importance of opening their innovation process (Svensson, 2012).

For what concerns the social impact, the practical evidence partially contradicts (Stalbrost and Holst, 2016) since the environmental impact is not among the main objectives of AFL and SLL, while only TECLA has it at the core of its mission. Alternatively, they all seem to generate social impact as societal improvement (Leminen et al, 2012) and well-being of communities (Wu, 2012).

Finally, it is important to notice that the three analyzed Living Lab have an expanded view over social impact which is acknowledged only in few researches (i.e. Pascu and Van Lieshout, 2009). Accordingly, we recommend Living Labs, not only to consider social impact as something limited to the citizens, but to seize its implications also in terms of benefits for every actor of the ecosystem.

Value creation – The empirical evidence demonstrated that the classification of value proposed in *section 3.4* adequately covers the entire spectrum of value that can be created by a Living Lab. Despite that, we have seen that none of the analyzed cases seems to systematically employ a classification for the generated value. Therefore, we advise to adopt such classification to identify the value created and better use it as a leverage towards the stakeholder.

Moreover, we have seen that Living Labs generate economic, business and public value, but the degree and extent each typology is produced in each case, is determined by a set of other characteristics, such as the network, the activities and the mission. Indeed, while for AFL economic value creation is almost absent, we show that the innovation processes inside SLL and TECLA bring substantial products and service improvements, which translate in added value to the whole value chain (Stahlbrost and Holst, 2016) especially for specific industry sectors, enterprises, research institutions and society (Mulder, 2008).

Evidence proved that economic value creation is made possible through user-centered research, experimentation and co-development (Leminen and Westerlund, 2015) and through systematic application of knowledge to technology (Følstad, 2008).

Business value is generated by AFL, SLL and TECLA mostly in terms of spreading the concept of open innovation across the ecosystem (Schuurman et al., 2016) and by offering knowledge and assets transfers (Svensson, 2012) to the actors of the network. The interviews and observations suggest that AFL, SLL and TECLA generate employee value, customer value, supplier value, managerial value and societal value. (Bergvall-Kåreborn et al, 2009) but only TECLA considers it as a fundamental contribution of the Living Lab to its community, while the other two cases often do not acknowledge the importance of the business value they generate.

The case study confirmed Ståhlbröst (2012) according to which public value is considered central in every Living Lab while its understanding seems still far from maturity. In general, AFL, SLL and TECLA generate public value by improving both everyday living conditions and the business environment of a city or of a region (Leminen and Westerlund, 2015). On the contrary, only TECLA considers environmental awareness and impact important elements of public value, while AFL and SLL disregard it, which contradicts Ståhlbröst and Holst (2016). The cases also confirmed Baccarne et al. (2014) since the real cases seemed legitimized by public value when their projects are supported with public resources.

Value delivery – Value delivery is a critical aspect for any Living Lab. The empirical research, especially the cases of AFL and TECLA, clearly demonstrates what stated by Leminen et al. (2012) according to which many actors or potential actors have difficulties in acknowledging their portion of value. Indeed, we suggest that a Living Lab needs to clearly address every category of actors with adequate delivery methods to ensure the right degree of commitment. In line with Veeckman et al. (2013), the three analyzed cases showed that having a clear and shared thematic focus is one of the keys to demonstrate business and public value to important stakeholders.

Moreover, the satisfactory results of SLL suggest that it is easier to deliver value to high innovative firms. In fact, having already an awareness about the importance of open innovation (Chesbrough, 2003) facilitates value capturing especially for firms. Therefore, a good suggestion comes from Katzy (2012): a business model designed starting from an accurate selection of highly innovative partners has better chances to reach financial self-sustainability. Nevertheless, not every context has abundance of highly innovative actors. In such contexts, a promising delivery method is proposed by TECLA which is trying to develop a common innovation language to share across its network.

Finally, Living Lab literature only marginally proposes the employment of economic metrics to translate the public value generated (Wood, 2010). This seems a promising path, since AFL successfully used different models and measures to demonstrate public value to its stakeholders.

6.3. Funding mix model: implications and suggestions

The empirical research showed that the three cases, despite being virtuous examples of Living Labs, still have not found the optimal funding mix.

First of all, the analyzed cases confirmed what several researchers already noticed (Wu, 2012; Brankaert, 2014): public funding is still the prevailing option for the majority of Living Labs. Public organizations can give an important contribution to the long-term viability, but it is equally important that a Living Lab is able to diversify its financing streams.

The analyzed cases proved that adequately translating the value created in a sustainable business model is still an ongoing challenge (Brankaert, 2014). One of the main reasons for this difficulty is what Katzy (2012) defined as the challenge of pioneers: indeed, for the ecosystem of cities or region the concept of Living Lab is still mostly unknown. Thus, Living Labs in the startup phase cannot count on a preset market, but need to develop it on their own. For this reason, in the first years of activities, Living Labs focus more on contributing to their community and create an impact with their initial budget, rather than on designing a viable business model for themselves.

Hence, in line with Mastelic et al. (2015), we advise any Living Lab to make systematic use of business modeling already from the early phases, and to revise and iterate it constantly. In addition, a Living Lab, necessarily needs to deal with every aspect of business modeling, especially with the revenue streams. Indeed, the funding mix model that we proposed can be a valuable support for Living Labs, when it get to design a self-sustainable business model.

Furthermore, we suggest using the funding mix model also to have a better grip over the entire range of stakeholders, especially on the private market. In fact, we have seen that the private market can have a big role in making a Living Lab viable in the long-term activating virtuous self-reinforcing processes. Thus, in line with Niitamo et al (2006) we developed our funding model keeping the network at the center and we considered the potential market of the Living Lab as the key to generate revenues from the services provided (Garcia-Guzman et al. 2013), and we suggest Living Labs to design their offering in terms of practices, resources and services in line with what the market needs and can offer (Rits et al., 2015).

In conclusion, a financially sustainable business model for a Living Lab should be based on a comprehensive view over the financing options. Thus, in the last part of this section, we explain the practical implications of the funding mix model and we develop a narrative that can guide Living Lab's practitioners to design a successful business model.

First, the network must be considered, identifying the actors that can potentially provide funds for the core activities of the Living Lab. Then, a Living Lab needs to understand the most profitable way that each actor can contribute to the innovation ecosystem: generally, the most adequate funding option for project partners interested in the economic value is PPS, while SUB is the most suitable for the strategic partners which support the mission of the Living Lab and are interested in public and business value. To obtain the maximum return from the network, a Living Lab has to involve a good mix of partners both from the private sector, which can ensure PPS, and from the public sector for SUB. This combination can potentially allow the Living Lab to have a sufficient budget for the routine activities and daily functioning, and for running the chosen project.

Moreover, having a well sorted mix of funding options ensures that the Living Lab does not rely on a single partner, or on a limited group, which would have a strong influence on strategy and mission. This is an important aspect to keep the Living Lab independent and prevent some partners' interests to prevail on smaller actors.

After analyzing in detail the entire network, we suggest exploring the funding options from entities outside the boundaries of the network in order to exploit the potential revenues coming from every actor. Hence, Living Labs should consider to systematically apply to open calls for different kinds of projects addressing social problems or sustainable development goals. Indeed, ONF are good options to complement the funds obtained directly from the partners inside the network. These endowments are especially needed in the set-up of the Living Lab: in fact, developing trust with the stakeholders and thus exploit the full potential of the network (both as PPS and SUB) is a long process, and ONF can help in financing the first period of activities.

Finally, a Living Lab can try to identify potential cross-financing options. If the Living Lab reaches a good level of maturity and is able to actively involve important stakeholders, CRF represents only a negligible part of the revenue, but it can be a valuable option in the set-up period.

7. Limitations and future work

Within this master thesis first we developed a consistent theoretical framework which combines the major literature streams and renowned sources. Then, based on such a literature framework, we built two models, the full sustainability model and the funding mix model. By doing so we tried to visualize and combine together all the elements of Living Lab which can concur in the development of a sustainable business model.

In this thesis, we combined over ten years of studies covering multiple sources and study streams, organizing them around the issue of financial sustainability which is still under-researched. Hence, our research shows that current literature about Living Labs has several gaps and several topics are often neglected by scholars and practitioners. In the previous chapter, we have seen that this thesis brings some concrete contribution to both theory and practice of Living Lab. In addition to it, in this chapter, we want to delineate a number of promising paths for future research which can bring substantial benefits to the Living Lab world.

Indeed, while this research brings a contribution to the overall understanding of financial sustainability, especially for Urban Living Labs, it also shows numerous aspects which are still under-researched: thus, our theoretical framework sets the basis for expanding current literature in several directions:

First, since Living Lab is getting ahead across Europe, many novel applications are emerging. For this reason, it would be beneficial in terms of clarity to distinguish and classify different typologies of Living Labs. Indeed, it should be developed a coherent and type-specific theoretical base for declinations like the Urban Living Lab which substantially deviate from the traditional technology-oriented view. In fact, despite we identified Urban Living Labs as a very promising emergent declination of the concept, we had to rely primarily on general studies and materials about Living Lab, since research about urban applications of Living Lab is still in its infancy

Second, financial sustainability is rarely the main subject of investigation, but it is rather incidentally covered in broader studies. Nevertheless, financial sustainability is one of the most common problems that Living Labs are encountering and represents an important obstacle for Living Lab adoption. Therefore, we believe that by further expanding this complex topic it is possible to make Living Lab even more beneficial.

Third, some of the aspects relating to financial sustainability are not addressed systematically. Indeed, there is not any concrete models to frame outcome and value creation inside a Living Lab. Thus, researchers should structure these topics in a way that can facilitate Living Labs to design and develop an adequate business model.

Fourth, the empirical research showed that value delivery is the key to connect the operations of the Living Lab with stakeholders and financiers. Despite that, value delivery is only rarely researched. Therefore, we advocate for researches shedding light on virtuous practices that Living Lab can employ to demonstrate the generated value more effectively.

Finally, we have noticed that the majority of studies adopt a theoretical perspective, but we believe that Living Labs needs some practical models and guidelines to be able to fully exploit their potential. Indeed, case studies revealing the virtuous practices of successful Living Labs represent a valuable source of information. In particular, future researches should focus on proposing financially self-sustainable business models for Living Labs.

Furthermore, the thesis itself shows a number of limitations: in addition to advocating to more researches to expand Living Lab theory, we believe that the results of this study are also worth of further improvements.

In fact, in the second part of the thesis we combined the insights obtained from Amsterdam Fieldlabs, Stratumseind Living Lab and Textile&Clothing Living Lab and we proposed two models: the full sustainability model provides a broader view on the interrelations and dynamics of the main elements of Living Lab while the funding mix model is a support for identifying the right funding mix that valorizes the value creation of the Living Lab. The combination of the two, can help a Living Lab to visualize the processes and design a more sustainable business model.

We constructed the second part of the thesis on a strong literature framework and included a consistent set of empirical data, but despite that, the models we proposed need of a further validation. In fact, our research was mostly based on qualitative data and involved a limited number of cases.

The models adequately represent the processes of AFL, SLL and TECLA, but they need to be tested on a broader sample. In addition, we inferred the interrelations between the characterizing elements with qualitative methods. Thus, future researches can make this study more robust by supporting our models with quantitative evidence and computing causation and mediation links.

In conclusion, the implications of the two models, together with the practical and theoretical recommendations, have the objective to accurately represent the research conducted in this thesis project. We believe that our theoretical and empirical study gives a concrete contribution to research and makes it a bit easier for Living Labs to become more viable and sustainable in the long-term. This is a very important goal for this thesis: in fact, Living Lab has the potential to become an important innovation which can have a role in solving the big challenges of our time. Nevertheless, we are aware that Living Lab is still in its early steps and has to face many difficulties before to establish as leading methodology and unleash its full potential.

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Appendix 1 – Complete list of contacted Living Labs

Living Lab	Country	Answer	Suitable	Selected
Dedale	France	No		
BCN Lab	Spain	No		
Mind Lab	Denmark	Negative		
Stratumseind Living Lab	The Netherlands	Yes	Yes	Yes
Amsterdam Fieldlabs	The Netherlands	Yes	Yes	Yes
Bristol Living Lab	UK	Negative		
City Lab Coventry	UK	No		
City Observatory	UK	No		
Sfax Smart City Lab	Tunisia	Negative		
Laboratorij Odprtega Inoviranja	Slovenia	No		
Rijeka iLiving Lab	Croatia	Negative		
Precision Agriculture Living Lab	Serbia	No		
Krakov Living Lab	Poland	No		
DhiTech	Italy	Yes	No	No
Textile&Clothing Living Lab	Italy	Yes	Yes	Yes
IMEC	Belgium	Yes	Yes	No
Ghent Living Lab	Belgium	No		
Silver Normandie Lab	France	Yes	No	No
Design Creative Living Lab	France	No		
Normandy Living Lab	France	No		
Lorraine Smart City Living Lab	France	Yes	Yes	No
Thessaly Living Lab	Greece	No		
Adaptive Governance Lab	Ireland	No		
CreaLab	Spain	No		

Appendix 2 – Complete list of keywords employed in the literature search

We report here the main keywords employed in the literature analysis. These keywords guided the research in the major academic search engine (primarily Google Scholar, ProQuest and ScienceDirect). For each set of keywords, we report here the number of the preliminary selected articles. Based on the abstract, title and importance, we analyzed in detail a smaller sample. Then, the most relevant were read completely and included in the study. Finally, we have highlighted which topic every set of keywords refers to.

N.B. often, many articles resulted from different researches and keywords

Keywords	Topic	Selected	Analyzed	Included
"Living Lab" AND "Innovation Network"	Network	14	7	2
"Living Lab" AND stakeholders	Network	17	9	3
"Living Lab" AND "innovation ecosystem"	Network	8	4	1
"Living Lab" AND "business ecosystem"	Network	7	4	1
"Living Lab" AND "quadruple helix collaboration"	Network	8	4	2
"Living Lab" AND "public sector"	Network	13	5	1
"Urban Living Lab"	Urban Living Lab	19	11	4
"Urban Transition Lab"	Urban Living Lab	4	3	1
"Living Lab" AND "Social orientation"	Urban Living Lab	10	6	3
"Socially oriented Living Lab"	Urban Living Lab	4	2	0
"Living Lab" AND "social challenges"	Urban Living Lab	7	2	1
"Living Lab" AND "user-centered innovation"	Characteristics	4	2	1
"Living Lab" AND "open innovation"	Characteristics	13	5	3
"Living Lab" AND Exploration	Activities	11	7	4
"Living Lab" AND Discovery	Activities	4	2	1
"Living Lab" AND Observation	Activities	5	3	1
"Living Lab" AND Co-creation	Activities	16	10	4
Co-creation	Activities	6	4	2
Co-creation AND "open innovation"	Activities	3	1	0
"Living Lab" AND Co-design	Activities	5	1	1
"Living Lab" AND "joint development"	Activities	5	1	0
"Living Lab" AND experimentation	Activities	11	6	4
"Living Lab" AND testing	Activities	9	5	3
"Living Lab" AND "test panel"	Activities	2	0	0
"Living Lab" AND evaluation	Activities	12	5	5
"Living Lab" AND feedback	Activities	6	3	1
"Living Lab" AND outcome	Outcome	14	10	2
"Living Lab" AND "outcome generation"	Outcome	3	3	0

"Living Lab" AND "knowledge valorization"	Outcome	8	6	4
Knowledge Valorization	Outcome	5	2	1
"Living Lab" AND "exploitation of network"	Outcome	12	6	3
"Living Lab" AND "network effect"	Outcome	6	4	1
"Exploitation of Network"	Outcome	4	2	1
"Living Lab" AND "Social Impact"	Outcome	11	8	4
"Living Lab" AND "social policies"	Outcome	5	2	1
"user-driven social policies"	Outcome	4	1	0
"Social Impact"	Outcome	10	2	2
"Living Lab" AND "sustainable development"	Outcome	7	6	4
"classification of value"	Value creation	4	2	2
"economic value"	Value creation	10	2	2
"public value"	Value creation	14	4	3
"business value"	Value creation	9	4	3
"Living Lab" AND "economic value"	Value creation	6	4	2
"Living Lab" AND "business value"	Value creation	4	3	0
"Living Lab" AND "public value"	Value creation	11	6	3
"economic value" AND "value delivery"	Value delivery	8	6	3
"public value" AND "value delivery"	Value delivery	10	7	4
"business value" AND "value delivery"	Value delivery	6	5	3
"economic value" AND demonstration	Value delivery	7	5	1
"business value" AND demonstration	Value delivery	5	2	1
"public value" AND demonstration	Value delivery	10	7	4
"Living Lab" AND "value delivery"	Value delivery	12	8	1
"Living Lab" AND "value demonstration"	Value delivery	12	9	2
"Living Lab" AND "financial sustainability"	Financial Sustainability	14	9	3
"Living Lab" AND "financial viability"	Financial Sustainability	4	4	1
"Living Lab" AND "financial feasibility"	Financial Sustainability	5	4	1
"Living Lab" AND "long-term viability"	Financial Sustainability	5	2	1
"Living Lab" AND "self-sustainability"	Financial Sustainability	3	3	0
"Living Lab" AND "revenue streams"	Financial Sustainability	7	7	1
"Living Lab" AND funding	Financial Sustainability	10	8	2
"Living Lab" AND financing	Financial Sustainability	10	7	2
"Living Lab" AND budget	Financial Sustainability	4	1	0
"Living Lab" AND "business model"	Financial Sustainability	16	11	4

Appendix 3 – Interview protocol

The following communication was forwarded to every interviewee in advance to the official meeting in order to provide them with a general idea of the investigation. As explained in chapter 3 the interviews were mainly conducted in a semi-structured manner: hence, the overview of research purpose was mostly employed as a reference point all along the meetings

Edoardo Gualandi - OVERVIEW OF RESEARCH PURPOSE

Here is the list of issues that I would like to investigate during my experience at IMEC. Depending on the person I will be talking to each time I will be focusing on some or all these topics in order to obtain a comprehensive view

- 1 How is the network constituted: actors involved, participation mechanisms, needs, expectations and contributions
- 2 The four main activities: Exploration, Co-creation, Experimentation and Evaluation. The extent to which these activities are performed, which actors are involved, what are objectives and outcome
- 3 Outcome of single projects and of the Lab overall
- 4 From outcome to value creation: how the activities of the Lab translate in Economic, Business and Public value
- 5 Value delivery: which actors benefit from the different kind of value and how the value is demonstrated to each actor
- 6 Direct revenue generation: linking the Network to the Value. How the value created translates in direct funding by the actors benefiting from it
- 7 Indirect revenue generation: which other forms of funding can the Lab count on (public funds, subsidies, European community etc.)
- 8 Ownership: of the Lab itself, of the knowledge developed, of the initiatives, of the product and services co-created

This is an overview of the main points that will be investigated, not precise questions but rather the direction I would like to give to the interviews and to the observation of the daily activities and practices. Moreover, I'm sure that many more insights will emerge during the experience there. It will be also interesting to me to observe the relationship existing between the participants to the Lab, their approach towards a shared mission and common objective and their perception of the concept of Living Lab

Appendix 4 – Transcript of the interview with Stratumseind Living Lab

In this appendix we report the transcript of the interview with Tinus Kanters, the founder of Stratumseind Living Lab. As explained in the methodology chapter, the transcript was analyzed iteratively, employing ex-ante coding, ex-post coding and content analysis based on thematic unit. In this appendix, we show, as an example, the process of content analysis, while in the next appendix we will show an iteration of ex-ante coding. After the transcript we provide the link to various on-line contents employed to have an holistic view over the Living Lab.

In order to do so, we employed colors as markers of the identified themes.

Network	Context, assets and capabilities	Mission	Activities
Outcome	Value Creation	Value delivery	Funding options

One of the most characteristic things that we are with the feet on the ground with the Living Lab. Stratumseind is a living street with 50 pubs and snackbars. I know very well the people who own a bar and we talk to each other, we work together with them and with police, owners of properties municipality to use technical equipment to improve the life of this street. We meet with any kind of problems, privacy, safety data ownership, ethics, influencing people with lights, colors and smell so we do a lot of work with people living and coming here, a very inspiring work

Q - What do the citizens think about the lab?

People living here and working here know about the lab but the people visiting, young people in the weekend 10-15 k young people they do not know and do not care. They do not care about privacy and ethics. We tried to inform involve in questionnaires. It works mainly with the people working and living the Stratumseind but does not with the visitors.

Q - What is the role of the process of building trust with them?

We are very trusted with people here, with the police and the pub owners True. we are not afraid of mistakes, if you're experimenting you can make mistakes. We work in Brainport context, Safety is the main topic. I work both with the local government and I am hired by the Dutch Institute of Technology Safety and Security, an organization that works together with the city of Eindhoven. Safety is our main goal and we do it through many diverse projects. We work together with two big cities, Eindhoven and Tilburg, and with their main universities.

Q - Who has the responsibility to finance the activities of the Lab?

Regional authorities police and safety Board of directors who finance the basics When working on specific projects, Companies have to finance it with their own budget. Since our basics and structure is financed by main partners we are independent from companies, which means that we are free to deal with any kind of company. For instance, we have Axis cameras and Bosh cameras. They compete with each other as companies but the Living Lab is not exclusive for any company, and anybody can come in. But if you want to test something here, you need to come with your own funding

Q - About companies, how large is the ecosystem involved? What kind of companies are involved in the Living Lab?

All companies are welcome: well-established companies like Atos and Philips and new companies like Sorama, and startups often coming out TU like vinotion

Q - Do you have different agreements with companies depending on their maturity, for instance, do you have special agreements for students' startups coming out from the university?

Yes, and if they do not have the money on their own we can help them, for example, we can intermediate with the local government to access funding, or with regional authorities or economic authorities to find extra money for the startups. This is also made possible because in line with Brainport's philosophy we try to stimulate innovation and economic activities in the region, especially in the technological field.

Q - I see that being part of the Brainport region seems to be an important element of the success of your Lab. Is that one of the key elements that made you one of the best examples of Living Lab?

In the Brainport ecosystem, a lot of school and companies work together. Brainport region is a quadruple helix, which was established several years ago by the city board specially to address the project of becoming a smart city, sustainable and vibrant. Yes, it is very important to be part of the brainport ecosystem, but we collaborate with several other industries: for instance, we collaborate with the automotive industry in Helmond. Then safety side, sport and technology are some of the other industries we are involved in.

Q - So making Eindhoven smart, sustainable and vibrant is also an important objective for you. Is it mostly about technological development, or you also want to have a social impact?

It is not exclusively about technological improvement: our idea of smartcity is also about make the city enjoyable to live in, with active healthy citizens and a vibrant social life

Q - Also entrepreneurship is one objective?

Yes, together with social wealth. In fact, at the moment there is a high employment rate in the region and everybody is satisfied. Another example about how we do things in the region with a Living Lab approach: three years ago, the city wanted to have a new light system. We wanted a new innovative approach. So, we did not want to focus only on lampposts, bulbs, light and electricity, but a full service of light. The city spent 3 years talking with different businesses and exploring different concerns to understand who could really deliver the most technological lighting system and multipurpose light. That was done looking at the city as a Living Lab, to explore new solution. Then, the consortium of two big companies Philips and Hijmans won the contest so they are now allowed to test any kind of light in the city. In the same way, three years ago we did not have a clear understanding about who is owning data and can process it, so when we got close to deal we had not only the technical agreement but also we discussed together with Philips and Hijmans for several months about data ownership

Q - Gaby was telling me how you wanted to address it from the beginning to not arrive too late to deal with critical things. Is the smart lighting another different living lab?

Somehow yes, because it is covering the entire city, but there is cooperation with us and also Stratumseind is part of it. The street: 300 meters, 50 pubs, 2 coffeeshops, 5 restaurants the quality of life is increasing. We have 800 aggression related issues. We call the living lab a tool to measure the influence on behavior that can be created with light, fragrance and design. We also employed

design art crime, or nudging, for examples we installed 350 baskets of plants on the third floor of the pubs. It gives a softer atmosphere. The Living Lab is a test facility for new kinds of sensors and system architecture, we started only in the street but we are extending to the entire smartcity of Eindhoven. Here we collect information through a lot of sensors, on the poles at the entrance of the street for example. We collect data almost 24/7, mostly real-time. We even collect also meteo data.

Q - So you basically have an holistic approach, and thus consider every aspect that can give new ideas on how to influence the behavior.

Yes, we also measure sound to recognize aggression, we perform self-phone counting, we can see where visitors are coming from. Through video we count the number of people coming in and out and we adjust the light according to it. We have a event calendar: we know when is the last day of exams, when football is on TV, we consider if it's Carnival or Easter these are all important elements to know how to handle fights. We also employ social sensors so we check real-time what is online concerning the street. We collect breweries data like how much beer they order in three months or the amount of waste they produce. We identified a connection between how clean is the street and fights. The data collected for the municipality, such as the amount of cars and bikes, help to improve traffic control system and understand better mobility.

Q - What is the main purpose of the data collected? Only identify patterns to improve Stratumseind living conditions or also find generality and relevance about the rest of the city and even other contexts?

We focus on solving mainly Stratum's problems, but we try to see the impact of the products we develop, the influence that can be delivered with light and smell. What we learn here, can potentially be applied to the rest of the city or to the entire country.

Q - So you want to make it scalable in contexts with less direct control

Here is about the data and the tech part, to see if it works

Q - Do you also want to bring benefits to the citizens through a new way of handling their data?

Yes, we want to increase their awareness

Q - Is communication important to make them aware of the value of such intervention?

We are trying to work on privacy by design: For instance, when we started we had to film the people so we required authorizations. Now we developed a better technology so that we do not need images. CityBeacon is an other kind of data harvesting co-developed project. We have now installed 22 of them around the city. It is a private product for advertising, but we included several different kind of sensors in it.

Q - Can you present me some examples of project that you assisted here, their objective and purpose?

The project citypulse is about aggression recognition. Trillion is a EC project about safety and police, exchange info between people and police to develop a connection at european level. We also tried to facilitate community building with websites and apps. Moreover, one of our biggest focus is on datas and through several project we tried to address two main issues by testing new system architectures (1) at national level we are working on privacy related issues. We have established a partnership with the ministry of internal affairs and the city of Amsterdam. (2) Then, since we have a tsunami of data we are developing a way

to handle it based on a European reference system. We are now talking about how to map all these different sensors in Eindhoven

Q - How was this project handled, how did the lab cooperated with the companies involved and the municipality?

First, we communicated a lot and we talked about data collection. To the discussion, gathered with the municipality and the company to jointly decide how to handle these data collected in public spaces, and we decided that we had to give people back their data since they were collected publicly. Also, we helped the city to apply business intelligence to their events to improve the fruition of the public. With the European project, we want to develop a system architecture to gather data from all different sources and give it back to citizens.

Q - Also to have a view on the future since there are many emerging technologies. Is your goal to address it in advance to avoid future bigger challenges? How important is to uniform data policies at European level?

Yes, it is important for example to focus on ID management, and develop the necessary knowledge to clearly define the authorizations about the kinds of information is possible to use. In this way, we developed a way transport data, We co-develop it also together with police to try to structure all the data. We need more data libraries and that's next step. We have thousands of different datasets which are hard to combine together so we want to learn how to make easier for different actors to use it combining in a way that different municipalities, organizations etc. can use data from different actors across the network covering the entire Netherlands in a shared library. We try to combine different needs on open data. We want to make the flow faster to deliver it efficiently to different bodies. We co-developed some IT principles together with the city of Eindhoven and Amsterdam: privacy, open data, social responsibility, open standards, support modularity security. Another one is about data collected on public spaces. We observed the data together with different backgrounds from university to translate complementary knowledge and find a way to model behavior. Then, on the street we can test the insights and co-develop models that can later be applied in other contexts, then we developed a way to send it directly to police to improve efficiency. We are leaders in Europe so we are able not only to attract local companies but companies from other countries like Atos. In fact, contrarily to other European applications of sensors here as a LL we try to integrate different actors and purposes to test out everything on the edge of the time from data ownership to privacy to tech

Q - Are the actors and partners also able to propose new applications and purposes and the other way around?

Yes, Ex Sorama was developing solutions for industry and we asked them if they could apply their technology to a new context: streets and urban environment, they did and now they have a new range of products. At the same time, if it was not for Sorama inputs we could not have developed a number of services for the citizens

Q - About the users, since there are 15k a weekend and do not participate actively but workers and people living the area are they involved in the co-creation, how important are trust building processes to make the people feel involved in the activities?

Yes, when users are aware of our work, they can contribute and obtain value. Especially on how to use the sensors. For example, since we could measure sound for the lab purposes, the pub owners asked if we could develop with them an application of sound sensors, so they know if they are doing too much sound, That's important for them, and can save them money since they can be fined for going over the limit, so they are interested in having these sensors available. They are also interested in data about people coming in the street like number, origin so now we are working together to co-develop an app integrating owners,

people and police. This application is a support also for the users that can use it to enter the pubs, pay etc. Now we are developing together with the marketing organization a way to give to commercial activities real time data

Q - What about the other activities. Experiments, how important is it?

I spend one third of my time communicating with people and other actors. One third, data harvesting. One third, new experiments, funding technical issues.

Q - Who else is involved in the everyday activities?

I am the only one full time, some other colleagues participating to a certain extent (i.e. legal support). We also share the technical asset with other actors i.e. police developing its application of sensors.

Q - University and companies are often working on the same project. What is their degree of involvement?

Universities, city police region are in the board of advisors. Companies not in direction. Then we work on a project base with different stakeholders with a distinction between strategic partners and project

Q - Who owns the outcome of the living lab?

Companies pay for participating so they maintain completely the IP, which eases up our job so we do not have to discuss on percentages. We have some requirements, for example the availability of data. There are licensing agreements between partners, i.e. the municipality often obtain a free license for ten years

Q - Is that the optimal degree of involvement for every stakeholder?

Yes, so every company is responsible, and we can make different agreements with different company without explain why to the others of different treatments

Q - The context seems to be very important. Would that be replicable elsewhere?

Eindhoven is a special context in which open innovation is highly supported by brainport and we have rooted set of companies in the tech field. Moreover, we developed trust and confidence. Also mentality of people is crucial for the success for this model

Other materials about Stratumseind Living Lab

Presentation by Tinus Kanters for the Dutch Institute of Technology and Safety, August 2017

<https://www.bnsp.nl/wp-content/uploads/2017/10/Presentation-LL-sept..pdf>

Granting of a Provincial subsidy for Stratumseind 2.0. Interview at Tinus Kanters

<http://www.transitsocialinnovation.eu/sii/ctp/ctp2-granting-of-a-provincial-subsidy-for-stratumseind-20>

Interview to Sorama, a partner of SLL, about the co-creation with the Living Lab

<https://www.youtube.com/watch?v=KPSJgu-n6fs&sns=em>

News, articles, videos and official communication from Stratumseind Living Lab official Facebook page

<https://www.facebook.com/LivingLabStratumseind/>

Appendix 5 – Transcript of the interview with Amsterdam Fieldlabs

In this appendix we report the transcript of the interview with Alex Straathof and Elke van der Heijden, two professors of Amsterdam University of Applied Science, deeply involved in the organization of the Fieldlabs. As explained in the methodology chapter, the transcript was analyzed iteratively, employing ex-ante coding, ex-post coding and content analysis based on thematic unit. In this appendix, we show, as an example, the process of ex-ante coding. Indeed, upfront to the interview we defined a set of keywords to be searched in the transcript. Again, we use colors to group families of keywords.

Network, Partner, Stakeholder, Actor, Citizen, People

Mission, Goal, Problem, Solution, Objective

Activity, Research, Exploration, Co-creation, development, Experimentation, Testing, Evaluation

Outcome, Project, Knowledge, Learn, Social, Public, City

Value, Commercial, Economic, Business, Model

Communication, Trust, Commitment, Involvement, Long-term, Measurement, Delivery, Demonstration

Budget, Finance, Funds, Sustainable, Feasible, Money, Invest, revenue

Q - I see that both of you are in the hearth of the Lab at least for what concern the social value of research. I'd like to have some practical information about the organization: how many people involved in daily activities, what is the biggest part of the work

A - 3 faculties **involved**, 10 professors, 4 very active everyday, 3 subjects around 5-7 different programs and **projects** ongoing

E- from 50k to 100k euros per year 1-2 full time researchers in the field

A - one is house of skills to improve the labor market, which now is based on diplomas. Old days you would work always in the same branch, but now it's more dynamics which is easy for high educated **people** but harder for **people** with a lower education. So we want to change it in 3 years time with 13 others organizations through around 20 different **subprojects**. This is one of the biggest.

E - the book was about the past setting of the LL. we went to locally based to **projects** the entire **city**. We ran 3 Fieldlabs for 3 years

A - the government **model** changed lately and neighborhoods lost their autonomy (before, they had a **budget**) now is more centralized, so we made a new contract with the central government from 1 to 2 million a year. Also organizations changed in size

E - but we still use the fieldlab approach so we look for **feasible projects** in specific neighborhoods

Q - is the approach changed for what concerns the **project**/**problem** identification?

A - we engaged with **problems** affect across the **city**, in fact we are dealing with unemployment, poverty and green environment and economic **development**. It grew to a higher level

E - the legitimacy of the work changed. The councils lost power, so we had to identify our new main **partner** and so work together with him to define the topic to **explore**. We do it working close to local inhabitants but also policy makers, we try to connect these two categories now. Before and after, we are working on the same subjects more or less. These are supported and fostered by a more metropolitan approach some more collaborative innovation processes were harder in a small scale.

Q - which agreement do you prefer with PA, better high or low level?

A - we grew a lot in size and competence and experience, we just started this new phase

E - 3 big **projects** made us grow, so the focus is central, strategy is more dominant than the one of local council. Our advantage is that with the Fieldlabs we understood how to make things in such a way that they become easily scalable which is a structural advantage also for a **financing** purposes.

E - we are both **investing**, The University and the municipality, the same amount of **money**. Dealing with local council was more difficult on the **money**, because they have smaller **budget** and they are not always able to **invest** on a strategy

Q - did you also benefit from the higher competence of the metropolitan administration?

A - because of our contact with politicians and administrators we have a broader **network** which is fundamental, we engaged with ministries, attended and organized conferences to define how the labor market should be **developed**.

A - the most important thing for us is the positioning in the region that became more clear, so we have more leverage also inside the university

D - which role had the positive results in this growth?

A - the success of Fieldlabs had a positive press (**communication**) so in the context of reorganization of the PA we were seen as a potential **actor** with an external perspective to contribute to the definition of the **city**'s strategy, they needed new inputs and directions. There was **problem** of silence in the municipality, but we are creating **value** for the **city** by combining different backgrounds and perspectives.

E - also other organizations, thanks to the success of prior Fieldlabs see now the potential benefit of collaborating with us. Also, if you look at the growth the role of our big **projects** was very important because we **developed** important

methods that were communicated to the public and the citizens, which they were able to seize the value and then judge the projects integrally.

A - because our success of communicating the value of the developed methods was one of the key to ensure the subsidies

Q - communication seems to be the key to demonstrate the value created by the Fieldlabs. Do you think that Amsterdam was a context ready to receive and understand this contribution, or a good communication can be independent form the context?

A - communication is really helpful, i.e. for HoS is doing a lot of communications, also blogs, presentations across the country, we support the people taking care of it. But communication is not always good but can be also against your purpose, especially when it's a matter of reaching different categories of people, that can get frustrated by the contents of communication

Q - how did you get the first involvement of municipality?

A - we had a project in one of the Fieldlabs, a 4 years project, where we were strongly involved with the council. That led to an involvement in the community. So, we begin with small scale, step by step

E - the best press we got was not from the media but since is hard to explain correctly what you do with the Fieldlabs, in fact we do not solve problems but we develop knowledge about it and methods models. It's important to show the importance of learning knowledge and that's a continuous process that we need to make it keep going. When there is not a

Youth and debts in south east also the providers and schools were involved in the process and the degree of hard work also ensured the commitment and long-term involvement

Q - is the delivery of the value linked to the learning process one of the main problems for you?

A - Learning can produce different kinds of value but is not always easy to demonstrate and communicate. In the House of Skills project we are responsible for making clear what the impact is with the local community and the actors. Also the other university of Amsterdam, which is in the economic field they have a civic benefit analysis so they can explain and find money and benefit translation of what we do, so we are going to apply it in the project and is going to be a key for ensure the support of stakeholders

E - There are also different analysis tools, like multi-stakeholder analysis to show what to demonstrate to different stakeholders in different phases

A - We also have some innovations about social cohesion, which is very valued by politics as well with migration and stuff, so we made a tool to make a comparison, mapping of lines of thoughts in groups and so measure social cohesion. We use different tools to make clear the effects

Q - is the ability to make this clear is key for success?

A Yes that's one of the main aspects that allowed our growth and deal with very big **projects**. It's a fundamental to have tools to **measure social** impact with important driver

E - But not only **measures** are important drivers of ensuring the support, in fact also responding to the perceived needs of the main **stakeholders** is maybe even more important. The **city** of Amsterdam needed of a **partner** with a new approach and critical distance and that's what we did. Also, to make roles clear and define expectations is fundamental, i.e. We have **problems** with tourisms in the center of Amsterdam and the **city** wanted us to immediately develop **solutions**. We said, we can start doing **researches** then maybe eventually propose a **solution**, that's our approach, it took us lot of time to explain our **mission** of **knowledge** valorization and only then become **development partners**. So, time with the **partners** is also fundamental. Only by **investing** the right amount of time it is possible to really make them understand your role, way of working, **mission** and tools. That's what we did with all our **partners** and that's how we managed to always have the necessary **funding** for the **projects**.

Q - to what extent you are also a development partner?

A - for example we had a **project** in a former prison and now we are participating in the **project** of make the neighborhood a better place

E - we **developed** potential **business** cases for HoS we will not be the big **investors** of the biggest cases but we promised to come up by **research** to come up with a **business** case responding to the need of the users but also of the **investors**. The success of the **business** case will depend on the **partners involved**, but through **research** we try to increase these chances

A - we do actual **research**, we tell narratives, it's different from academical **researches**

Q - do you also proceed side by side with the partners in the development process?

E - we participate to the entire process, for example we follow the **experimentation** and we perform **evaluation** and we use it to improve the **business** case. Then also about **learning** we try to influence the discussion inside the university to raise the awareness

A - we were asked to **develop** a **business model** for House of Skills, but we preferred to focus on **business** cases so we make a labor market on small scale for 5k **people** and if the **model** is working we can upscale

E - we work with a lot international based university **knowledge** based, really **co-creating** product, but the product is not the main result. That's easier in technology **research** and medical field, but as our university is harder and we need to remain focused on action **research**. Action **research** does not **involve co-development**.

A - especially in **social project** we take some responsibilities and we need to have relationship with students and practitioners, so it's important the quality of process and **research**, not only important to **research** but you must succeed in creating a reliable organization. So, our way of doing a living lab as a lot of consequence for the many **actors**

Q - *what about students projects, are they only a support to more competent professors or they are actively involved in the Living Lab activities?*

A - they have different tasks and also the number can vary. In a big **project** there can be hundreds of students

Q - *can the Living Lab represent a chance for university to improve the quality of its didactics?*

A - I agree, for the top performing students we help them finding a job in the field, so you can link the LL **projects** to their career.

Q - *I've read that ideally you split the budget: 25% provided by the university, 25% by the municipality and the rest by project partners. Who are the other stakeholders? Do they see economic and business value or you only involve organizations that aim at public value*

A - the prison project is a **commercial project** so it can attract a wider set of main **partners**. Beside municipality, we always **involve** several **partner** and often paying **partners** but also depends on the kind of the **project**. So as a professor you have to find **funds** for yourself to be **involved** so all professors put together their **network**.

Q - *Have you considered other possible revenue streams?*

A we do not have **revenue** streams as such, we are not in **projects** going to market, our **research** do not have a **commercial value** but mostly **social value**

Q - *so many partners invest mostly based on trust and long-term relationship*

A - there are several realities that are encountering a moment of difficulty and need to go through deep changes. We are for example working with refugees at the house of skills. So we are an interesting party. For university and municipality is a good **investment social** impact, but you need the **commitment** as we have here. it depends on subject and **goals**, to make it applicable to different contexts

E - we give the chance for spinoffs within our **projects** but with our kind of **research** is really hard to **deliver commercial outcomes**. And we definitely do not want to do **commercial** consultancy

Appendix 6 – Report of the meeting: Amsterdam Fieldlabs’ project “House of Skills”

This is the official report of the bimestrial meeting of the House of Skills, one of AFL’s main projects. We have been asked to ensure confidentiality over the participants outside AUAS.

Verslag partnerbijeenkomst House of Skills WP5

Datum: 29 maart 2018

Tijd en locatie: 11:00 - 13:00, Studenthotel, Wibautstraat Amsterdam

Aanwezig:

Alex Straathof, professor AUAS

[REDACTED], Senior strategy manager, Deloitte

[REDACTED], Strategy director, Deloitte

[REDACTED], manager of partner company

[REDACTED], policy advisor Geemete Amsterdam

[REDACTED], representative of labor union FVN

[REDACTED], coordinator of House of Skills, Geemete Amsterdam

Laura Vonk, researcher AUAS

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[REDACTED], professor HvA

[REDACTED], professor HvA

Djimo van Berlo, researcher AUAS

Elke van der Heijden, professor AUAS

1. Opening, agenda, laatste ontwikkelingen

Een diner pensant heeft plaatsgevonden. Hierbij zijn afspraken gemaakt over het regionaal skills akkoord en er is nagedacht over hoe dit eruit kan zien. Er komt een werkgroep om hieraan invulling te geven. Ook komt er een werkgroep voor een skills-paspoort met vertegenwoordigers vanuit verschillende werkpakketten. Het skills-paspoort verbindt de verschillende Werkpakketten met elkaar en deze aanpak zou versnelling op moeten leveren.

Het House of Skills programma hier in Amsterdam wordt gezien als voorbeeld in Nederland. Ook de OBA is geïnteresseerd. De OBA is bezig haar positie te heroriënteren en wil een vloer inrichting voor leven lang ontwikkelen. Zij zien HoS graag als inwoner van hun huis. De gemeente Amsterdam ontwikkelt een sociale werkkoepel, die zich gedeeltelijk richt op arbeidsongeschikten. Men kijkt hierbij naar sociale firma’s, en ook naar HoS. Er is ook onderzoek geweest naar assessment van statushouders. Ook zij zouden zich graag ontwikkelen op het gebied van skills.

Al deze ontwikkelingen zijn mogelijk van invloed op de strategie van HoS.

2. Voortgang en planning WP5 door Elke van der Heijden

De afgelopen tijd zijn 5 praktijkcases geanalyseerd door middel van Canvas en interviews: Servicepunt Techniek, Statushouders WoW, Verzilveren & Vergrijzen, Kinderopvang en Veluwe Portaal. Van deze cases zijn knelpunten geanalyseerd vanuit economisch kader. De perspectieven van werkgevers- en nemers zijn beschreven. Deze informatie leidt tot het aanscherpen van de

doelstelling House of Skills. We zullen keuzes moeten maken mbt op welke knelpunten te interveniëren. De afronding van T0 zal de vorm aannemen van een presentatie naar de WP-leiders en stuurgroep.

De vraag komt op wanneer concrete (deel)producten kunnen worden gedeeld. Men heeft te maken met vertrouwelijkheid mbt de cases. Maar sommige concrete vragen kunnen wel beantwoord worden. Hoe dit te delen en/of erover te publiceren kan als agendapunt opgenomen worden voor een volgende keer.

3a. Knelpuntenanalyse door [REDACTED]

Belangrijkste vraag WP5: "Hoe ontwikkelen we een business case, bestaande uit een OM, GM en FM voor het House of Skills na de projectperiode?" Dit hangt af van de inrichting HoS - doelstelling, aanleiding / bestaande en verwachte problemen, doelgerichtheid / doelmatigheid interventie. De knelpuntenanalyse levert hiervoor input. Sommige knelpunten kunnen door de markt opgelost worden. Dit blijkt bij bijvoorbeeld intersectorale mobiliteit onvoldoende het geval. Het rendement van scholing is onzeker, waardoor weinig wordt geïnvesteerd. Een mogelijke interventie hiervoor zou zijn het rendement aan een collectief te verbinden. Ook is van belang niet op een tijdelijk probleem te interveniëren. Voorbeeld knelpunten op het gebied van skills:

- Scholing sluit onvoldoende aan op talenten, vraag, belevingswereld
- Skills ontstaan vaak als gevolg van werkervaring
- Investeerders in trainingen en opleidingen zijn niet altijd dezelfde mensen als die er profijt van opdoen

Bij het inrichten van HoS is het van belang na te denken over welke knelpunten je oplost. Wat zijn slimme en innovatie interventies? Lossen die bestaande knelpunten op? Leveren ze voldoende meerwaarde? Zorgt het niet voor nieuwe knelpunten?

Welke knelpunten bestaan of ontstaan er op de skillsmarkt, waardoor de vraag naar skills en het aanbod van skills onvoldoende bij elkaar komt? Hoe en in welke mate kunnen interventies knelpunten verzachten of oplossen?

Andere mogelijke knelpunten:

- De bewustwording, initiatiefneming, leercultuur vanuit de werknemers en de werkgevers die hiermee van doen hebben
- Gebrek aan inzicht van gevraagde skills vanuit steeds veranderende functies; beperkt beroepsbeeld en beperkte communicatie / marketing hierover
- Bij stages en tijdelijke plaatsingen is vaak onvoldoende tijd en geld voor gerichte begeleiding
- De kortste route naar werk lijkt een verkeerde benadering: wat is duurzame plaatsing?
- Wie is verantwoordelijk? Instituten veranderen. Regio zou meer aan zet worden gebracht
- De marktpositie van werknemers en de macht van bepaalde partijen zou een knelpunt kunnen zijn
- Investerings in werknemers zijn vooral individueel gericht. Dat zou moeten veranderen.

Van de afronding van t0 zal de focus liggen op een beperkt aantal knelpunten voor de businesscase - waarop is het verstandig je te concentreren?

3b. Perspectief van de deelnemers door [REDACTED]

De cases zijn zeer informatief. Over van werk naar werk blijkt weinig te vinden. Uit de huidige cases blijkt een grote rol voor het UWV en de gemeente, op het gebied van werving en assessment - hier wordt al veel geselecteerd. Dat oppert de vraag of en hoe de werving in HoS zit. Als HoS open is voor iedereen, zou de werving hier moeten beginnen.

Gaat het over soft skills? Of 21st century skills? Capabilities of vakmanschap? Over deze begrippen wordt veel gepeinsd. Vakmanschap: iemand is zo opgeleid in een vak, dat hij zelf de autonomie heeft om te zeggen of goed of slecht werk is geleverd. Deze definitie van vakmanschap is niet gelijk aan een verzameling skills. Is een verzameling skills samen een beroep? Dat zou met WP2 kunnen worden bekeken. Goede arbeid betekent ook dat mensen niet ziek worden en zich kunnen ontwikkelen. Deze input kan leiden tot aanscherping van de doelstelling van HoS.

Een andere vraag is of HoS een sociale onderneming is, of een commerciële school?

3c. Discussie

We zouden als case voor T1 kunnen nemen: van werk naar werk door de derde tranche van Asscher.

Een andere case zou kunnen zijn VDL in Zuid-Limburg. Dit wordt als succesvol gezien. Ook de case Birch wordt onderzocht.

Misschien is het interessant te kijken naar wat op papier al langer bestaat, maar niet van de grond wil komen. Waarom zou dat zijn? Met welke vragen zit je als werknemer of werkgever, en waaraan kan HoS antwoord bieden?

Er lijkt een mismatch te zijn tussen de cases en de doelstelling van werk naar werk. Welke skills moeten in mijn bedrijf staan? Kunnen we mensen een skillspaspoort meegeven? Ook is het een idee naar jobcrafting literatuur te kijken. Hoe is hierin initiatief te nemen, en door wie?

Van veel werk op MBO niveau komen mensen moeilijk rond. Een voorwaarde voor zelfontplooiing is je kunnen ontspannen en niet focussen op overleven.

Het is zaak ook knelpunten op te lossen en niet steeds uit te breiden, te verbreden. Een product of publicatie voor de zomer is een idee om zichtbaar te maken.

Wat tijdens deze bijeenkomst is besproken, wordt in T0 opgenomen. Veel vragen en antwoorden komen omhoog en hebben te maken met de invulling van T3. Komende tijd gaan we ook customer journeys nadrukkelijk volgen. We gaan kijken op welke knelpunten we ons richten en met wat voor oplossingen. De knelpuntenanalyse kan dienen als ruggengraat voor ons handelingsperspectief. We kunnen keuzes maken voor knelpunten op basis van prioriteit, rendement (voor wie?). Daarnaast zal HoS ook enige financiële impact hebben - betalen zij, net als voor gas, water en licht?

Volgende keer staat ondermeer finance op de agenda als presentatie. Voor volgende cases proberen we voorbeelden van werk naar werk te vinden.

Appendix 7 – Textile&Clothing Living Lab’s application form to ENoLL

We attach here the application to the European Network of Living Lab that TECLA submitted in April 2017. We iterated the several coding steps also to this document in order to systematically identify insights salient to our research. We show here one of the several iterations. Indeed, for SLL interview we demonstrated thematic content analysis and for AFL we showed ex-ante coding, while here we present ex-post coding, which means that the keywords on which we base the analysis are defined after a preliminary examination of the document.

Network, Partner, Stakeholder, Actor, Player, Enterprise, Company, Entrepreneur, SMEs, professionals, experts, researcher, student, startup, TCBL, ecosystem, Citizen, People, Public

Experimentation, Testing, Evaluation Research, Exploration, Co-creation, Co-design, design, development,

Outcome, Project, Service Knowledge, Know-how, Expertise, Social, City environment, ethic, territory

Value, Commercial, Product, Economic, Business, Model, Ideas, Market

Finance, Funds, Sustainable, Invest



Membership Application

ENoLL
Wave

11th

READ THIS GUIDE CAREFULLY BEFORE YOU START WRITING YOUR MEMBERSHIP APPLICATION!

The ENoLL label targets operational living lab structures and gives you access to ENoLL adherent membership. You are invited to reach out the ENoLL Office should you have any doubt on membership choice, or to check relevance of your lab structure

Your application must be sent to the ENoLL Secretariat via email (info@enoll.org) before **April 7th, 2017 3pm CET**. Submit well before the deadline to avoid e-mail congestion!

You are allowed to do up to 2 re-submissions before final deadline (use same file-name for **version**)

When submitting attach your application as PDF file named:
PreRegistrationNumber_ENoLL11W_<ISOCountryCode>_<LLshortname>.pdf

Example: "056_ENoLL11W_SE_ArcticLL.pdf" (application for a Swedish LL named "ArcticLL" with preregistration number 056)

All main sections must be addressed. If certain sections are not applicable to your Lab please explain why

The application must not exceed 10 pages with normal text 10pt Arial, plus the attached letters of recommendation and support

You need to submit 2 letters of recommendation, plus letters of support. All letters need to be scanned and pasted into the application file in the appropriate sections. We recommend you not to **create** overly large image sizes for the scanned documents.

Evaluators appreciate clarifying images and drawings, as long as the final application file size (pdf) is kept to less than 15 MB. We also warmly welcome links to any material proving your Living Lab track record: websites, videos, project results, etc.

During the evaluation period applicants may be contacted by the evaluation team if **some** clarifications are needed.

In case of a successful proposal the applicant becomes a member of the European Network of Living Labs (ENoLL) after paying the annual administrative fee of 500 EUR, and agrees to publication of the contents of this application form (unless indicated in writing)

Basic Facts

Living Lab (host) organisation

Pre-registration number	030
Living Lab short name	T&C LL
Living Lab full name (title)	Textile & Clothing Living Lab
Host organisation name	Consorzio Arca
Host organisation VAT number	[REDACTED]
Host organisation type	Non profit
Postal address	[REDACTED]
Post code	[REDACTED]
City	Palermo
Country	Italy
Telephone	[REDACTED]
Fax	[REDACTED]
Web-site (URL)	www.consorzioarca.it
Twitter	@ArcaIncubatore
Facebook	https://www.facebook.com/ConsorzioArca/
Other social media	
Living Lab established [year]	

Living Lab manager/ main contact

First name	Luca
Last name	Leonardi
Title (Mr/Mrs/Ms)	Mr.
Postal address	[REDACTED]
Post code, City	[REDACTED]
Country	IT
Email	lleonardi@consorzioarca.it
FB and Twitter (if any)	https://www.facebook.com/ArcaTextileLab/

1. Membership Motivation

Joining the European **Network** of Living Labs (EnoLL) represents a new step towards the overall strategy to reinforce and support the initiatives of industrial **development** and exploit the endogenous potential of this region at the centre of Mediterranean basin. EnoLL Membership will give impulse to its daily practice in the field of **co-design**, awareness-raising, **citizens** engagement, **testing** and **experimentation** of innovative **products** and **business models**.

Gain

The EnoLL label provides a better visibility of the **businesses**, R&D and creativity of the sicilian **territory**. The external recognition of formal and informal local competences and **networks** started with Horizon

2020 TEXTILE & CLOTHING BUSINESS LABS project, will also provide us with a reference community of users and igniters to foster the lively innovation and to valorise the territory.

The ENoLL label give access to a network of experts: The integration of an enlarged community, sharing a common innovative approach, means reinforcing everyone's innovative capacity and favouring scientific and technical cooperation, in order to accelerate the creation and diffusion of new user-centric solutions. T&C Lab expectations of being a part of the LL paradigm are to speed up and to deliver effective co-creative models for the design of new products, services and successful business models and gain valuable insights.

Contribution –

T&C Lab is an opportunity to test the methodology of LL in the textile and clothing sector. At the moment, there is any ENoLL Living Lab dedicated to redefine the textile and clothing industry by exploring and showing consumers, workers, designers, industries, entrepreneurs real attractive, desirable long lasting alternatives, about technical domains or/ and products, services and business models. We are living in a transition moment where, large part of the world populations start to demanding different way to produce, sell and make cloths. The make movement is delivering home machine to produce garments and iot find his way to garments and textiles. On the other hand we need to reconnect Eu industries and consumer with tradition and artisan know how. T&C LL main contribution is to be pivotal and sew all this components.

Interested Working groups:

Living Lab services for SMEs

Effective Membership application:

As for the shift to Effective Member role, the promoter will assess if it will be more suitable to perform this role directly or to be represented and give its contribution to the strategic management level through a territorial coordination body, in order to implement a systemic and integrated approach to local sustainable and inclusive development.

Summary



T&CL aims to reduce the gap between Smes and R&D issues. The rising of TCBL ecosystem (Horizon 2020 project) will help to reduce both technological and geographical gap with Europe. It will thus address to the issues of Fashion Technology with a more inclusive and co-design approach that aims to produce a lasting impact on the territory, offering a space where exploring the emerging opportunities of the new “Making Economy” (e.g. personal robotics, home production, etc.); redirecting the capacities of “old artisans” and family workers (or “fasonists”) and re-connecting their knowledge with e.g. new entrepreneurs, young and creative people; and taking full advantage of the benefits of Future Internet

technologies for the T&C global supply chain (diffused e-commerce networks, IoT tracking systems, virtual warehouses, customer engagement, etc.) in the light of a new customer-driven approach based on market intelligence. T&C lab will be a phisical space where encouraging and make possible to discuss ideas and projects, meet people and collaborators, with formal and informal cooperation methodologies, contribute to ideas and rediscovers hand sewing and embroidery traditions. This Lab will also contribute to enlarge the community of artisans and DIY makers.

Our Lab is an experiment to reactivate knowledge and tradition of the territory gathering a network of people and artisans able to ignite the process identification in a common culture, first step to ignite a process of transformation.

Organisation

Since 2011 ARCA has hosted TLL Sicily (<http://www.openlivinglabs.eu/livinglab/tll-territorial-living-lab-sicilian-region>), admitted to the 2nd ENoLL Wave in 2007, the Territorial Living Lab for the Sicilian Region, with the objective to use ICT to develop innovative means of participatory strategic co-planning and territorial self-governance, under the assumption that citizen co-responsibility and ownership, awareness of context and implications of choices, and monitoring of the impacts of decisions taken can together finally generate models for sustainable spatial development. The three arenas of e-Democracy, e-Government services, and GIS-based tools for strategic planning and environmental monitoring have been well represented therein. TLL Sicily model has involved the regional dimension in a role of strategic coordination while directly involving local authorities, citizen groups and ad hoc local partnerships in actual experimentation, with a substantial innovation in spatial planning methods and practice and with the view of a new model of governance for territorial competitiveness, in line with RIS3 2014-2020.

Within TLL, in accordance with the Living Lab philosophy, ARCA has developed a fruitful collaboration with stakeholders from the quadruple helix and key players of the innovation ecosystem, notably: policy makers at regional and municipal level; local development agencies; IT companies; research centres; associations and NGOs. It has experimented models of participative behaviour and active citizenship and democracy to develop urban and rural sustainable systems from the economic, social, governance and environmental side, where technologies, know-how and innovative solutions have acted as enabling forces. Over the past few years the partnership has achieved a good maturity in the field of technology, business and social innovation, also in the framework of EC funded projects (MEDLAB, PARTERRE, SMILIES, CreativeMed). Moreover, its active involvement in the consulting process leading to the formulation of planning documents for the definition of the priorities of Structural Funds and of the Regional Innovation Strategy 2014-2020 has allowed to consolidate the user-driven approach to innovation and regional development.

Through its experience in TLL, ARCA has developed and implemented the model of two thematic Living Lab initiatives, the *Solar Lab (SoLL)* and the *Textile & Clothing Lab*. Both of them gather the competence achieved at local and international level in the two sectors, the multi-actor partnership involved and the supply chain players sensitized and empowered.

Textile & Clothing Lab starts from this consolidated environment and select and engage with local players that fit with the activity of the Lab: ie Sartoria Sociale, a sewing cooperative, involved in the past by ARCA and noq key player of the Textile Lab in testing and developing products or Sartoria Crimi, a micro enterprise newly engaged for the Lab.

The Textile&Clothing Lab borrow a qualified and experienced staff, from Consorzio Arca but is developing a proper governance with a dedicated Lab Manager, mentors and dedicated tutors for the workshops. Below the snapshot of the present governance:



Since 2010 ARCA has participated in several projects funded by the EU under different programmes (MED, CIP PSP, Lifelong Learning Programme, ERASMUS +, Horizon 2020, COSME, Interreg Med) and led flagship cross-border cooperation initiatives with participating countries from North Africa and Middle East (ENPI CBC MED). Some of these projects are focused on renewable energy increase in the energy mix and energy efficiency in public buildings through the integration of advanced technologies. ARCA is member of several European and global networks, such as EEN – Enterprise Europe Network, EBN Innovation Network, SDSN – Sustainable Development Solutions Network and ENoLL and is increasing its connections with international innovation systems.

T&C Lab has been awarded of the title of Hub Leader of H2020 **project** WEAR: Wearable technologists Engage with Artists for Responsible innovation. The **project** involves a consortium of 7 Institutions in 6 countries and it is coordinated by imec, (Brussels). The hub will act as support centre, to promote and expand the WEAR **network**, to host its events, to contribute to the final WEAR **Sustainability Toolkit**, to act as advocates of the WEAR **Sustainability Toolkit**, and to promote and support future **projects** in this area of innovation.

Openness

ARCA has been committed to the **design**, adaptation and maintenance of open innovation collaborative platforms since 2014. The first **outcome** has been NETKITE open innovation (<http://openinnovation.netkite.eu/>) as a tool to foster open **business models** in the Mediterranean basin with the interaction of different contributors. It has hosted new 'solutions' for **products/services**, '**projects**' from the evolution of the **ideas** and **business ideas** upgrading the **projects** with the help of the community and turning the **project** into a **company**. The platform has been working as an acceleration engine, letting the initiatives uploaded **develop** quickly and smartly.

In the energy sector, this approach has led to the establishment of an e-**learning** platform (<http://moodle.stsmed.eu/>) which did only allow to upload, download and share in a virtual space **training** materials and **knowledge** on solar systems and technologies, but also to exchange technical **know-how**, promote innovation and **network** among the **learning** communities in different countries (through videos on the solar lab and the digital control systems, e-**learning/ project** online activities proceeding in a parallel way with the **development** of the solar lab).

Finally, the newly **designed wave.consortioarca.it** OI platform fosters the close collaboration between different contributors as the driver to **create social** and **economic** value and promote the effective **development** of innovation **ecosystems** through the power of collective intelligence. The goal of **Wave** is to establish a dynamic space of collaboration inspired by the open innovation philosophy, where the need and the offer of skills, **ideas** and creativity can match. It offers to solution seekers a space for publishing their call, informing about **projects** or challenges. The process will informally generate new links and **partnerships**, which may finally be consolidated by starting a new venture, signing R&D contracts or license agreements. By promoting challenges supported from large or even smaller **companies**, as well as **public** bodies, the OI platform can boost the creativity of young **professionals** and **researchers**, awarding the emerging local talents and attracting new ones. The **Wave** platform will follow this methodology, summed up through these sections: **IDEAS**: to discuss about own thoughts with members of the community, in order to be able to grow, evolve, and become a **project** (one can read, comment, vote, share on social **networks**, and read comments from within the community, related to own and other **ideas**), **PROJECTS**: where good technological and innovative **ideas** can become quickly a real **business** and **business ideas** already drafted can be upscaled and grow up (**projects** can be shared to look for **partners**, **investors**, skills and contributions for further **development**); if anyone has got an innovative **project**, he/she can share it; load a new contribution; post an update; if anyone has found an innovative **project**, he/she can collaborate with other **projects**, read, comment, vote, share, **CHALLENGES**: it is the chance to compete and win prizes for own **project**; users can participate in the challenges, find a great variety of problems to be solved, apply their own **expertise**, stretch their creative boundaries, and get different kinds of awards or **acknowledgement** from the community; **BRAINSTORM**: a section where anyone can talk about a topic or a problem, or search for help from within the community, i.e. to do a survey, a context analysis or a **market research** investigation, preliminary to the **development** of a new **business** idea and **HOW TO**: mixing the use of tools **developed** for examples by **TCBL project** like *Knowledge Spaces (An online, interactive **business model** repository that hosts and links materials and manufacturing **knowledge** for T&C, as well as **market**, **technology**, **economic** and **social** trend observations and policy watching, Deliverable 1.1 www.tcbl.eu).* and tutorials **developed** by the Lab. Wave is **created** with the aim to link the emergent **ecosystem** of **SME** and **start up** in Sicily. Platform will be **tested** with **TCBL ecosystem** and boost through the Livin Lab.

Through Creative Commons license the ownership of original work and **ideas** conveyed through the open innovation **environment** is protected, governing the sharing of **knowledge** within the community and the dissemination of digital contents. The theme is meant to be crucial by ARCA, which manages a university **business** incubator and is quite experienced in the protection of foreground **knowledge** and the exploitation of advanced **research** outputs, which represent the most

valuable asset for the innovators. The framework which governs the protection of author's right within the Living Lab makes references to the most consolidated EU and internal practices for IPR protection, patenting and licensing and follows the roadmap of the European IPR Helpdesk, managed by the European Commission's Executive Agency for Small and Medium-sized Enterprises (EASME), the policy guidance provided by the European Commission's Enterprise and Industry Directorate – General, and the fact sheet "Intellectual property and business plans" issued by the IPR Helpdesk. At the same time, contributors to the Living Lab virtual collaboration space will be encouraged to disseminate and share information as far as possible, as the basis for mutual learning and peer support. T&C Lab partnership is open to new membership requests in progress, with a broad participatory basis, provided that the applicant agrees on the strategic agenda of the Living Lab but also we would like that groups and communities we want to connect with, will be inspired by a series of principles such as: curiosity, durability, viability openness and respect, and signs a memorandum of understanding, after the approval of the admission by the General Assembly. Each member makes available tangible or intangible assets for the Living Lab, such as facilities, human resources and expertise, publications, services and so on, and cooperates with the other members for the joint participation in EU programmes for research and technological development, innovation and training, interregional and transnational cooperation.



T&C Lab communication and promotion strategy follow a blended approach making use of different channels, according to different targets (citizens, students, businesses, administrators, T&C professionals, researchers, investors, makers), namely: social media (Lab's FB page started 4 months ago and achieved 400 likes and more than 3000 visualizations), videos, advertising, web info, tutorials, co-design round tables, exhibitions and workshops.

Resources



T&C Lab contains 3d printers, sewing and cutting machines, pattern maker software but can make available to the users both the facilities and the equipment available in the ARCA Fabbrica, a workshop including several labs, such as: the mechatronics workshop, about 250 sqm, with the digital fabrication and rapid prototyping laboratory, the electronics laboratory, the mechanical laboratory; -the IT lab, including machinery for processing metal, measuring scientific instruments, equipment for the shared design and production assistance (CAD / CAM / CAE); -the graphic and multimedia lab: it enables to realize

advanced multimedia tools, three dimensional reconstructions, graphics and technical digital printing, being equipped with A0 plotters, scanners, 3D laser capture systems, video cameras.

- The fabLab@school facilities and equipments.

The lab are located within the incubator premises which cover a surface of 1.500 sqm, videomonitoring 24 hours and fully covered by wired and wifi, with classrooms equipped with internet connection, laptop PCs connected to the Internet via a protected wireless access point, video conferencing, video projection, sound system.

As mentioned in chapter 4, ARCA has developed a good capacity in fund raising, both through its investors networks (venture capital, finance and credit system) and the access to EU funds through projects.

The first setup of the Textile & Clothing Lab have been built thanks to funds from the European Commission under the Horizon 2020 Textile&Clothing Business Labs project. In the next future, there would be the chance to access the ERDF funds in the Regional Operational Plan 2014-2020 (1.3.2 Support to the generation of innovative solutions to specific societal challenges, also through open

innovation environments such as the Living Labs). ARCA has successfully carried out several EU funded projects (under MED, ENPI CBC MED, CIP Framework Programme, H2020, COSME, Interreg Med).

From the beginning sustainability was a major theme and we are working to develop a catalogue of services to guarantee full operation, such as: support packages for innovative SMEs, technology transfer, access to EU finance, advice on EU law and standards, intellectual Property Rights (IPRs), speak up on EU law, research funding, internationalization, training modules for entrepreneurs, researchers and experts in technology transfer on the topics of open innovation.

Seminars, conferences, meetings and other events where users get the floor and where we deal with themes related to the business system and, in general, connected to economic and social development through innovation and creativity.

For the management of the activities and initiatives promoted by T&C Lab, management is entrusted to the structure of ARCA and its qualified staff and takes advantage from a consolidated public/private approach, whereas its operation is ensured through a network of experts, professionals, researchers and entrepreneurs. The T&C Lab is serving both the academic community and the productive system for the co-design and testing of innovative solutions and products. T&C Lab organization is currently based on the international network of 20 TCBL Labs (in Italy, Greece, UK, Portugal, Netherlands, Slovenia, Germany and Spain) experimenting the different technologies or concepts with different level of optimization and customized on different territories. At the territorial level, it includes about 30 stakeholders representing businesses and start-ups, cooperatives, associations, NGOs, research centres, which have been involved in different actions such as awareness-raising, concept and technical design, SMEs qualification in the supply chain, education and training, market survey.

Our Lab governance is three dimensional and effect organizational, contextual and technological aspects are related to the life cycle of the Lab:

The strategic level deals with issues like:

- the way IPR and exploitation of results are dealt with the way stakeholders are involved (financial contributions, commitment, responsibility, influence),
- Sustainability ie financing: public-private-partnership, commercial;
- Management structure: driver and nature of the Lab, like community-driven, research driven, business/industry driven, technology driven;
- Open/closeness: sharing resources/network;
- Living Lab development: consortium dynamics (e.g. additional partners, user groups),

The operational level includes aspects like:

- Working practices for the day to day management;
- Execution & monitoring of the Lab goals regarding the synergy, quality and progress monitoring, internal communication;
- The definition of user group, dissemination and external communication: national and international consolidation; the way projects are organized and funded.

Users and Reality

At point 5, talking about communication, it has been outlined how ARCA has already developed experiences of community engagement in the phases of consulting, co-design, external evaluation, dissemination of outcomes and decision-making process. In particular, the organization of focus group meetings and Electronic Participatory Meetings can be mentioned as tools for involvement of stakeholders and key players coming from different sectors, competence domain, professional field, institutional role.

At T&C Lab will use a concept framework developed by H2020 TCBL project consortium involving key social players and innovators who will interact to generate ethically acceptable and socially and environmentally sustainable innovation products, services and processes and to boost technological applications which fit crucial societal challenges lead by a process oriented approach with iterative planning open to emergent processes.



In order to achieve them we identify a set of elements such as:

- a) Process orientation
 - b) Iterative / cyclic
 - c) Co-design
 - d) Bottom-up
 - e) Value based
 - f) Based on running activities
 - g) Understanding by experiencing
 - h) Reframing
- a) Develop a common language and shared understanding of the Labs and its potential. Such an approach aims to shape a certain culture through which to build 'a movement' towards an alternative for the current industry.
 - b) By cultivating a culture step by step and developing a common language, it becomes easier to share a state of mind with new people connecting to the network
 - c) Co-design simply means designing using the skills and knowledge of all the people involved. We need co-design because we want to create a holistic system that takes into account the many different perspectives of partners and stakeholders.
 - d) A bottom-up approach means that work is grounded in the understanding of the experiences, ideas and skills of the people who intermediate, set up, coordinate or use the Labs.
 - e) Our Labs and its practice is rooted in moral-ethical frames that are part of the work we do. We need make explicit those shared values (fairness, ethical practice, open processes, etc.) and the shared vision based on them, in order to be able to question our work and navigate safely through chaos and complexity. Besides the shared values and vision, personal drivers and an intrinsic motivation are also important for the Labs as spaces for experimentation, curiosity and research. People involved and working in Labs should not only be able to solve problems, they should also be able to define problems.
 - f) We do not start from scratch but we can build on existing Livin Lab experience and existing facilities by connecting, rather than starting things from 'new' ideas. This gives us all the opportunity to learn from each other and exchange knowledge concerning the local T&C industry and possible Lab approaches.
 - g) A common error is to ask people to change or do things differently through existing structures, while working in a traditional way through abstract representations that never become tangible. You cannot simply talk about openness, if you do not understand what that means for your own values or process, if you do not feel the consequences yourself. We simply need to practice what we preach.
 - h) The Labs are about experimentation and innovation, which can be facilitated and motivated by questioning, making, prototyping, problem finding, etc. In general, people have a tendency to solve problems using the frames and the language they are used to; indeed, the question itself often sets the frame for the answer. According to a well-known quote of Albert Einstein, "you can never solve a problem on the level on which it was created", you need other frames and perspectives to solve the problem or answer the question. Reframing aims to help unlock imagination by understanding the problem and empathizing with the end users. It is a design process approach and requires a constant mental attitude throughout or at least during critical moments in which decisions are made. Frames can be opened by using some of the following approaches: The assessment of the outcomes of T&C Lab activities will be measured on the traceability of the process (documentation, interpretation of data, application of a standardized methodology), the quality and effectiveness (appropriateness of the approach, the method, the sampling strategy, the communication tools), the relevance to the multi-actor target (users' satisfaction and responsiveness, synergies generated, co-creation outputs, knowledge mobilized, agreements drawn up).

The evaluation process designed is, based on quantitative and qualitative indicators namely:

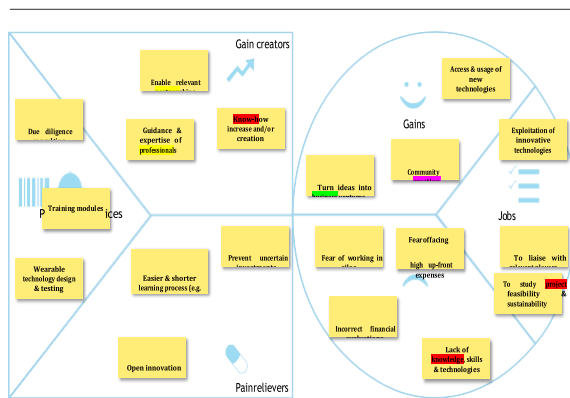
- the awareness events realized;
- the info materials produced and circulated, including newsletters recipients;
- the business community sensitized;
- the level of access and interactions in the open innovation platforms
- the training activities tracked and the nr.of participants trained;

- users with a **business ideas**, sensitized to **start-up** creation;
- **SMEs** success stories (transition paths to new **business models**).

Value

In order to perform an in-depth analysis of Lab, we investigated the goals the lab desire to achieve and the jobs they would like to get done by the lab.

This analysis was made by **TCBL Consortium**, with interviews of Labs managers and published in Deliverable 6.5 (available at <http://tcbl.eu/about>). For this purpose, the **Value Proposition Canvas** (Osterwalder, A., Pigneur, Y. (2010) has been selected for rationalizing such a fit by mapping the **value** generated by our Lab. It is important to remark that the words 'beneficiaries' and 'target groups' have been used instead of the word 'customers'. This decision was taken in order to highlight that T&C Lab **values** are based on **social** inclusion, distribution of skills, sharing of knowledge and open contents and not on pure trading dynamics.



The *customer* profile description in the VPC is made up of three sections, as follows: *Customer Jobs*, *Gains* and *Pains*. The *Customer Jobs* describe the things that the beneficiaries are trying to do and to attain by engaging with the Labs. *Customer Jobs* could be the tasks they are trying to accomplish, needs they are trying to satisfy, or the problems they are trying to solve. *Gains* describe the **outcomes** beneficiaries want to achieve or the benefits they seek from a particular Lab **service**. *Pains*, for their part, explain bad **outcomes**, risks and obstacles related to the customer jobs. The latter side describes the features of a specific Lab **value** proposition ('**create value**'). The **Value Map** is divided in three sections, namely,

Products and **Services**, **Pain Relievers** and **Gain Creators**. **Products** and **Services** list all the offerings of a Lab, both single **products** and bundle of **products** and **services** that help the beneficiaries to accomplish their goals and to satisfy their requirements.

Main services & products offered	Beneficiaries' jobs	Target groups
Due diligence consulting, Training modules, Wearable technology co-design design & testing , Collection of artisanal knowledge Capture & transmission of pattern cutting knowledge Collection & digitalization of reference material	Exploiting innovative technologies Liaising with relevant players, Studying project feasibility & sustainability , Mixing tradition and innovative ideas , Innovating old practices adopted in T&C sector, Gaining in-depth knowledge about T&C heritage	Individuals Educational institutes Smes & startups Students , Professionals Fashion designers

Gains Creators 1: Demonstrations trough AR tutorials, Interoperability between pattern macros & CAD systems **Value** added for **market** differentiation
Gains Creators 2: Enable relevant **partnership**, Guidance & **expertise** of **professionals**, know how increase and/or creation of

Gains 1: Study and **creations** of new patterns, Transform heritage in something new, New stylish clothes with low **environmental** impact
Gains 2: Acces & Usage of new technologies, community **creation**, turn **ideas** into **business** ventures

<p>Pains Relievers 1: Entrepreneurial training, Access to a digitalized archive, Demonstrations of new profit ways</p> <p>Pains Relievers 2: Open innovation, Easier & shorter learning process, Prevent uncertain investments.</p>	<p>Pains 1: Unknown potential business outcome, Lack of prototyping facilities, Lack of Knowledge facilities</p> <p>Pains 2: Fear of working in silos, fear of tacit high up front expenses, Incorrect financial evaluation, Lack of knowledge, skills & technologies</p>
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In these few months of operations we are working daily on the creation of the ecosystem facing difficulties on working on a territory that is discovering new concepts like open innovation and user driven methodologies. Success stories are the attendance of events, smes cooperation with labs, media attention, links created between migrants, NGO, Sicilian historical Smes and startups, memorandum of understanding sign with new actors on the territory (Fashion Accademy) We also testing our business models and we imagine that we will have first results at the end of the year.

2. Direction and Plans for the Future



The development strategic agenda of T&C Lab will be implemented through an action plan which includes in the medium term, among others: etc.):

- customer engagement, in the light of a new customer-driven approach based on market intelligence.
- from the research side: to assess emerging opportunities of the new “Making Economy” (e.g. personal robotics, home production, wearable devices, self cleaning textile, bacterial dying.
- from the business side: redirecting the capacities of “old artisans” and family workers (or “fasonists”) and re-connecting their knowledge with e.g. new entrepreneurs, young and creative people; and taking full advantage of the benefits of Future Internet technologies for the T&C global supply chain (diffused e-commerce networks, IoT tracking systems, virtual warehouses, to develop contacts with stakeholders at regional, national, and international level to attract investments to the lab;
- select, this year, one or two enterprises that offer a product to develop through the Lab.
- from the policy side: to further develop the contacts with regional, national textile and clothing clusters and regional administration;
- from the citizens’ side: to promote public events which will contribute to customer awareness raising about social and environmental sustainability of T&C production;
- from the international perspective: connecting with emerging network such as Fashion Revolution, Greenpeace Detox, Innovative fashion ecosystem like Manufacture New York; integrate and synergy creation with WEAR project ecosystem and TCBL project Ecosystem.

Appendix 8 – Report of the workshop “Sustainable Living Lab”

The workshop was hosted by “Sustainable Living Lab”, a recently founded Living Lab in Geneva, and had the objective of stimulating the confrontation between different actors on the challenge of making a Living Lab financially self-sustainable. The workshop was held during the Open Living Lab Days 2018, the annual plenary conference of ENoLL, and involved 25 different figures all active in the Living Lab field. Several were coming from the Academia, others from Public Institutions, others were the founders or employees of Living Labs initiatives.



Join at:
slido.com
#L639

AGENDA

1. IMPACT HUB & SUSTAINABLE LIVING LAB
2. HACKING A COMMON CHALLENGE: HOW TO BALANCE CIVIC PARTICIPATION AND FINANCIAL SELF-SUSTAINABILITY IN LIVING LABS ?

PART I

IMPACT HUB & SUSTAINABLE LIVING LAB



ABOUT IMPACT HUB
Part Innovation Lab, Part Business Incubator, Part Learning Community

OUR MISSION: We **CONNECT**, **INSPIRE** and **ENABLE** individuals and organisations to turn their ideas into successful ventures for sustainable impact.

The core function and USP of Impact Hub is its proven expertise in community building, curation and management to massively increase innovation and entrepreneurship through collaboration of diverse people and organizations.

We do this through offering our members and community:

- Connections and support from a like minded community
- Innovation labs and startup incubation programs locally, regionally and globally
- Access to co-working spaces and countless events and trainings for a thriving startup ecosystem

SWITZERLAND'S LARGEST ENTREPRENEURIAL NETWORK FOR IMPACT

Impact Hub is Switzerland's largest startup and innovation community for impact with 1'500 members+ having access to five locations in Zurich, Bern, Geneva, Lausanne and Basel.

All Impact Hubs bring special strengths to the national ecosystem:

- **Impact Hub Bern** - Bringing innovation into government institutions
- **Impact Hub Zürich** - Connecting startups and big players
- **Impact Hub Geneva** - Innovating with international organisations
- **Impact Hub Lausanne** - Connecting tech and universities with social impact and the broader ecosystem
- **Impact Hub Basel** - coming soon...in 2018



CASE STUDY: WHAT IMPACT HUB HAS DONE FOR ZURICH AND GENEVA

Impact Hub Zurich opened in 2011 and is considered one of the biggest startup support organizations in the Canton of Zurich. Impact Hub Geneva opened in 2015, and is growing fast, with key partnerships across many sectors in the city.

1,200+ Members, incl. Startups and innovators	30+ incubation and innovation programs	2,800m2+ of collaborative space
50,000+ people engaged across Switzerland	2,500+ applications for programs yearly	550+ events and workshops yearly
550+ Full-time jobs created	1,200+ startups supported through coaching, workspace, strategic networks and direct funding in 5 years	13,000 events visitors yearly (tech meetups, corporate innovation events, etc.)
7.3m Investment raised	2 Global programs: Kickstart Accelerator and Accelerate2030	7 Large partnerships over 5 years, incl. Google For Entrepreneurs partnership

We prototype, demonstrate and establish the future of business, technology and society



Impact Hub Lausanne: 600m2
Impact Hub Zurich: 2200m2
Impact Hub Geneva: 600m2
Impact Hub Bern: 650m2

PART OF A GLOBAL NETWORK

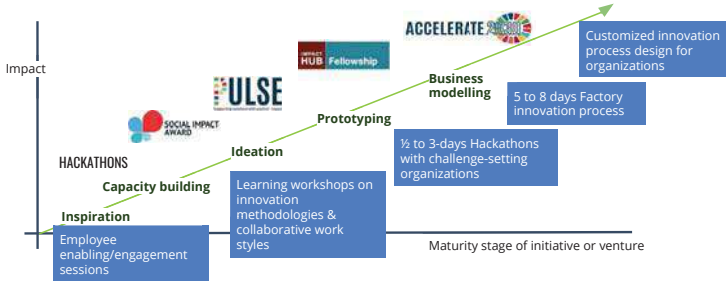
Impact Hub is the world's largest network of startup and innovation spaces with over 100 locations in cities across the world, ranging from Singapore to New York, Amsterdam to Mexico City.



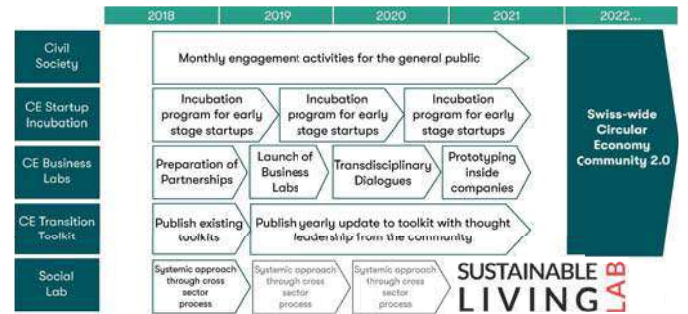
6,000+ New full-time jobs created in 2016
1,500+ New start-ups founded yearly
50% Of members reported double digit growth
3 Mil Customers purchased our members' products and services

Innovation lab & business incubator

Our ideation, incubation and acceleration processes cater both - the creation of new solutions on complex societal / environmental challenges.



Corporate partnerships play a key role in establishing a Swiss-wide Circular Economy community



Establishing a Swiss-wide Circular Economy community will benefit the environment, established companies, Start ups as well as Switzerland as a whole.



SUSTAINABLE LIVING LAB



Catalyse cross-sector collaboration for sustainable innovation

SUSTAINABLE LIVING LAB



SUSTAINABLE LIVING LAB



SUSTAINABLE LIVING LAB





Topic-specific startup incubator

- Tailored support
- Access to workspace
- Coaching & mentoring
- Seed funding

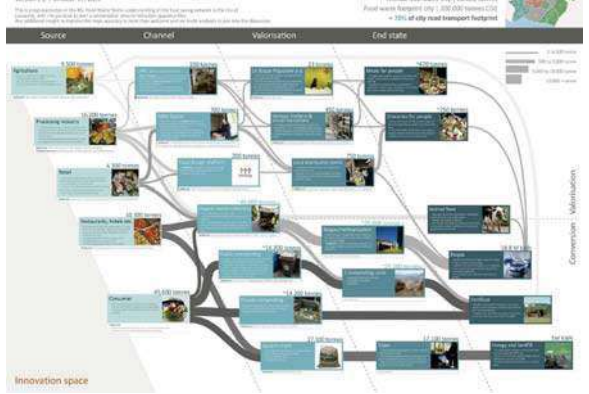


SUSTAINABLE LIVING LAB

2017-18



Food Save Flow Map | Lausanne



Topic-specific startup incubator

- Tailored support
- Access to workspace
- Coaching & mentoring
- Seed funding

SUSTAINABLE LIVING LAB

2018-19



Practical skills workshops for sustainable lifestyles



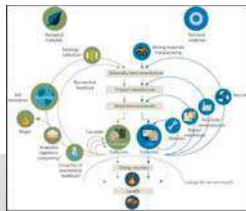
- Food & kitchen
- Personal care & bathroom
- Clothing & fashion
- Travel, mobility & leisure
- Work
- Money

SUSTAINABLE LIVING LAB



Beyond Waste

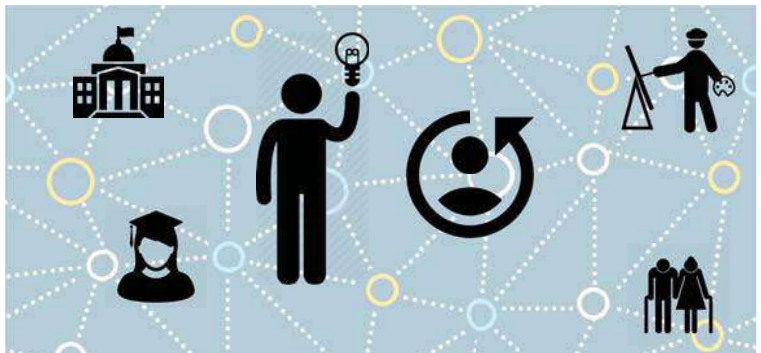
Circular Resources Lab



A cross-sectoral, experimental learning journey to develop circular economy solutions in water, plastic & electronic waste



SUSTAINABLE LIVING LAB



SUSTAINABLE LIVING LAB



PART 2

HACKING A COMMON CHALLENGE:

HOW TO ENSURE OUR LIVING LABS REMAIN BOTH PARTICIPATORY AND FINANCIALLY VIABLE?

2 DISCUSSION ROUNDS

1 HOST PER TABLE

1 COLLECTIVE HARVEST



WORLD CAFÉ ETIQUETTE

- FOCUS** on what matters
- CONTRIBUTE** your thinking and experience
- LISTEN** to what matters
- CONNECT** ideas
- LISTEN TOGETHER** for patterns, insights and deeper questions
- PLAY, DOODLE, DRAW**



First round (20 minutes):

How to foster **continuous civic participation**?

How to integrate a **mechanism for feedback loops**?

In other words, how to make a lab truly participatory and fostering co-creation amongst citizens, government, companies and schools/universities?



Second round (20 minutes):

How to become **financially viable**, assuming that grants are not unlimited?

What different **business models** have we tested, or could we test?



HARVEST

HOW TO ENSURE OUR LIVING LABS REMAIN...	
PARTICIPATORY	FINANCIALLY VIABLE
<p>circumstance for brainstorming (space design) should not financially reward participation, rather foster confort, effortless, fancy location</p> <p>database of potential users & stakeholders</p> <p>things to take in consideration prior: thinking of expectations and interests (are they the right people for the topic?)</p> <p>the commitment of different actors to ensure ideas are 'picked up'</p> <p>show appreciation for the participants, especially being flexible, listening indirectly and acting on what we hear.</p> <p>Make sure they have fun, food.</p>	<p>Sporadic revenue from events (entry fee)</p> <p>Crowdfunding</p> <p>Sponsors</p> <p>Membership model and affordable subscription</p> <p>Tax (state-subsidy paid from taxpayers' money)</p> <p>3 categories: Public funding is pretty much essential, so do lab work on issues that are relevant for city or state. Cross-financing like having a bar, a co-working, space rental, etc. Demonstrating the value that is created, e.g. tangible products; commercialisation and intangible through measures and indicators</p>



HARVEST

HOW TO ENSURE OUR LIVING LABS REMAIN...	
PARTICIPATORY	FINANCIALLY VIABLE
<p>About feedback: make sure gather it during and after so that participants can share</p> <p>Long term: outcomes or lack of outcomes needs to be shared with participants, so they know what their time and thinking contributed to</p> <p>activity with fun, charismatic people, inspiring get incentives</p> <p>speed dating and ice-breaking techniques so they get used to living lab activities</p> <p>living labs</p> <p>users need to feel part of a process, a roadmap, rather than single events.</p>	<p>Test panel: testing is an activity for which the living lab is paid by companies</p> <p>To find different things that have different forms of payment, different activities, some more profitable others less... kind of like freemium model</p> <p>Subscription model, crowdfunding...</p> <p>Commercialising the services of the lab while keeping the entrance as low as possible</p> <p>Progressive payments e.g. 1st service paid at 10% and then increasingly, the rest could be subsidized by the state</p> <p>Ways of paying in the 'barter' model of paying for services and products in exchange for complementary ones</p>



HARVEST

HOW TO ENSURE OUR LIVING LABS REMAIN...	
PARTICIPATORY	FINANCIALLY VIABLE
<p>circumstance for brainstorming (space design) should not financially reward participation, rather foster confort, effortless, fancy location</p> <p>database of potential users & stakeholders</p> <p>things to take in consideration prior: thinking of expectations and interests (are they the right people for the topic?)</p> <p>the commitment of different actors to ensure ideas are 'picked up'</p> <p>show appreciation for the participants, especially being flexible, listening indirectly and acting on what we hear.</p> <p>Make sure they have fun, food.</p> <p>About feedback: make sure gather it during and after so that participants can share</p> <p>Long term: outcomes or lack of outcomes needs to</p>	<p>Sporadic revenue from events (entry fee)</p> <p>Crowdfunding</p> <p>Sponsors</p> <p>Membership model and affordable subscription</p> <p>Tax (state-subsidy paid from taxpayers' money)</p> <p>3 categories: Public funding is pretty much essential, so do lab work on issues that are relevant for city or state. Cross-financing like having a bar, a co-working, space rental, etc. Demonstrating the value that is created, e.g. tangible products; commercialisation and intangible through measures and indicators</p> <p>2) Test panel: testing is an activity for which the living lab is paid by companies</p> <p>To find different things that have different forms of</p>



PARTICIPATORY	FINANCIALLY VIABLE
<p>envisage social activities such as exhibitions</p> <p>living lab as an approach, and you can show users how they can benefit. can be physical or a shared project</p> <p>Communication is key point: true participation needs to define a common terminology for all stakeholders</p> <p>Transparency: the goals, the activities, the progression of projects, storytelling</p> <p>Mobile app to communicate and get feedback from stakeholders and participants in an effortless and fun way (e.g. buttons)</p> <p>Agile methodologies to enable rapid prototyping and multi-stakeholder participation</p>	<p>Public financing is important, but explore different scales, so building on the capacity to reach those different scales, e.g. city, region, country, EU. This also applies to the corporate or private sector</p> <p>Being a producer of projects where the living lab is a shareholder, so takes the risk but also reaps the returns.</p> <p>Trying different business models.</p> <p>Salaries - trustworthy model</p> <p>Do you actually need money to be viable?</p> <p>Striving for self-sustainable autonomy, looking for win win alliances, ecosystem building in terms of utilities, etc.</p> <p>Important to include ideas about future monetary systems.</p> <p>Above all create community.</p> <p>Invite conservative businesses to hold their meetings in your environment, especially strategic meetings. New space has value, maybe also offer facilitation skills so they have new approaches that they don't know and lets them change a mindset</p> <p>Individual person becoming our patron, instead of sponsor, like private philanthropy</p>

