Chapter 12
Collaborative Decision-Making Processes for Local Innovation: The CoULL Methodology in Living Labs Approach

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12.1 Introduction

The recent European Union programs and activities, oriented to promote an integrated vision of innovative urban planning and design, involving citizens as "city makers" to innovate and participate in governance and policy-making, identify cities as nodes able to bring together global networks of skills, knowledge, capital, public and private value (European Commission, 2019a, 2019b, 2020). The different existing and new research and innovation activities focused on urban issues contribute to enabling a sustainable and systemic approach to innovation through promoting co-creation, co-development and co-implementation processes, supported by new business and governance models, mobilising new partnerships and types of investments, and informing policy-making, planning and land use management.

The multiple initiatives support cities in developing a people-centred approach, putting open innovation into practice and spreading multi-stakeholder solutions across cities, accelerating the transition to sustainable, climate-neutral, inclusive, resilient, safe, healthy, smart, prosperous and socially innovative cities.

A human-centred city needs strategic research and innovation agenda focusing on eco-innovative solutions, where eco-innovation, according to European Commission (Decision N° 1639/2006/EC) and the Eco-Innovation Action Plan (EcoAP) (European Commission, 2011), can be defined as "any innovation that makes progress towards the goal of sustainable development by reducing impacts on the environment, increasing resilience to environmental pressures or using natural resources more efficiently and responsibly". EcoAP identifies the need to promote a constructive interaction among different stakeholders, including policy-makers on various

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governance levels, Member State representatives, the business sector, researchers and civil society, underling the opportunity of designing and proposing an interdisciplinary and transdisciplinary framework that ties together knowledge, innovation and the environment.

Indeed, the elaboration and implementation of eco-innovation processes and actions can be supported by the Quintuple Helix model (Carayannis & Campbell, 2010), which integrates the Triple Helix and the Quadruple Helix models. Whereas Triple Helix focuses on knowledge production and uses in a context where university, industry and government interact (Etzkowitz & Leydesdorff, 2000), the Quadruple Helix adds the helix of the media-based and culture-based public (Campbell & Carayannis, 2017; Carayannis & Campbell, 2009) (Fig. 12.1).

The Quintuple Helix introduces the helix of the "environment" with attention to natural environments, including social ecology features, and considering society–nature interactions and symbiosis between human activity and the environment (Rapport, 2007). The Quintuple Helix can be considered an analytical framework for sustainable development and social ecology, where societal ecosystem (actors, institutions, structures and processes) interrelates with social and natural environments, enabling the integration between knowledge and innovation, and making operative the eco-innovation defining a context of "innovation ecosystem". Knowledge and learning represent, respectively, a resource and a process able to generate new ideas and opportunities, leveraging innovation and creativity, and able to develop "creative knowledge environments" (Concilio & Celino, 2012; Dougherty, 2004; Ellström, 2010; Hemlin et al., 2004; Wallin & Horelli, 2010; Zobel et al., 2017).

In crisis conditions, it is essential to understand how cities build, convert and modify the relationships proper to urban contexts through endogenous development processes based on knowledge and learning (Campbell, 2012). The interaction between knowledge and the learning process determines the opportunity to build new relationships among communities, where trust becomes an essential component for elaborating shared collaborative development strategies.

According to the above perspective, Living Lab's concept constitutes an approach that structures the possible interactions between knowledge and learning, identifying a user-centred ecosystem, open to different kinds of innovation, understood as a process model of collaborative behaviour and active democracy, to implement self-sustainable development practices (Concilio, 2016; Dutilleul et al., 2010; Følstad, 2008; Leminen et al., 2012; Marsh, 2008). The competitive advantage of the territories and their economic actors no longer depends solely on technological innovation and the territorial system's capacity to understand the social demand for innovation and direct it towards a better quality of life.

The Living Labs approach can be implemented to design, explore, and experiment with policies, programs and projects and evaluate potential impacts, using methods and tools capable of integrating technical assessments with those of a political nature. These approaches allow analysing the changes in the relationship between the natural and built environment and the settled community, stimulating reflections oriented on the collaborative aspects of the decision-making process. A crucial role is played by co-evaluation techniques (Garnsey & McGlade, 2006; Guba & Lincoln, 1989;

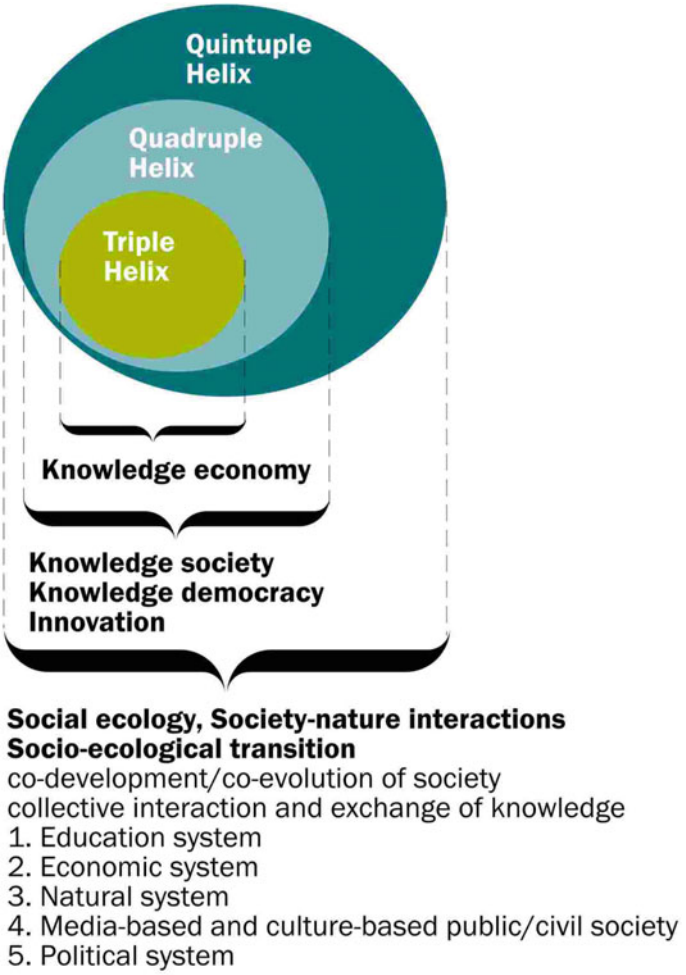

Fig. 12.1 From Triple Helix model to Quintuple Helix model (*Source* Carayannis & Campbell, 2017, *elaboration of authors*)

Patton, 2011), experimenting with adaptive and synergistic evaluation models to support collaborative and incremental decision-making processes. Co-evaluation is open to the interaction among knowledge, new digital technologies and innovative methodologies, such as gamification processes, useful to support the creation and strengthening of existing bonds and solve real-life problems (Cerreta et al., 2020; Panaro, 2015).

The implementation of collaborative evaluation processes integrates Multi-Criteria Analysis (MCA) and Multi-Group Analysis (MGA), Social Mapping Analysis, Social Network Analysis, Participatory Appraisal and GIS, Soft System Methodology, and Network Analysis, combining approaches and tools focused on

enabling dialogue and cooperation among different interests, skills and knowledge. The interaction among different groups of actors allows us to understand and identify the possible Public–Private-People-Partnerships (PPPPs) (Marana et al., 2018), outlining a context-aware strategy, consisting of micro-actions, co-created and co-designed, shared and achievable.

In these processes, the web and platforms allow activating networks among services and people, taking into account the Internet of Things, Internet of Services, and Internet of People (Simmers & Anandarajan, 2018).

The paper is organised as follows. Section 12.2 presents the Living Lab approach; Sect. 12.3 describes the CoULL methodology oriented to develop an integrated approach of Urban Living Lab, an evolution of FormIT methodology combined with the 4Co Model; Sect. 12.4 explicates the framework of CoULL methodology implemented in some research projects; Sect. 12.5 provides some recommendations and highlights the conclusions.

12.2 The Living Lab Approach: A Transformative Process

The concept of Living Lab (LL) (Marsh, 2008, European Commission, 2009; Leminen et al., 2020; ENoLL, 2021) is closely connected to the priorities of the Europe 2020 strategy and of the Digital Agenda for Europe and is the subject of numerous user-centric open innovation programs (Framework Program for Competitiveness and Innovation—CIP, ICT Program of the Seventh Framework Program), and of European projects (SMARTiP, EPIC, PERIPHÈRIA, City SDK, CIVITAS, LIVERUR, AgriLink, etc.), supported by the European ENoLL Network, today composed of more than 440 accredited Living Labs.

There are many definitions that, over time, have tried to clarify the concept of LL, related to its fundamental principles: openness, influence, realism, value, sustainability (Bergvall-Kåreborn et al., 2009).

Openness refers to the collaboration between people of different backgrounds, perspectives, knowledge and experiences. Influence is related to users' active role, who, like other partners, have decision-making power; for this reason in the LLs there are often correlated concepts such as participation, involvement and commitment (Barki & Hartwick, 1989; Baroudi et al., 1986). Realism refers to the need to test innovation and user behaviour in a real-life context, thus obtaining valid results for the market. Value is related to the economic value for the actors involved, to the "business value" (the value for the employee, for the customer, of the suppliers, the managerial and social value). Sustainability means responsibility for the broader community in which we operate. The following aspects are highlighted: lifelong learning, development over time, partnerships and networks, satisfaction of personal and social desires, environmental responsibility and economic effects (Bergvall-Kåreborn et al., 2009; Hossain et al., 2019; Liedtke et al., 2012). Precisely the capacity of LL to produce innovation in a broader community has determined that they assume stronger links with urban policies ever. Therefore, the LL approach has found new application fields

(work environments, district areas, urban planning) and took different forms. Today the trend in Europe is to adapt the LL concept and approach and use them as a tool to foster ITC innovation, inclusion, utility and usability and their applications in society (Eriksson et al., 2005; Voytenko et al., 2016).

In recent years, many European research strategies have promoted new social innovation paths for urban development (for example, Horizon 2020, Urbact and JPI Urban Europe). In particular, the JPI Urban Europe program seeks to create the conditions for which solutions can be developed and tested in real-life environments thanks to the collaboration between interested parties and citizens, paving the way for experimentation with Urban Living Lab (ULL).

ULLs distinguish from LLs for the find of locally sustainable solutions to city problems. Indeed, in ULL, the real-life context of innovation is a territory or a space-bound place, and the answers are found involving citizens and local stakeholders. The ULLs have been implemented to support cities to speed up the sustainable transition (such as climate change and energy transition), promoting the development and operationalisation of innovation, experimentation, and knowledge in real-life urban settings while emphasising the important role of participation, engagement and co-creation (Bulkeley et al., 2016). Indeed, it is becoming increasingly evident that none of the challenges facing contemporary cities (economic and digital disparities; ageing populations; migration; environmental and health crisis) can be solved by governments if they act alone.

The search for innovative solutions to current urban problems also requires new models of cooperation among entities (central, regional, local government), civil society associations, businesses and other interested parties. The traditional relationships between the citizen and the public administration are therefore evolving towards "pluralist" models (Peters & Savoie, 2000), in which the interested parties participate in some way in the realisation of sustainable solutions and services (Pollitt et al., 2006). ULLs become tools for triggering local innovation processes that affect public goods and collective services in this decision context.

Generally, in ULLs, the innovation process is assured thanks to co-creation activities (Steen & van Bueren, 2017). By co-creation, unusual and new ideas can be developed thanks to the presence and the co-working of several stakeholders at the same time and in the same place. They can help identify problems and challenges, desired trajectories that are seen as feasible solutions and can be followed to deal with complex systems. At the same time, ULLs rely on Public–Private-People-Partnerships (PPPs) (Innovation Alcotra, 2013), as citizens and local associations are considered an essential source for the innovation process.

However, integrating the LL approach with the territory development policies is a complex operation that requires the need to identify necessary initiatives and structure a network of participating and potentially interested local actors. In this way, the demand for innovation is prepared for actual experimentation, in which participatory strategic planning and territorial self-government take on particular importance. Research on how to shape and steer ULLs has been conducted through the literature review on LLs and participatory governance models. The study has developed a methodology framework, called Collaborative Urban Living Lab (CoULL)

(Panaro, 2015), an evolution of FormIT methodology (Ståhlbröst & Holst, 2012), combined with the 4Co Model (Pollitt et al., 2006) to implement ULL in the local Co-Governance processes.

12.3 The CoULL Methodology

The CoULL methodology aims to rationalise local Co-Governance processes through the articulation of a ULL. These processes aimed at engaging and involving citizens in every phase of public and collective services development (4CO Model): design (Co-Design), production (Co-Production), decision-making (Co-Decision), and evaluation (Co-Evaluate) (Pollitt et al., 2006). The 4CO model highlights how cooperative solutions are necessary for cooperation between governments and between bodies and institutions, civil society associations, businesses, stakeholders and citizens. Participation and active involvement are a prerequisite for development creation of sustainable solutions. This consideration implies that public bodies evolve from a closed system towards the organisation of an open network, which builds dialogue and a relationship of trust with society through transparency and the activation of awareness and responsibility processes. Therefore, the traditional model of "design-decision-production-evaluation" is reinterpreted according to a cooperative approach that involves stakeholders and citizens at every stage of the process.

The "co-design-co-decision-co-production-co-evaluation" model develops dynamically, including continuous feedback among the different phases, recognising that a production experience can lead to design changes, evaluation results can influence the other stages, and different decisions are made at all stages, not just at one point in the process cycle.

The four different models of relations among public institutions and citizens/users (Fig. 12.2) allow for highlighting how decision-making processes can progressively evolve.

The Traditional Model (quadrant I) highlights a predominance of internal activities oriented to providing services and focused on inputs and procedures. Citizens as consumers do not intervene in the process; the focus is on the quality of resource allocation and the related processes and activities. Compliance with the rules and legality are the essential prerequisites.

The Implementation Participation Model (quadrant II) includes citizens intended as co-producers. Public sector administrations are recognised as open to the outside world, but the focus remains on internal inputs and procedures. Voluntary collaboration is only considered to reduce costs and provide additional services.

The Enlightened Ruler's Model (quadrant III) provides for the citizens' participation only in the evaluation phase concerning the quality of the services offered.

The Co-Governing Model (quadrant IV) integrates the phases of co-production and co-evaluation and adds co-design and co-decision. The model is open to the outside world and provides for the active participation of multiple stakeholders, involved both in the services offered and in the expected results, outlining a form of

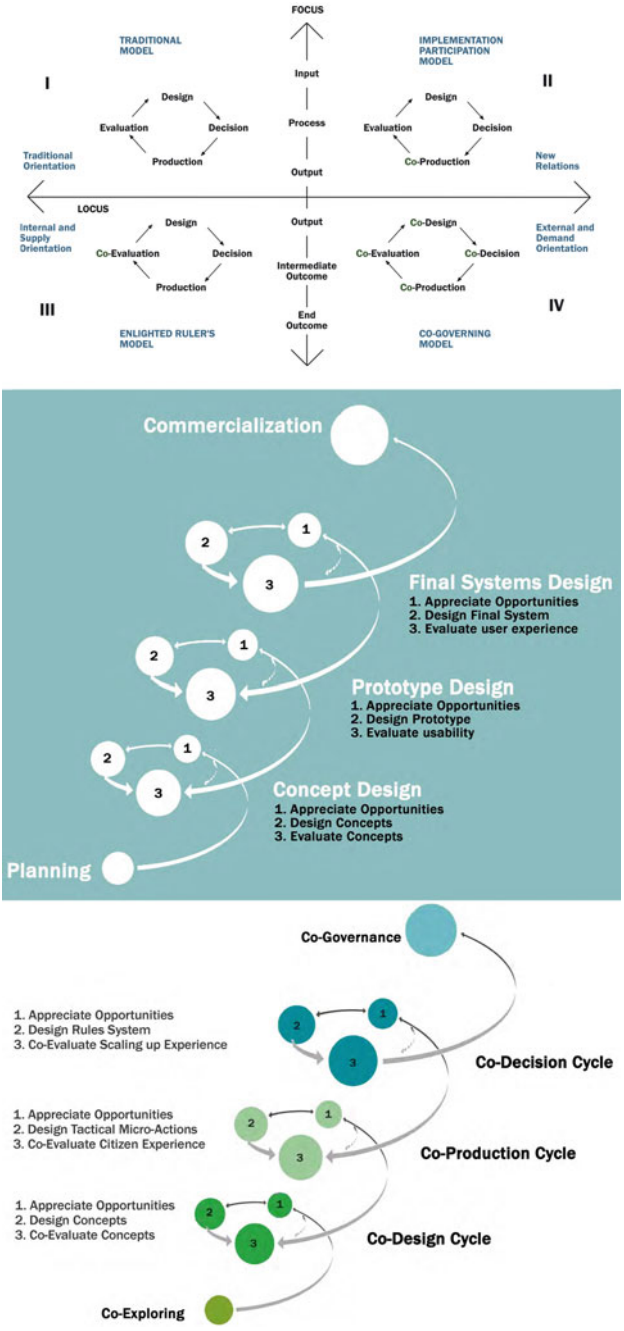

Fig. 12.2 The 4CO model (*Source* Pollitt et al., 2006, *elaboration of authors*); The FormIT model (*Source* Almirall et al., 2012, Ståhlbröst, 2008 *elaboration of authors*); The CoULL methodology (*Source* Panaro, 2015)

co-management in which the measure of citizen satisfaction can be transformed into satisfaction management (Van Dooren et al., 2004).

The 4CO model introduces an innovative process in the decision context, including cooperation among the different stakeholders to improve the quality of the process and results.

At the same time, the FormIT model (Fig. 12.2), developed by the Luleå University of Technology in cooperation with CDT and different IT enterprises with the aim to support the involvement and engagement of users in LL (Bergvall-Kåreborn & Ståhlbröst, 2009; Bergvall-Kåreborn et al., 2009; Ståhlbröst, 2008), integrates the approaches of Soft Systems Thinking (SST) (Checkland, 1981; Checkland & Scholes, 1999), which recognises plural points of view crucial to bring about change; Appreciative Inquiry (AI) (Cooperrider & Whitney, 2005), which considers the development opportunities arising from positive experiences as a basis for innovation; and NeedFinding (NF) (Patnaik & Becker, 1999), which focuses on the needs and interests of users throughout the entire process of developing innovation, keeping multiple fields of investigation open and looking beyond the immediate problem to be solved. The FormIT methodology articulates an interactive process between users and the development team. The innovation occurs in three iterative cycles: Concept Design, Prototype design, and Final Systems Design. Each cycle, in turn, is developed in three phases: Appreciate Opportunities, Design, and Evaluate. The evaluation phase is present in each cycle to expand the focus from aspects related exclusively to usability towards a system's holistic vision. In each cycle, the individual phases take on specific objectives and lead to different results.

According to the FormIT model, the CoULL framework has articulated a ULL into incremental and progressive development cycles, drawing a spiral process. Each cycle represents a phase of the 4CO Model: Co-Design (Cycle 1), Co-Production (Cycle 2), Co-Decision (Cycle 3). At the same time, each cycle has further divided into additional steps that assume a diverse nomenclature and meaning in the different cycles. A Co-Evaluation phase has been added in each development cycle, while the Co-Governance model is placed at the spiral's apex.

The methodological structure also provides for a preliminary Co-Exploring phase. The conditions for developing and concrete experimentation of innovative solutions for the supply and co-management of public or collective services, spaces and goods are investigated with local actors (Fig. 12.2).

The proposed methodology aims to include in the different development cycles: citizens and social innovators; enterprises (profit, low profit and non-profit); cognitive institutions (schools, universities, research centres, academies and cultural institutes); organised civil society (social partners and third sector subjects); public institutions (Iaione, 2015).

In the Co-Design Cycle, the goal is to identify the values recognised by local communities and define concepts with the citizens to enhance the territory. The cycle develops by considering the following steps:

- Identification of a reliable sample of citizens/users and selection of involvement and engagement tools and techniques (Appreciate Opportunities);

- Elaboration of intervention concepts with the participants (Design Concepts);
- Identification and representation of local values shared by the involved community (Co-Evaluate Concepts).

The Co-Design Cycle works to recognise the identity components on which to base transformation micro-actions of the context. Indeed, the specific context is the privileged place where the behaviours, actions, ways of living and perceiving of users and citizens that change over time are manifested. All these components give each context-specific meanings, making it an identity for a community in a given period.

Therefore, representing the perceived reality is equivalent to investigating the spatial and temporal relationships of local values, developing an internal knowledge of the territory, starting from acquiring the meanings attributed to physical characteristics. Therefore, the aim is not to represent reality as it is but as it is lived. The specific context does not have a value in itself; it depends on the social relations that give meaning to the different goods and places.

Indeed, contexts with similar characteristics can assume different meanings, roles, protection systems because there is a relational nature between goods and places that requires interpretative analyses. Therefore, the role and type of relationships that contribute to the formation of values are investigated, starting from the perceptions of users and citizens' points of view, thus also exploring the lesser-known aspects and the potentials that emerge in the comparison between specific groups of involved actors.

In the Co-Production Cycle, the goal is to implement micro-actions to enhance the specific context with a selected group of citizens and partners. It is, therefore, configured as a cycle that includes the definition and testing of regeneration models. The cycle develops considering:

- Identification of citizens and users to be actively involved in the testing process, identifying specific needs and requirements (Appreciate Opportunities);
- Elaboration of an intervention program, defining the conditions, methods and types of collaboration among partners, also through the drafting of specific agreements (Design Tactical Micro-Actions);
- Monitoring of the experience of citizens, users and partners to detect perceptions, changes in behaviour, and any corrective actions and new relationships (Co-Evaluate Citizen Experience).

This cycle is taking into account the practices of tactical urban planning (Pfeifer, 2013), which recognises the needs and methods to be included in the processes of gradual transformation in everyday experiences. The main purposes are: actively involve the beneficiaries to bring about the change; collect the ideas that come from the context to face the challenges of local transformation; satisfy real needs with low costs and short times; reduce the chances of risk; develop the different forms of social capital among the different actors involved in the decision-making process. To give and answer to the social and economic changes of a local context, an active commitment of citizens is therefore experienced in the transformation process through the implementation of temporary interventions, considered as a bottom-up approach that

can help to recognise shared goods and trigger innovative processes of revitalisation of local resources.

In the Co-Decision Cycle, the goal is to define a co-management system of goods and/or places shared among citizens, local administration and users.

This process happens when a community recognises itself around a common good (Ostrom, 1990) and claims its management capacity. By participating actively and directly, an individual activates a mechanism of sharing with others but recognises a common good when he/she begins to feel responsible for actions, affect transformations and contribute to related choices. Only in this case, it is possible to start a Co-Decision process, defining: needs and opportunities (Appreciate Opportunities); a system of rules for the co-management of common goods (Design Rules System); the conditions of process scalability (Co-Evaluate Scaling up Experience).

According to Ostrom (1990), commons are spaces or collective resources, managed by a limited group of people (local community), based on rules known, accepted and shared by community members. The commons' recognition depends on social conventions and institutions: indeed, a good becomes legally common only if a community undertakes to manage it as such. Through experimentation by trial and error, communities can consolidate mutual trust relationships, self-regulate and develop high skills. Community and shared management of commons, when applicable, can lead to more significant benefits than state or private management, because it actively involves individuals for whom that resource is conceived as a vital good.

The Co-Evaluation phase, internal to all development cycles, allows for the transition and implementation from one cycle to other thanks to the recognition of: values shared by a specific community (Co-Evaluate Concepts); actions that favour the recognition of common goods (Co-Evaluate Citizen Experience); local conditions that can enable the development of new models of co-management of common goods (Co-Evaluate Scaling up Experience).

Co-Evaluation, integrating adaptive and synergistic approaches, identifies cyclical decision-making paths that from knowledge lead to the identification of relationships and, therefore, to the construction of new values (Zeleny, 2005). In this phase, the potential of the spontaneous transmission of knowledge and the availability to interactive, mutual and collaborative learning among the different involved actors, useful for supporting social and territorial innovation processes, are investigated.

12.4 The CoULL Implementation in Different Decision Contexts

The CoULL methodology has been elaborated and tested in the CilentoLabscape project (Cerreta & Fusco Girard, 2016; Cerreta & Panaro, 2017), revised in the GardeNet project (Cerreta, Panaro, et al., 2018) and the SSMOLL project (Cerreta et al., 2020). Besides, it represents the conceptual reference of the methodological

Fig. 12.3 The CoULL methodology and the test projects

framework developed and implemented in the REPAiR project (Amenta et al., 2019; Cerreta, Inglese, et al., 2018) (Fig. 12.3).

In the CilentoLabscape project, the Living Lab, activated in the National Park of Cilento, Vallo di Diano and Alburni, focuses on the concept of "human smart landscape", in which the smart and human dimensions are integrated and uses technologies as an enabling factor to connect and involve institutions and citizens. The aim is oriented to rebuilding, recreating and motivating communities, stimulating and supporting their collaborative activities to achieve a condition of shared social well-being. In this direction, the CilentoLabscape LL represented a Co-Promotion and Co-Production process of the unknown, abandoned, or underused places of the Park.

The CoULL methodology has allowed to Co-Explore with local actors the more suitable topics and places to activate specific thematic arenas, Co-Design experimental actions, and Co-Produce them with local groups. Where possible, has also been implemented the Co-Decision Cycle to support local Co-Governance processes.

More in dept, thanks to the cooperation with local actors, three different thematic arenas have been activated:

- Ri.Vivo arena for identifying new ways to reuse the abandoned village of Castel Ruggero in the municipality of Torre Orsaia;
- Ci.Resto/Ci.Vado/Ci.Torno arena for re-discovering value places of the Park and identifying new itineraries suitable for more sustainable tourism;
- Ri.Uso arena for bottom-up regenerating of unused public spaces in the municipality of Sapri.

From a methodological point of view, the Ri.Vivo arena was developed up to the first cycle of Co-Design that was carried out a new narrative of the Castel Ruggero village by mapping its significant elements, collecting stories, surveying the buildings and spaces, elaborating visions, identifying interests and needs. The Co-Evaluation step

was worked to bring out a new interpretation of the landscape values and identify possible enhancement tactics.

The Ci.Resto/Ci.Vado/Ci.Torno arena was a travelling workshop in the National Park of Cilento, Vallo di Diano and Alburni and was developed in the Co-Design and Co-Production cycles. In the Co-Design Cycle, a survey was elaborated on the "places of value" of the Park aimed at building maps of identity values. In the Co-Production Cycle, a gamification process was activated to test an alternative way of cultural promotion of the Vallo di Diano territory. Attention was focused on the spatial experience of people and communities and its representation in the geographical space to trace the identities of the territory and develop a multidimensional interpretation of the landscape qualities.

The Ri.Uso arena has developed the three cycles of Co-Design, Co-Production and Co-Decision. In particular, in the Co-Design Cycle a survey was focused on the public space in the municipality of Sapri to identify an area in which to experiment bottom-up urban regeneration. In the Co-Production Cycle, micro-actions were developed for the transformation of the test area. The Co-Evaluate Citizen Experience phase has had a key role and was aimed at assessing citizens' engagement and experience throughout the process activated in the Co-Production cycle. The Co-Decision cycle has been activated when the neighbourhood inhabitants have started a process of co-management of the common spaces by agreeing on a uses regulation and related maintenance, then approved by the local administration.

The incremental process has activated new social interactions over time, resulting in a change of intended use (from parking to square) of the test area, recognised as a common good and supporting the cooperation for shared results. In this cycle, the Co-Evaluate Scaling up Experience phase was aimed at monitoring the process of co-management of urban spaces, the local community's level of participation, the dissemination of results in the urban context and institutional and social spaces.

In the GardeNet project, an Urban Living Lab has been activated in the city of Naples, developing a co-learning process to favour the involvement of the young generation in urban green care. Indeed, the GardeNet ULL has represented a safe test environment for new collaborations among public and private actors, non-profit organisations, young people, and active citizenship to increase young people's participation in green care.

The collaboration with different organisations has permitted to explore the potential of shared gardens as socialising public places in problematic urban areas characterised by a high density of population and young, a high unemployment rate, a low level of education and a lack of safe public spaces.

The CoULL methodology has facilitated the activation of a Public–Private-People Partnership (PPPP) and to exchange among different actors developing their ability to direct services at citizen's and young's needs. The GardeNet project has worked in three problematic districts of the city, and the related activities have been implemented according to all the cycles and steps of the CoULL methodology.

In particular, in the Co-Design Cycle, it has been activated collaboration with high schools, universities, and local associations to share experiences and co-design ways to involve different target groups of young (teenager, students, parents, unemployed)

in the various neighbourhoods of the city. In the Co-Production Cycle, have been tested different activities (practical workshops, open-air lectures, training activities and public events), monitoring all participants' engagement and their progressive interest to cooperate to improve spaces and the definition of new activities for the post-project phase.

In the Co-Decision Cycle, a process of communication, information and dissemination of the results was activated. During all process, the Co-evaluation of elaborations (Co-Evaluate Concepts), actions and services (Co-Evaluate Citizen Experience) has permitted to analyse the conditions for the replicability of the experiments in the same or other areas of the city (Co-Evaluate Scaling up Experience), promoting shared gardens as a model for increasing civic participation, the sense of belonging of the younger generations and responding to the demand for urban well-being.

The GardeNet project has allowed developing a collaborative and inclusive learning space for the new generations, using new technologies and gamification processes as tools for interaction, expanding the languages and methods of exchange, and stimulating formal and informal cognitive processes.

In the SSMOLL project the CoULL approach has been explored and tested in the case study of the San Sebastiano del Monte dei Morti Living Lab, in the municipality of Salerno, activating a Collaborative Decision-Making Process Living Lab (CDMP-LL) for the adaptive reuse of cultural heritage and the implementation of a Creative Living Lab (CLL).

In this decision context, the three main phases have been reinterpreted to identify the enabling conditions for the galvanisation of a culture-led regeneration process for the San Sebastiano del Monte dei Morti church, unused since the 1980s. A central role has been developed by the Co-explore and Co-Design phases. The Co-explore phase has had the purpose of activating the CLL and included the structured decision-making process before reopening the church. It aimed to understand the potential and critical issues and, above all, at building the enabling conditions that would allow the reopening of the church and the activation of a culture-led regeneration process. The results obtained in the Co-explore phase have been oriented to identifying the main characteristics of the CLL and the selection of actions able to build a shared collective awareness. The Co-Design phase started with the church's reopening and has been followed by the Co-Production phase, including the two cycles of activities that made it possible to develop and test the CLL process.

In the SSMOLL project, the Co-evaluation phase has been conceived as a transversal action, present during every phase of the process but also including the three main phases of Co-explore, Co-Design and Co-Production. Indeed, in each phase, it was possible to assess and share the results with the other actors involved in the decision-making process, analyse their multidimensional components, and express quantitative and qualitative indicators generated by the community's active collaboration. The methodological process activated for the CLL of the former Morticelli church is still in progress, allowing redefining and testing an adaptive collaborative decision-making process and generating new values during the path of reuse,

with relevant impacts for the entire urban context. At the same time, the CLL implementation was essential to develop and experiment with techniques and modalities of co-evaluation to support adaptive community-based reuse processes.

In the REPAiR project, the CoULL methodology has been the basis for the Co-creation process implemented in Peri-Urban Living Labs (PULLs), based on five iterative phases: Co-Exploring; Co-Design; Co-Production; Co-Decision; Co-Governance. The main innovative aspects introduced by the REPAiR project concern both the context in which the methodological path of LL is developed, oriented towards the regeneration of the peri-urban areas interpreted as wastescapes, and the interaction with the approaches of Geodesign and Life Cycle Assessment (REPAiR, 2017, 2018).

The PULLs have been organised in six metropolitan areas across Europe: Amsterdam and Naples, as pilot cases, and Ghent, Hamburg, Pécs, Łódź as follow-up case studies. In these physical and virtual environments, different key actors and stakeholders (representatives of regions, municipalities, corporations, people, citizens and individuals, design professionals, information technologists, scientists, and students) collaboratively generate new ideas, creative innovation and strategies for the development of circular economy thought the elaboration of eco-innovative solutions, in co-creation sessions.

In the methodological process, the Co-Exploring phase assumes a crucial role. It deals with two relevant phases of the Geodesign model: the Representation Model, dealing with the definition of a common understanding of the territory, developed with the collaboration and cooperation of all the researchers, stakeholders and experts identified and involved in the project, and identifying the main challenges and objectives; the Process Model, investigating key resource flows, and mapping material flows and waste management system in the selected focus areas.

The Co-Design phase interacts with two other significant phases of the Geodesign process: the Evaluation Model and the Change Model. In these two phases, the research team with local stakeholders and experts developed a phase of assessing the status quo and identifying specific challenges to elaborate situated Eco-Innovative Solutions (EIS) and their functioning.

The Co-Production phase is related to the Change Model of Geodesign, focused on developing EIS and Eco-Innovative strategies to promote and activate innovation processes oriented to the transition to more circular models in peri-urban areas, managing agreements and conflicts among different interests and groups of decision-makers.

The Co-Decision phase supports the Impact Model's structuring, assessing EIS efficiency, analysing the multidimensional impacts and their effects on the selected peri-urban areas.

The Co-Governance phase is related to the Decision Model, and it is about delivering decision-making models based on co-creation and scaling up to other similar cases, promoting collaborative governance processes.

In the REPAiR project, the co-creation builds on multidimensional and multi-contextual strengths of PULLs and interacts with the co-evaluation of physical and socio-economical impacts of eco-innovative solutions and building a process

of awareness and collaborative learning among all the engaged stakeholders to stress out the main issues of each phase.

12.5 Conclusions

In conditions of crisis, it has been highlighted that it is essential to understand how cities build, convert and modify the relationships typical of urban contexts through endogenous development processes (Campbell, 2012). The interaction between knowledge and the learning process determines the opportunity to build new relationships between communities, in which trust becomes the essential component for building shared collaborative development strategies.

The LL concept and the CoULL methodology allow structuring an approach that enables the possible interactions between knowledge and learning, identifying an innovation, user-centred and people-based ecosystem, interpreted as a process model of collaborative behaviour and active democracy, applied to carry out self-sustainable development practices.

Integrating the LL approach to the development policies of an urban context and territory is a complex challenge that requires the need to identify priority interests and structure a network of participating and potentially interested local actors. In this way, the demand for innovation enables effective experimentation, in which participatory strategic co-planning, territorial self-government and social cohesion take on particular relevance.

The LLs, in different interpretations, can be used for the design, exploration, experimentation of policies, programs and projects and for the assessment of potential impacts, using approaches and tools capable of integrating technical and political evaluations. These approaches allow analysing the changes in the relationship between the natural environment, the built environment and the settled community. They stimulate reflections on the collaborative aspects of the decision-making process and the co-evaluation techniques, experimenting with adaptive and synergistic evaluation models to support incremental decision-making processes, open to the interaction between different knowledge,

In general terms, the CoULL methodology implemented in different LLs experiences develops a site-specific approach, depending on the purposes and the various stakeholders involved in the decision-making process and how they can contribute.

The application of the CoULL approach in the four identified projects highlights how it was possible to pursue specific objectives at different territorial scales (landscape, city and neighbourhood), in which collaborative governance represents a common component. In the CilentoLabscape project, a Co-Promotion and Co-Production process of places for enhancing the National Park of Cilento, Vallo di Diano and Alburni was activated, focusing on collective awareness, sustainable tourism and adaptive reuse. The GardeNet project was developed by activating a Co-learning process for young generations inclusion in the shared urban gardens practices, where the green and young city is a crucial component. The SSMOLL

project implemented a culture-led regeneration process for the adaptive reuse of religious cultural heritage, contributing to a diffused collective awareness. The REPAiR project promoted a Co-Creation process to develop eco-innovative solutions and strategies for transition to circular economy models in peri-urban areas. The topic of wastescapes and their implications on urban metabolism is essential to need a hybrid approach, where Geodesign and Life Cycle Assessment interplay.

The CoULL methodology aimed at assuring more extensive participation and cooperation of local stakeholders who are actively involved in the decision-making process for the regeneration of the selected contexts. It follows that the outcomes of the co-creation workshops implemented in the different experiences of the described research projects are the result of the actors' engagement since the first phase of the idea development, sharing the ownership of the project/solution ideas and assuring conscious management of their implementation. Furthermore, local communities' involvement has shown to positively influence citizens by having them struggle together to identify solutions and strategies for operationalising sustainability principles, resulting in increased trust in their institutions and among the new communities' actors. The implementation of co-creation processes has been supported to overcome institutional lock-in situations, promoting collaborative and cooperative processes to identify strategies and actions that integrate roles and points of view, overcome the limits of sectoral approaches and make local innovation operational.

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