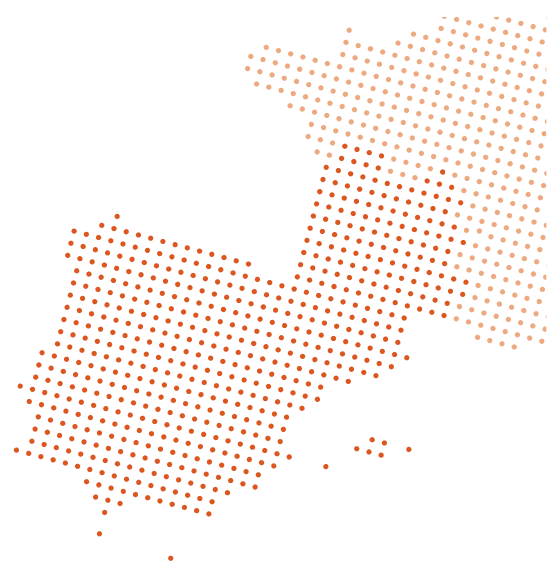
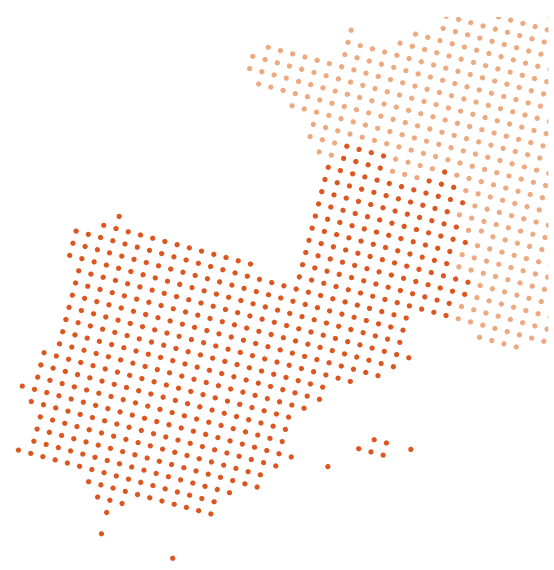


E 2.1.1 Report on the common methodology for creation, implementation and management of three experimental Living Labs

Report on GT 2

January 2020





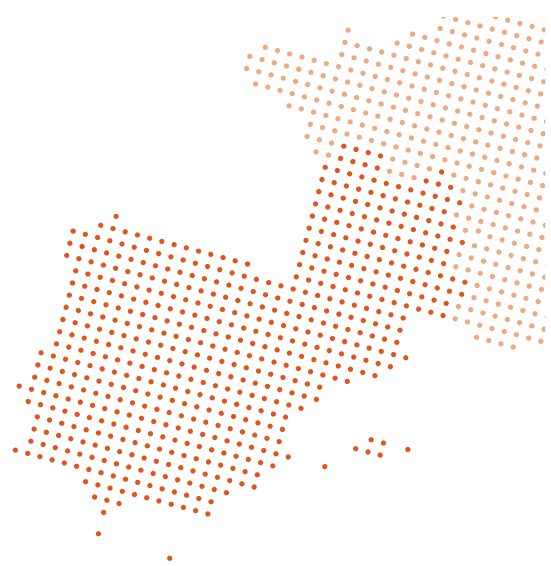
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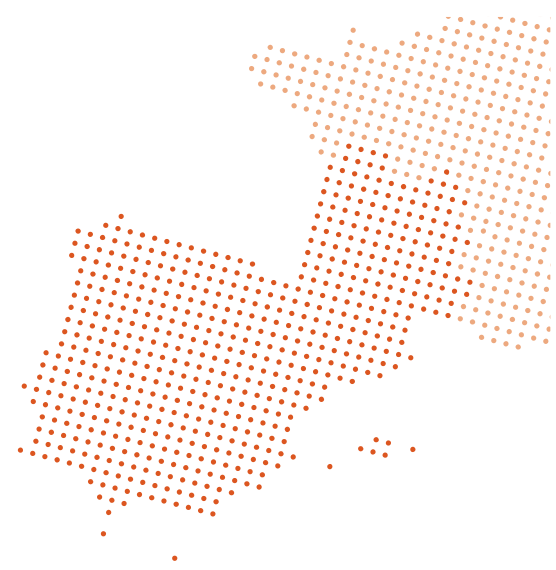
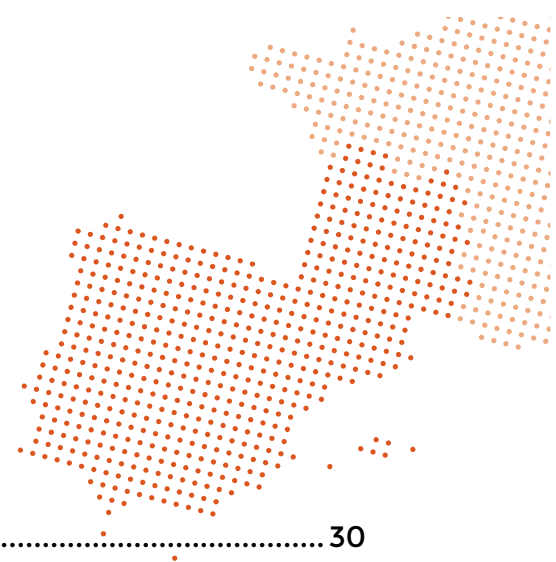
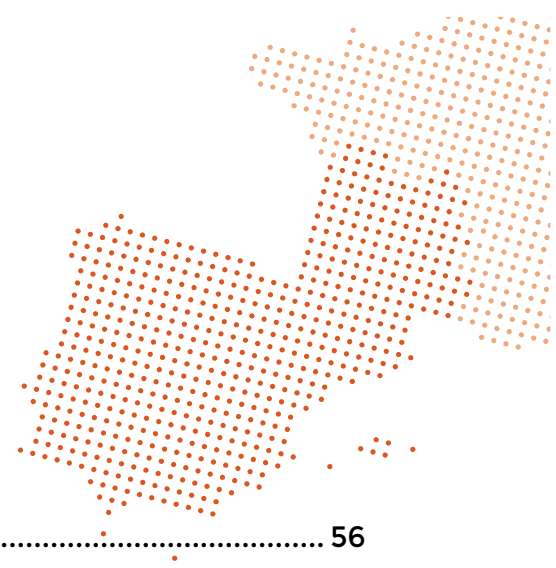


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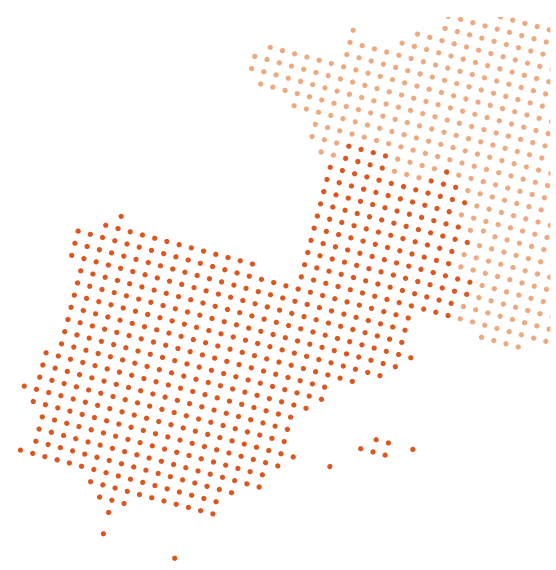
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List of acronyms and abbreviations

AdTA - Águas do Tejo Atlântico, S.A. (Portugal)

CENTA- Centro de las NuevasTecnologíasdel Agua (Spain)

ENoLL - European Network of Living Labs

UE - EuropeanUnion

IFTS - Institut de la Filtration et des TechniquesSéparatives (France)

ISA - Instituto Superior de Agronomia (Portugal)

IST - Instituto Superior Técnico (Portugal)

OIEau - Office International de l'Eau (France)

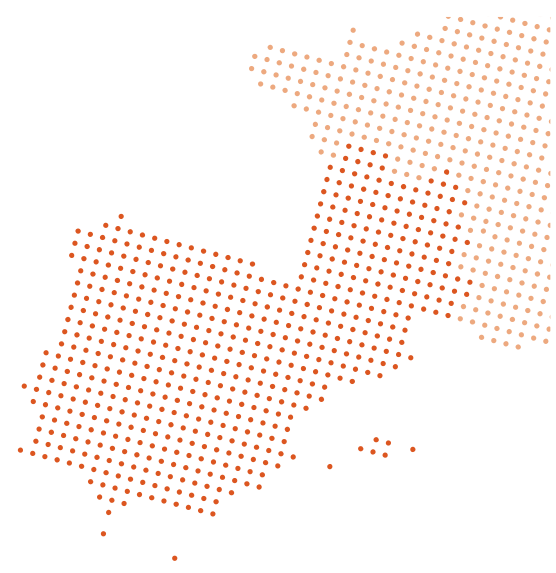
R&D - Research and Development

RIS - Research and Innovation Strategies for Smart Specialization

SME - Small and Medium Enterprise

UNILIM - Université de Limoges (France)

WoLLs - Water oriented Living Labs



1 Summary

This report develops the methodology for the implementation of the Living Lab within the framework of the TWIST project.

First, it includes a section that will help us understand what a Living Lab is, the benefits for stakeholders and society and the key principles for the activities carried out in a Living Lab.

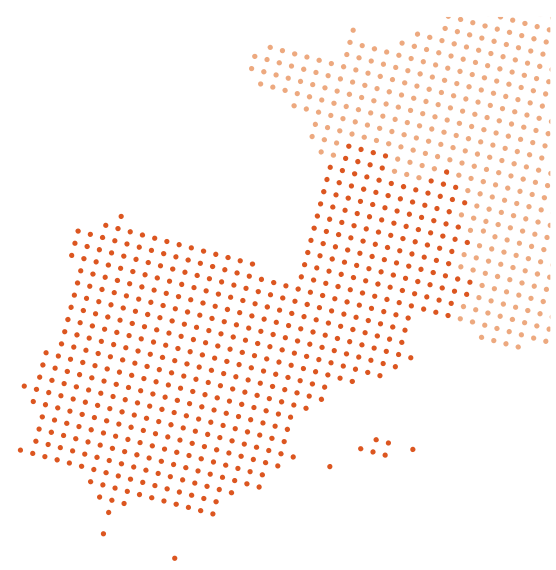
Next, the report describes the starting point of the three Living Labs in Spain, France and Portugal.

The heart of the document lays on the common methodology for the implementation of the three Living Labs. This methodology establishes a series of guidelines and information that will help us implement the different Living Labs. The methodology includes the components that any Living Lab must have, the process to develop the Living Lab, the definition of the type of Living Lab that we want to create in each of the regions, the structure and management of the Living Lab, with a basic definition of how the Living Lab promoter group and the operating group that is responsible for developing research projects should be formed.

It also includes the identification of the target users and the purposes of the Living Lab and the characteristics that the user community must have. Other aspects included in the methodology are the funding of the Living Lab, the definition of the catalogue of services and the incorporation of new stakeholders, as well as one section devoted to the possibility of interaction with other Living Labs or innovation networks.

Next, the document treats the contents of the eventual management and monitoring and evaluation plans that could be implemented in the Living Labs for the correct management, monitoring and evaluation of their operation.

Finally, it also includes the methodology for the development of activities / projects in the Living Labs, through exploration, experimentation and evaluation, and provides information to assist in the exploration process and in users' engagement.



2 Introduction

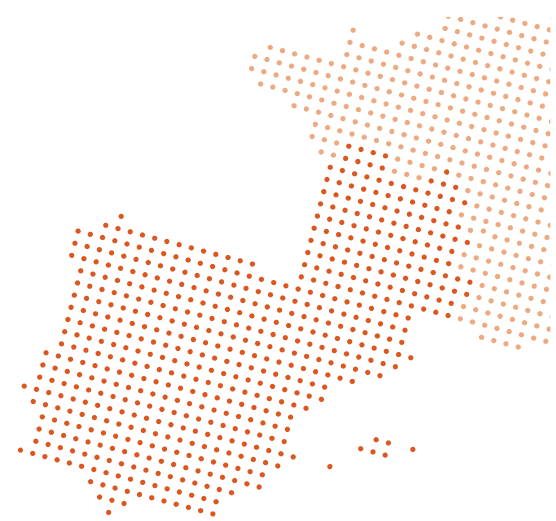
In the last decades there has been a huge shift from a product-based economy to a service economy. Innovative services can take many different forms but innovate always means to create something new and different, and to be creative.

One of the aims, when dealing with innovations, is to learn from mistakes so that these can be avoided in future innovation processes. In addition, to learn means to seek, use and share information about what went wrong. Besides, innovation involves idea generation and testing promising concepts.

Sustainable growth is increasingly related to the capacity of regional economies to innovate and transform, adapting to an ever changing and more competitive environment. This means that a much greater effort needs to be put into creating the eco-systems that encourage innovation, research and development (R&D) and entrepreneurship, as stressed by the Europe 2020 strategy and its Innovation Union flagship initiative. The promotion of innovation is therefore a central feature in the Cohesion Policy 2014-2020 programming period, where 30% of the total allocations are going to be deployed for innovation in the wider sense. The smart specialisation strategies (RIS3) are also mobilising the innovation potential of all EU regions.

Creating innovative services that have market impact is not a direct process and for SMEs, the innovation process can be even harder to accomplish. Some SMEs might not have the resources, or all the needed skills, to carry out the innovation activities. Innovation is a costly process and there are hundreds of unsuccessful products beyond every success. Even successful products may be far from being user friendly. In such a context, user-centric validation can play an important role in speeding up effectively the innovation process through addressing the actual user needs.

In recent years, Living Labs have become a powerful instrument for effectively involving the user at all stages of the research, development and innovation process, thereby contributing to European competitiveness and growth. Living Labs try to support the innovation process for all involved stakeholders, from manufacturers to end-users and administrations, with special attention to SMEs



and a focus on potential users. Living Lab research is emerging as a potentially important trend in innovation research.

Living Labs communities have had a significant impact on European innovation policy, which is shifting from linear research and innovation activities to open innovation. Not only have these recommendations shaped the research agenda of Horizon 2020, but have also inspired the provisions for R&D&I within Cohesion Policy and Territorial Cooperation Programmes for 2014-2020, particularly through the Smart Specialisation Strategies defined for all EU Regions and Member States, most of which are also providing the implementation framework for the EU Digital Agenda at local level.

Additionally, Living Labs provide new opportunities to enable a bottom-up policy coherence, starting from the needs and aspirations of local and regional stakeholders, creating a bridge between European policies and programmes, including Horizon 2020, Smart Specialisation, the Urban Agenda, Cohesion Policy, and so forth.

Specific calls in different sections of the Horizon 2020 work programme directly recommend Living Labs as innovation and experimentation instruments in particular in areas related to smart cities, urban innovation, mobility and international cooperation. The potential for societal and innovative development through co-creation in all sectors of society is widely recognised and the current socio-economic context, despite many difficulties, provides for manifold opportunities to fully exploit it.

Living Labs can combine European vertical specialisation domains (health, smart cities, water, education etc.) with horizontal and territorial specialization and are resolute to build and strengthen the European Open Innovation ecosystem that enables the internationalisation of SMEs creating a pan-European experimentation environment. In this context the European Network of Living Labs (ENoLL) joined forces with Water Europe in order to map and work together on water living labs related context and reach out to an international innovation ecosystem platform for big impact.



3 Living labs for user-driven open innovation

3.1 Concept of Living Lab

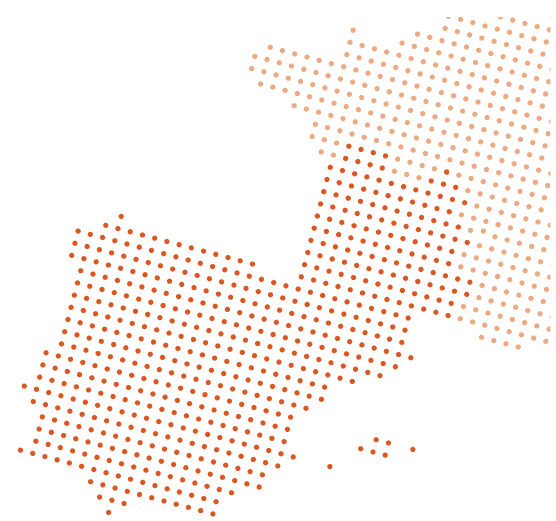
In the literature on Living Labs, the term 'living lab' is predominantly used to refer to one or more of the following attributes:

- A space for designing and validating projects involving technological, social and/or cultural innovation.
- A type of structure dedicated to Research, Development and Innovation (R&D&i).
- A legal entity designed to make it possible to work on a single level with stakeholders from the public and private sectors and citizens (PPPP - People-Public-Private-Partnership).
- A variety of participatory methodology based on active collaboration and cooperation between the various agents of a system.
- A set of fundamentally qualitative research techniques.

As a type of laboratory, Living Labs have a singular characteristic: they are set up to document, generate and experiment with ideas, concepts and/or prototypes of new products and services. They do this in real situations with real people who use prototypes or new version of products and/or services before they are formally inserted into the market or society.

Living Labs can be defined as **open innovation environments** in real-life settings, in which user-driven innovation is fully integrated within the co-creation process of new services, products and societal infrastructures. They are based on a partnership between academia - business - citizens- government, which enables users to take an active part in the research, development and innovation process:

- bringing the users early into the creative process in order to better discover new and emerging behaviours and user patterns;
- bridging the innovation gap between technology development and the uptake of new products and services involving all relevant players of the value network via partnerships between academia, business, citizens, and government;



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

Living Labs operate as **intermediaries** among citizens, research organisations, companies, cities and regions for joint value co-creation, rapid prototyping or validation to scale up innovation and businesses. These activities take place across many different domains, typically in health and wellbeing, smart cities and circular economy, culture and creativity, energy and mobility.

In a Living Lab, the aim is to **accomplish Quadruple helix** by harmonizing the innovation process among four main stakeholders: companies, public organisations, researchers and citizens. These stakeholders can benefit from the Living Lab approach in many different ways, for instance companies can get new and innovative ideas, end-users can get the innovation they want, researchers can get study cases and public organisations can get increased return on investment on innovation research.

Living Labs have in general an important role in **filling gaps**. They bridge the different gaps between technology ideation and development on the one hand, and market entry and fulfilment on the other. As flexible **ecosystems**, Living Labs can provide a demand driven ‘innovation’ approach by iteratively engaging all the key actors across the phases, and putting the user in the center. Living Labs often start their bridging in the applied research phase. Taking the step from technology prototypes for innovative and visionary users to evolving products for pragmatic and mainstream users, also called crossing the “pre-commercial gap”, is the major acting field for Living Labs as iterative user involvement adds significant value to the rapid prototyping and service/product development phases (Figure 3.1).

User-driven open innovation methodologies can significantly improve the efficiency of the innovation process and contribute to better take-up of R&D&i results, thereby improving the competitiveness of industry in Europe, in particular for SMEs, including microentrepreneurs.

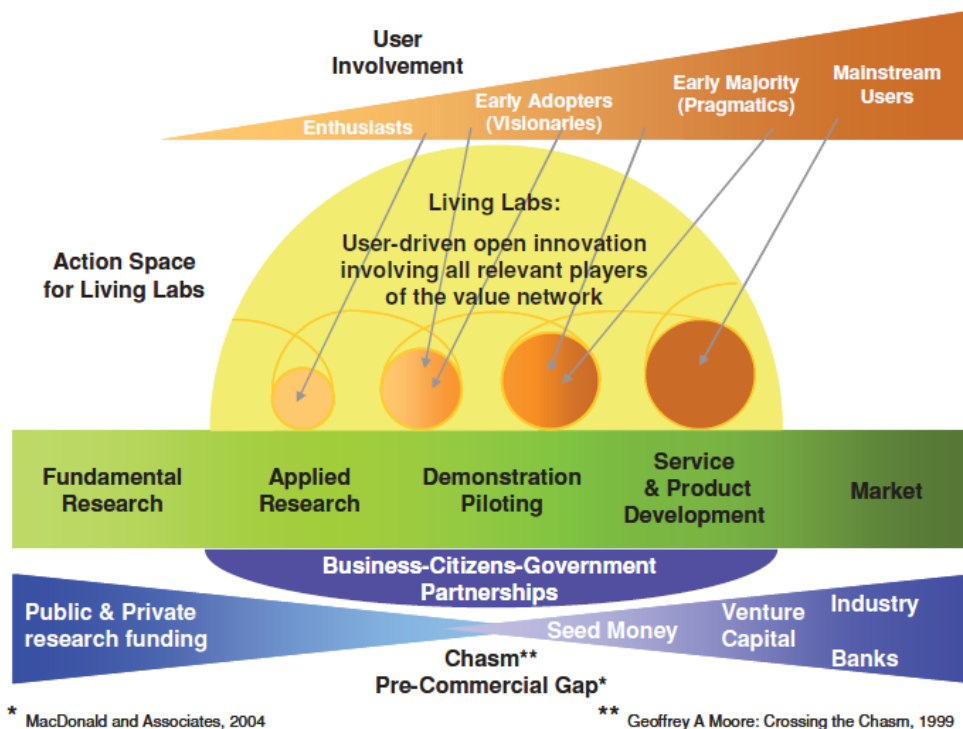


Figure 3.1 Action space for Living Labs along the technology adoption cycle (Source: Living Labs for user-driven open innovation. An overview of the living labs methodology, activities and achievements, January 2009)

3.2 Benefits of Living Labs

General benefits of Living Labs are:

- Innovative ideas generation;
- Increase of users' satisfaction;
- More desired products or services;
- Increase of users' knowledge;
- Better design of the business model.

The **benefits for the different types of stakeholders** to implement user-driven open innovation and Living Lab methodologies can be summarised as follows:



- For the **end-users** (of the technologies/products): To be empowered to influence the development of services and products which serve real needs, and to jointly contribute to savings and improved processes through active participation in the R&D and innovation lifecycle.
- For the **SMEs**: developing, validating and integrating new ideas and rapidly scaling-up their local services and products to other markets.
- For the **larger company**: making the innovation process more effective by partnering with other companies as well as end-users.
- For **researchers, the economy and the society**: Stimulating business-citizens-government partnerships as flexible service and technology innovation ecosystems; integrating technological and social innovation in an innovative culture; increasing returns on investments in ICT R&D and innovation.

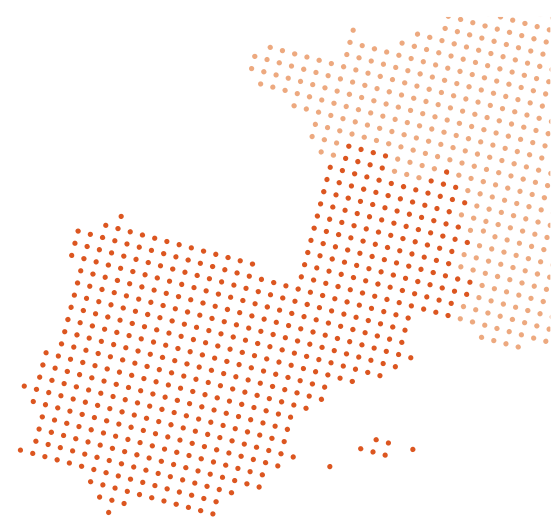
3.3 Living Labs in the water sector

Within the water sector, Water-Oriented Living Labs (WoLLs) are a key tool for the implementation of Water Europe's Water Vision "The Value of Water" to promote systematic innovations in the water system that are needed to achieve a Water-Smart Society.

Water Europe developed the identification methodology of WoLLs, which included the direct consultation of the Water Europe's Working Groups, followed by a public consultation. They have published an 'Atlas of the EU Water Oriented Living Labs' that can be downloaded online on the web (see Citazions list).

Following Water Europe perspective, WoLLs are defined as: "real-life, water oriented and demo-type and platform-type environments with a cross-sector nexus approach, which have the involvement and commitment of multi-stakeholders (including water authorities) and a certain continuity, and provide a "field lab" to develop, test, and validate a combination of solutions as defined in the Strategic Innovation and Research Agenda (SIRA), which include technologies, their integration as well as combination with new business models and innovative policies based on the value of water."

The definition of Living Lab shared by all the WoLLs is:



- Demo-type and platform-type research and innovation settings, with context specific needs and enabling conditions.
- Water-oriented interventions with a cross-sector nexus approach in real-world and/or realistic environments.
- Proactive learning and innovation ecosystem with R&D continuity and reproducibility.
- Open and local multi-stakeholder governance structure with democratic control systems.

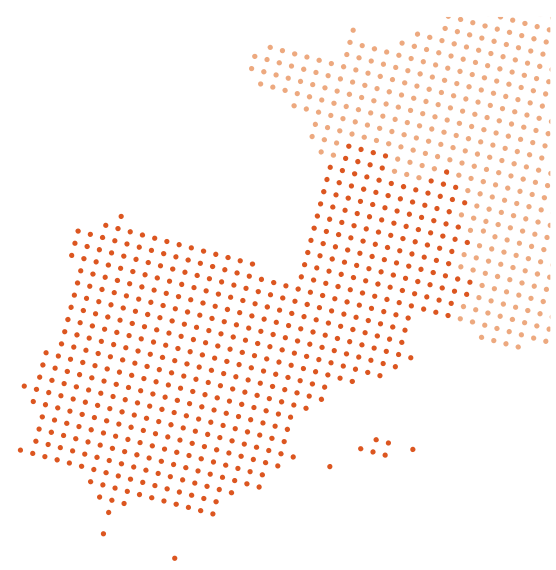
In general, it can be concluded that Living Labs and Living Lab projects have specific characteristics that facilitate value creation for innovation processes and enable internationalisation activities.

3.4 Key principles for Living Lab activities

In Living Lab activities there are several Key Principles that should permeate all operations:

- **Value:** economic value of innovation outcomes and activities and ‘value in-use’ concept.
- **Influence:** involvement of competent partners and domain experts.
- **Sustainability:** includes economical, ecological and social aspects.
- **Openness:** cross-fertilization, different levels of openness, and collaboration.
- **Realism:** testing and evaluation in users’ real-world environments.
- **Continuity:** trust building and context-unique knowledge over projects and innovation cases.
- **Empowerment of users:** motivation and creative ideation capabilities of Living Lab user communities.
- **Spontaneity:** spontaneous interaction, reaction, and ideation.

These Key Principles are valuable since they provide the basis for design of Living Lab activities. They also define what counts as a Living Lab and how the value of Living Lab activities can be assessed. The Living Lab Methodology Handbook (SmartIES) describes the importance of these key principles and how can they be implemented in Living Labs activities.



3.4.1 Value: Benefits - sacrifices

Why is value important and what does it stand for?

Providing a superior 'value in use' for end-users is a key aspect for business success. To be able to create value for end-users, it is important to understand their needs and motivations as well as how these needs can be met by an innovation. This focus gives organisations an opportunity to increase the level of innovation and to decrease the risk of developing something that end-users do not want. The assumption is that at the moment of purchase, the end-user makes a calculation and evaluation of what is given (value in use) in respect to what is taken in terms of money.

What is the value creation in Living Lab?

Living Lab processes/activities support value creation in at least two different ways: for the Living Lab users (e.g. SMEs) in terms of business value and for the presumptive end-user of the developed innovation in terms of 'value in use'.

Business value includes aspects such as employee value, customer value, supplier value, managerial value and societal value. One way to open up new markets is by focusing on creating advances in 'value in use'.

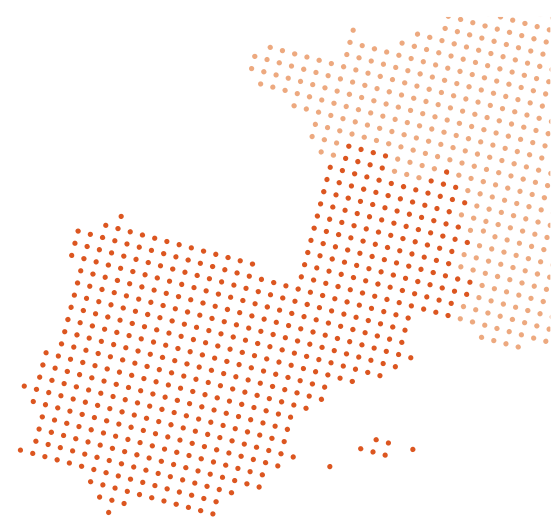
How can it be implemented in Living Labs?

Living Lab processes/activities support the process of understanding if the end-user has a need for a service/product and how intense their attraction for that service/product is in the real-world context. Living Labs can support processes by allowing users to elaborate the service in their context to determine if it provides a value for them. In addition, a Living Lab can also provide insights about how end-users perceive value. These insights can guide the innovation process to deliver innovations that are perceived as valuable from a business and an end-user perspective.

3.4.2 Influence: users' feedback

Why is influence important and what does it stand for?

One key aspect of the influence is to view Living Lab users as active, competent partners and domain experts. Their involvement and influence in innovation and



development processes is essential. Equally important is to base these innovations on the needs and desires of potential users and to realise that these users often represent a heterogeneous group. This means using the creative power of Living Lab users while facilitating their right to influence these innovations. By stressing the decision making power this principle differs from related concepts such as participation, involvement, and engagement.

What is the influence in Living Lab?

Involving more stakeholders in the innovation process can improve the quality of the product/service being developed. Hence, many commercially attractive products/services come from user innovations. In addition, the amount of ideas that users render as well as the heights of the innovative ideas can be greater than those just rendered by developers.

Adding to that is the emerging trend of users who want the opportunity to influence products and services. For instance, Nike involves customers in developing and designing shoes. The trend of letting customers and users influence companies' services can be expected to grow.

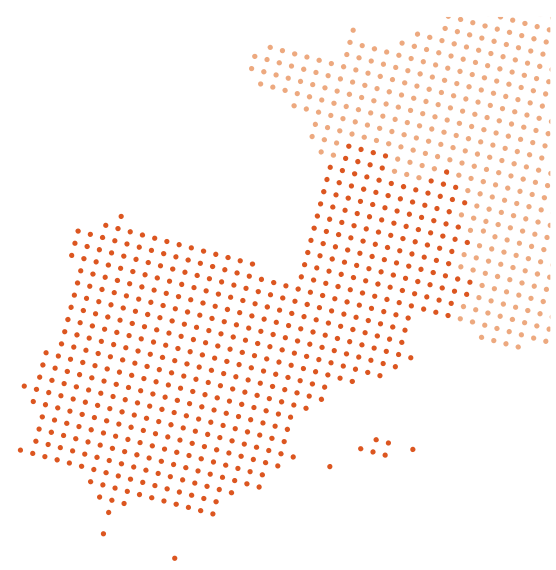
How can it be implemented in Living Labs?

To take the step from participation or involvement to influence, domain experts' and users' needs and ideas should be clearly traceable in concepts, prototypes, and the finished product. One important issue that Living Labs need to manage is how to assure that participation, influence, and responsibility among different activity/project partners are balanced and harmonised with each other and with the ideology of the project.

3.4.3 Sustainability: Meet the needs of both present and future

Why is sustainability important and what does it stand for?

Creating a sustainable environment includes economical, ecological and social aspects, which makes it a complex task. Many organisations have potential to contribute to sustainable growth while improving productivity, lowering costs and strengthening revenue.



What is sustainability in Living Lab?

An important aspect of a Living Lab is the partnership and its related networks since good cross-border collaboration builds on trust, and this takes time to build up. In order to succeed with new innovations, it is important to inspire usage, meet personal desires, and fit and contribute to 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 effects.

Sustainability also includes financial sustainability. For many living labs it is very hard to develop models that are financially sustainable, usually subsidy is involved, but it is important to develop Living Labs that can run without as well.

How can it be implemented in Living Labs?

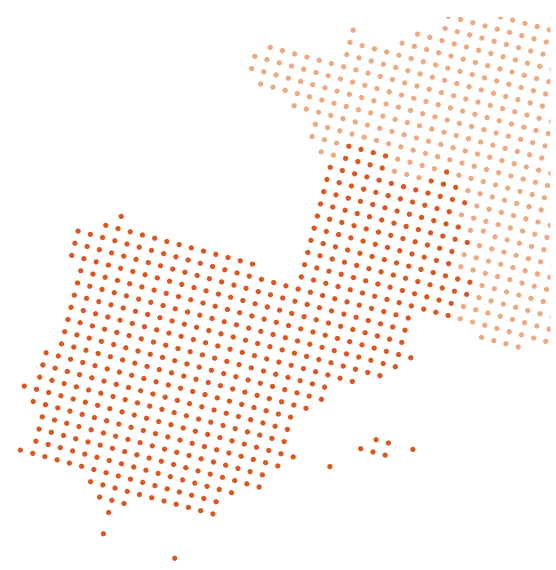
It is important that Living Labs take responsibility for their ecological, social, and economic effects. The innovation processes supported by a Living Lab must address sustainability issues, for instance, by choosing the right materials, implementing environmentally friendly processes, and considering the social and economic impact that the innovation might have once implemented. But also must address financial issues to guarantee the viability of the Living Lab.

3.4.4 Openness: bi-directional flows of knowledge

Why is openness important and what does it stand for?

The current innovation landscape has changed. Many companies have thus identified a need to open up their innovation processes since innovation stakeholders have become more mobile, venture capital more abundant, and knowledge more widely dispersed across different types of organisations.

In Living Labs, several stakeholders are invited to participate in the innovation process. Openness is essential to gather a variety of perspectives that might lead to faster and more successful development, new ideas and unexpected business openings in markets.



What is the openness in a Living Lab?

Living Labs and similar innovation environments can strengthen innovation capacity due to cross-fertilization and open collaboration between various actors of different backgrounds, with different perspectives that have different knowledge and experiences.

One way to strengthen smaller enterprises' innovation capacity is by collaborating with other actors such as academia, the public sector and other enterprises. Living Lab might thereby strengthen the innovation capacity and may also provide a scenario where different stakeholders get the chance to meet and collaborate.

How can it be implemented in Living Labs?

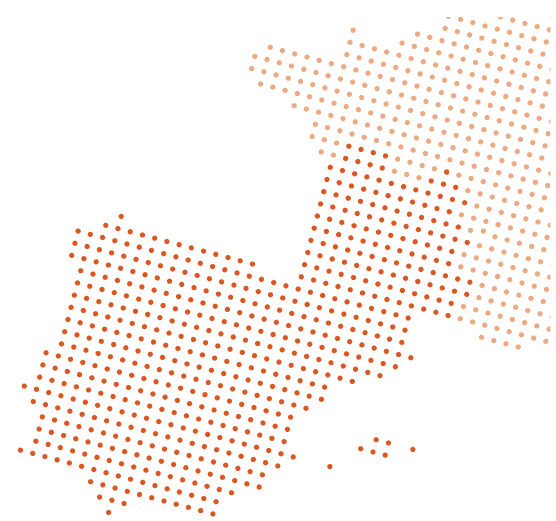
Openness is crucial for innovation processes in Living Labs to gather a multitude of perspectives in order to develop as attractive an innovation as possible. Opening up innovation processes also offers potential to decrease the time to market and to better utilise collective creativity. However, to be able to cooperate and share in a multi-stakeholder milieu, different levels of openness between stakeholders seems to be a requirement.

Despite the many benefits of transparency, disadvantages can also arise since intellectual property can be difficult to protect. In this sense, there are ways to manage intellectual property rights (IPR) that help Living Labs ensure that all members respect each other and share their knowledge. Living Labs may establish rules and regulations regarding the use, exchange, and licensing of IPR prior to the start of an innovation project within a consortium agreement that all members must sign. The agreement may also include how costs and profits will be distributed to each member considering their role and investment in developments.

3.4.5 Realism: Experiences in and from different situations

Why is realism important and what does it stand for?

One of the cornerstones of the Living Lab approach is that innovation activities should be carried out in a realistic, natural, real-life setting. This is important, since people cannot experience anything independent of the experience they get from



the world. To increase understanding of how a product/service influences and fits into the actors' activities and goals, it is important to study them in their context.

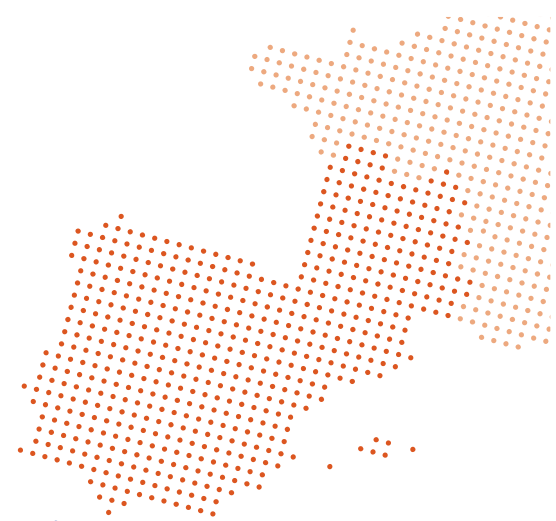
What is the realism in a Living Lab?

Since all stakeholders have their individual local reality, everyone has a potential useful view of how the current situation can be improved. Including more people in the process will ideally increase the possibility of keeping up with the ever more rapidly changing environment of the organization.

Orchestrating realistic use situations and understanding users' behaviour is one way to generate results that are valid for real markets.

How can it be implemented in Living Labs?

To facilitate realistic situations, two different approaches can be observed in relation to Living Labs. In the first approach, environments for testing and evaluating products or services are created in ways that are similar to the real world, while in the second approach, products and services are tested and evaluated in users' real-world environments. It is crucial to involve users as well as other stakeholders in the innovation process. The reality aspect is also considered by involving real users rather than relying on theories.



4 Origin TWIST platforms: starting situation

4.1 Open Water Living Lab (OWL2) (Spain)

The objective of this Living Lab is to favour in the Spanish regions of the SUDOE space the implementation of an open innovation model, in the field of wastewater treatment and reuse, which allows eliminating and reducing the barriers that hinder the innovation process.

It is thus conceived as an instrument that helps the innovation process from beginning to end, enabling holistic support and monitoring of the process. Therefore, it must be configured for the collection and analysis of information and to generate and validate solutions in real environments, before they are fully inserted in the market.

Far from being conceived as a test bench or as a closed scientific laboratory where researchers conduct experiments under controlled conditions, the OWL2 will be an open and flexible space where researchers, developers, entrepreneurs, associations, administrations, academics, citizens, etc., join and cooperate to boost innovation projects.

The OWL2 is managed by the Andalusian Public Foundation Centre of New Water Technologies (CENTA) that is a water research centre promoted by the Regional Ministry of the Environment of the Government of Andalusia with the support of other public and private bodies from the water sector. With a research career backed by more than 30 years of experience in wastewater treatment and water resources management, CENTA has become a reference undisputed internationally and has been able to establish a wide network of relationships and synergies with companies, administrations, as well as with other research centres. And citizens have always been in the focus of the activities of the Foundation, with the dissemination and environmental awareness program on wastewater treatment for small populations.

The OWL2 is located at the Experimental Centre of the CENTA Foundation in Carrión de los Céspedes (Seville). It is a scientific and technological platform, with more than 41,000 m² of surface area dedicated to the experimentation and development of water treatment technologies.



Undoubtedly, the Experimental R&D&I Centre of the CENTA Foundation, offers a very solvent starting point for the deployment of a Living Lab, since both its physical space and its portfolio of services already combine today a good part of these factors, providing an inner environment that will undoubtedly favour the start of the project. In more than 30 years of operation, has been able to establish a wide network of relations and synergies with companies, administrations, as well as with other research centres.

Although it cannot be said that today it is fully a Living Lab, it has approximated this model enough, since it has been interacting with the scientific community, companies, administration and also society, through an extensive work program.

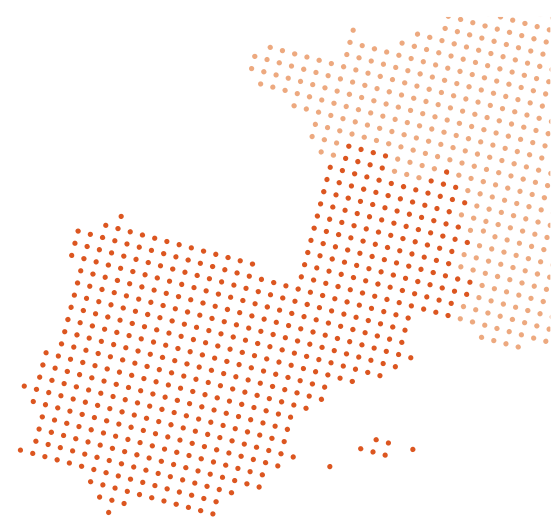
Undoubtedly, its great dynamism and synergies with a broad group of stakeholders from different sectors of the quadruple propeller, makes this experimental centre an excellent precursor for the development of a Living Lab specialized in wastewater treatment and reuse, giving Direct service to the regions of Andalusia and Murcia, given its high capacity to mobilize and value the innovation generated in existing R&D&I projects as well as new projects.

However, to fully configure the Experimental Centre as a Living Lab, its organizational and functional model must be defined and structured in a way that guarantees the establishment of a true open innovation system, which favours the incorporation of innovative products and/or technologies to the market, and favour innovation processes in the public sector.

4.2 LaViso Living Lab (France)

LaViso is a partnership between the International Office of Water (OIEau), the Institute for Techniques of Separation and Filtration (IFTS) and the University of Limoges. It is in the south-west of France and its focus is on waste-water treatment technologies and associated infrastructure management. While this may be its primary focus, the Living Lab is not limited in its capacities and interest to provide support for solutions in a wide range of applications.

The partners have not agreed on the structure of the living lab. The preference is for a memorandum of understanding between the partners.



The three main partners and their represented organizations offer to support entrepreneurs in the development of new technological processes and the marketing of innovative products and services.

Support for innovation

At the beginning of the innovation process, they can propose the facilitation of discussions in a climate of innovation and development of water technologies in the New Aquitaine region. For this, they set up co-creation workshops with CODEmaker and mobilize a co-design workshop hosted at the University of Limoges. These events can include all the key stakeholders identified in the quadruple helix concept (academy, industry, government and public).

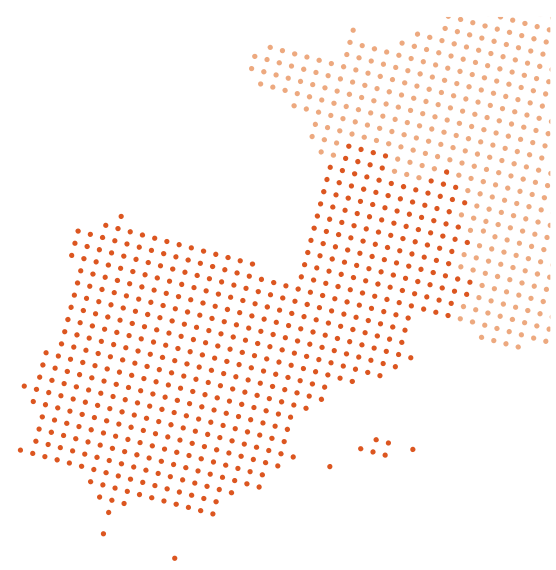
Generate innovative research

The Living Lab aims to respond to technological needs with the construction of research projects that will bring together expertise in the fields of environment and water technologies, including chemistry, biology, microbiology, science soil and process engineering. LaViSo can propose trials on a pilot scale or process on semi-industrial units with performance monitoring thanks to the expertise of the project partners.

LaViSo offers assistance in research funding for research and technology transfer projects, the construction of appropriate consortia and the implementation of technical studies hosted on test platforms.

Technology transfer

'Technology transfer and research-industry cooperation are powerful levers of innovation and for companies, a development accelerator' (CCI France). LaViSo wants to sustainably strengthen the competitiveness of companies by providing innovative solutions of a high technological level that will lead quickly to the establishment of new products and services. With the presence of several networks in the consortium such as Water and Climate, the expertise available within each consortium member and the availability of platforms, LaViSO offers technical support covering all levels of preparation, ranging from the definition from concept to technology validation. The transfer can lead to a financial transaction, and materialize in different ways: patent acquisition, cooperation, provision of human resources, etc.



Training

The partners are experts in many technologies and methodologies that will benefit from the innovation process, with the expertise to provide leading edge water treatment technology. It will also be possible to provide on-demand training for technical processes.

Labeling? Normalization

LaViSo makes an important contribution to the development of vocabulary standards, measures or tests that contribute to the clarification of technical and commercial exchanges, for example IFTS creates standardization commissions, researches and develops new procedures for essays and drafts the draft standards on which all agree.

Intellectual property

Thanks to the support services for innovation and transfer from the University of Limoges grouped together in AVRUL, the work done within the framework of the LaVISO will ensure that intellectual property rights are taken into account throughout the entire process.

Market Analysis and Marketing

The consortium also aims to provide studies on market opportunities for technologies that will be evaluated, in particular through the external partners of the TWIST project, such as the CCIs in New Aquitaine. The partnership also has access to a wide range of support actors.

4.3 Urban Lisbon Living Lab (Portugal)

The partnership includes Instituto Superior Técnico (IST), Instituto Superior de Agronomia (ISA) and Águas do Tejo Atlântico, S.A. (AdTA). At the beginning of TWIST project each institution had its own independent research, although collaboration had existed in the past between all of the institutions.

Águas do Tejo Atlântico, S.A. (AdTA) is a public company and is responsible for managing and operating the wastewater treatment system of Greater Lisbon and



West¹, guaranteeing the quality, continuity and efficiency of the service. It exploits a system that includes 104 Water Resource Recovery Facilities (WRRF), 292 pumping stations and 922 km of main sewage system, and treats around 244 Mm³/yr, serving a population of 2.4 million inhabitants (23 municipalities).

AdTA has as mission contributing to the pursuit of national objectives in wastewater collection and treatment within a framework of economic, financial, technical, social and environmental sustainability. AdTA is a strong and well recognised RD&i agent within the industry - which includes its own RD&i dedicated department.

It is also common that AdTA receive master and doctoral students to conduct their Master thesis in partnership with academia.

By partaking on TWIST, AdTA has the opportunity not only to share its knowledge, but also to improve in skills, its human capital in relevant topics, such as, nutrients recovery, wastewater treatment and reuse and/or processes modelling and optimization. AdTA will put at disposal of TWIST project and Portuguese partners its infrastructure for N/P recovery and wastewater reuse.

Instituto Superior Técnico (IST) is a Higher Education Institution, the largest school of Engineering, Science and Technology in Portugal. IST's mission is to contribute to the development of society by providing top quality higher education in the areas of Engineering, Science, Technology and Architecture, at undergraduate and postgraduate levels, as well as developing RD&I activities, to allow it to provide teaching in line with the highest international standards. Its mission is therefore expressed in the three functions which characterize the concept of a modern university: to generate knowledge, to transfer skilled professionals and to transfer and apply knowledge and innovation.

IST consists of 9 departments and is involved in some of the most prestigious RD&I and technology transfer institutions in Portugal, with remarkable impact internationally in many scientific and technological domains. There are about 10,500 full-year equivalent under and post graduate students, and about 1,500 full time equivalent teaching and non-teaching staff.

¹NUTS III



The contribution of IST to apply knowledge and innovation is also described by the creation of 53 Spin-off companies since 2009, which further apply into society the research developed in this institution. IST also stimulates intellectual property protection as a means of fostering knowledge valorisation currently has a portfolio of more than 250 patents, being the Portuguese institution with the largest number of patents registered. Many of these patents result from research projects involving companies that have preferential rights for commercial exploitation. Licensing other intellectual property rights, such as computer programs copyright or technology products associated brands, among others, is also carried out by IST. Some of IST's startups have license agreements that enable exploitation of intellectual property rights of the school and associated research centres.

The School of Agriculture, **Instituto Superior de Agronomia (ISA)** is one of the faculties of the University of Lisbon. The core mission of ISA is Higher Education, Research & Development, and Technology Transfer in the scientific fields of Agriculture, Forestry and Natural Resources Engineering, Food Science and Engineering, Animal Production Engineering, Environmental Engineering, Biology, and Landscape Architecture. Within Higher Education, ISA is attended by 1500 undergraduate, master and PhD students.

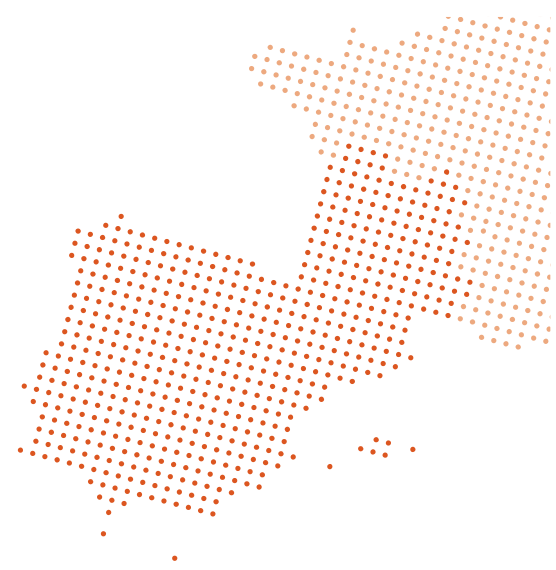
ISA hosts three nationally recognized scientific research centres: i) the Forest Research Centre (CEF) is a research unit devoted to the integrated research of forestry and related ecosystems, forestry products and forest related service, ii) the Centre Linking Landscape, Environment, Agriculture and Food (LEAF) focused on the entire Agro-Food chain, combining basic and applied sciences, from the cell and microorganisms to the landscape, for the knowledge and promotion of effective solutions aiming at the conservation of natural resources and the production and food quality, iii) the Research Network on Biodiversity and Evolutionary Biology (Associated Laboratory), in partnership with CIBIO, University of Porto and iv) the Centre for Applied Ecology "Prof. Baeta Neves" (CEABN) an integrated research centre whose mission is to promote scientific research in applied ecology to forest and agricultural ecosystems, contributing to management and use.

The three institutions that form the Urban Lisbon Living Lab will maintain their autonomy and the Living Lab projects will be based in one of them, selected on a case-by-case basis. The location of the project will depend on its TRL level and the



topic to be addressed. The remaining two institutions will collaborate in the project according to the type of tasks involved.

For each project a Mutual agreement memorandum or protocol will be developed, which will include the definition of roles, tasks to perform, resource allocation and benefits associated with each organization.



5 Components of the Living Lab

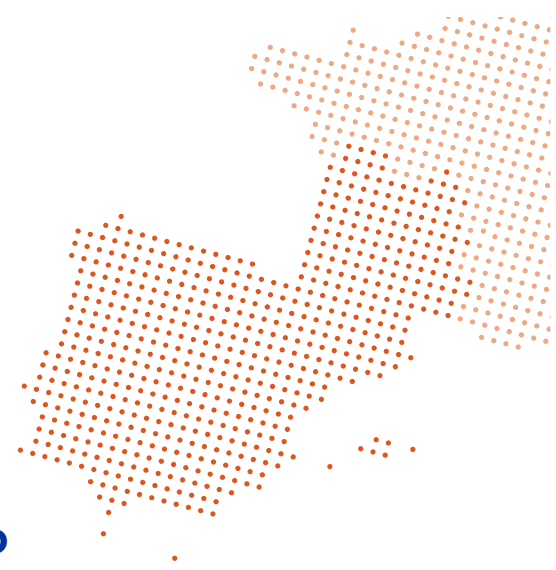
The main components of a Living Lab are:

- **Infrastructure:** a physical space for research and development of the products/services.
- **ICT:** outlines the role that ICT technology can play to facilitate new ways of cooperating and co-creating new innovations among stakeholders.
- **Management:** represent the ownership, organization, and policy aspects; a Living Lab can be managed by e.g. consultants, companies or researchers.
- **Partners & Users:** they relate to the actors within the Living Lab network, that bring their own specific wealth of knowledge and expertise to the collective, helping to achieve boundary spanning knowledge transfer.
- **Research:** symbolizes the collective learning and reflection that take place in the Living Lab. Technological research partners can also provide direct access to research that can benefit the outcome of a technological innovation.
- **Approach:** represents the methods and techniques for Living Lab practices which are necessary for professional and successful Living Lab operations. Each Living Lab will have its set of methods and tools that better adequate to the expertise and goals. Formal and informal methods such as survey, interviews, questionnaires, observation, focus groups or multi-criteria analysis have been used to collect and produce data.
- **Innovation:** is in the centre of the rest of the components.

Hence, a Living Lab environment should have a good relationship with, and access to users willing to be involved in innovation processes. Any Living Lab should also have access to multi-contextual environments, as well as high-end technology and infrastructure that can support both the processes of user involvement and technology development and tests. Each Living Lab environment also needs organisation and methodologies suitable for its specific circumstances. Finally, a Living Lab needs access to a diversity of expertise in terms of different partners that can contribute to the current activities. Equally important are the key principles of the approaches applied in Living Lab activities.



- The functional design of the TWIST Living Labs must combine different planes:
- Be an R&D infrastructure: if innovation is the last phase of the R&D cycle, it is undoubtedly an input that it is carried out in a context where there is already research and development, which guarantees proximity between the generation of knowledge and the use of that knowledge, which will favour the development of synergies.
- Enable an innovation ecosystem that guarantees the participation of all the actors and favours their interaction, so as to guarantee the collaboration of the public and private sectors, universities, companies, administrations, etc.
- Ensure symbiosis and hybridization relationships between the different actors involved in the Living Lab.
- Establish a consolidated space for collaboration between the public sector, the private sector and society in the water sector.
- Generate a context that stimulates the generation of ideas and enhances technological demand.
- Establish processes and mechanisms that make it possible to know the demands and needs of the users.
- Interaction with other R&D infrastructures.



6 Process of developing the Living Lab

It is not easy to design, create and consolidate a Living Lab. If a Living Lab is conceived as an exercise in collaborative research, in order to carry out a specific number of pilot projects involving social innovation and public participation, it may prove to be significantly easier to develop (although still not exempt from difficulties).

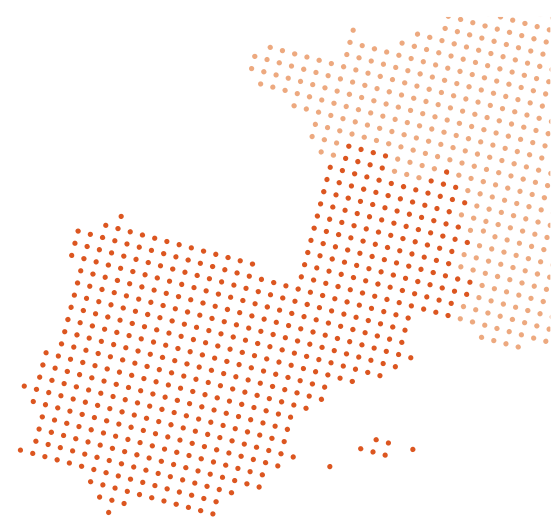
It is possible to identify a series of steps in the process of developing a Living Lab:

1. Definition of the type of Living Lab we want to create.
2. Definition of the Living Lab context
3. Structure and management of the Living Lab:
 - a. Establishing the group promoting the Living Lab.
 - b. Establishing the group operating the Living Lab.
 - c. Establishing the internal regulation.
4. Identification of the target sector (users) and purpose of the Living Lab.
5. Establishing a community of users.

6.1 Definition of the type of Living Lab we want to create

Many different types of Living Lab environments exist such as:

1. **Research Living Labs**, focusing on performing research on different aspects of the innovation process.
2. **Corporate Living Labs** that focus on having a physical place where they invite stakeholders (e.g. citizens) to co-create innovations.
3. **Organizational Living Labs**, where the members of an organization co-creatively develop innovations.
4. **Intermediary Living Labs**, in which different partners are invited to collaboratively innovate in a neutral arena.
5. **Time limited Living Labs**, as a support for the innovation process in a project. The Living Lab closes when the project ends.



Due to the constant development of the concept other types of Living Labs certainly exists.

Despite the multiple different implementations, Living Labs share certain **common elements** that are central to the approach (Figure 6.1):

- **Multi-method approaches:** there is no single Living Lab methodology, but all Living Labs combine and customize different user-centred, co-creation methodologies to best fit their purpose.
- **User engagement:** this is rooted already in the origins of Living Labs, the key to success in any activity is to involve the users already at the beginning of the process.
- **Multi-stakeholder participation:** involving all relevant stakeholders is of crucial importance. These include all the quadruple helix actors: representatives of public and private sector, academia and citizens.
- **Real-life setting:** a very specific characteristic of Living Labs is that the activities take place in real-life settings to gain a thorough overview of the context.
- **Co-creation:** typically, especially in technology projects, activities are designed as top-down experiments, benefiting from users being involved as factors rather than actors. There is an increasing recognition that this needs to change so that users become equal contributors and co-creators rather than subjects of studies. The Living Lab approach strives for mutually valued outcomes that are results of all stakeholders being actively engaged in the process from the very beginning.

Depending on the characteristics of the institutions to which the TWIST project partners belong, each group of partners involved in the development of the Living Lab must **define what type of Living Lab** they want to create.

6.2 Definition of the Living Lab context

To define the Living Lab context, it has to be taken into account:

- **Physical context:** location of the Living Lab facilities and infrastructure.
- **Technical/information context:** information available and to be created and platforms for information dissemination;



- **Social context:** engaged actors, their characteristics and roles, values norms and attitudes (e.g. position regarding knowledge exchange);
- **Tasks context:** tasks and actions that will likely take place and potential interruptions (e.g. by a technical problem).

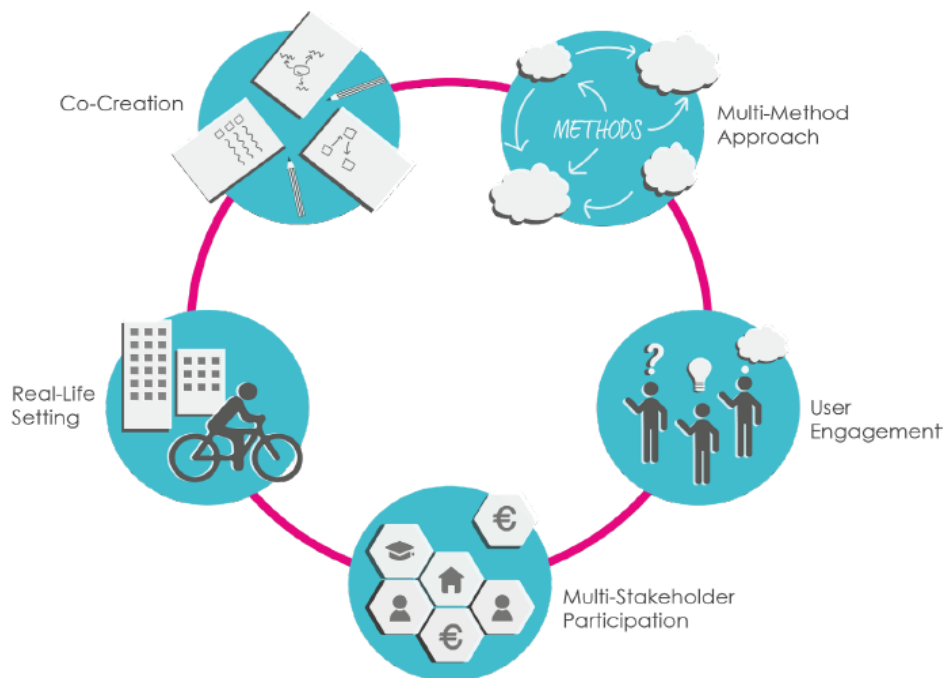
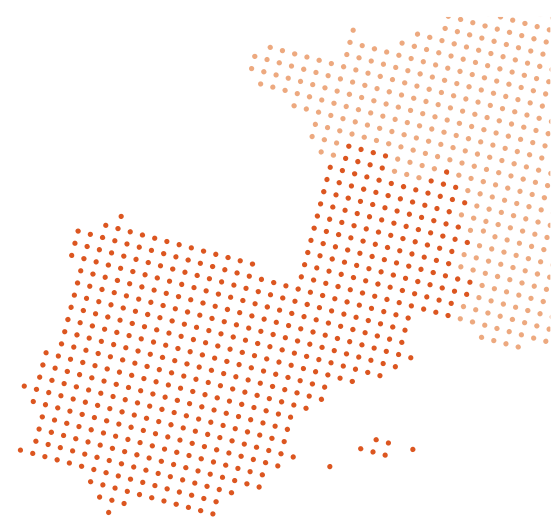


Figure 6.1 Common elements of the Living Labs (Source: Living Lab Methodology Handbook)

6.3 Structure and management of the Living Lab

The governance structure of a Living Lab describes the way it is organized and managed at different levels such as the operational or strategic ones.

The **strategic level** deals with issues like: the way Intellectual Property Rights and exploitation of results are dealt with; the way stakeholders are involved (financial contributions, commitment, responsibility, influence); public-private-partnership; ownership of the Living Lab; services, infrastructure, and the responsible entity for Living Lab (dedicated organization or consortium); the management structure, e.g. director, steering board, (technical) program



committee, user committee; driver and nature of the Living Lab, e.g. 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), subsidy/funding policy and the definition and adjustment of the agenda.

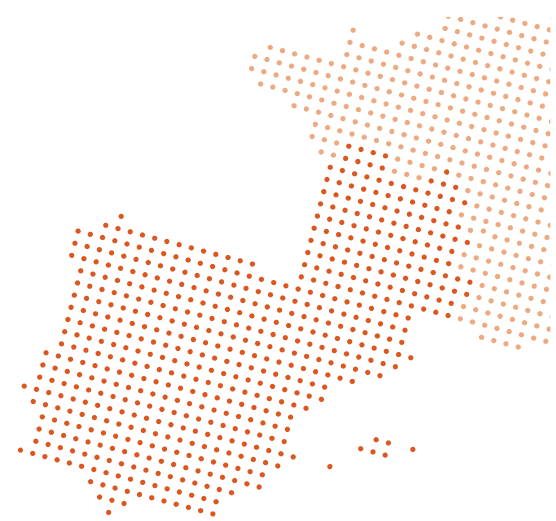
The **operational level** includes aspects like: working practices for the day to day management; execution & monitoring of the living lab goals regarding the synergy, quality and progress monitoring; internal communication; the way new software and services are introduced and validated, responsibilities and liabilities; the definition of user group/ awareness of being part of Living Lab; dissemination and external communication: national and international consolidation; the way projects are organized and funded.

In general terms, the structure of a Living Lab devoted to technological innovation projects can be complex. A **'complete' Living Lab** can have a board and an advisory council and a three-pronged research, development and innovation management that may be in the hands of one, two or three people (group promoting the Living Lab). It has a head of projects and then project coordinators and researchers, developers and research and innovation support staff (group operating the Living Lab). It may also have community developers and trainers. There may be staff devoted to communication, IT staff and people with specific expertise depending on the speciality of the living lab.

6.3.1 Establishing the group promoting the Living Lab

Prior to anything else it is necessary to **create a lead group**. This could be a mixed group that is easily capable of coordinating.

If the Living Lab operates more as a research group and originates from e.g. the structure of an EU project, its organisation chart should feature a group of promoters exhibiting a wide range of institutional and professional profiles, with a head and a spokesperson, and an operational group made up of the heads of the pilot studies and with at least a coordinator and an assistant of the Living Lab, and with one person responsible for overseeing and advising on methodology.



This promoting group takes ownership of the problem to be investigated and can include representatives of the institutions involved – public, private, companies, universities, NGOs, associations and so on, as may be the case.

There is also the possibility that the promoting group of the Living Lab is a single institution, as long as that the starting point for the deployment of the Living Lab, including the physical space and its portfolio of services, already combine a good part of these factors, providing an inner environment that will undoubtedly favour the start of the project.

For practical purposes therefore, what a Living Lab requires in the context of the TWIST project is that all the actors who are going to participate in one way or another in the pilot projects share:

- A social space in common,
- A tool for communicating with each other, and
- Protocols for arranging cooperation between them.

The group needs to be designed taking into account that, to the extent possible, the various agents who make up the system should be included so that all (or most) of the views, values and perspectives of active agents can be represented.

Some examples of different types of Living Labs in the water sector can be consulted in the document 'Atlas of the EU Water Oriented Living Labs' (Water Europe, Brussels).

The **leader** of the Living Lab is the person who will need to be connected to the various partners to ensure that the efforts invested in the Living Lab produce results.

It should be noted that what a Living Lab foresees is a systemic approach to problems. This involves locating the appropriate interlocutors, establishing a common language between them and cooperating to design solutions together.



6.3.2 Establishing the group operating the Living Lab

Secondly, the operating group has to be set up to design and carry out the research, create content, perform analyses and draw up appropriate reports and documents. This group plans the investigation, analyses the results, creates contents and prepares reports on the outcomes of the experiences. In order to design and validate solutions, Living Labs conduct research with and for users.

The operating group should have a **head of projects** (coordinator) and then project coordinators and researchers, developers and research and innovation support staff. It may also have community developers and trainers. There may be staff devoted to communication, IT staff and people with specific expertise depending on the speciality of the living lab.

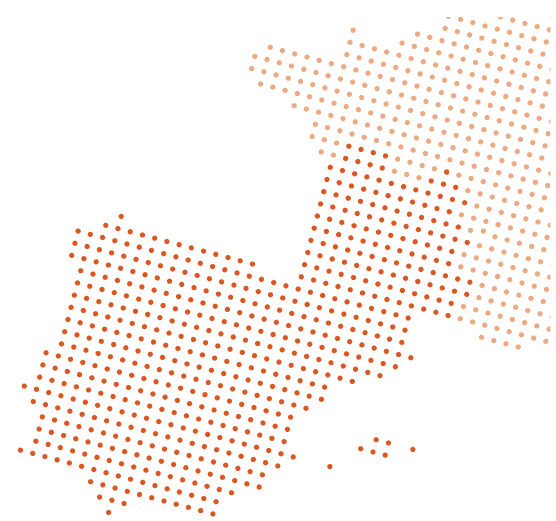
It could be considered in this group the inclusion of some partner institution that develops some of the services that the Living Lab can offer (as example, an communication platform).

6.4 Identification of the target sector (users) and purposes of the Living Lab

The aim of a Living lab is to accomplish Quadruple helix by harmonizing the innovation process among different actors and stakeholders (companies, public administration, researchers and the citizens). Researchers, students, citizens, user communities, external people, NGOs, SMEs, consultants, universities and facilities staff are an example of the multitude of actors that can be part of a Living Lab and of its innovation projects.

The different types of actors bring different contribution to the Living Lab ecosystem. It is therefore important to understand and define the type of each engaged stakeholder to better understand and define in which phase they are likely to be engaged, their likely contribution to knowledge creation whilst simultaneously boosting the creation of synergies. It is also necessary to differentiate between the users of the Living Lab and the end-users of a technology/product.

Building upon the work of Leminen et al. (2012), Schuurman (2015) defines five different **types of Living Lab actors**:



Utilisers aim to develop their businesses within the living lab ecosystem, focusing on developing and testing their new products and services. These utilisers use Living Labs as a strategic tool to collect data on test-users of their products or services and collaborate with all stakeholders in the Living Lab ecosystem, including the end-users. These actors can drive short-term Living Lab projects and can be regarded as short-term ‘users of the Living Lab’. Within the TWIST project utilisers are likely to be **technology suppliers** that will work with the Living Lab community towards the creation of innovation.

Enablers can be various public sector actors, non-governmental organisations or financiers, such as towns, municipalities, or development organisations. These actors can provide (financial) resources or policy support in order to start-up and maintain the Living Lab operations.

Providers provide the other actors in the Living Lab with their product or service portfolio. They are mainly private companies that enter into Living Labs to co-develop new products, services and solutions to their own business or industry needs and focus more on long-term results. They attain these goals through their involvement in general Living Lab operations and (possibly) in the Living Lab cases, driven by utilisers.

Researchers have an important mediating role between the utilizers and the end-users, as they make information regarding user needs easier to read and understand. They are expected to function as intermediaries between utilisers and users, as through their research they are able to abstract need and/or solution information from the users, which the utilisers are looking to explore. However, the Living Lab operations and activities also allow researchers to explore their own knowledge base (testing hypotheses, generating new theories/methodologies, etc.). They expect to generate research data that can be academically valorised. By doing so, researchers contribute to the knowledge retention of the Living Lab.

Users are the ‘end-users’ that are being involved in the Living Lab operations and in the (short-term) Living Lab cases. In some Living Labs, existing user groups or user communities are involved, while in others the Living Lab operations themselves facilitate the formation of a living lab user community. Due to the specificity of the Living Labs to be created within the TWIST project, in the large majority of occasions, end-users are going to be the facilities operators and



managers (private or public), whether from a WWTP or from industrial facilities. End-users can also be farmers that will use reclaimed water or resources.

The **target sector** of each Living Lab must be defined. In Task GT1.1 the regional actors inside the water sector in the region of each Living Lab have been identified. It will work as a database of potential beneficiaries from TWIST project and their interest to collaborate in R&D&i projects related to the wastewater sector.

TWIST partners must keep in mind that a Living Lab is a space where people can meet and build relations around technology development, and find ways of working together, and respond to the opportunities arising from fortuitous connections that the space permits.

The **objectives** of the Living Lab must also be defined: mission, general objective and specific objectives.

6.5 Establishing a community of users

Living Labs are a tool in which users are becoming involved in experimental technological innovations to solve societally relevant problems. In a sense, the Living Lab approach has become a social policy tool through which users are expected to become part of a collective way of dealing and solving societal problems. With this comes the clear transformation of the user into an active user-subject: a user who participates in the living lab while at the same time, is a subject of the lab. This raises several interesting issues such as the new role and expectations for users, and how to engage and involve them in innovation, and for what purposes in light of the varying interests of the different stakeholders involved.

Once the organizational structure of the Living Lab is established, one of the first things to do is create a community of users. This community will be essential to validate the proposed model. It must be emphasized that the task of creating and activating necessary to ensure that the activity of a user community is productive is arduous.

One of the keys to ensuring that a community of users works properly is the care put into its design, its gestation period, its growth and its consolidation as a



productive community (in other words, that it generates experiences and knowledge in a regular basis).

In order to **attract users**, they will need to be offered some **incentive**, for example, **content** (some type of information with which they can provide feedback to the designers, researchers, etc.). ICT tools are a medium of user participation that contributes to lowering entry barriers and creating performance outcomes. Entries in blogs (texts, videos, provocative or suggestive images) and getting debates going can be good tools. This could require a **content creator** and a **community manager**. Another solution, simpler and less expensive, comprises using **email groups**.

A more dynamic method involves organising activities such as **events** and **periodic consultations** (crowdsourcing). All these strategies are designed in accordance with the problem to be treated. The ideal profile for running these tasks is that of **the coordinator of researchers**, a person who, as well as researching, devotes part of their time to catalysing the relationship with the researchers.

To start catalysing a community of users, content and activities are required to attract people. For it, it is important to have a particularly **motivated group of users in each campaign of consultation** within the community of users. This group may need a boost of additional coordination from the Leader of the Living Lab. This group is engaged and operates as an animating, encouraging and motivating group for the general group's activity. This ensures that less effort is spent in getting debates going and the group's participation is greater.

Much of the co-creation has focused on improving the participatory element in innovation, but not on how participation or processes relate to the **empowerment** of users. Some have operated empowerment at three levels: information, consultation and cooperation. As for the information, it refers to the stakeholders who receive information; in consultation, stakeholders are asked for their opinions; and, finally, in matters of cooperation, the views of the stakeholders are incorporated into the decisions.

Instead of presuming that all practices would have the same effect, it would also be good to study how practices promote the perception of empowerment by the users. Perhaps for some stakeholders, information sharing might be seen as a



low-level way of being empowered. This would give due attention to differences between stakeholders and it would not be assumed that co-creation practices can be summarized in a single list for all that will be applied in all contexts. Other aspects such as local culture, politics and social infrastructure must also be considered.

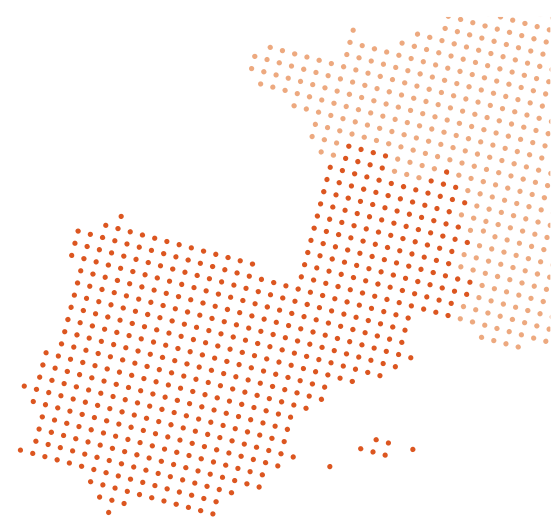
The guideline for users' integration (AAL, 2013) makes several **recommendations** to this regard:

- **Know what your user integration goals are.** Have a clear idea of what you want to achieve with the user integration. Without a clear goal, you might discover wonderful things, but fail to resolve the actual problem at hand.
- **Ask the right questions.** If you need information about the users, you have to ask the right questions. Asking about a product improvement (e.g. of a vacuum cleaner) differs from asking for ideas to solve a problem (e.g. to have a clean house).
- **Don't re-invent the wheel.** There is no need to research what others have researched before. Look for secondary data before you start doing primary research. Thereafter you can focus your primary research on new issues.
- **Plan your user integration process early.** Have a clear understanding of how you want to research user needs through user integration. Timing is crucial from a development point of view (e.g. when ideas are needed or when testing is needed) and from a user recruitment point of view. Senior users are often more busy than one might expect.
- **Integrate the right users.** If you want to learn something from users, you have to decide from whom you want to learn: Integrate users with a lot of ICT experience ('lead users') with idea creation phases; integrate users who are at high risk of making errors when using a solution in the testing phases.
- **Don't make user integration a democratic exercise.** A majority does not usually suggest the best ideas or identify the biggest problems, individuals do. It is the expert's (i.e. your) task to select the best ideas and most relevant problems.
- **Don't let the loudest voice win.** The person involved in user integration, who has the strongest opinion or the loudest voice, does not necessarily have the right or the best opinion. Listen to all users and encourage them to voice their ideas. You must select the solution with the most potential.



- Know which methods to use. Understand different user integration methods' potentials and limits. Only by choosing a method that helps you answer your question with the users you invited, will you be able to understand what they really want or fear.
- Think about the business model from the beginning. Understand what the added value of your solution is from the beginning and try to develop it accordingly. There is no need for a new solution if it offers no additional benefits.
- Integrate paying parties (e.g. tertiary users) from the beginning. Try to understand the needs of those who might pay for the solution as early as possible. Although solutions are socially desirable, they can only unfold their true potential if they are also affordable.
- Make your innovation process iterative. Try to create ideas, develop prototypes of partial solutions, test them, and improve them. Don't wait until the final prototype is ready to test but test continuously to ensure steady improvements.

Many discussions of TWIST partners have been focused on **who will be the users of a Living Lab in the wastewater treatment sector**, and how to involve **citizens** as users of the Living Lab. In wastewater treatment sector, the end users of a technology or product will not be citizens (or organizations of citizens), with exceptions. Living Labs in other sectors that are more focused on civil society can consider citizens as potential users of the Living Lab. But in the wastewater treatment sector it is more difficult to engage the civil society as users of the Living Labs. Anyway, it could be possible to identify some civil organizations that could be considered users of the Living Lab, for example agricultural irrigation organizations (for water reuse) that could be users of the Living Lab or end-users of a technology, NGOs that have projects or can identify needs related to water, local neighbourhood associations, rural development associations, etc. This different kind of associations or organizations may have a good knowledge of the problems related to water in their territory, can be useful for dissemination of the activities of the Living Labs, can be a nexus between the scientific community and the citizens for the diffusion of knowledge, or even give services for the organization of local events. When working at local level it is easier to involve citizens than when working at regional level. So, the day to day work of the Living

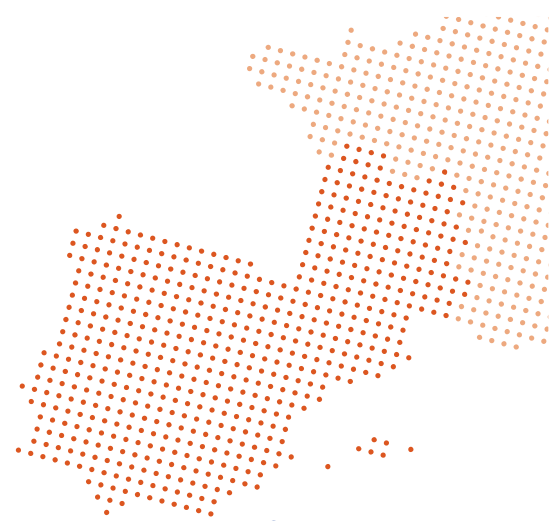


Labs could open some civil organizations to participate, which could have not been considered in the first phase. An effort should be made to think about it and contact potential users of the living lab among this kind of associations/organizations.

Some of the relevant actors have already been identified at early stages of the TWIST project. The list is a starting point, and other actors are likely to be identified and engaged at this stage or later in the process.

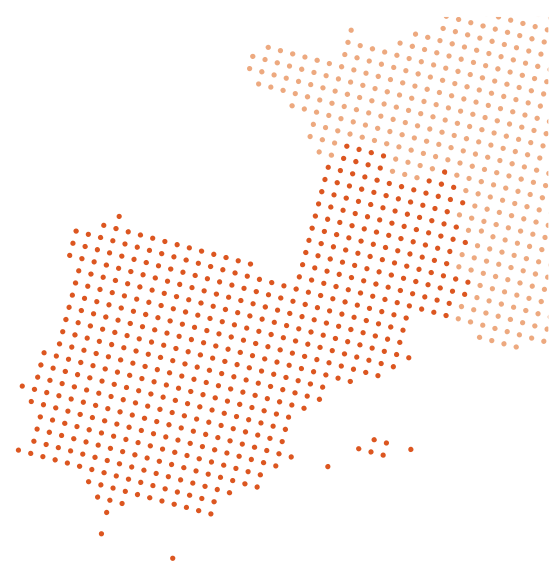
The stakeholders to be added are directly related to the decisions made on how to develop the Living Lab and its projects, namely on whether or not other actors of industries from the identified smart specialization areas should be engaged. For those stakeholders interested on becoming users of the Living Lab, the Living Lab managing entity should define stakeholder's roles and responsibilities within the Living Lab Constellation. The nomination to be user of the Living lab should be on a voluntary basis.

These roles could be defined in an inception meeting with the stakeholder. After defining stakeholder's roles and responsibilities, the Living Lab would get a list of confirmed stakeholders, users and public to be engaged, categorized by likely role.



7 Incorporation of new stakeholders as partners of the Living Lab

The partners of the Living Lab must decide if it would be possible in the future to incorporate new partners in the promoting group of the Living Lab and the form for it. Our goal is to involve the stakeholders representing interests and different responsibilities, including all players of the water sector. Or in the future may one partner decide to leave the Living Lab structure. Therefore, it could be of interest to incorporate new stakeholders in the group promoting the Living Lab.



8 Service catalogue definition

Based on the potential of the partners or users, each Living Lab can develop a catalogue of services to offer, which can serve as a source of financing for its operation.

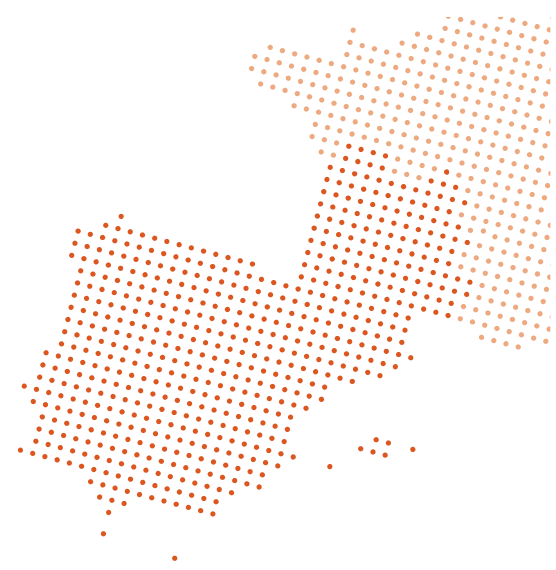


9 Identify and characterize the Living Lab infrastructure

In this section, information should be provided on the type of existing and needed infrastructure(s):

- Essential Infrastructures.
- Facilities where the experimentation will take place (if fixed or ad-hoc) and facilities to be used to hosts events such as workshops.
- Networks – ICT-related infrastructure
- Potential (that will depend on each Living Lab, its projects and activities):
 - Software
 - Hardware
 - Sensors

The list and characterisation of the existing infrastructures will allow identifying their main problems or possible constraints to the activities/projects.



10 Funding of the Living Lab

Financial sustainability is fundamental for a Living Lab to be viable in the long-term and eventually scale up its operations. Social value should be the core of any Living Lab project, but it is also the hardest to obtain: long-term viability is necessary to have a concrete impact on society.

Living Labs require continuous financing and a sustainable financing model to support their innovation. However, they are often not financially sustainable and strive to transfer the value created to a sustainable business model. Therefore, a good number of Living Labs are temporary and financial sustainability seems to be the key condition to become permanent and remain operational in the long term. In addition, the ability to implement solutions with a concrete impact throughout the life of a Living Lab must be ensured.

Most of Living Labs that are adequately funded primarily rely on public grants and subsidies. Even if this is a feasible financing option in the short-term, it does not ensure the viability in the long-term.

The funding can draw on different funding options, which are classified as pay per service (PPS), subsidies (SUB), out of network funds (ONF) and cross-financing (CRF) (Gualandi&Romme, 2019). In the next paragraphs, the four categories are explained in more detail (Figure 10.1).

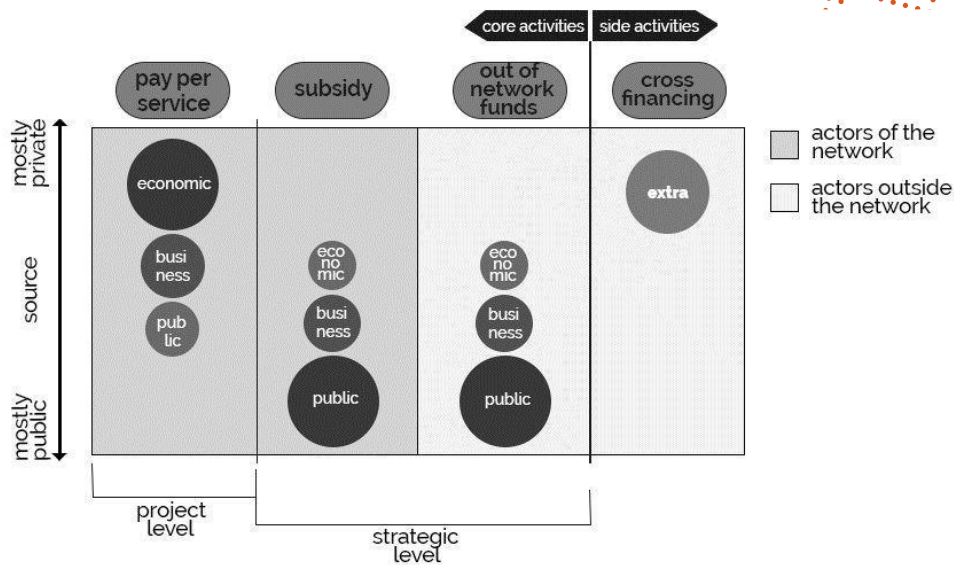


Figure 10.1 Funding mix framework. Source: Gualandi&Romme, 2019.

1. Pay per service (PPS)

Pay per service (PPS) is the most immediate monetary recognition of the services offered by the Living Lab. Indeed, the source of PPS is mostly private. In rare occasions, PPS can be related to company and social value. In these cases, the source can shift partially toward the public sector. Finally, PPS is a funding option at a project level: indeed, PPS relates to the services provided by the LL in the context of a specific project.

2. Subsidies (SUB)

Subsidies are the most frequent funding option connected to social and company value and are ensured by the strategic partners. In fact, social and company 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. Hence, SUB is a funding option that mainly relies on public sources.

3. Out of network funds (ONF)

Living Labs have the possibility to gather important funds by systematically applying for European Community, national and regional calls. Living Labs' 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.

4. Cross-financing (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 LL 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 LL can lease software, etc.). The source of CRF is almost exclusively private and completely external to Living Lab activities.

TWIST Living Labs must describe the funding options they can achieve in order to the long-term viability. In the framework of the project, the objective of funding of the Living Lab must be to ensure the viability, not the economic benefit.



11 Interrelation with other Living-Labs and innovation networks

International cooperation is an intrinsic component of the processes of innovation and development. Besides a model of cooperation, networks are an organizational model for institutional strengthening, for the articulation of national innovation systems and for their internationalization (Ortega Madrigal et al. 2017). Likewise, during the last 10 years there has been an increase of Living Labs linked to innovation in Europe. They are forming a growing community channeled through the European Network of Living Labs.

In the specific case of the Living Lab networks, the results are oriented to strengthen their capacity to provide services such as the validation and development of products, services and systems. The main objective is the exchange of best practices and lessons learned. The harmonization and integration of tools and methods among the partners is other cooperation objective. Finally, a third objective is to develop a larger scale research among the partners of the different laboratories (Ortega Madrigal et al. 2017). It is required a greater organizational structure to achieve collaborative and research results at a higher scale, the networks are still young.

11.1 Interrelation mechanisms among the three TWIST Living-Labs

Our Living Labs are instruments for the active participation of all stakeholders in the R&D&I processes, through the development of co-creation activities, experimentation and evaluation of innovations within the fields related to water management. That is why, naturally, they will contribute to promoting the emergence and strengthening of networks.

The three TWIST Living Laboratories aim to promote common learning between sectors and between regions with different levels of innovation and technological development, working in a network and in a complementary way. This will favour transregional and transnational technological cooperation (achieving an effect impact multiplier). They will also develop synergies between actors to strengthen existing networks and promote new.



Our Living Labs will take advantage and improve regional R&D facilities already existing. TWIST will promote its common use and territorial technological specialization, to optimize thus the regional resources available.

The three Living Labs commit to design transparent mechanisms of joint support to the target groups, favouring access to the most appropriate solutions depending on the needs of end users.

One of the ways to establish the mechanisms for the interrelation among the three TWIST Living Labs is to sign an agreement. The way of developing the agreement has to be decided between the partners of the three Living Labs.

11.2 Relations with innovation networks in the water sector

Two water-related innovation networks have been identified at the European level: EIP Water and Water Europe.

11.2.1 EIP Water

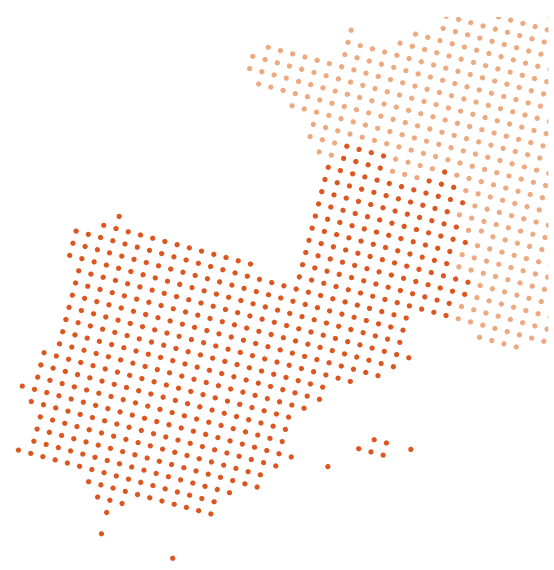
The European Innovation Partnership on Water - EIP Water in short - is an initiative within the EU 2020 Innovation Union. The EIP Water facilitates the development of innovative solutions to address major European and global water challenges. At the same time, the EIP Water supports the creation of market opportunities for these innovations, both inside and outside of Europe.

The EIP Water aims to remove barriers by advancing and leveraging existing solutions. Its implementation has started in May 2013 with the main objective to initiate and promote collaborative processes for change and innovation in the water sector across the public and private sector, non-governmental organisations and the general public. This is mainly done via the establishment of Action Groups.

Topics

Eight priority topics have been identified in the EIP Water Strategic Implementation Plan (SIP). They focus on innovation driven actions that will potentially deliver the highest impact. Five thematic priorities have been selected:

- Water reuse and recycling
- Water and wastewater treatment, including recovery of resource.



- Water-energy nexus.
- Flood and drought risk management.
- Ecosystem services

In addition, there are three selected cross cutting priorities:

- Water governance
- Decision support systems and monitoring
- Financing for innovation

Smart technology has been defined as an enabling factor for all priorities. The EIP Water focuses furthermore on the following **five key barriers and bottlenecks to innovation** in the water sector:

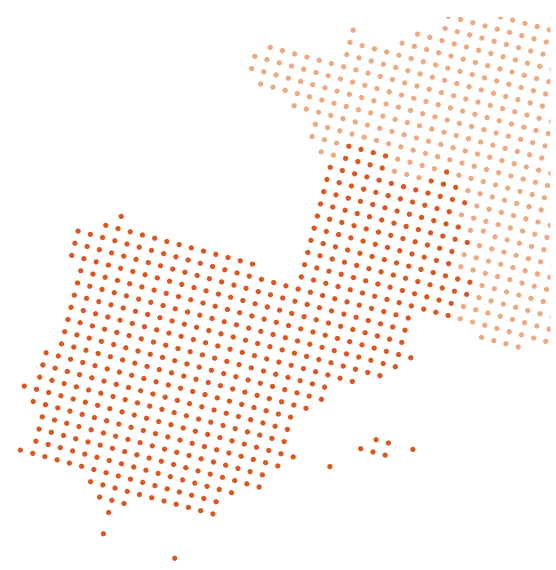
1. Improving access to funding and adequate financial instruments, including markets.
2. Setting an innovation-friendly regulatory framework and overcoming regulatory barriers.
3. Promoting public innovation procurement (supporting the European Assistance for Innovation Procurement Initiative EAFIP)
4. Promoting and learning from Partnerships.
5. Promoting testing facilities and dissemination of showcases.

Organisation and governance

The EIP Water is led by a Steering Group, consisting of 26 high-level representatives of relevant stakeholders spanning both the demand and supply sides of innovation that provide strategic guidance and recommendations to European Commissioners on relevant policies and implementation.

29 Action Groups are developing their own innovations and support the EIP Water work on identifying and removing barriers to innovation. They offer practice-based experiences that can result in appropriate water policy recommendations.

A Secretariat, composed of a consortium of external consultants, has been set up in 2012 to support the various day-to-day activities and bodies of the EIP Water. The Secretariat works under the supervision of the European Commission's DG for the Environment.



Advantages of EIP Water

The EIP Water has positioned itself successfully as a strong player in the European water innovation sector. EIP Water acts mainly in three areas:

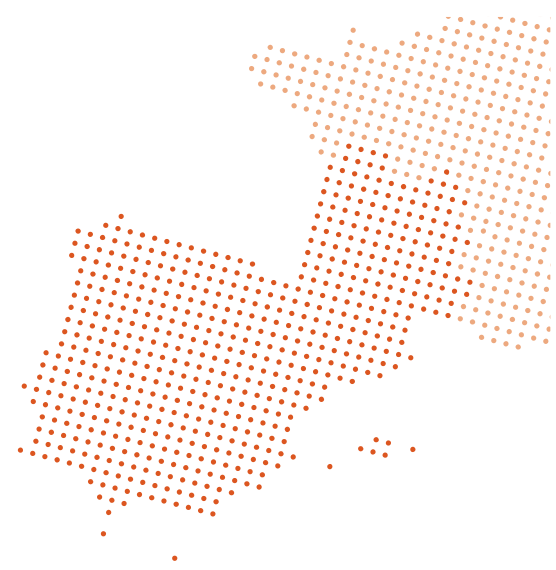
- It supports its Action Groups to deliver faster and better, and to overcome barriers.
- It supports the creation of a proper framework (financing, regulation).
- It communicates and informs about water innovation challenges, and promotes solutions.

How to get involved

The EIP Water is set up as a multi-stakeholder entity with the objective of contributing to and facilitating more innovation collaboration in the water sector in Europe and globally, while seizing market opportunities. It involves stakeholders from public and private institutions, research and knowledge institutes, technology development, NGOs, SMEs, financial sector, ICT, and various water using industries. Some of the instruments of the EIP Water may also be of interest to media and the general public.

According to its partnership approach, different levels of involvement have been defined, and the EIP Water requires the active participation of interested parties to work in Action Groups or get involved in the EIP-Water tools. There are six main reasons for getting involved:

1. Joint development and transfer of innovation
2. Visibility and exposure: For example, a project submitted by an Action Group within the EIP Water will be able to use the label of the EIP Water for external communication purposes, attracting exposure and potential interested markets.
3. Network opportunities
4. Access to EIP Water tools facilitating water innovation: An Online Marketplace was launched in the summer of 2013. At EIP Water Conferences, Action Groups will present their work and foster new partnerships.
5. Support policy development to remove barriers to innovation, including the deployment of financial mechanisms
6. Access to water and innovation related information



Action Groups

The EIP Water has until date published three calls for expressions of commitment for which over 100 proposals were received. Out of these, a total of 29 applications have been selected as [Action Groups of the EIP Water](#). These proposals fulfilled all the requirements and showed the most promising approaches, combining innovative ideas with partners across the innovation value chain and potential for applications and/or commercialization. These Action Groups are actively supported by the EIP Water Secretariat, the European Commission and Steering Group members to increase their impacts and drive concrete outcomes.

In principle, the Action Groups can add additional partners, in order to widen the perspective and further strengthen their activities. The decision to add partners is made by the partners of each Action Group themselves. If you are interested to join one of the Action Groups, please contact the lead partner.

The proposals that had not been selected have received feedback comments. The European Commission strongly encourages the partners involved to further strengthen their proposals and submit them again at the next call for expressions of commitment. The EIP Water Secretariat is available for support.

EIP Water tools

The EIP Water develops and implements a series of tools to support and facilitate the development of water related innovation in Europe and beyond. These tools will not necessarily be linked to the priorities of the EIP Water, but will be open to any stakeholder in the water sector and interested in innovate solutions and approaches. Existing tools that have been developed since 2013 are:

EIP Water Conferences: will be organized to present the activities of the Action Groups and the progress in implementing the EIP Water, its tools and activities.

Online Marketplace: The objective of the Online Marketplace is to create and establish a digital hub for water innovation “matchmaking” - by connecting problem owners with owners of solutions, regardless of their geographical position. The Marketplace offers a large variety of features, driven by the stakeholders' interests, and is continuously optimised.



The EIP Water Marketplace enables you to search for colleagues of interest across the entire innovation value chain, as well as offer your products and services. It is possible to find people along their expertise, search for specific projects, search for specific products, search for companies or organizations, and filter a interesting news stream.

Advantages of collaborating with EIP Water for the Living Labs

The objectives of the TWIST project are perfectly aligned with the objectives and mission of EIP Water. First, the main objective of the TWIST project is the creation of new partnerships between key actors in the water sector with the ability to mobilize innovation processes, creating an innovative model of organization and collaboration. Second, two of EIP Water's thematic priorities coincide with the orientations of the three Living Lab of the TWIST project. On the other hand, EIP Water offers tools such as the Market Place also contemplated in the TWIST project.

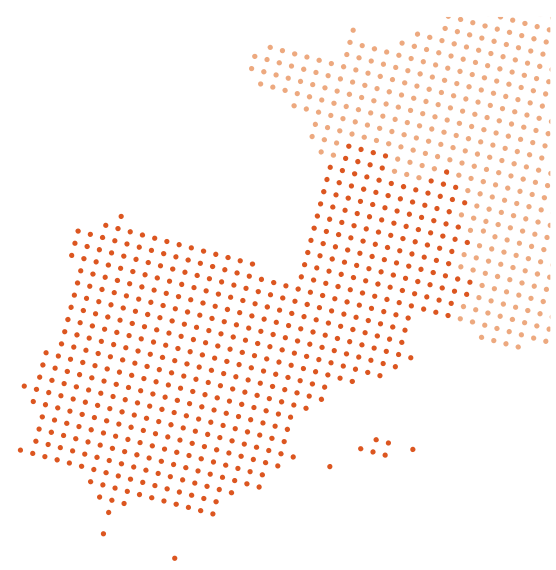
Collaboration and/or participation with EIP Water can bring many advantages to the project, as well as to the activities carried out in the Living Labs:

- EIP water could boost the dissemination of the project as well as the activities carried out by the TWIST Living Labs.
- All products or projects carried out in the Living Lab could be included in the Market Place tool.
- Participation in action groups could accelerate innovation processes in the Living Lab.

Possible actions for participating in EIP Water

Living Labs partners could take several actions that could be discussed:

- Participate in action groups already existing.
- Propose to EIP Water the creation of a new Action Group on Living Labs.
- Submit to the EIP Market Place all the projects developed by partners of the Living Labs.
- Create profiles of the organisations and researchers of the Living Labs.



11.2.2 Water Europe

Water Europe (WE) is the recognized voice and promotor of water-related RTD and innovation in Europe. Is a European technology platform aimed at overcoming the fragmentation of the European water sector. They strive to increase coordination and collaboration, to enhance the performance of the water service providers, water users, and technology providers, in a sustainable and inclusive way, and to contribute to solving water-related societal challenges.

Water Europe is a multi-stakeholder organization representing the full diversity of the water value chain. Their constituency reflects the diversity of roles, uses, and interests of water service providers, water users, technology providers, public authorities, and civil society.

Their mission is:

- Improve coordination and collaboration in the water sector and water using sectors.
- Enhance the performance and competitiveness of the European water sector and water using sectors.
- Contribute to solving societal challenges through research and innovation.

Their activities are organised in three programmes:

- The Collaboration Programme: allows the members to network, exchange knowledge and experiences, and to collaborate along the water value chain to address challenges, develop and implement new solutions, and shape successful project consortia.
- The Advocacy Programme: advocating for the proper inclusion of water-related topic in European funding programmes.
- The Market Programme: enables the members to bring their research results and innovative solutions to the market in Europe and beyond.

Working Groups

Working Groups (WG) are R&I focused and cover the full water cycle. Their functional flexibility enables them to tackle the existing and emerging water challenges. Each WG works in cross-fertilising collaboration with the Vision Leadership Teams of the Water Europe Clusters, with other WGs and the Water



Europe's strategic stakeholders producing tangible outcomes towards the achievement of the Water Smart Society.

Water Oriented Living Labs (WoLLs)

Water Europe is committed to the development of so-called water-oriented living labs. These Living Labs require the involvement and commitment of multi-stakeholders, including water authorities, while providing a “field lab” to develop, test, and validate a combination of solutions as defined in the Water Europe SIRA.

Membership

Services to members are at the heart of the WE strategy. With the members' needs as their guiding compass, they provide top-notch services to the diversified membership. In line with the ETP strategy developed by the European Commission, WE offers a wide range of services.

The fee to become a member of Water Europe for Research & Technology Developers is 3,000 €/year. Members from EU member states with a GDP of less than 75% of the EU average, can apply for a membership fee reduction (1.050 €/year).

11.2.3 National and Regional water innovation networks

At national and regional level, every Living Lab can identify the existing innovation networks in which they could have interest to participate.

In Andalusia two platforms have been identified:

Plataforma Tecnológica Española del Agua

It is a network of R&D&I of the water sector whose main objectives are:

- Generate added value for Partners, Sector and Society.
- Encourage participation and collaboration in R + D + i between national and international entities and authorities, public and private, strengthening the collaboration between the scientific community and the business sector.
- Prepare and implement a Strategic Research Agenda (AEI).
- Identify and promote R & D & I projects.
- Promote technology transfer.
- Promote the formation of the productive and user fabric.



The Platform promotes sectoral R+D+i, and Spanish participation in the international scene, and especially of Spanish companies and public centres in programs, initiatives and projects of the European Union.

CESEAND

The Centre for European Services to Andalusian Companies (CESEAND) is the Andalusian node of the Enterprise Europe Network, the European Network of SME Support Centres for internationalization, business cooperation, innovation, European R&D projects and transfer of technology.

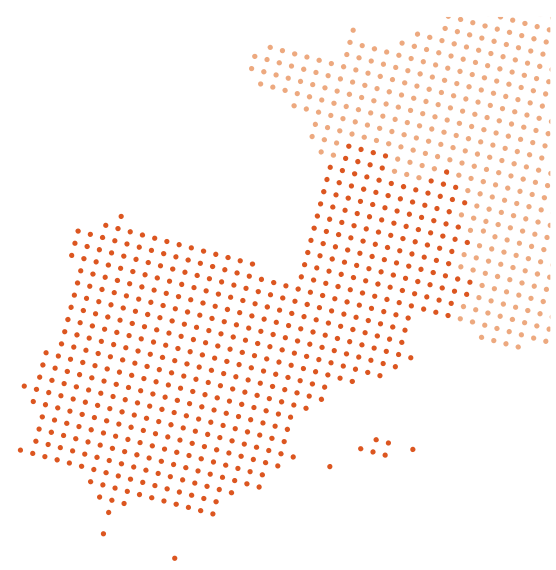
CESEAND is formed by a Consortium coordinated by the Agency for Innovation and Development of Andalusia (IDEA), in which the Andalusian Agency of Knowledge, the Confederation of Entrepreneurs of Andalusia (CEA) and the Andalusian Council of Chambers of Commerce participate.

The main objective of CESEAND is to offer a comprehensive service to all companies by the different CESEAND partners according to the “one-stop-shop” principle, including business or technological cooperation activities, advice on innovation, internationalization and financing within the framework of the programs and calls of the European Union.

11.3 Relation with Living Lab networks

Public and private organisations from across the world actively committed to engaging and empowering users and citizens to take part in sustainable innovation processes are invited to apply for membership of the **European Network of Living Labs** (ENoLL). <https://enoll.org/>

ENoLL counts today 150+ active Living Labs members worldwide (400+ historically recognised over 12 years), including active members in 20 of the 28 EU Member States, 2 of the candidates and it is present in 5 continents in addition to Europe. Directly, as well as through its active members, ENoLL provides co-creation, user engagement, test and experimentation facilities targeting innovation in many different domains such as energy, media, mobility, healthcare, agrifood, etc. As such, ENoLL is well placed to act as a platform for best practice exchange, learning and support, and Living Lab international project development.



Innovation Partners

Innovation Partners are organisations which are involved in the object and activities of the association, but who are not selected according to the ENoLL selections process. Through payment of the annual membership fee they get access to the ENoLL member activities, but no voting rights in the General Assembly. They also get full rights to act and represent the ENoLL non-profit organization. They can submit candidatures for the ENoLL elected bodies (and have voting rights if elected).

Adherent members

Adherent members are organisations that represent a Living Lab, which was duly selected according to the ENoLL selection process (also called a 'Wave'). During this selection process, adherent member applicants provide ENoLL with a motivated application as a Living Lab. If the organisation meets the criteria set by the ENoLL association, adherent membership is granted to the applying organisation. These members are included in the ENoLL communication channels, and have the right to be present and participate in the ENoLL activities (General Assembly twice a year, Working Groups and Thematic Groups).

Eligible proposals are then assessed by a panel of experts selected from within the ENoLL community in a peer-led review process. All reviewers have experience in running Living Labs in different cultural, sectorial and geographical contexts. All evaluation criteria are very important. However, it is not strictly necessary to satisfy them all: evaluators look more at their balance with respect to the development of Living Lab operations.

Applications passing the eligibility test are assigned to teams having no member from the proposing country and are scored according to the following criteria, clustered into five categories.

Adherent members do not pay any membership fees (only an annual administrative fee), and therefore have no voting rights in the General Assembly. Waves are initiated ad hoc on a more or less yearly basis.

Effective members

Adherent members can choose to become Effective members and have a vote in the organisation and strategic directions of the ENoLL association. Only



approved Living Labs can become effective members. They do so by paying the annual fee and gain some rights.

Yearly fee

The yearly fee for **Innovation Partners** and **Effective Members** is € 5.000 and should be paid at the beginning of each year. The administrative fee for **Adherent Members** is € 500.

The Learning Lab programme

The learning Lab programme is offered on an annual basis to a group of Learning Lab mentee. The programme consists of Living Lab trainings and learning materials. The materials are continuously adapted in accordance with the current needs of the participants in the programme.

The Learning Lab fee consists of an annual fee of € 500. Upon payment of the fee the Learning Lab mentees gain access to the learning materials represented in the member's area of the Learning Lab for one year. Additionally, the fee includes entry for one representative of the organisation at the next Day 0 event, hosted in connection with the annual Open Living Lab Days conference. Day 0 consists of tailor-made presentations and workshops designed especially for the Learning Lab programme.

Learning Lab consultancy - training day

This one-day training organised at a location chosen by the client is co-designed and co-facilitated together with the ENoLL office and minimum one active Living Lab member from our network. The € 5000 fee includes the organisation of a tailor-made one-day workshop built around topics identified through consultation with the client. Travel fees are included in the price, yet administrative event organisation (venue, catering etc.) is organised by the host (client).

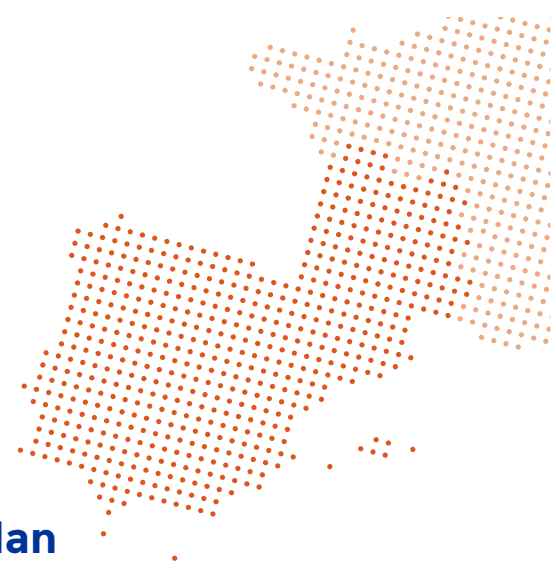
Learning Lab consultancy - mentoring

The mentoring programme brings together an expert Living Lab member and the client in a one-on-one consultancy programme, based on tailor made offers. The client provides a brief upon which the Living Labs from our network build their applications from which the client can choose their mentor. The duration and



other specifics included in the fee of € 20 000 - € 25 000 are to be agreed together between the two parties.

Every TWIST Living Lab is free to decide if they want to be a member of the ENoLL and which kind of member. It could be interesting to become an Adherent Member to start, to receive support of the Network, paying an administrative fee (500 €).



12 Internal regulation – Management Plan

12.1 Initial considerations

For the internal regulation of the activities of the Living Lab it could be useful to prepare a Management Plan. It is up to the freedom of the TWIST Living Lab partners to decide if the management plan is prepared and what its extent is, which contents among those proposed or additional could be included. The Management Plan is not mandatory and, in some cases, might not even be needed; on the other hand some actions not foreseen can be needed and added in a case-by-case approach. It is the responsibility of the Living Lab managing entity to select and/or adapt the sections to be undertaken as appropriate. This management plan could include the following sections.

12.2 Type of entity

Define the type of entity we are going to create. Some physical and permanent Living Labs are constituted as foundations; others operate as associations, as research centres and some as private companies. Some partners may also prefer a memorandum of understanding or a coalition agreement between the partners of the Living Lab.

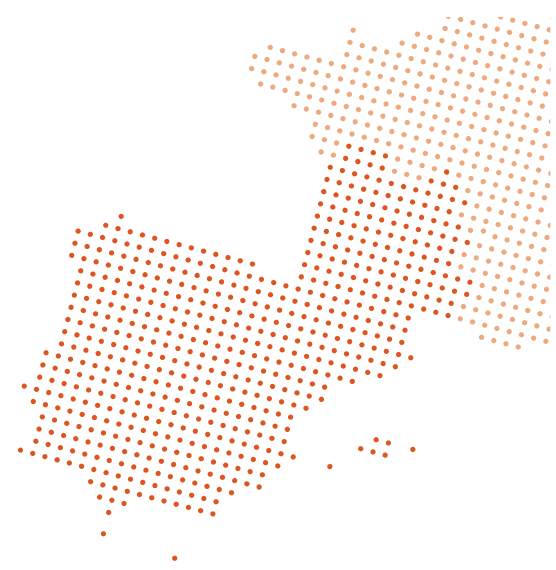
The structures of such entities are chosen in accordance with the types of interest they represent.

12.3 Type of Living Lab

Define the type of Living Lab and which sector is focused on. See chapter 5.3.

12.4 Objectives of the Living Lab

- Mission
- General objectives
- Specific objectives



12.5 Target sector

Identification of the potential users of the Living Lab, including stakeholders from the Quadruple Helix.

12.6 Organization chart

- Promoting group
 - Leader of the Living Lab
 - Committees, etc.
- Operating group
 - Coordinator
 - Project coordinators and researchers
 - Supporting staff
 - Communication staff, etc.

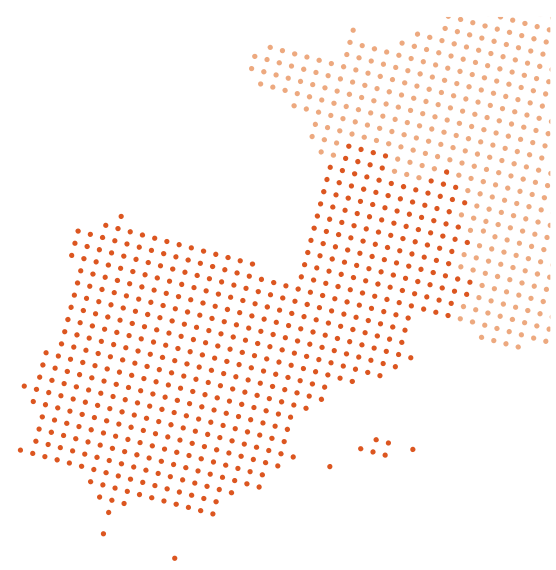
12.7 Facilities of the Living Lab

Describe the facilities of the Living Lab, including ICT-related infrastructure, and the potential for research.

12.8 Communication mechanisms and meetings

Both the promoting group and the operative group should have a tool for internal communication. The easiest way is establishing e-mail groups, and it would be good to define the mechanisms for the fluent communication between the coordinator of research and the leader of the promoting group, as well as between partners.

- Communication channels
- Periodical meetings
- Technical meetings
- Dissemination and communication



12.9 Corporate image

Every Living Lab will design their own logo, based on the common characteristics accorded between TWIST partners.

12.10 Periodical reports

An important activity for the dissemination of the activities of the Living Lab is the elaboration of periodical reports, which may have annual periodicity, and that could be disseminated among the users community and the general public.

12.11 Documents repository

Materials developed during the activities of the Living Labs (guides, documents, etc.), that are not subject to confidentiality, could be shared between the partners of the Living Lab. In that case partners should agree the repository or mechanisms for sharing that information.

12.12 Services catalogue

This section contains the catalogue of services that the Living Lab offers, that can serve as a source of financing for its operation.



13 Internal evaluation – Monitoring and evaluation plan

13.1 Initial considerations

Monitoring and evaluation of a project is understood as the actions taken to observe the execution of the project, so that possible problems can be identified in a timely manner and corrective measures can be taken if appropriate. The monitoring and evaluation process is an essential component of results-based management. It constitutes the foundations that allow to elaborate clear and exact reports on the results obtained through the project, in order to provide information to the decision makers and evaluate the effects. The monitoring of projects aims to support their management, as well as anticipate and manage their risks. It is about the more or less systematic and continuous collection of useful data for further analysis (review and evaluation) and for decision making that will be transmitted to the affected parties.

In order to monitor and evaluate the performance of the Living Lab, a monitoring and evaluation (M&E) plan could be prepared. The monitoring moment could also serve to verify any slippage between the planned and the executed activities.

The Monitoring and Evaluation Plan is not mandatory. It is the responsibility of the Living Lab managing entity to select and/or adapt the sections to be undertaken as appropriate.

This plan can include following sections:

13.2 Objectives

First, it is necessary to define the objectives, either of the Living Lab as an entity, as of the activities / projects that are developed.

13.3 Indicators

The performance of a Living Lab is evaluated in the same way as the performance of any project, business, programme or strategic plan is evaluated. In



order to be able to evaluate the degree to which the initial objectives have been achieved it is necessary to create a set of indicators.

Comparing the initial and final state of the indicators enables the effect of the changes carried out during the time to be ascertained. These indicators can be established at two levels:

- for the Living Lab as a whole, and
- for each of its pilot projects taken individually.

Indicators to complement the ones suggested here should be developed when each Living Lab project is agreed upon and not ahead of it.

Type of indicators:

The three widely acknowledged types of indicators are:

a. ***Process indicators:*** are those indicators that are used to measure project processes or activities. For example, in a Living Lab, this could be “the number of consultations to users.”

b. ***Outcome Indicators:*** Are indicators that measure project outcomes. Outcomes are medium impacts of a project. For example, in the case of a Living lab, outcome indicators could be “the number of users involved in the Living Lab.”

c. ***Impact Indicators:*** Are indicators that measure the long term impacts of a project, also known as the project impact. In the case of the Living lab, e.g. number of products that reach market or a certain TRL.”

Factors to consider when selecting project indicators

Any appropriate M&E indicator must meet particular thresholds. They must be:

- ***Precise/Well defined:*** Probably the most important characteristic of indicators is that they should be precise or well defined. In other words, indicators must not be ambiguous. Otherwise, different interpretations of indicators by different people implies different results.
- ***Reliable:*** implies that the indicator yields the same results on repeated trials/ attempts when used to measure outcomes. If an indicator doesn't yield consistent results, then it is not a good indicator.



- **Valid:** implies that the indicator actually measures what it intends to measure. For example, if you intend to measure impact of a project on access to safe drinking water, it must measure exactly that and nothing else.
- **Measurable:** an indicator must be measurable. If an indicator cannot be measured, then it should and must not be used as an indicator.
- **Practicable:** In other cases, although an indicator can be measured, it is impracticable to do due to the cost or process constraints. An indicator must be able to utilize locally available resources while at the same time being cost effective.

Example of questions to which the indicators can answer for the performance quality of Living lab

- Has an effective consortium been created? [Identify coordination needs and delineate the consortium's successes and failures]
- Was the exploration carried out by the established deadline, with the personnel and the resources planned? [Compare the original planning to the actual execution]
- To what extent has a dynamic and participatory community of users been created? [Compare the goals to be met to the community and the final attainments, identify conflicts arising and contributions generated, etc.]
- Have the insights stemming from the research been duly expressed in materials, guides, graphs, diagrams and other documents that enable the scalability and transfer of the acquired knowledge?
- Has a realistic intervention plan been designed that has given rise to observable changes? [Compare its goals to the results obtained]
- Has evidence been collected of a change in the state?[Compare the figures for the indicators before and after the intervention]

13.4 Actions

When the analysis of indicators shows a deviation of the objectives that were established, either in the operation of the Living lab or in the development of activities / projects, it could be useful to define the actions needed to correct those deviations.



13.5 Evaluation reports

These reports should be made on a regular basis (e.g. yearly) and must include the initial and current state of the indicators and the progress in the period. They also should identify the deviations detected with respect to the initial objectives, either of the Living Lab or the activities/projects developed.



14 Methodology for Living Lab activities/projects

14.1 Introduction

Living Labs are complex multi-stakeholder constellations where a multitude of activities take place. Based on a systematic literature review and on experiences and observations of Living Lab practices, Schuurman (2015) made a distinction between three different levels of analysis within Living Lab phenomena:

- The **macro or organizational level**, where the Living Lab is a set of actors and stakeholders organized to enable and foster innovation, typically in a certain domain or area, often also with a territorial link or focus;
- The **meso or project level**, where Living Lab activities take place following a mostly organization-specific methodology in order to foster innovation;
- The **micro or user activity level**, where the various assets and capabilities of the Living Lab organization manifest themselves as separate activities where users and/or stakeholders are involved.

The methodology for Living Lab activities, with the common elements and identified innovation process, thus can be situated at the **meso-level**, where the projects are structured based on it. As presented before, the following principles are core within Living Lab methodologies: active user involvement, real-life experimentation, multi-stakeholder and multi-method approaches.

However, to anchor the individual user involvement activities (**micro level**) with a methodological framework that follows this design reasoning, Schuurman et al. (2013) proposed that Living Lab activities/projects resembled a quasi-experimental approach. Following the above reasoning, we can distinguish three main blocks within Living Lab activities/projects, following the innovation development phases:

- **Exploration:** getting to know the ‘current state’ and designing possible ‘future states’. It means involving all stakeholders, especially user communities, in the initial phases of the co-creation process to discover new scenarios, new social challenges, etc. in real environments.



- **Experimentation:** real-life testing of one or more proposed ‘future states’. The implementation of “live” scenarios for the discovery of emerging uses, behaviors and market opportunities and to experience live scenarios with a large number of users, while collecting the data that will be analyzed in context during the evaluation activity.
- **Evaluation:** assessing the impact of the experiment with regards to the ‘current state’ in order to iterate the ‘future state’. Evaluation of concepts, products and services according to social criteria. Evaluate new ideas and innovative concepts, through various dimensions beyond technological innovation.

In short, Living Labs contributes to building a new innovation model in which users become from passive receivers to fully active elements throughout the process.

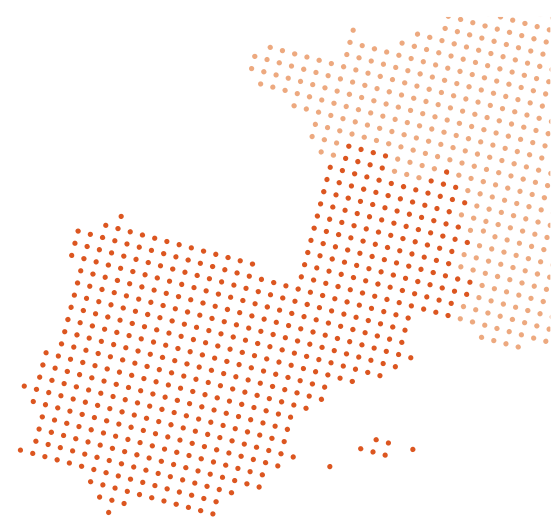
Different methods and tools are used throughout the Living Lab innovation processes having Veeckman et al. (2013) conclude that the innovation outcomes of a Living Lab depend on the type and mix of the used tools.

There is a wealth of methods and tools that can be applied in a Living Lab, that depend on several variables including among others, the governance structure and expertise, its domain or objective.

14.2 Exploration

The first phase within an innovation project, following the Living Lab approach, can be labelled as ‘exploration’. In terms of the new product development process, this consists of moving from idea towards concept or prototype of the solution, identifying needs and opportunities.

The **main goal** of this stage is getting an **overview of the current products and practices of users you want to target**. A specific focus is put on the current problems they still face, taking into account the specific contexts in which these problems occur. This is done by means of methods and techniques like observation, participation (events, workshops, surveys, etc.) and in-depth interviews.



After understanding the users and their context, one engages in the process of **discovering latent needs and wants of the users**. This leads to the definition of opportunities for improvement of the users' 'current state'. These opportunities materialize in possible 'future states' by means of:

- *Brainstorming*. This ranges from the identification of existing solutions (through documentation, consulting experts), to the generation of new solutions/ideas (e.g. via workshops employing creativity techniques). This stage concludes with a list of ideas.
- *Evaluation and selection of ideas*. This is the stage when the ideas are filtered and candidate ideas for project proposals are chosen. This is generally on the basis of innovation, social/environmental desirability, economic viability, technological feasibility and security.
- *Conceptualisation*. This is the stage for developing the most promising ideas emerging from the evaluation filter and developing the concept. The concept will shape the design. Concepts should be validated and enhanced (improved) by the agents involved.
- *Design and prototyping of solutions*. Once the concept is established it is then drafted and laid out for the subsequent construction of a prototype of the product or service.

The prototypes will be validated with the help of the users involved. As many prototypes of the product, service, etc. are made as are needed to reach an agreed level of satisfaction among the parties involved.

Subsequently, exploration is used to develop and share ideas for solutions to these needs, in order to come to concrete innovation concepts. This exploration stage also provides a certain benchmark of the 'current state'. This is important, as it allows the measurement of potential impacts and effects of the experimentation stage in order to measure the effects of the innovation. Therefore, this stage also can be considered as the 'pre-measurement' before the intervention, which takes place in the experimentation stage.



14.3 Strategy for activating the process of consultation among users

Having planned the exploration (which methods and techniques will be used to carry out the exploration?), the operating group will have to execute the exploration (how, by whom, when and where is the information going to be gathered?) and subsequently process the results (how will the information generated, amassed, ordered and analysed be turned into knowledge?).

Activating the process of consultation is just one more step in the research process. The research should be carried out bearing in mind that the results of the research effort should be capable of being applied to transform the existing reality.

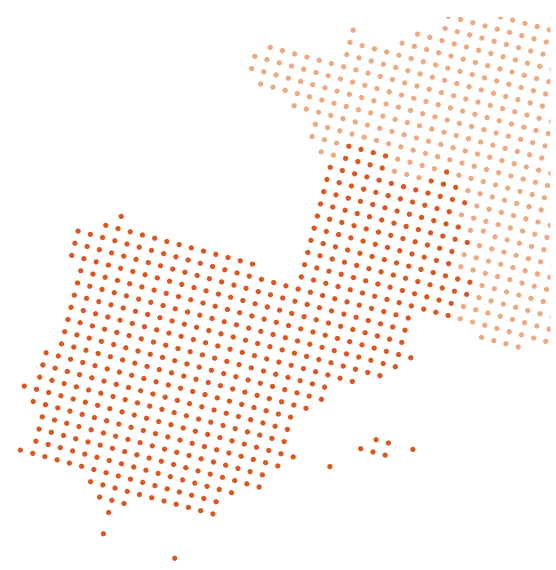
Scientists, designers, communication experts, specialists in marketing, entrepreneurs, large companies, institutions, NGOs, industrial and engineers as well as specific personnel appropriate to each context and community administrators may all converge in an R&D&i project.

Each Living Lab will have its set of methods and tools that better adequate to the expertise and goals. Formal and informal methods such as surveys, interviews, questionnaires, observation, workshops, events, focus groups or multi-criteria analysis have been used to collect and produce data.

Some documents can be consulted, like:

- **End-User Engagement Toolkit** develop by U4LoT project, which aims to introduce some research background as well as serve as a practical guidance for researchers and practitioners on Living Lab methodologies, co-creation and user engagement. <https://u4iot.eu/end-user-engagement-toolkit.html>
- **Engage 2020**. Tools and instruments for a better societal engagement in "Horizon 2020". D3.2 Public Engagement Methods and Tools. <http://engage2020.eu/media/D3-2-Public-Engagement-Methods-and-Tools-3.pdf>

This document includes an Annex in which the best methods and tools for the context of a Living Lab in the water sector.



14.4 Experimentation

The second stage within an innovation development process can be labelled as ‘experimentation’. In the previous stage a certain solution or ‘future state’ materialized into a concept, this stage puts it to the test by developing and experimenting with a prototype.

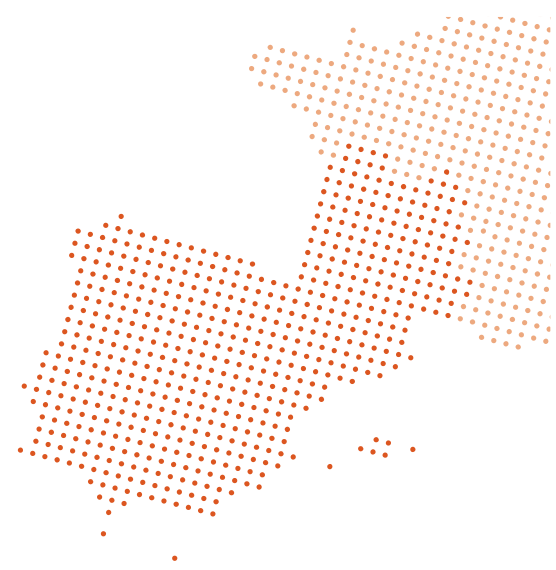
The magnitude and scope of the project determine the roles. In the case of TWIST Living Labs, the personnel involved will depend on each specific pilot project. But **all the agents truly involved in a project** ought to be included in the management and research process.

The important thing is that in designing the working group for each project the various agents comprising a system are represented and that, in one way or another, they are there to contribute to its dynamism. To this end the relevant potential participants need to be identified, contacted and offered the Living Lab as a space of communication, coordination and cooperation for carrying out the pilot projects.

Specific for a Living Lab approach is the ‘real-life’ setting in which the testing takes place. The degree in which ‘real-life’ can be attained is linked to the maturity of the design. Prototypes can take on many forms, from tangible Minimum Viable Products to intangible services or experimental design prototypes, but their main goal is to facilitate testing of the possible ‘future state’. Depending on the maturity, the interventions can be labelled as technology assessments, User Experience testing, or actual field trials.

When a prototype is stable enough, the experimentation can take the form of an actual field trial. Depending on the possibilities, this testing can be short to longer term, involve a few to large amounts of users, and can include some specific to all aspects of the solution.

Summarizing, the experimentation stage puts the designed solution to the test, as much as possible in a real-life context, and allows a decision to be made on whether to head back to the exploration stage to iterate your solution, or whether to proceed to the evaluation stage.



14.5 Evaluation

The third and final stage consists of evaluating the innovation. As the exploration stage provided a benchmark regarding the 'current state' of the end-users, the experimentation stage simulated an envisioned 'future state' by means of an intervention.

In terms of Open Innovation processes, this stage is aimed at exploitation. Exploitation entails purposive outflows of knowledge or technology, implying innovation activities to leverage existing technological capabilities outside the boundaries of the organization. Related to the entrepreneurship literature, this stage can also be labelled as the 'product-market'-fit. In the experimentation stage ideas can be enabled to mature into a tested prototype, which can now be addressed to a target market and to the end users. The goal is to launch and implement the innovation into these target markets, based on a go-to-market strategy.

The focus is on understanding the potential market, which can be done through techniques as market research, user toolkits for customization or conjoint analysis for defining a concrete offering. This also involves preparing a coherent marketing communication and strategy. A key question at this stage is: what advantages is the 'future state' able to deliver in terms of the 'current state'? This also facilitates determining pricing levels, as this is much easier when it is possible to quantify the impact of your solution.

This stage can also consist of the post-launch activities, where actual adoption and usage of the innovation is monitored in order to re-design or add new functionalities according to the needs of existing or new market groups.

14.6 Time management and requirements of projects

Time management in a Living Lab is fundamental. Budgets are generally tight and it is therefore desirable for time management to be as strict as possible. As a general rule, it will always be necessary to institute multilinear planning, in other words doing varying things at the same time, and trying to solve unforeseen eventualities into the phases that have been planned. Since projects involve relations with people and institutions, delays typically occur. The work must



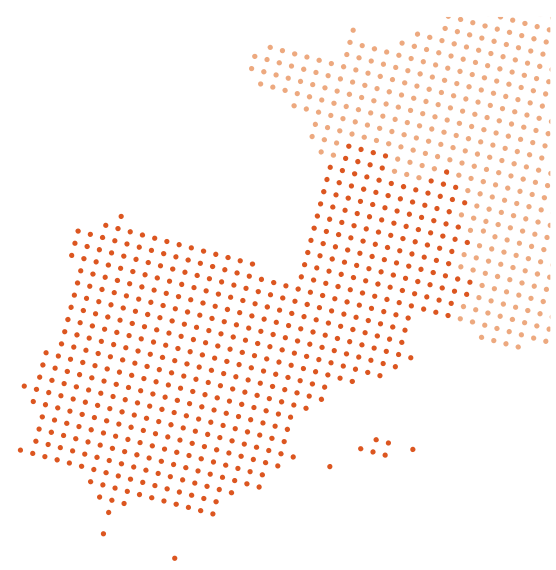
therefore be organised with the ongoing awareness of the need to gain time because, when they are least expected, unforeseen circumstances will arise.

In major projects where pilot tests are planned, such as EU projects, a paradox tends to arise that can lead to frustration and plunge the project into crisis. Tests are planned and a budget is drawn up assuming that the validation tests of the pilot study will provide positive results. But what happens when the pilot study is negative (the invention does not work as expected)? What resources will be used to remedy the situation? And what resources will be used to carry out a second pilot study to ensure that the tweaks have been successful, and the solution can now be scaled up? Administratively, matters have been conducted as they were supposed to be. In other words, all the participants have acted correctly and, on the face of it, everything has been duly explained. The results however have left the door open to 'future research'. This is a lost opportunity. A Living Lab needs to change these dynamics on the basis that solutions are not always positively validated, and it is sometimes necessary to incorporate unforeseen changes, changes that may be substantial. It is therefore necessary to accept that the pilot studies may prove complicated, and that budgets will have to be managed creatively as a result.

Worse still, what happens if, once the users are appointed, they ask for things that go beyond the remit of the project? What happens if instead of incremental changes (which the project is likely to be able to accommodate without undue difficulty) they ask for radical or even disruptive changes? What capacity does the project have to respond to such proposals? Was it not supposed to be a user-centred innovation project? As with the previous scenario, a Living Lab ought to be capable of resolving such dynamics.

One solution is to work on anticipating unplanned events. Users often surprise researchers with their proposals. Let us include time and resources for the unforeseen.

In other words, the duration of research depends on its complexity. It is always possible however to adapt it to the agreed deadlines. Everything depends on the use that is made of resources, on the time and on the people involved. There are many flexible ways of conducting research.



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