multirisk sciEnce for resilienT commUnities undeR a changiNgclimate

Codice progetto MUR: **PE00000005** – CUP LEAD PARTNER

TS1 – Urban and metropolitan settlements

Task 5.5.2 – City scale exercise for risk evaluation scenarios

Deliverable DV 5.5.2 - City-scale exercise preparation and setup report

AUTHORS

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0.4			
1.0			

Executive summary

The main objective of Task 5.5.2 – City-Scale Exercise for Risk Scenarios Evaluation, within the Work package 5 "Urban labs for dynamic multirisk management, is to develop a shared methodology for defining a series of city-scale exercises to be experimented within the framework of the RETURN Urban Living Labs (ULLs) for multirisk management in critical urban contexts.

The RETURN Urban Living Labs approach is set up as an approach that combines multiple city-scale exercises in relation to the different stages of the project process, as well as tools and stakeholders. The ULLs are conceived as physical and virtual environments where solutions and strategies - contributing to the definition of alternative scenarios - sensitive to urban and territorial contexts, can be co-designed with the involvement of different stakeholders, selected for each case study and throughout according to all stages of the design process.

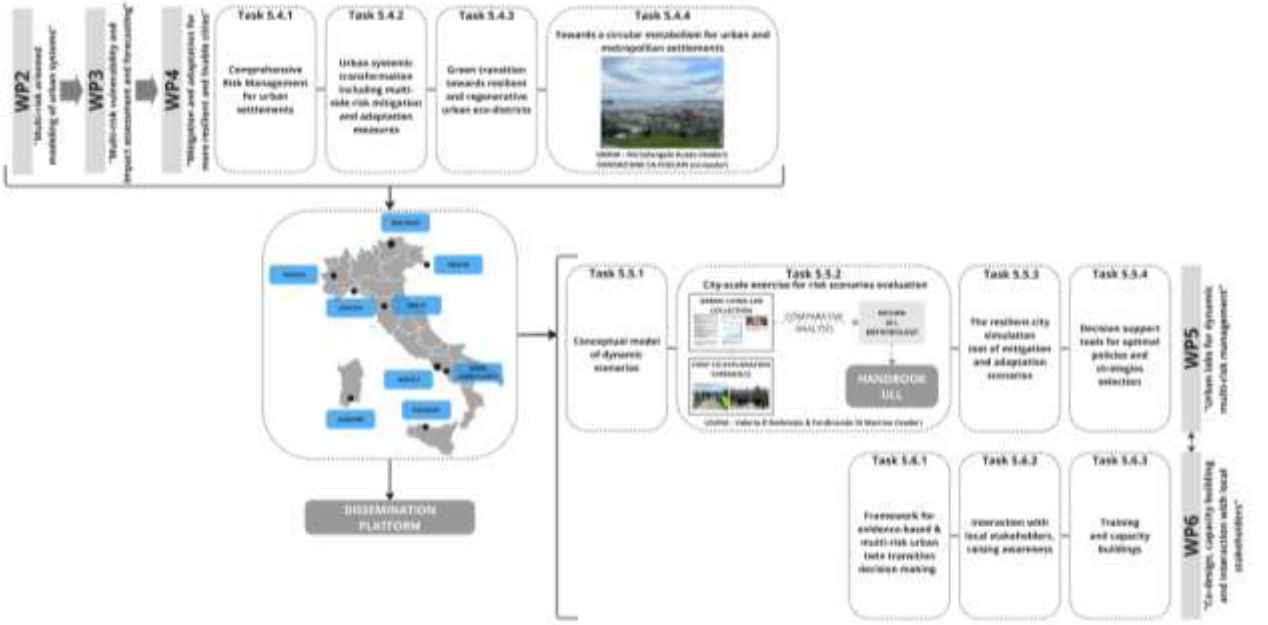

Fig. 1 Inter-Spoke relations

In the initial phase, a collection of Urban Living Lab examples was conducted, with data compiled in the first part of the Deliverable (Part 1, Chapter 2). The examples were selected based on specific criteria such as significance, duration, and the knowledge of various members of the research team with the project. The comparison of the selected experiences contributed to the definition of a methodology for the RETURN ULL, organized into three phases (Part 2, Chapter 3). These phases enable the practical implementation of city-scale exercises aimed at improving risk management in the design of critical multirisk urban contexts. The three phases – co-exploring, co-design, co-testing – are developed through a series of city-scale exercises tested in the Bagnoli-Coroglio case study. The case study is to be considered as a Proof of Concept.

The second part of the deliverable not only describes the methodology of the ULL with respect to the different phases but also outlines the various tools and city scale exercises that can be used within ULLs. Initially, the Urban Living Lab involves a co-exploring phase of territorial contexts, followed by a second phase focused on co-designing innovative design and process strategies for managing both natural and anthropogenic risks. Finally, the co-testing phase will ensure the implementation and experimentation of the strategies developed in the former phase by evaluating their expected impacts, and can identify to what extent the proposed methodology might be refined and adapted for transferability to other case studies.

Finally, the third part presents the reports of the meetings developed within the three phases of the RETURN ULL applied to the Bagnoli test case (ref. WP 4 – Deliverable 5.4.5).

Focus on Inter-Task relations

Task 5.5.2 works in synergy with Task 5.4.4 for the definition of the concept of Urban Metabolic Risk (fig. 1) and with task 5.3.3 on systemic vulnerability about the potentialities of indicator-based approaches to evaluate contextual social, environmental and spatial characteristics of multirisk scenarios.

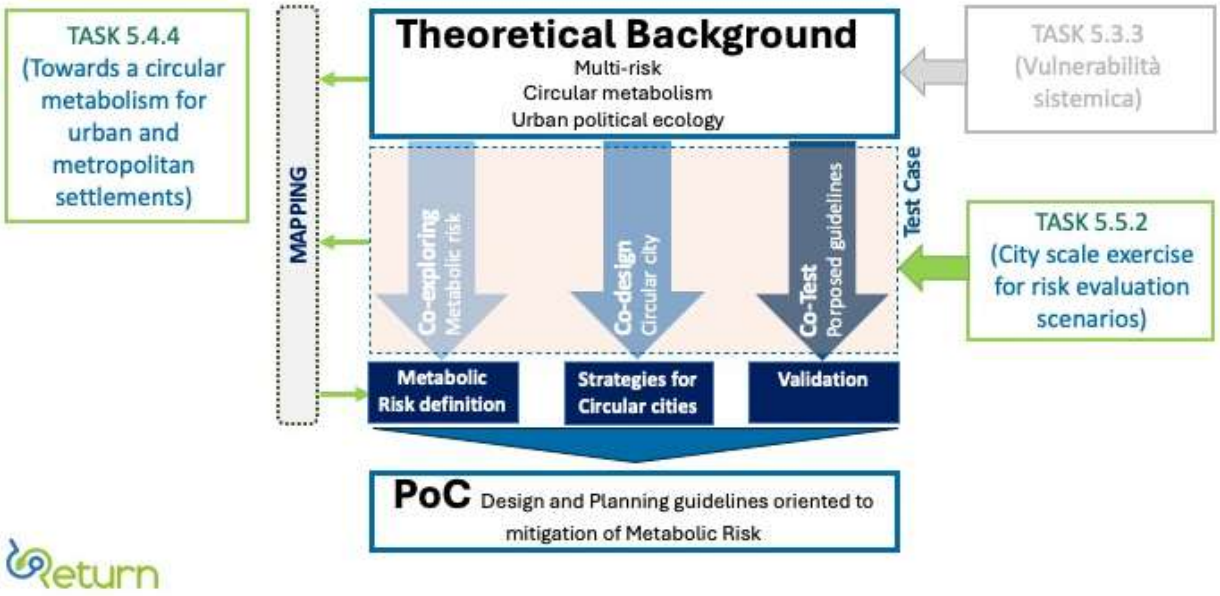

Fig. 2. Inter-task collaboration among Task 5.5.2 and Task 5.4.4

Part 1. Theoretical framework and sample collection for city scale exercise

1 Urban Living Lab in multirisk urban contexts

1.1 State of the art

The concept of the Living Lab (LL) has emerged in academic literature over the past few decades. Some scholars trace its origins to 2000 (Schaffers et al., 2008), marking the shift when innovative research moved out of “in vitro” laboratories and into “in vivo” urban spaces, involving the active participation of potential users (Bergvall-Kåreborn et al., 2009).

Within scientific literature, there is no unified definition of Living Labs (van Timmeren, 2017; Rizzo, Habibipour and Ståhlbröst, 2021). In some studies, they are defined as a methodology, in others as an environment, a system, or a governance approach (Steen and Van Bueren, 2017). Originated as an IT research approach in projects and companies, a Living Lab is used as a tool through which companies connect with customers to integrate users’ feedback. One of the first LL is the MIT PlaceLab, which took place in Massachusetts Institute of Technology (MIT) between 1999 and 2009 (Martin et al., 2023) and investigated ubiquitous computing technologies in home settings (Intille et al., 2005).

Urban Living Labs are a typology of Living Labs where the territorial focus and the goal concentrated in cities (Martin et al. 2023; Chronéer et al., 2019; Steen & van Bueren, 2017). Furthermore, it requires a physical location in the target area, and it is specifically focused on urban sustainability (Steen and Van Bueren, 2017; Menny et al., 2018). Moreover, some scholars emphasize that ULLs are applied to projects of varying scales and durations, with some evolving over time into structures of participatory governance (Bradley and Mahmoud, 2024). Consequently, the number of phases involved can vary depending on the specific conditions and expected outcomes. Nevertheless, common characteristics can be identified, such as voluntary participation (Mensink, Birrer, and Dutilleul, 2010) and the possibility that ULL participants may not necessarily be the end-users of the innovative process.

ULLs are considered an innovative research method that allows for the exploration, examination, testing, and evaluation of concepts, scenarios, and ideas directly within their context (Bulkeley, 2017). They have often been employed during various stages of the design process, particularly in Transition Studies and urban and landscape design (Bortolotti et al., 2023). In this context, ULL methodologies stimulate change processes and support sustainable transitions (Amenta et al., 2019; Greer et al., 2020).

Numerous studies have conducted extensive bibliographic reviews on the use of ULLs (Cuomo, 2022). These works reveal a highly diverse landscape in terms of geographic localization and topics addressed. Geographically, this approach initially spread in Northern Europe and the United States (Bagjier et al., 1991). Today, the approach is widely used in Europe, as evidenced by the establishment of the European Network of Living Labs (ENoLL) in 2006[1]. However, there are also examples of ULLs in cities across the Global South (Amorim, Menezes, and Gonçalves Fernandes, 2022).

Co-creation as “the foundation for the Urban Living Lab approach at the local level" (Kabisch et al., 2019) is seen today as an inclusive and transparent way to successfully design shared visions for future sustainable development, addressing complex urban decision-making and engaging diverse interests in planning. Noble

[1] Since 2006 ENoLL has developed more than 440 Living Labs in Europe and around the world. ENoLL is a non-profit international organization thta promotes user-driven innovation ecosystems empowering the global development of Living Labs by providing toolkits and sharing knowledge on the matter (ENoLL, 2022). The rapid growth of the ENoLL network reflects the worldwide Living Labs trend.

and Enseñado (2022) emphasize the role of ULLs in proposing solutions to climate change. ULLs are an effective tool for sustainable transitions (von Wirth et al., 2019) toward innovative urban systems based on the circular economy (CE), particularly for their ability to foster shared knowledge (Florez Ayala, Alberton, and Ersoy, 2022). Ascione et al. (2021) highlight how the Living Lab methodology is particularly useful in promoting collaboration in circular systems (CE), especially through the application and testing of Nature-Based Solutions (NBS) (Rizzo, Habibipour, and Ståhlbröst, 2021). Bradley and Mahmoud (2024), referencing the CLEVER Cities project, underscore the importance of LLs for the co-creation and co-validation of NBS in contexts with limited social networks. In this direction, Amorim, Menezes, and Gonçalves Fernandes (2022) stress the use of ULLs to develop resilience in critical urban infrastructures to combat climate change in Global South cities.

A further sign of the growing importance of Urban Living Labs in European policies is the Horizon Europe mission "A Soil Deal for Europe" (European Commission, 2021), which aims to activate 100 Living Labs and demonstration beacons by 2030 in urban and rural settings to promote soil health. This is also the context of the 2024 call "HORIZON-MISS-2024-SOIL-01-02: Living Labs in urban areas for healthy soils", which selected 13 European projects to test innovative solutions for remediation, ecological reconnection and co-management of urban soils (European Commission, 2024). Several European projects have already integrated the ULL approach into their operational strategies. Among them, UPSURGE (Horizon 2020) promotes an urban regenerative model through Nature-Based Solutions co-created in five European cities, while URBiNAT aims to build healthy urban corridors through participatory co-design processes in cities such as Porto, Nantes, Sofia and Siena. The CUP4Creativity project, funded by Urban Innovative Actions, experiments with a cultural Urban Living Lab in Budapest based on the activation of temporary spaces and digital tools for local participation. REGREEN, finally, applies ULL in European and Chinese cities to co-create green solutions and strengthen the delivery of ecosystem services in metropolitan contexts. These examples highlight how the ULL approach is consolidating itself as a key infrastructure for ecological and circular transitions in complex urban contexts, demonstrating its ability to integrate bottom-up practices, territorial experimentation and collaborative governance.

Urban Living Labs are becoming more and more relevant in EU policies and initiatives. Among them, Joint Programming Initiative (JPI) Urban Europe has operated on a transnational scale since 2010 focusing on how to make urban transformation processes sustainable and innovative by connecting scientists, civic society, public authorities and industry. This goal has been pursued also thanks to JPI Urban Europe research on ULLs, developed thanks to the Governance of Urban Sustainability Transitions (GUST) project, which investigated the governance of sustainability transitions through ULL between 2014 and 2017. Among the product of their work, 'The Emerging Landscape of Urban Living Labs' booklet frames the raising importance of ULLs in urban developments' co-design, co-governance and co-management and their positive impact on cities and communities (McCormick & Hartmann, 2017).

Taking into account a multiplicity of actors and engaging them in the design process itself, Living Labs contribute greatly to the self-determination of a community and of its future, driving it towards systemic change. By combining the identification of an urban location and having a concrete focus on experimentation, ULLs constitute ideal sites and approaches in governing transformative change in sustainability transitions (von Wirth et al. 2019). Among them, the transition from linear metabolism to Circular Urban Metabolism in agreement with local communities calls for a flexible and innovative methodology in which Circular Economy principles and transparent and inclusive decision-making processes are applied (Amenta et al., 2019). Acknowledging that an urban living lab for environmental sustainability and circular economy can be considered as a multi-actor ecosystem, Engez, Leminen and Aarikka-Stenroos demonstrate "how diverse actors from companies, the city, universities, and users/residents and flows in sustainable urban living labs constitute a circular economy ecosystem"[2] (Engez et al., 2021). Literature shows how the circular and ecosystemic perspective is taken into consideration in the ULLs realm and underlines the potential social resilience that lies in this kind of approach: citizens confronted with complex, unfamiliar and decision-making

[2] A circular ecosystem is "a system of interdependent and heterogenous actors that go beyond industrial boundaries and direct the collective efforts toward a circular value proposition, providing opportunities for economic and environmental sustainability" (Trevisan et al., 2022).

situations may become resilient (Robazza et al., 2024). Nevertheless, a gap regarding the evaluation of the production of resilience generated by ULLs in the long term exists (Robazza et al., 2024). The increasing application in research and practice of the Urban Living Lab methodology in challenging urban contexts for implementing 'sustainable cities and communities' (SDG 11) is just one of the pieces of evidence that shows the potentialities of ULLs. Today ULLs could represent a valid approach for investigating and co-designing Circular Urban Metabolism in multirisk urban contexts, being able to bring, at the same table of discussion, different stakeholders which normally do not easily interact in their daily activities, stimulating them to share their ideas and proposal for planning in a safe environment, that foster innovation.

While the use of ULLs is often associated with the co-creation and co-validation of NBS to transition toward cities more resilient to climate risks, there are no recorded cases of applications in multirisk contexts. In rare cases, the ULL approach has been tested in socio-economically disadvantaged contexts as a tool to facilitate ecological transition, typically considering social risk merely as a background factor. This research aims to fill this gap by using the ULL approach to design an ecological transition in a multirisk context, highlighting its potential and limitations. We argue that ULLs could represent an experimental tool to be implemented in building resilient multirisk scenarios in an (eco)innovative key, with the involvement of all stakeholders. Urban Living Labs as open real-life environments for high-level innovation (Leminen et al., 2012), furthermore, collaboration between users and stakeholders represent "a form of experimental governance" (Voytenko et al., 2016), a unique approach for investigating and co-designing Circular Urban Metabolism in multirisk urban contexts.

Fig 32: keywords cloud of ULL in the examples collected in section 2.2

Going beyond a Quadruple Helix approach, which comprehends government, academia, industry and civil society as participants and combine both top-down and bottom-up approaches (Nguyen & Marques, 2021), the research adopts a Quintuple Helix approach that emphasizes the need to intertwine academia, industry, government, civil society, and the environment, and by connecting knowledge, innovation and the (natural) environment (Carayannis & Campbell, 2010), to achieve a holistic understanding of the local challenges and co-developing eco-innovations within multirisk environments (Varvaris et al., 2024). The Quintuple Helix approach is simultaneously interdisciplinary and transdisciplinary, ensuring the participation of a wide range of disciplines, from the natural sciences, due to the environmental aspects, to the social sciences and humanities (Carayannis & Campbell, 2010), assuring, in this way, the development of eco-innovation for the sustainability of fragile environments, such as multirisk exposed habitats. In a multirisk environment, it is crucial, indeed, to include in the discourse the plurality of feedback coming from the different stakeholders, strengthening the relationship between the territory itself and the people encouraging a feeling of inclusion, and providing innovative and out-of-the-box solutions are only some of the advantages that we are currently registering.

1.2 Stakeholder engagement for ULL in multirisk scenarios

The framework of Urban Living Labs (ULLs), conceptualized as an application of the Quintuple Helix Model, provides innovative tools to address multirisk scenarios in urban areas. Stakeholder engagement plays a central role within these frameworks, particularly in addressing the complex interconnections between environmental, social, and technological challenges. The Quintuple Helix Model expands the traditional triple and quadruple helix frameworks by introducing a fifth dimension: the environment. This addition highlights the interdependence of economic, social, and ecological sustainability (Carayannis & Campbell, 2010). In multirisk urban settings, where hazards intersect with social vulnerabilities, this model aligns diverse stakeholders, including government, academia, industry, civil society, and the environment (Ranga & Etzkowitz, 2013). By integrating risk and environmental considerations, the model fosters cross-sector collaboration, enabling sustainable and resilient urban planning (Barth, 2011). In high-risk areas, engaging diverse stakeholders ensures resilience-building strategies that are holistic and adaptive reflecting the necessity of including expert and tacit knowledge in a co-production framework (Visconti, 2023).

Within the RETURN project, a specific task (T5.6.2) emphasizes stakeholder engagement in disaster risk reduction (DRR). This task focuses on identifying stakeholders and tools to ensure effective involvement in designing and managing responsive strategies for multirisk scenarios. This approach is closely tied to the ULL framework and this paragraph deepens understanding of how stakeholder engagement in real-world contexts of ULL can facilitates the development of resilience pathways involving multiple actors and integrating scientific, technical and citizen knowledge. The discussion here provided aims to strength cross-fertilization between project deliverables and amplify the impacts of the project outcomes.

While research on stakeholder interaction in urban experimental setups, or living laboratories, remains limited (Torma, 2020), participant engagement is increasingly recognized across sectors as a vital strategy for fostering relationships (Steen, 2013). Stakeholder engagement has been extensively applied in contexts such as large-scale infrastructural projects, where complex and dynamic environments demand adaptable tools (Giacomin, 2014). Including participant perspectives enhances decision-making and project implementation while legitimizing concerns, aligning priorities, and benefiting society (Manzini, 2015).

ULLs offer real-world environments to co-create innovative urban solutions by integrating diverse perspectives and knowledge systems (Evans et al., 2016). Combining expert and local knowledge is critical in multirisk scenarios, as it promotes a holistic understanding of risks and impacts while addressing technical feasibility and community needs. Participatory frameworks like ULLs enable inclusive dialogue and co-creation among scientists, policymakers, businesses, and citizens, ensuring that disaster preparedness and response measures are adaptive and context-specific (Evans et al., 2016). Literature underscores the importance of stakeholder engagement in fostering value creation, innovation, planning, learning, and sustainability (Kujala, 2022; Esposito De Vita & Visconti, 2022).

Stakeholder engagement is critical for effective disaster risk reduction (DRR) in multirisk scenarios, as it ensures the inclusion of diverse perspectives and expertise in identifying vulnerabilities, assessing risks, and implementing mitigation strategies (Visconti, 2023). Such approaches empower communities by leveraging their local knowledge to complement expert assessments and yield sustainable solutions (UNDRR, 2019). Collaboration among local governments, civil society, private sectors, and marginalized groups strengthens social cohesion, trust, and shared responsibility, which are essential for resilience-building (Benson & Twigg, 2007). Moreover, participatory methodologies, including mapping, workshops, and simulations, help overcome power imbalances and promote equitable representation (Voytenko et al., 2016). ULLs, as platforms for participatory engagement, integrate these methodologies, fostering co-creation and innovative solutions for interconnected risks in urban settings.
Coupling expert and non-expert knowledge is critical in multirisk scenarios as it fosters a holistic understanding of risks and their impacts, integrating technical expertise with local insights and lived experiences (Visconti, 2023). In multirisk urban settlements, ULLs allow for stakeholder co-creation to address interconnected risks and significantly contributing to integrating information about the context and the communities that are often neglected in the purely quantitative modelling of risks. Effective engagement also

enhances early warning systems and preparedness by integrating scientific insights with community-based practices, ultimately reducing exposure to hazards and minimizing disaster impacts (Gaillard & Mercer, 2013).

ULLs also function as iterative feedback systems, enabling continuous learning and flexible collaboration between universities, industries, governments, and society. These subsystems bring together distinct forms of capital—human, economic, political, and social knowledge to shape urban sustainability and socio-ecological development (Torma, 2020; Campbell & Carayannis, 2009). By aligning with the Quintuple Helix Model, ULLs create collaborative ecosystems that enhance knowledge exchange and co-innovation among stakeholders (Baccarne et al., 2014; Steen & von Bueren, 2017). Stakeholders in ULLs are often categorized as providers (educational institutions), utilizers (firms and service providers), enablers (city representatives), and users (residents), with participation levels shaped by the priorities of leading actors (Juujärvi & Pesso, 2013; Leminen, 2013). While citizen involvement in ULLs is transformative, its impact relies heavily on inclusivity and the goals established by key stakeholders (Menny et al., 2018).

1.2.1 Stakeholder engagement strategy

Developing a stakeholder engagement strategy for an Urban Living Lab (ULL) addressing multirisk scenarios in urban settlements requires a structured and inclusive approach. The strategy should prioritize collaboration, transparency, and equitable representation to ensure all voices are heard, and solutions are co-created effectively. Effective disaster response relies on fostering robust networks incorporating diverse stakeholders has consistently proven to enhance societal engagement and improve the outcomes for disaster risk reduction and urban regeneration strategies (Moynihan, 2008). Multistakeholder initiatives are particularly beneficial as they promote collective action for the greater public good. By focusing on shared goals, these initiatives tend to be more efficient, productive, and impactful (Beisheim & Simon, 2016). According to Panneer et al. (2024), stakeholders that can be engaged in disaster risk reduction can be categorized into three main groups: primary, secondary, and key stakeholders. Key stakeholders are directly involved in decision-making and policy formulation, while primary and secondary stakeholders have vested interests but are not directly engaged in the processes (Freeman et al., 2010). The overarching goal is to unite these groups, guided by principles of equity and accountability. This inclusive approach fosters transparency and democratic participation, leading to stronger partnerships and networks that significantly enhance disaster management (Hemmati, 2012) and strategies to cope with multiple risks. Engaging multiple stakeholders contributes to capacity-building, drives innovation, and accelerates decision-making (Panneer et al., 2024). These elements collectively lead to more effective and efficient disaster management, ultimately benefiting the community (Achyar et al., 2015). Strands of an effective engagement strategy need to be developed with the final aim of building cultural, and sociopolitical practices and institutions (Esposito de Vita et al. 2022; Berrone et al., 2019). Guiding pillars should reflect the wide variety of information and knowledge held by the diversity of stakeholders, the expected outcomes of the specific project/ULL integrating local knowledge, experience, and creativity, including ecological, cultural, and sociopolitical practices (Esposito de Vita et al., 2022). In tab.1 an engagement strategy for ULL is presented, phasing out the different steps required for the development, the main activities and actions of the strategy proposed.

1. Identify and Map Stakeholders	**Key Stakeholders**	Identify groups directly involved or affected, such as: **Local Government and Policy Makers;** Public Authorities; **Universities and Research Institutions; Private Sector and Industry; Civil Society Organizations (CSOs); Residents; Environmental Groups**
	Stakeholder Mapping	Use tools like power-interest grids to identify stakeholder influence and interests, ensuring no critical group is excluded (Reed et al., 2009).
2. Foster Multi-Stakeholder Collaboration	**Platform Creation**	Establish a participatory platform where all stakeholders can exchange knowledge and ideas, such as regular workshops, forums, or online collaboration tools. The ULL serve as an experimental environment for shaping and testing a prototype for this platform

	Collaborative Governance	Create inclusive decision-making structures where stakeholders co-develop objectives, solutions, and policies (Baccarne et al., 2014).
	Knowledge Integration	Blend scientific expertise with local and traditional knowledge to address multirisk dynamics effectively (Gaillard & Mercer, 2013).
3. Design Participatory Engagement Mechanisms	**Participatory Tools**	• **Workshops and Focus Groups**: To gather diverse viewpoints and co-create solutions. • **Participatory Mapping**: To identify risks and vulnerabilities with community input. • **Simulation Exercises**: To test multirisk scenarios and gather feedback on potential solutions. • **Citizen Science Initiatives**: To engage residents in data collection and monitoring. • **Gaming sessions**: To co-design possible actions/solutions for multirisk contexts.
	Feedback Loops	Implement systems for stakeholders to continuously provide input, ensuring flexibility and adaptation throughout the project lifecycle (Voytenko et al., 2016).
4. Build Trust and Capacity	**Transparency**	Share information openly to build trust among stakeholders.
	Capacity Building	Provide training and resources to empower communities, particularly marginalized groups, to actively participate in the ULL (UNDRR, 2019).
	Conflict Resolution Mechanisms	Establish processes to address disagreements and ensure balanced power dynamics (Leminen, 2013).
5. Monitor, Evaluate, and Sustain Engagement	**Performance Indicators**	Develop metrics to measure stakeholder engagement, such as participation rates, diversity of stakeholders, and satisfaction levels.
	Iterative Feedback	Regularly evaluate engagement processes and adjust strategies as needed.
	Sustainability Plan	Ensure long-term engagement by institutionalizing collaborative practices and maintaining partnerships beyond the initial project phase.

Tab. 1 ULL stakeholder engagement strategies

1.3 Urban Living Labs for knowledge share

Urban Living Labs and, more generally, city scale exercises have received increasing attention both in terms of theoretical and operational reflection, establishing themselves as tools for innovation in technology transfer in design processes.

In line with the objectives of the RETURN project, the concept of technology transfer implemented in Urban Living Labs can be defined as knowledge share, i.e. ULLs can be defined as tools that enables proactive and collaborative actions aimed at the distribution, connection and co-production of knowledge, resulting in the activation of circular, multi-sourcing and multi-directional processes (Conti & Grimaldi, 2024). However, in the practical application of ULLs as tools for knowledge sharing in multirisk scenarios, the scientific literature still highlights gaps in relation to the applicability of ULLs as tools for co-governance multirisk-oriented project (Trogrlić et al., 2024), as well as on the criteria for monitoring the resulting impacts in terms of direct benefits and co-benefits deriving from ULLs implementation (Paskaleva & Cooper, 2021).

In the knowledge sharing activated in the Urban Living Labs, the process therefore takes on a central role and, in order to be effective, it must allow systemic connection of data, information and knowledge from different sources, activating a circular process based on interactions and cross-contamination. Interactions involve different dimensions and must be implemented in a vertical and horizontal perspective in relation to stakeholders, but also transversal perspective according to approaches that goes beyond specific disciplines and thematic areas. In this scenario, the stakeholders involved in all the phases, whether they are citizens, users, project partners or experts, contribute equally to the design process, enabling the activation of innovative processes that combine ecologically oriented and social innovation in a social-ecological-technological perspective (Clemente, 2025). In these social-ecological-technological perspective, the technological component of Urban Living Labs acts as a medium between the social and environmental components.

2. Urban Living Labs examples collection towards a methodology

2.1. Methodology for Urban Living Lab Case Study Analysis

Being the methodology of Urban Living Lab not universally defined so far (as showed in the literature review of the part 1.1 above), a total of 17 national and international examples of Living Labs at various scales and in different types of territories were analyzed through a structured review process, to be able to outline specific methodological steps for the RETURN ULL. Methodologically, this review enables a synthetic-comparative analysis of the examples collected, allowing for the identification of common factors and the specificities related to the main goals and the site-specific and hazard-specific characteristics.

The elements considered in the review (see the sample sheet below) are diverse. The sheet is divided into two sections:

- the first section includes closed-ended questions designed to provide concise, quantifiable, and comparable responses;
- the second section features open-ended questions (up to 5,000 characters, images and references), enabling more detailed descriptions of the project.

In the first section, the title of the project is recorded, followed by details about the research groups and project type, including the source of funding. Given the importance of the ENoLL network (European Network of Living Labs) in developing Living Lab approach in Europe, the template also notes whether the project is a member of this network.

Other information includes the number of participants, the typology of people involved and the temporal range. As highlighted in bibliographic research, timeframe is particularly relevant in the living lab approach. While it is often closely tied to the type of funding and project nature, it is noteworthy that in cases where the duration exceeds three years, the LL approach can lead to the development of new forms of participatory territorial governance. Then site-specific characteristics are highlighted. The identification of urban areas analyzes the reference scale, measured both by the size of the area targeted by the lab (territorial scale, macro-district scale, urban district scale and census zone scale - ref. DV 5.2.2) and the number of participants involved. The urban context of the project is equally important and may include urban, peri-urban, or low-density areas. These different contexts influence how the lab is implemented and how participants engage.

The template also captures the primary risks addressed in the LL, categorizing them as environmental, natural, or anthropogenic risks. Bibliographic research indicates that the LL approach is frequently used for the co-design of Nature-Based Solutions (NBS), whereas it is rarely employed to suggest innovative management methods for multirisk contexts. As highlighted in the templates, risk is often used primarily as a backdrop to the discussion.

Having also a focus on circularity and urban metabolism (also due to inter-Task activities, Task 5.4.4) the sheet also includes information on predominant flows taking into account in the labs, such as water, waste, and people, as well as material flows like plastic and metal.

The type of innovation introduced is another key element in ULL. Innovations can be economic, environmental, legal, political, social, or technological according to PESTEL approach. These play a crucial role in determining the project's impact on the community and the surrounding environment.

The degree of participation and the way in which participants are engaged is also considered a particularly important factor for analysing the different experiences. The template specifies whether participants were involved through an open call, a direct invitation (via an established network), or a call disseminated through social media.

The second section of the sheets includes an open-ended space on the project's structure and phases, allowing for a more detailed description and the inclusion of images and references. Keywords are then provided to categorize the main topics addressed.

Below is an example of the sheet for the review.

PROJECT TITLE					
Author/s					
RESEARCH UNIT					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ PON	□ other		
European Network of Living Labs (ENoLL)					
□ Yes	□ No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
□ public	□ private	□ institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	□ periurban area	□ periphery neighborhood	
RISKS TAKEN INTO ACCOUNT					
□ natural	□ environmental	□ anthropic			
TIPOLOGY OF INNOVATION					
□ Economic	□ Environmental	□ Legal	□ Political	□ Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
□ water	□ waste	□ people	□ metal	□ plastic	□
DEGREE OF PARTICIPATION					
□ passive	□ active	□ co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	□ direct contacts	□		
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Max 5.000 characters					
KEYWORDS					
1-5 keywords					
IMAGES					
1-2 images					
REFERENCES					
3-5 References					

Tab. 2 ULL collection sample sheet

An integrated analysis of the elements outlined in the template provides a comprehensive view of each case while simultaneously enabling a comparative analysis. This approach highlights differences and identifies the most effective elements in various contexts.

2.2 Collection

Within the research groups involved in the Task, 17 examples of urban living labs and, more generally, of city scale exercises were collected. These examples have been selected as they have seen the participation of differentiated stakeholders in the design processes, implementing processes of shared knowledge and co-design. For each example, a sheet was developed.

1. PONTICELLI SMART LAB;
2. Recovery and management of the commons: reuse processes of settlement systems;
3. CEDAS: building CEnsus for seismic Damage Assessment;
4. Ecological Risk Assessment to support the management of a sediment contaminated site;
5. Sostenibilità delle Bonifiche in Italia – White book, *Lisa Pizzol (GreenDecision srl);*
6. PED4ALL;
7. Ma.Sa.Ma. – Mapear Santa Marta;
8. REPAiR PULL. – PeriUrban Living Lab;
9. UnaLab - Urban Nature Labs;
10. An Urban Living Lab (ULL) Framework (2018);
11. TRANSFORMER;
12. SCORE - Smart Control of the Climate Resilience in European Coastal Cities;
13. LABORATORIO BAGNOLI;
14. CALL - CAlabria creative Living Lab;
15. Rural and Creativity HUB for the Vulture Regional Park*;*
16. La costruzione della Strategia Regionale Aree Interne nel ciclo di programmazione europea 2021- 2027;
17. Local Living Lab: Vivere il territorio. Un nuovo modo di abitare.

Example n.1

PONTICELLI SMART LAB					
Author/s: Cristina Visconti					
RESEARCH UNIT					
DiARC Department of Architecture Federico II					
PROJET TYPOLOGY					
□ Horizon	□ Prin	X PON			
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	X 10 - 30	□ 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		

URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	□ periurban area	X periphery neighbourhood	
RISKS TAKEN INTO ACCOUNT					
□ natural	X environmental	□ anthropic			
TYPE OF INNOVATION					
□ Economic	X Environmental	□ Legal	□ Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
X water	□ waste	□ people	□ metal	□ plastic	□ …
DEGREE OF PARTICIPATION					
□ passive	□ active	X co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	X direct contacts			
KEYWORDS					
Knowledge co-production; climate change impacts; every-day risks					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					

The "Ponticelli Smart Lab" has been developed in the framework of the research project METROPOLIS-Methodologies and Technologies for integrated and Sustainable Adaptation and Security of Urban Systems (2013-2016), PON Ricerca e Competitività 2007-2013, funded by the Ministry of Economic Development, Ministry of University and European Research. The research carried out by the Department of Architecture of the University of Napoli Federico II, aimed to analyze climate change risks and adaptation options for the demonstration case of East Naples, (D'Ambrosio and Leone, 2018). In this context, a component of participatory research was undertaken to co-produce knowledge with local communities about climate change impacts at district and neighborhood scale (Palestino, 2018; Visconti, 2017). The "Ponticelli Smart Lab" has been articulated as a tool based on the Urban Living Lab model, already tested in creating social innovation about climate change topics in several geographical contexts (Bulkely et al. 2016) to identify local knowledge often neglected in top-down research model about risks.

The territory of the Ponticell Smart Lab is East Naples, an area situated between Mount Vesuvius and the city's historic district threaten by several environmental risks (geophysical, climate-related, pollution). The area of study is enclosed between the heavily contaminated former industrial site (S.I.N.) and the high-risk Vesuvius Red Zone, characterized by volcanic and seismic hazards. Climate-related risks, in particular flash floods and heat waves are emerging in the last years and they will be exacerbated in future, due to the urban characteristics and the high vulnerability of the population. East Naples encompasses three municipalities - San Giovanni a Teduccio, Barra, and Ponticelli - which have undergone significant socio-ecological shifts over the past five decades due to urban expansion that modified significantly the ecological functioning of the agricultural wet-land ecosystem. The area is subject to marginalization and segregation phenomena, interlinked to several socio-spatial issues determined by urban (see Visconti 2023).

The Urban Living Lab promoted by the Department of Architecture of the University of Napoli Federico II (DiARC), has been held in Ponticelli on September and December 2016 at the Media Library of the Monello di Arci Movie Cultural Associations, in collaboration with the Social Garden of Ponticelli, "Centro Diurno Lilliput ASL 1" (Re-habilitation daily center), "Casa Mia Nitti"(Social Center) and "ReMida" (Creative recycle laboratory).

The ULL has been structured around three phases: 1. Field work applying ethnographic methods (e.g. ethnographic diary; participant observation) to survey: local impacts of pluvial flood and contextual vulnerability; bottom-up initiatives; community resilience; 2. Focus groups, collaborative mapping and storytelling to investigate: effects of climate change at district level; memory of water related to the wet-land ecosystem; every-day risks; potentialities for adaptation in terms of local on-going initiatives; transformation of the natural and built environment due to the massive post-earthquake intervention of social housing (PSER); 3. Co-design and Self-construction of a prototype for rainwater harvesting for the Social Garden of Ponticelli situated in an area of the public park "Fratelli De Filippo" (Workshop Socio-Technical resilient Cells) (see fig. 1).

The ULL has been developed by a group of DiARC researchers (coordinated by 2 researchers M.F. Palestino and C. Visconti, with the participation of 3 researchers for specific activities), a group of 10/15 participants among representatives of local associations and institutions and interested citizens engaged in the phase 2, a group of 20 participants among students, gardeners of the Social Garden of Ponticelli, local experts and architects of "Archintorno"(no profit for international cooperation and self-construction) engaged in the phase 3.

The main outcomes of the ULL have been: co-production of qualitative data about climate change and everyday risks; a video reportage "Resilient Ponticelli", based on a collective narration of the neighborhood made by multiple voices (experts and citizens); the realization of a water sensitive design prototype at community scale. The innovation process and the co-production results have been discussed in depth in several publications (Visconti 2017 a; Visconti 2017 b; Visconti 2023; Palestino 2018) that highlighted the effectiveness of the ULL methodology in terms of collective learning; co-production of knowledge; recognition and inclusion of community knowledge; potentialities for inclusiveness and awareness about opportunities related to climate-change discourse;

risk reduction and community engagement. In fact, the ULL in the case of Ponticelli has trigged a horizontal exchange resulting in: informing the research about immaterial aspects and identity features not included in the top-down analysis, acquisition of knowledge about the daily conditions of risk and places, at the same time vehiculating to the community a know-how on climate change opportunities.

REFERENCES

Bulkely, H., Coenen, L., Frantzeskaki, N., Hartmann, C., Kronsell, A., Mai, L., Marvin, S., McCormick, K., van Steenbergen, F., Voytenko Palgan, Y. (2016), "Urban living labs: governing urban sustainability transitions", *Current Opinion in Environmental Sustainability 2017, System dynamics and sustainability*, 22:13–17, Elsevier.

D'ambrosio, V., & Leone, M. F. (Eds.). (2018). *Environmental Design for Climate Change adaptation. Innovative models for the production of knowledge*. Naples, Italy: CLEAN.

Palestino, M. F. (2018). Ponticelli Smart lab: A hybrid environment for the implementation of experimental approaches to climate change. In V. D ambrosio, & M. F. Leone (Eds.), *Environmental Design for climate Change adaptation. Tools and Guidelines for climate risk reduction*. Naples, Italy: CLEAN.

Palestino M.F., Visconti C., 2017, Resilient Ponticelli Tackling Climate Change with Community, https://vimeo.com/246951600, https://vimeo.com/243534401

Visconti, C. (2017a). *Water sensitive measures in context of socio-environmental vulnerability: Resilience practices for climate change adaptation in East Naples*. University of Naples Federico II. http://www.fedoa.unina.it/view/creators/Visconti=3ACristina=3A=3A.html.

Visconti, C. (2017b). Community-based adaptation measures for Water Sensitive Urban Design in context of socio-environmental vulnerability [S.l.]. *TECHNE - Journal of Technology for Architecture and Environment*, 352–361. https://doi.org/10.13128/ Techne-20802.nov.2017.ISSN.2239-0243

Visconti, C. (2023). Co-production of knowledge for climate-resilient design and planning in Naples, Italy. *Habitat International*, *135*, 102748.

IMAGES

Fig. 1. Phases of the ULL, Methods and outcomes.

– **Example n.2**

“Recovery and management of the commons: reuse processes of settlement systems” PhD Research					
Author/s: Martina Bosone					
RESEARCH UNIT					
Department of Architecture (DiARC) – University of Naples Federico II					
PROJET TYPOLOGY					
□ Horizon	X Prin	□	□		
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	X 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
□ city centre	X historic centre	□ industrial area	□ periurban area		
RISKS TAKEN INTO ACCOUNT					
□ natural	□ environmental	X anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	□ Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
□ water	X waste	X people	□ metal	□ plastic	□
DEGREE OF PARTICIPATION					
□ passive	X active	□ co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	X direct contacts	X surveys	X interviews	
KEYWORDS					
Multi-Stakeholder Engagement Processes, circular economy, adaptive reuse, social innovation, multidimensional evaluation					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
The experimentation here presented regards the activation of an Urban Living Lab in Ercolano, in the context of a PRIN project 'Metropolitan cities: economic-territorial strategies, financial constraints and circular regeneration', funded in 2015 by the Ministry of University and Research. The aim of the ULL was to elaborate scenarios for rebalancing waste in a circular perspective, by stimulating a participatory and inclusive approach and to identify new ways of interaction between stakeholders and decision makers for the definition of regeneration strategies. To achieve this goal a set of meetings with local stakeholders was organized between October 2017 and October 2018 (Bosone, 2019). Ercolano is a municipality of the Vesuvian area of the Naples Metropolitan City, in the south of Italy, which is included in the buffer zone identified by UNESCO as World Heritage Site, together with the archaeological areas of Pompeii and Torre Annunziata. The main characteristics of Ercolano cultural heritage and landscape are the quality of natural resources compromised by a strongly stratified and heterogeneous urban fabric; conditions of physical, economic and social degradation can be traced back to phenomena of an environmental nature. These pressures are linked to social and economic dynamics and the ways in which the cultural heritage and landscape are enjoyed. In Ercolano, the analysis of disruptive pressures shows that the prevailing vulnerabilities and waste conditions are to be found in the environmental sub-system, in the social sub-system, in the cultural sub-system and in the economic sub-system. The use of Multi-Stakeholder Engagement Processes (UNDP, 2006) helped the organization and the integration of the expressed values in a shared vision, which was used as the critical starting framework to build a participatory and shared decision-making and planning process (Bosone & Ciampa, 2021).					

In the wake of the inclusive approach outlined in a ministerial document (MIBACT, 2018), the experimentation activated a process of social innovation with the involvement of different actors at all stages of the project process:

- the institutions (Region and Municipality) interested in investing in the cultural heritage of the settlement systems with the aim of also revitalising the economic and social fabric through recovery projects;
- the expert knowledge represented by the University and research bodies with the aim of managing the quality of the project and mediating the interests of the various stakeholders involved;
- the Third Sector bodies and the cultural poles present in the area for the creation of a virtuous network capable of enhancing and promoting the local cultural heritage;
- the community interested in improving living conditions and reactivating the local economy.

In order to discretise the conditions of waste resulting from the impact of disturbing pressures, two working tables were organized:

- the first, to activate a dialogue with the community, through the distribution of large-scale mixed questionnaires, which allowed the analysis of the unexpressed needs and the expectations and the issues considered essential for local development and for the enhancement of individual wellbeing;
- the second, to promote confrontation with the institutions through direct interviews in order to investigate the more influent dynamics and pressures that impacted on their role, also trying to identify potential links with other stakeholders for the definition of new management models.

All the data (hard and soft) obtained from the listening phases of the territory contributed to the participatory definition of a regenerative model (Healey, 2003) for Ercolano, capable of acting simultaneously on the physical, social, economic and cultural levels, creating relationships and circular dynamics between local resources.

The innovativeness of the process developed consisted in the involvement of actors and the interaction between decision-makers, stakeholders, users, and planners in all phases of the information and decision-making process, thus increasing the community capacity building and sense of responsibility.

In the wake of this experimentation, other initiatives are currently being implemented in Ercolano, the monitoring of which will contribute to producing empirical evidence on the role of culture and cultural heritage as drivers for the circular economy model.

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REFERENCES

Bosone, M. Recupero e Gestione dei Beni Comuni: Processi di Riuso dei Sistemi Insediativi. Ph.D. Thesis, University of Naples Federico II, Naples, Italy, 2019.

Bosone, M., and Ciampa, F. 2021. "Human-Centred Indicators (HCI) to Regenerate Vulnerable Cultural Heritage and Landscape towards a Circular City: From the Bronx (NY) to Ercolano (IT)" Sustainability 13, no. 10: 5505. https://doi.org/10.3390/su13105505

Healey, P. 2003. Collaborative planning in perspective. Planning Theory, 2(2), 101-123.

MIBACT 2018. Piano Strategico per lo sviluppo delle aree comprese nel Piano di Gestione del sito UNESCO "Aree archeologiche di Pompei, Ercolano e Torre Annunziata", www.open.pompeiisites.org

UNDP. 2006. Multi-Stakeholder Engagement Processes. Capacity Development Group, Bureau for Development Policy, UNDP: New York, NY, USA, 6 November 2006. Available online: http://content-ext.undp.org/aplaws_publications/1463193/Engagement-Processes-cp7.pdf (accessed on 24 October 2023).

– **Example n.3**

“CEDAS: building CEnsus for seismic Damage ASsessment"					
Author/s: Antonella Peresan, Chiara Scaini, OGS					
RESEARCH UNIT					
OGS					
PROJET TYPOLOGY					
□ Horizon	□ Prin	X PCTO activity			
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public (High Schools)	□ private	□ institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
X territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	□ periurban area	X entire urban area	
RISKS TAKEN INTO ACCOUNT					
X natural	□ environmental	□ anthropic			
TYPE OF INNOVATION					
□ Economic	X Environmental	□ Legal	□ Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
□ water	□ waste	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	□ co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	□ direct contacts	X Institutional		
KEYWORDS					
risk awareness; crowdsourced data; citizen science, seismic, residential areas					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Location: Urban centers in Northeastern Italy **Duration**: 3-4 months (for each of the two consecutive editions) **Risk**: earthquakes **People involved:** about 170 high school students (plus 6-8 teachers) in each edition **Frequency of sessions:** 4-5 half day meetings for each edition **Description**: The project consists in the collection and elaboration of crowdsourced data on main residential buildings typologies of Northeastern Italy, a seismically active area which suffered consequences from strong past earthquakes. During the two editions of the project, 342 high school students collected reports on more than 7000 buildings, performing a statistical analysis of their results. The CEDAS project makes a first step beyond crowdsourcing activities and applies citizen science to exposure development. Results allow identifying the most common building typologies in the region and the challenges and opportunities associated with data collection and analysis. The experience collected during the CEDAS project shows that crowdsourcing and citizen science activities can contribute to both enhancing the exposure data available for the scientific community and increasing risk awareness among young students in the region.					
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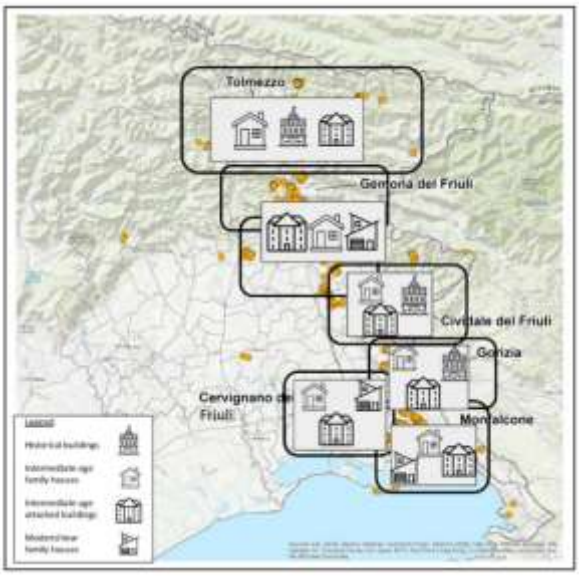

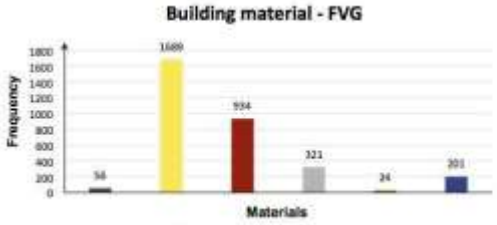

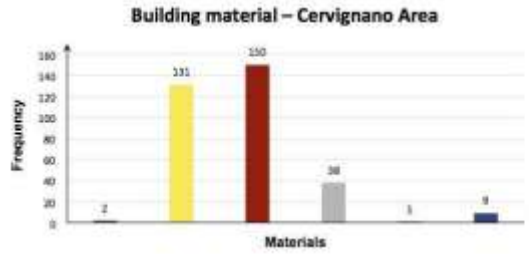

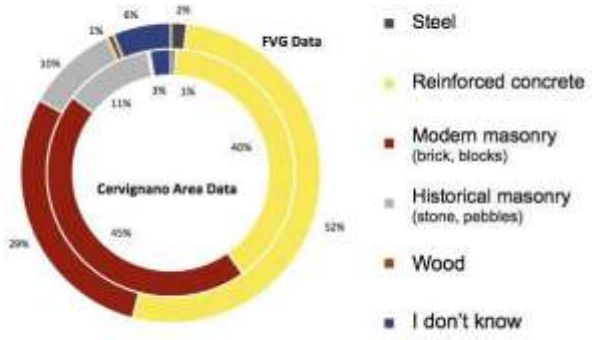

REFERENCES

Scaini C., Peresan A., Tamaro A., Poggi V., Barnaba C. (2022) "Can high-school students contribute to seismic risk mitigation? Lessons learned from the development of a crowd-sourced exposure database. International Journal of Disaster Risk Reduction, 69, art. no. 102755. DOI: 10.1016/j.ijdrr.2021.10275

Peresan, A., Scaini, C., Barnaba, C (2023). "Crowd-Sourced Buildings Data Collection and Remote Training: New Opportunities to Engage Students in Seismic Risk Reduction". Earth Science, Systems and Society 3, 10088. doi: 10.3389/esss.2023.10088

– **Example n.4**

Ecological Risk Assessment to support the management of a sediment contaminated site					
Author/s: Elisa Bizzotto, Petra Scanferla,					
RESEARCH UNIT					
Fondazione Università Ca' Foscari					
PROJECT TYPOLOGY					
□ Horizon	□ Prin	x Others			
European Network of Living Labs (ENoLL)					
□ Yes	x No				
NUMBER OF PEOPLE PARTECIPATING					

□ 0 - 10	x 10 - 30	□ 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
x public	x private	x institutions			
TEMPORAL RANGE					
□ 0 – 6 months	x 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	□ periurban area	x natural system	
RISKS TAKEN INTO ACCOUNT					
□ natural	x environmental	□ anthropic			
TYPE OF INNOVATION					
□ Economic	x Environmental	□ Legal	□ Political	□ Social	x Technical
FLOWS TAKEN INTO ACCOUNT					
□ resources	□ waste	x biota	x food	x sediment	
DEGREE OF PARTICIPATION					
□ passive	x active	x co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	x direct contacts			
KEYWORDS					
Ecological Risk Assessment, Contaminated Site Management, communication					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Ecological risk assessment (ERA) is defined as an iterative process that evaluates the likelihood of adverse ecological effects resulting from exposure to one or more stressors. Although ERA is recognized as a valuable procedure to better address efforts and strategies for site remediation, in Europe a common framework for the implementation of ERA in the management of contaminated sites is lacking (Bizzotto et al. 2022). In Italy, there are no legally binding provisions regulating the direct assessment of potential likelihood of ecological risks. However, also in Italy there is a need to define tools and methods for flexible, realistic, and site-specific ecological risk assessment to support a sustainable management of potentially contaminated site with ecological values (such as river/lakes/coastal water with contaminated sediment). Under this context, a participatory and proactive approach can represent a useful strategy to deal with the technical challenges for a proper assessment and management of contaminated sites with ecological values; an example is represented by the methodological experiences gained from an Italian contaminated aquatic system assessed under a risk-based approach through a multi-stakeholder collaboration. The case study regards historic contamination in an aquatic ecosystem (declared a National Contaminated Site or Site of National Priority) in Northern Italy. Sediment, water and biota of the aquatic ecosystem were characterized through several investigations performed in collaboration with public environmental agencies and research institutes. An ecological risk assessment (ERA) was proposed to support environmental management of the site and a technical board was established made up of experts from academia, public environmental agencies, research institutes and industry, with the final aim of developing a shared approach and evaluating site-specific ecological risks. Several technical meetings were performed in order to share, discuss and evaluate the best practices and the proposed technical approach for the site-specific evaluation. The approach was considered a positive contribution to the decision-making processes by integrating environmental, social and economic aspects, with communication between stakeholders. ERA largely supports risk managers but can also provide a transparent process for communication with interested parties which is an integral part of the entire process (Marziali et al., 2015).					
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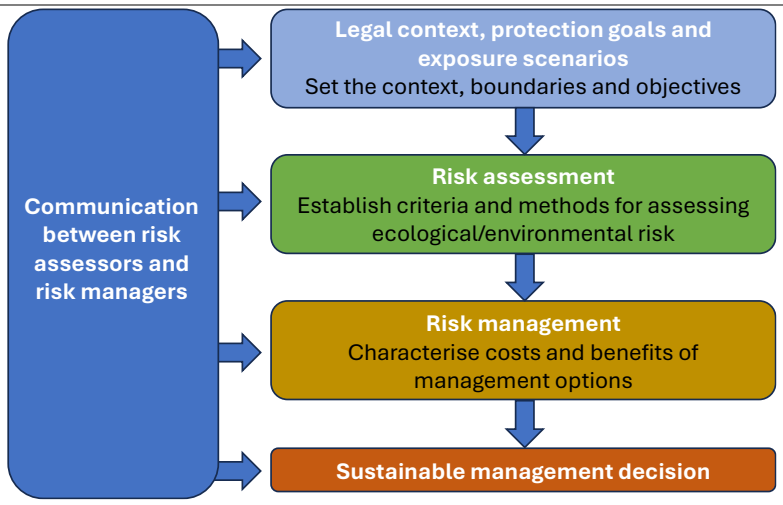

REFERENCES

Marziali et al., 2015. Methodologies and Approaches for Sediment Characterisation and Ecological Risk Assessment Based on Experience Gained in an Italian Case Study – poster presented at the Europe SETAC 2015

Bizzotto et al., 2022. Ecological risk assessment for contaminated sites in Italy: Guidelines and path forward. Integrated Environmental Assessment and Management — Volume 00, Number 00—pp. 1–7

– **Example n.5**

Sostenibilità delle Bonifiche in Italia – White book					
Author/s: Lisa Pizzol, Elisa Giubilato, Elisa Bizzotto, Petra Scanferla					
RESEARCH UNIT					
GreenDecision srl, Fondazione Università Ca' Foscari					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ xxxx	x Others		
European Network of Living Labs (ENoLL)					
□ Yes	x No				
NUMBER OF PEOPLE PARTICIPATING					
□ 0 - 10	x 10 - 30	□ 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
x public	x private	x institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	x > 3 years			
SCALE					
□ territorial	□ macro-district	□ district	□ census zone	X non applicable	
URBAN CONTEXT (WP2 RETURN)					
□ city centre	□ historic centre	x industrial area	□ periurban area	□ Others	
RISKS TAKEN INTO ACCOUNT					
□ natural	x environmental	x anthropic			
TYPE OF INNOVATION					
□ Economic	x Environmental	□ Legal	□ Political	□ Social	x Technical
FLOWS TAKEN INTO ACCOUNT					
x resources	x waste	□ biota	□ food	□ sediment	
DEGREE OF PARTICIPATION					
□ passive	x active	□ co-creation			

PEOPLE'S ENGAGEMENT					
□ open call	□ social media	x direct contacts	x online meeting		

KEYWORDS

Sustainability, Remediation, Sustainable Remediation Forum, White book, Stakeholder

STRUCTURE AND PHASES OF THE URBAN LIVING LABS

In the last decade, the concept of sustainability has begun to take on an important role in our way of speaking, thinking, and acting. Under this context, in 2015 SuRF (Sustainable Remediation Forum) Italy organized and managed a series of technical meetings with the aim to release a White Book about the Sustainability in the remediation sector in Italy (SURF, 2015). The goal of the document was to present the principles, the scope, and the main activities that coincide with a sustainable approach to the process of remediation in Italy.

Essentially, the "founding fathers" of SuRF Italy made the first step by bringing together stakeholders, both public and private, and seating them around a symbolic table to develop common definitions and achieve greater clarity in order to promote initiatives on this topic. To achieve this, after an analysis of the Italian regulatory context, the three dimensions of sustainability (environmental, social, and economic) were evaluated, as well as their maturity and development in the field of remediation (definition of indicators of sustainability for each aspect).A particular emphasis was placed on the description and means of involvement by the stakeholders, providing recommendations for their roles and responsibilities within the decision-making process. Their role needs to be integrated within the development of a remediation project, leaving the final responsibility of the selected choices to the regulators in charge of the proceedings. Training, information, and sharing of decision making will allow the adoption of criteria of sustainability in the management of contaminated sites remediation and will promote the use of innovative technologies. The identification of steps where technical choices can be shared and agreed upon can also contribute to speeding up the remediation proceedings, especially in complex sites.

The development, by "problem owners", of remediation choices based on environmental, social and economic sustainability criteria can constitute an element that will promote an evolution in environmental regulations. Some examples of voluntary and effective application of the principles of sustainability in remediation choices are reported in the White Book, to provide the Reader with a picture of the status of the application of these concepts both in Italy as well as internationally, and to highlight different aspects of the application of sustainability principles to remediation.

By adopting these principles in a systematic way, remediation will not only be fully and effectively utilized, but will also directly and indirectly contribute to the economic development of the country by returning areas to new investments and by limiting soil consumption.

Beginning from what is summarized and described in this White Book, the SuRF Italy working group intends to continue offering its contribution to the development of tools and technical guidelines to implement the various themes addressed, in support of the different parties involved in the management of contaminated sites in our country.

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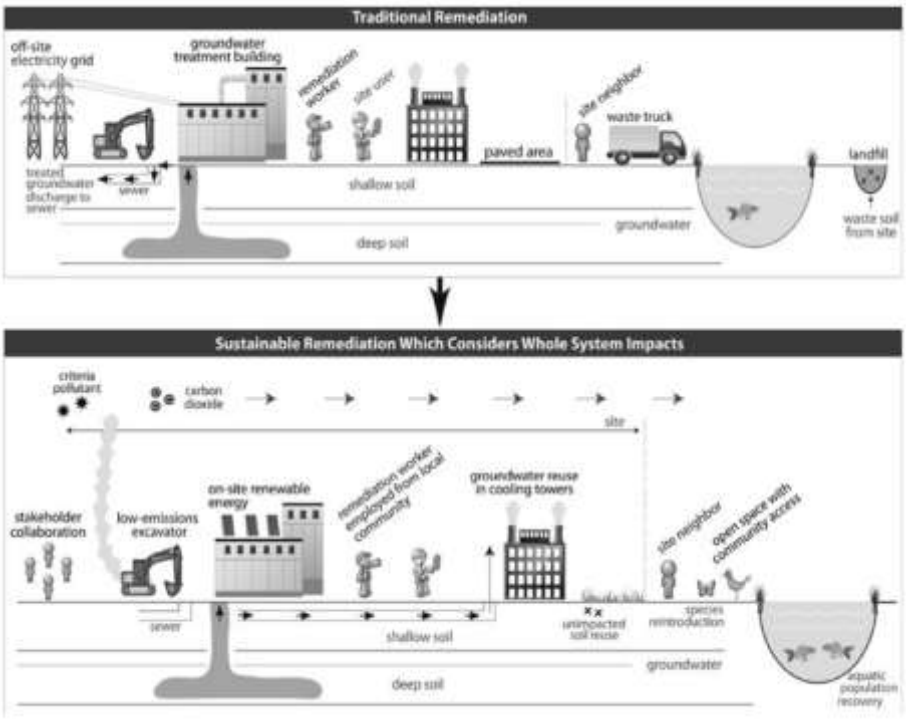
Table: stakeholder involvement process in the different phases of the remediation process (ITA)

Fasi del processo di bonifica	Attività di coinvolgimento delle Autorità	Attività di coinvolgimento di altri potenziali stakeholder
Identificazione degli obiettivi di progetto in relazione alle ipotesi di pianificazione e sviluppo del territorio, tenendo conto delle eventuali attività di bonifica già in corso e degli aspetti sociali, ambientali ed economici di interesse/criticità. Applicabile alle ipotesi di riqualificazione e contestuale riconversione dei brownfields.	Incontro tra: • Autorità competenti per l'approvazione degli interventi • Autorità competenti per lo sviluppo, la pianificazione ed il governo del territorio • soggetto interessato alla bonifica del sito (cd proponente) per condividere gli obiettivi di progetto in relazione alle ipotesi di pianificazione e sviluppo del territorio ed individuare eventuali ulteriori soggetti interessati (es investitori). Le indicazioni fornite dalle Autorità devono essere integrate nel processo; se tali indicazioni non sono coerenti con gli obiettivi del proponente, l'utilizzo di strumenti di supporto alle decisioni può approfondire l'analisi e il confronto tra gli obiettivi di intervento.	Incontro tecnico allargato agli stakeholder selezionati per dare informazione delle principali problematiche delle aree oggetto di intervento ed avviare un eventuale confronto sulle linee di sviluppo del sito con i soggetti interessati. Le osservazioni e le proposte che perverranno dalle parti interessate (entro tempi certi che tengano conto dei termini procedimentali vigenti) possono essere valutate nell'ambito dello sviluppo delle alternative d'intervento e dello studio di fattibilità.
Redazione di uno studio di fattibilità sulle diverse alternative d'intervento compatibili con gli obiettivi identificati e tenendo conto delle eventuali attività di bonifica già in corso. Le alternative identificate vengono poi confrontate, per l'identificazione dello scenario più sostenibile da sviluppare	Integrazione delle indicazioni delle Autorità per l'identificazione delle alternative di bonifica da considerare nel processo decisionale. Tali alternative dovranno essere coerenti con i principi di sostenibilità.	
Applicabile in linea generale. Sviluppo ed applicazione dei criteri di valutazione di sostenibilità delle alternative progettuali individuate: • Definizione del campo di applicazione.	Incontro tra le Autorità e il proponente per identificare il campo di applicazione e lo strumento di supporto alle decisioni e definire i criteri iniziali di selezione, i pesi e gli approcci di gestione dei dati, etc.	Incontro pubblico per illustrare agli stakeholder selezionati: • Lo studio di fattibilità sulle alternative progettuali compatibili con gli obiettivi identificati

• Consenso sugli strumenti/tecniche previste/proposte per fornire supporto alle decisioni • Identificazione degli obiettivi e indicatori di sostenibilità da applicare al caso. • Attribuzione dei pesi ai diversi indicatori. Redazione di un documento di sintesi sull'approccio di valutazione elaborato	Nell'ambito degli strumenti amministrativi vigenti, tale fase può essere rappresentata alla conferenza dei servizi preliminare disciplinata dall'art. 14 bis della L. 241/90 e smi	• I criteri proposti per la valutazione di sostenibilità delle alternative. Le proposte degli stakeholder sui criteri di valutazione di sostenibilità (rese entro tempi certi che tengano conto dei termini procedimentali vigenti) sono valutate nella selezione dell'ipotesi progettuale più idonea. In caso di contrasto sui criteri di valutazione occorrerà effettuare analisi di sensitività
Consenso sull'approccio	Approvazione da parte dell'Autorità competente del documento che riporta l'approccio di valutazione, definito sulla base delle proposte del proponente e degli stakeholder selezionati.	
Valutazione di sostenibilità: • Valutazione dei risultati • Analisi di sensitività • Analisi delle incertezze Documentazione dei risultati e delle conclusioni	Comunicazione dei risultati alle Autorità.	
Progettazione dell'intervento di bonifica	Approvazione da parte dell'Autorità competente del progetto di intervento	Informazione agli stakeholder selezionati, da parte del proponente e dell'Autorità, sugli esiti del processo di valutazione di sostenibilità e sul conseguente percorso progettuale elaborato
Realizzazione dell'intervento di bonifica e valutazione delle performance dell'intervento in termini di sostenibilità	Verifica dei risultati e degli eventuali scostamenti del progetto rispetto a quanto preventivato. Cooperazione con le Autorità per identificare eventuali opportunità di miglioramento e di ottimizzazione.	Comunicazione dei risultati agli stakeholder selezionati.



Example of a conceptual model illustrating differences between traditional and sustainable remediation projects

REFERENCES

SURF Italy, 2015. Libro Bianco - Sostenibilità nelle Bonifiche in Italia. Available at http://www.reconnet.net/Docs/SuRF_Italy_Libro_Bianco_rev_Ottobre2015.pdf

– **Example n. 6**

PED4ALL
Author/s: Silvio Cristiano, Università degli Studi di Firenze
RESEARCH UNIT (coordinators)
Università degli Studi Roma Tre (prof. Ranzato); Université Libre de Bruxelles (prof. Vanin)
PROJET TYPOLOGY

□ Horizon	□ Prin	X Urban Europe			
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
X city centre	□ historic centre	X industrial area	□ periurban area		
RISKS TAKEN INTO ACCOUNT					
□ natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	X Legal	X Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
□ water	□ waste	□ people	□ metal	□ plastic	X energy
DEGREE OF PARTICIPATION					
□ passive	□ active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts			
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Stakeholder: Università degli Studi Roma Tre; Municipio Roma VIII; cooperativa Pin.Go.; impresa culturale Industrie Fluviali; centro sociale per anziani; commercianti locali; complesso abitativo del Porto Fluviale; etc. currently at a preparatory stage (no more information available – to be monitored)					
IMAGES					

REFERENCES
Ranzato, M., Vanin, F., & Cristiano, S. (2022). Il progetto PED4ALL a Roma, Bruxelles e Istanbul. *Diritto & Società*, *4*, 971-980. https://architettura.uniroma3.it/wp-content/uploads/sites/20/file_locked/2024/04/Relazione-ricerca-2023-24L.pdf

– **Example n. 7**

Ma.Sa.Ma. – Mapear Santa Marta					
Author/s: Silvio Cristiano, Università degli Studi di Firenze					
RESEARCH UNIT (coordinators)					
Politecnico di Torino (prof. Alfredo Mela; prof.ssa Daniela Ciaffi)					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□	X international cooperation		
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
Politecnico di Torino; associazione ADES Santa Marta (facente funzione di amministrazione locale); università salvadoregne; radio, associazioni e comitati locali					
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
X territorial	macro-district	□ district	□ census zone		
URBAN CONTEXT (WP2 RETURN)					
□ city centre	□ historic centre	□ industrial area	□ periurban area	X countryside	
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	□ Legal	□ Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
X water	X waste	□ people	□ metal	□ plastic	□
DEGREE OF PARTICIPATION					
X passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	□ social media	X direct contacts	□ local community interphone		
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Phases: preparatory (from a distance, with remote contacts on site); preparatory (on site, with meetings with key stakeholders, including local administrations and universities in the country); scouting (walks, mapping, and interactions with local population); operational (assemblies, open days, working tables, games / role play sessions); final presentation and discussion. Included risks were related to the protection of and from local water (streams); waste management; pollution-related disease spread; best practices in farming tecniques, GIS-based governance; bioclimatic building techniques. Stakeholder : Politecnico di Torino; associazione ADES Santa Marta (facente funzione di amministrazione locale); università salvadoregne; radio, associazioni e comitati locali ULL Concluded (2014)					
IMAGES					

REFERENCES

Cristiano, S., Falchetti, C., Vasilescu, V., & Orefice, E. (2015). Effective participatory processes and multi- disciplinary approaches for the analysis of a territory and the fostering of durable and sustainable self- managed strategic planning: the Ma.Sa.Ma. project, a rural case study in El Salvador. Rinforzare il capitale umano nei Paesi a risorse limitate. Health and wealth for all by the year 2030. Abstract proceedings of the IV Congress of the University Network for Development Cooperation (CUCS), Brescia, 10-12/09/2015.

Falchetti, C., Cristiano, S., & Mela, A.(2018). Failing while succeeding? On the delicate effects of a yet sincere cooperation. *Journal of UNiversities and international development COoperation, 1/2018,* 67-79 [ISSN: 2531-8772]

Cristiano, S., Falchetti, C., Miacola, F., Dinatale, V., Ronco, F., Savio, R., Schiavon, D.I., Bindi, V., & Deriu, M. (2018). Cooperation beyond development. Rethinking international aid for the self- determination of recipient communities. *Journal of UNiversities and international development COoperation, 1/2018,* 42-50 [ISSN: 2531-8772]

Ciaffi, D., & Mela, A. (2015). El Salvador verso la pianificazione di città e territori: un'esperienza partecipativa pilota a Santa Marta. *Visioni LatinoAmericane*, *12*, 73-88.

– **Example(n. 8)**

REPAiR PULL. – PeriUrban Living Lab					
Author/s: Federica Vingelli					
RESEARCH UNIT					
DiARC - UNINA					
PROJET TYPOLOGY					
x Horizon	□ Prin	□ Urban Europe			
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	X periurban area		

RISKS TAKEN INTO ACCOUNT					
□ natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	X Legal	□ Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
□ water	X waste	□ bio	□ metal	□ plastic	X wastescapes
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	X local community		
KEYWORDS					
Wastescapes, Eco-innovative Solution, Co-design, circular economy, peri-urban					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					

REPAiR Horizon2020 main objective was the development of place-based and strategies for a circular management of material resources, land and Wastescapes in peri-urban areas, in order to move activate processes of urban regeneration. The Peri-Urban Living Labs, as territorial laboratories of co-design, are focused on specific areas assumed as study cases, a significant part of peri-urban zones, for spatial and socio-economic conditions. Living Labs involve both private and public actors and they are iterative processes made up of following phases:

Co-exploring: In this phase a common understanding of the territory is developed with all the researchers, stakeholders and experts identified and involved in the project. Key resource/waste flows are selected through the co-definition and co-mapping of material flows and waste management system and main challenges are pointed out.

Co-design: Within this phase local teams develop the capacity to design Eco-Innovative Solutions and strategies through interaction in laboratories.

Co-production: a catalogue of Eco-Innovative Solutions which are specific for each case study is produced and their feasibility is checked by local teams

Co-decision: In this phase, research teams and stakeholders explore the opportunities to draw public attention to the Eco-Innovative Solutions, and to understand the chances for influencing the decision-making processes. The ultimate goal becomes to trigger future local development through co-creation.

Co-Governance is the last phase of the PULL and happens after the REPAiR Project, how the different cases will implement REPAiR in the further projects and is about delivering decision-making models based on co-creation and making them transferable to further cases

Link: https://h2020repair.eu/repair-peri-urban-living-lab/

IMAGES

Carrying out a PULL Afragola, Naples 2020.

Systemic section of RECALL the Eco – Innovative Solution

REFERENCES

Amenta L, van Timmeren A. (2018) Beyond Wastescapes: Towards Circular Landscapes. Addressing the Spatial Dimension of Circularity through the Regeneration of Wastescapes. Sustainability, 10(12):4740. https://doi.org/10.3390/su10124740 REPAiR 2018_01

Vittiglio, V., Iodice, S., Amenta, L., Attademo, A., Formato, E., Russo, M. (2018) Eco-innovative strategies towards peri-urban sustainability: the case study of the metropolitan area of Naples. Europa XXI (2018) vol. 34, pp. 23-40. doi: https://doi.org/10.7163/Eu21.2018.34.2

Remøy H., Wandl A., Ceric D., van Timmeren A. (2019) Facilitating Circular Economy in Urban Planning. Urban Planning, Vol 4, No 3, p. 1-4. DOI: 10.17645/up.v4i3.2484 REPAiR 2019_05

- Example (n. 9)

UnaLab - Urban Nature Labs					
Author/s: Sabrina Puzone					
RESEARCH UNIT					
DiARC - UNINA					
PROJET TYPOLOGY					
x Horizon	□ Prin	□ Urban Europe			
European Network of Living Labs (ENoLL)					
x Yes	□ No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	X > 3 years			
SCALE					
X territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
X city centre	□ historic centre	□ industrial area	□ periurban area		
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	□ Legal	□ Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT)					
X resource	□ waste	Xpeople	□ metal	□ plastic	X bio

DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	X local community		
KEYWORDS					
Nature based solution; resilience; co-design, co-creation, citizen engagement					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					

The aim of UnaLab - Urban Nature Labs Project is to contribute to the development of cities smarter, more inclusive, more resilient and sustainable, through the use of innovative NBS (nature-based solutions) thanks to co-creation activities with stakeholders and implementation of living lab and citizen engagement in demonstration cities (Eindhoven in Netherlands, Tampere in Finland and Genova in Italy) (https://unalab.eu/en).

The Urban Living Labs has the aim to increase public value and is structured in 3 phases:

1. iniziating and scoping: this phase is focus of ULL aim definition and its vision, as well as identifying the central actors, common strategies and agendas;
2. process development and experimenting: designing supportive frameworks and involving diverse stakeholders to test solutions for urban challenges;
3. reflecting and closing: evaluating the outcomes, expand the application of successful solutions, and disseminating lessons learned to influence urban governance and planning.

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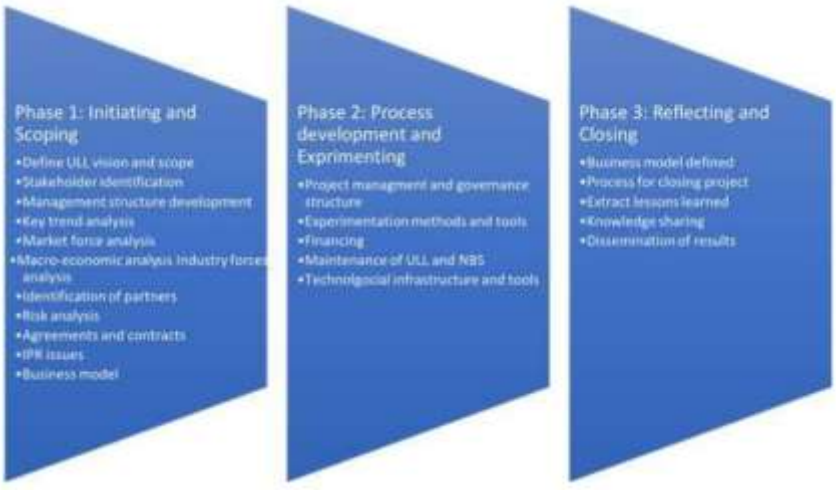

Methodological framework. Source: https://unalab.eu/en

Urban Living Lab Playground The Co-Creation GamerBelgio – Bruxelles (2019) Source: https://unalab.eu/en

REFERENCES
Ståhlbröst, A., Habibipour, A., Chronéer, D., Vaittinen, I., Zalokar, S., & Mafe, C. (2018). UnaLab ULL Framework. Habibipour, A., Ståhlbröst, A., Zalokar, S., & Vaittinen, I. (2020). Living lab handbook for urban living labs developing nature-based solutions. https://unalab.eu/en

– **Example (n. 10)**

TRANSFORMER					
Author/s: Sabrina Puzone					
RESEARCH UNIT					
DiARC - UNINA					
PROJET TYPOLOGY					
x Horizon	□ Prin	□ Urban Europe			
FA PARTE DELLA RETE European Network of Living Labs (ENoLL)					
x Yes	□ No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	X > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
X city centre	□ historic centre	□ industrial area	□ periurban area		
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TIPOLOGIA DI INNOVAZIONE					
X Economic	X Environmental	□ Legal	X Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
X resource	□ waste	X bio	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	X local community		
KEYWORDS					
Super-Lab; Co-creation; Self-Reliant Communities; Civic Participation					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
The TRANSFORMER project takes a regional-scale approach by transforming entire areas into ‘Transition Super-Labs’ (TSL), living laboratories where innovative solutions towards climate neutrality can be developed, tested and implemented. Funded by Horizon Europe, the project focuses on four European regions: Ruhr Area (Germany), Emilia Romagna (Italy), Lower Silesia (Poland) and Western Macedonia (Greece). The GRTs combine empirical evidence of rapid and effective decarbonisation processes with large-scale testing of technological and non-technological solutions characterised by low economic impact and high efficiency. At the heart of the project is the co-creation and democratic participation of civil society, in line with European innovation strategies such as the Green Deal and Horizon Europe.					

Structure and the main objectives include:

1. regional Needs Analysis: each GRT starts with an in-depth study of the regional context to identify the main challenges and opportunities related to the climate transition. This step includes the involvement of key actors such as government agencies, companies, universities and local communities;
2. development of Strategic Roadmaps: once the needs have been analysed, a roadmap is drafted outlining the actions needed to achieve climate neutrality within 10-15 years. The roadmap includes specific targets, timelines, funding methods and tools to monitor progress;
3. large-scale experimentation: LSTs are designed as platforms for testing innovative technological and non-technological solutions under real conditions. These interventions are implemented on a large scale, ensuring a holistic approach to decarbonisation.
4. co-Creation and Civic Participation: the involvement of civil society is central. Co-creation processes ensure that the solutions developed meet local needs and promote a fair and equitable transition. This strengthens participatory democracy and consolidates support for climate policies.
5. creating Self-Reliant Communities: one of the main aims of GRT is to form self-sustaining communities of practice, capable of maintaining the initiatives developed over time and serving as replicable models in other regions;
6. evaluation and replicability: results are systematically monitored and analysed to assess their effectiveness. This approach ensures that the GRT model can be adapted and implemented in other regions, contributing to the European green transition.

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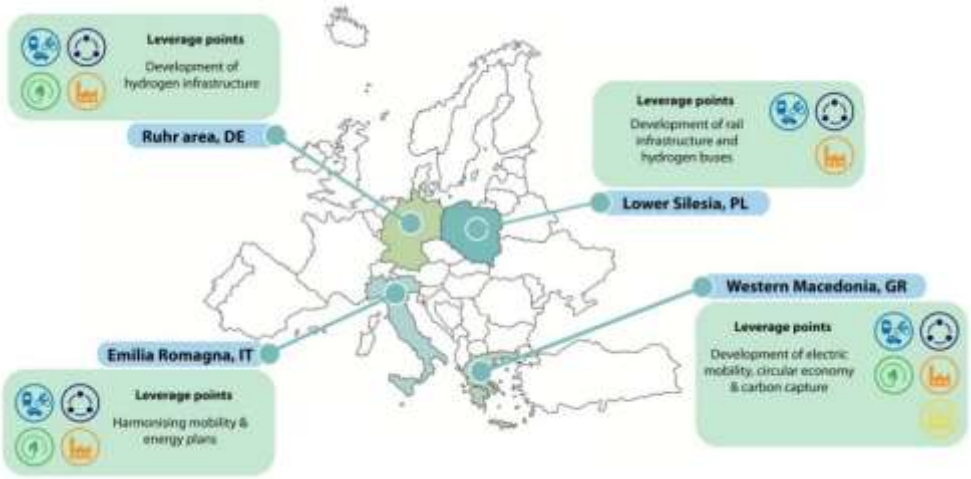

Map of TRANSFORMER Super-Labs. Source: https://www.transformer-project.eu/

Workshoop Bologna (2023) Source: https://www.transformer-project.eu/

REFERENCES

https://www.transformer-project.eu/

– **Example(n. 11)**

SCORE - Smart Control of the Climate Resilience in European Coastal Cities.					
Author/s: Sabrina Puzone					
RESEARCH UNIT					
DiARC - UNINA					
PROJET TYPOLOGY					
x Horizon	□ Prin	□ Urban Europe			
European Network of Living Labs (ENoLL)					
x Yes	□ No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	X > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone	□	
URBAN CONTEXT					
X city centre	□ historic centre	□ industrial area	□ periurban area		
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	□ Legal	X Political	X Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
X resource	X water	X bio	X sand & clay	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	X local community		
KEYWORDS					
Co-design; evaluate; prototype; smart control; resilience					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					

The EU-funded project SCORE (Smart Control of the Climate Resilience in Coastal Cities) focuses on increasing the climate resilience of European coastal cities through innovative integrated solutions. Among its main objectives is the development of Coastal City Living Labs (CCLLs), an approach that combines the involvement of citizens, scientists and policy makers to address challenges such as sea level rise, coastal erosion and extreme weather events.

The CCLL model expands the traditional 'living laboratory' concept, adapting it to the needs of coastal cities. The project establishes a network of 10 CCLLs distributed between pioneer and 'follower' cities, creating a continuous exchange of knowledge and best practices. This approach is based on smart technologies, Nature-Based Solutions (NBS) and an Ecosystem-Based Approach (EBA) to improve climate resilience.

The SCORE project is structured in four iterative phases, which ensure a progressive integration of the developed solutions with the local context and the needs of different stakeholders.

Phases of the CCLL Process:

1. **Empathise & Define**
   This foundational phase identifies stakeholder needs and barriers related to resilience challenges, defining a shared understanding of the issues;
2. **Ideate & Co-Design**
   Stakeholders collaboratively develop solutions through iterative co-creation, producing a Minimal Viable Product (MVP) that addresses identified priorities:
3. **Prototype & Pilot**
   The MVP is tested in real-life settings within the CCLLs through localized pilot projects, ensuring alignment with stakeholder requirements;

4. **Test & Evaluate**
   The solution undergoes broader testing to gather feedback and assess its impact, ensuring replicability and refinement for broader implementation.

CCLLs emphasize participatory and adaptive design, ensuring the developed solutions are technologically robust, socially accepted, and financially viable. Their iterative and collaborative approach fosters the exchange of knowledge across labs, enhancing the capacity for climate adaptation in coastal cities. By integrating NBS, smart technologies, and stakeholder engagement, SCORE sets a blueprint for coastal resilience in Europe.

Link: https://score-eu-project.eu

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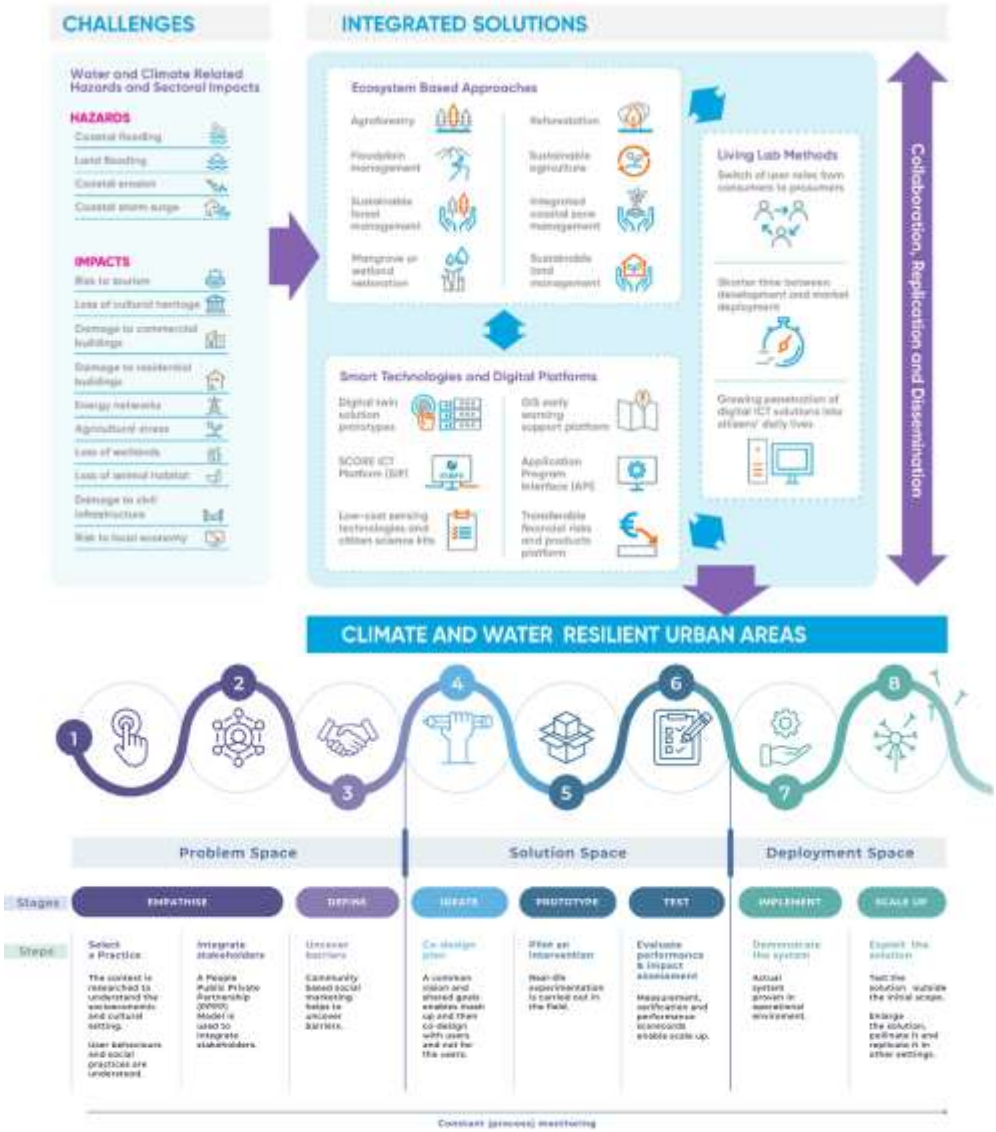

Project concept. Source: https://score-eu-project.eu

Workshop Barcelona (2022). Source: https://score-eu-project.eu

REFERENCES
Ocean & Climate Platform. (2022). Adapting Coastal Cities and Territories to Sea Level Rise in the Mediterranean Region: Challenges and Best Practices. Ocean & Climate Platforme. 48 pp.

- **Example(n.12)**

LABORATORIO BAGNOLI					
Author/s: Emanuela Coppola					
RESEARCH UNIT					
DiARC - UNINA					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ Urban Europe	X PCTO activity		
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	□ 1 – 3 years	X > 3 years			
SCALE					
□ territorial	□ macro-district	X district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	X industrial area	□ periurban area	X periphery neighborhood	
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	□ Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
X waste	X water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
X passive	X active	□ co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	X social media	X direct contacts	□ local community		
KEYWORDS					
Social capital, identity walks, questionnaire, laboratory, high school					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
The Bagnoli Laboratory, in its first structure as a Laboratory on urban quality in Bagnoli, involved over two hundred students, 138 from the Michelangelo middle school and over 60 from the “A. Labriola” between 2016 and 2019 (from 2017 to 2019 as a two-year school/work alternation project of the Labriola High School) and from 2019 to 2024 with the Istituto Superiore Statale “F.S. Nitti” of Naples and from 2023-24 with the Liceo Artistico “U. Boccioni”, again as a PCTO project. The Bagnoli Laboratory had the aim of increasing the civic sense of young people who live and frequent the neighborhood by encouraging them not to get used to suffering urban decay but to react to it. By learning the teaching of the "right to the city" we wanted to make people understand that a neighborhood must obligatorily and necessarily offer livable urban spaces. The first project was divided into two phases: - first, the students responded to a questionnaire on the places in the neighborhood; - subsequently, the same people, in an intergenerational dialogue, interviewed some citizens about the places. Furthermore, the comparison with older generations highlighted a loss of memory of the places that marked the history					

of the neighborhood such as the Starza Masseria or the San Laise hill. Even the same area where the factory stood appears to young people as a place separated from the neighborhood.

- thirdly, identity walks open to citizens were organized as part of the Jane's Walk event. From this perspective, in addition to being a laboratory on the quality of urban spaces and on a possible ecological transformation of places, the project also functioned as a laboratory on memory for the children.

IMAGES

REFERENCES

E. Coppola, G. Bruno (2024), "Bagnoli: riconnettere attraverso una passeggiata patrimoniale un territorio fatto di recinti" in *Cultura della sostenibilità per comunità inclusive. Strumenti metodologici per nuove visioni*, a cura di Antonio Uricchio, Massimo Clemente, Maria Casola e Gaia Daldanise, Collana "Ricerca e Documentazione", Aracne Editore, Collana Studi e Ricerche della Fondazione La Rocca, pp.161- 173
https://www.aracneeditrice.eu/it/pubblicazioni/cultura-della-sostenibilita-per-comunita-inclusive-gaia-daldanise-maria-casola-massimo-clemente-antonio-felice-uricchio-9791221812435.html

E. Coppola (2020), "Laboratorio Bagnoli" Edicampus Edizioni– ISBN 978-88-7603-145-8
http://www.edicampus-edizioni.it/images/ebook/laboratorio-bagnoli.pdf

E. Coppola (2018), "L'Urbanistica a scuola come strumento per contrastare la povertà urbana e accrescere il senso di città" in Urbanistica n° 162 - INU Edizioni – ISNN 0042-1022, pp.67-73.

- **Example(n.13)**

CALL - CAlabria creative Living Lab					
Author/s: Emanuela Coppola, Eleonora Giovene di Girasole (CNR- IRSS)					
RESEARCH UNIT					
DiARC Department of Architecture Federico II (LUPT Center Project)					
PROJET TYPOLOGY					
□ Horizon	X Prin	□ Urban Europe	□ PCTO activity		
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
□ territorial	□ macro-district	□ district	□ census zone	X small tourist municipalities	
URBAN CONTEXT					
X city centre	□ historic centre	□ industrial area	□ periurban area	□ periphery neighborhood	
RISKS TAKEN INTO ACCOUNT					
X natural	□ environmental	□ anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	X Political	□ Social	X Technical
FLOWS TAKEN INTO ACCOUNT)					
□ waste	□ water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	X social media	X direct contacts	□ local community		
KEYWORDS					
Creative Living Lab; Innovative Practices; Sustainable Development; Resistant Communities; Cultural Enhancement					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
As part of the project “Calabria Creative Living Lab (CALL) project, winner of the Por FESR -FSE Calabria 2014-2020 call, AXIS I – PROMOTION OF RESEARCH AND INNOVATION, Action 1.3.2 “I support the generation of innovative solutions for specific problems of social relevance, also through the use of open innovation environments such as Living Labs" - and in reference to WP2 "Analysis of the state of the art and territorial context of case studies" in which the CNR IRISS is a partner, it was signed a Memorandum of Understanding with the “Raffaele d'Ambrosio” Interdepartmental Research Center Laboratory of Urbanism and Territorial Planning of the University of Naples “Federico II”. The Agreement was divided into the performance of the following activities: - construction of a database of literature and good practices, at European and national level, on new services (cultural-creative, social, sustainable tourism) linked to cultural and tourist valorisation for the development of the territory. - in-depth analysis of the needs of the Municipalities thanks to the georeferenced analysis of the places and actors in the territory that produce and flow cultural, social and tourist services, with the aim of monitoring current supply and demand. The activities must be carried out for the municipalities of Stalettì (CZ), Squillace (CZ), Taverna (CZ). The LUPT - and in reference to WP2 "Analysis of the state of the art and territorial context of case studies" has carried out the following activities:					

Task 2.1 Construction of the knowledge system and database of literature and good practices - Expected results: systematization of information relating to cultural-creative, social practices of sustainable tourism also through Sentimental analysis.
Task 2.2 In-depth analysis of the needs of the territory and of the reference communities: Analysis of the territory-actors-users system through GIS - Expected results: In-depth analysis of the needs of the beneficiary municipality and of the territorial vocations with GIS support - Systematization and transformation of useful data, in GIS form, to carry out subsequent activities.
We also participated in the three workshops in the area and in the prefiguration of development scenarios.

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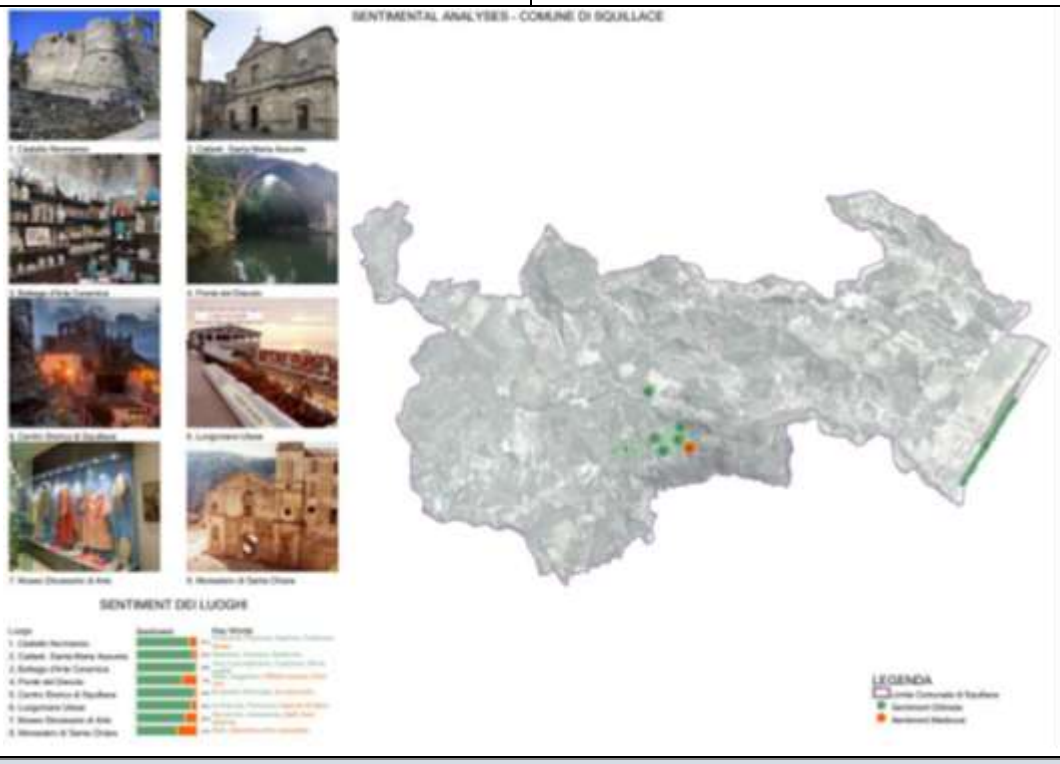

REFERENCES

https://www.iriss.cnr.it/progetti/calabria-creative-living-lab-call/
Registrazione del workshop “Pratiche innovative per uno sviluppo sostenibile di comunità resistenti”

- **Example (n.14)**

Rural and Creativity HUB for the Vulture Regional Park					
Author/s: Emanuela Coppola					
RESEARCH UNIT					
DiARC Department of Architecture Federico II (LUPT Center Project)					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ Urban Europe	□ PCTO activity	X Natural Park Plan	
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
X territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
□ city centre	□ historic centre	□ industrial area	□ periurban area	X natural park	
RISKS TAKEN INTO ACCOUNT					
□ natural	□ environmental	X anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	X Political	□ Social	X Technical
FLOWS TAKEN INTO ACCOUNT					
□ waste	□ water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	X direct contacts	□ local community	X institutional	
KEYWORDS					
Natural Park · Living Lab · Partecipation · Community · Cutlural Heritage · Engagement					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Rural and Creativity HUB for the Vulture Regional Park is been a tool in a Park Plan to make the Vulture Regional Park a model of study and experimentation of a Rural and Creativity Lab, through a "place-based and people-oriented" approach. The project is divided into activities that are perfectly functional and correlated with each other, starting from the identification of needs and ending with the definition of community assets based on the use of living labs: 1.Community Hub - to promote the re-appropriation of physical and relational spaces by the community. A path of Inclusive Governance, capacitation and community engagement to live together the community hub as a public good. A bottom-up construction site. Within this hub, we foresee the realisation of a map of all the spaces belonging to the Vulture Park area, including both forests and urban territories. 2.Rural-cultural Hub - a shared experimentation space for new generative welfare practices through the hybridization of culture, citizenship, and agriculture. Com-munity-supported social farming and distribution of products from the fields, Co-production of storytelling workshops, research/action of the territory, Immersive paths and experiential agricultural workshops. 3. OpenScience Hub - a study centre on open innovation applied to the environ-ment and creativity and sustainable development.					

4.Creativity Hub - to experiment with social, cultural and agricultural innovation practices and contribute to feeding the reflection and knowledge produced by communities of change, community-hubs and researchers in Italy.
The main deliverable of this hub will be the creation and publication of a shar-ing platform for the development of local economies and the advertisement of the activities carried out in the other hubs and, more in general, in the park. Another main objective of this hub is the mentoring of young people under 40, which will also be formed and prepared by researchers and professors of the LUPT centre and the various Universities in Basilicata.

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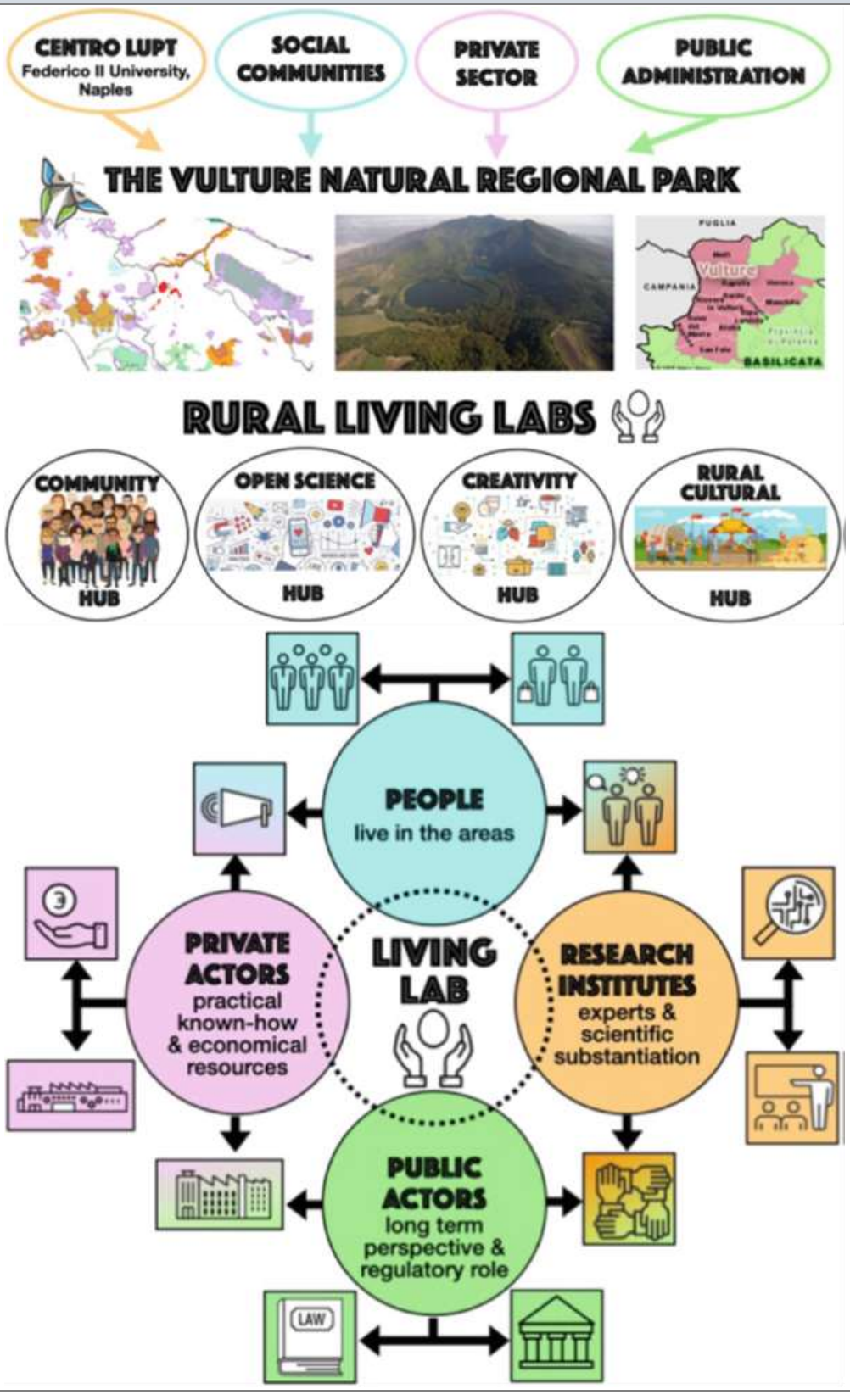


REFERENCES
E. Coppola, G. Sica (2023), “Rural and Creativity HUB for the Vulture Regional Park: making community, starting with the construction of a participatory LAB”, in Bevilacqua (Carmelina), Kakderi (Christina), Provenzano (Vincenzo), Balland (Pierre Alexandre) New Metropolitan Perspective. Transition with Resilience for Evolutionary Development - Open Access TREnD edito Springer, pp. 389-404 – Riconoscimento SCOPUS
ISSN 2367-3370 ISSN 2367-3389 (electronic) Lecture Notes in Networks and Systems ISBN 978-3-031-34210-3 ISBN 978-3-031-34211-0 (eBook) https://doi.org/10.1007/978-3-031-34211-0
Sica, G., VULTURE PARK LIVING LAB: A people place-based cultural Lab for the Vulture Regional Park". In: AGATHON PROJECT | Saggi e Ricerche ISSN online: 2704- 615X, pp.46-68, 2022, (doi.org/10.19229/978-88-5509-446-7/732022).

- **Example(n.15)**

La costruzione della Strategia Regionale Aree Interne nel ciclo di programmazione europea 2021 -2027 / The construction of the Regional Strategy for Inner Areas in the European programming cycle 2021-2027.					
Author/s: Bruna Vendemmia					
RESEARCH UNIT					
DAStU – Politecnico di Milano - Alessandro Coppola (responsabile scientifico)					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ Urban Europe	□ PCTO activity	X SNAI e SRAI	
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	□ 30 - 60	□ 60 - 100	X > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
□ 0 – 6 months	X 1 – 3 years	□ > 3 years			
SCALE					
X territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
X city centre	X historic centre	X industrial area	X periurban area	X entire urban area	
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	X Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
□ waste	□ water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
x passive	□ active	□ co-creation			
PEOPLE'S ENGAGEMENT					
□ open call	□ social media	X direct contacts	□ local community	X institutional	
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
The workshops are part of the project “the Construction of the Regional Strategy for Inner Areas in the European Programming cycle 2021-2017". The project consists of a research/action on processes of marginalization and peripheralization carried out by the Department of Architecture and Urban Studies of the Polytechnic University of Milan in collaboration with the Lombardy Region, under the scientific coordination of Professor A. Coppola. The project analyses 14 Inner Areas located in Lombardia Region, in a condition of anthropic, environmental and natural risks, through workshops with local stakeholders, in order to design a stratergy for the requalification of these areas.					

The 28 workshops engaged with approximately a thousand local and extra-local actors through over 28 workshops and 9 thematic seminars. The program was funded with national and European funds

IMAGES

The San Martino ad Imagna Valley

December 2023. Workshop with local stakeholders in Val Trompia

REFERENCES

L. Saija (2016) La ricerca-azione in pianificazione territoriale e urbanistica. Metodi del Territorio Franco Angeli:Milano. ISBN: 9788891710734

F. Barbera, a. De Rossi (2021) Metromontagna un progetto per riabitare l'Italia. Donzelli: Roma. ISBN:8855221949

- **Example(n.16)**

U-RISE lab Montagna Fiorentina					
Author/s: Caterina Secchi, Adriano Cancellieri					
RESEARCH UNIT					
IUAV University of Venice					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ Urban Europe	□ PCTO activity	X PNRR	
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
SCALE					
X territorial	□ macro-district	□ district	□ census zone		
URBAN CONTEXT					
□ city centre	X historic centre	□ industrial area	X periurban area	X entire urban area	
RISKS TAKEN INTO ACCOUNT					
X natural	X environmental	X anthropic			
TYPE OF INNOVATION					
□ Economic	□ Environmental	□ Legal	X Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
□ waste	□ water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	□ local community	X institutional	
KEYWORDS					
place based innovation, workshop, networking, nature					
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Location: San Godenzo, città metropolitana di Firenze People involved: 20 external young participants (students and professionals from all over italy), 10 internal young participants (from San Godenzo), 7 mentors, 1 trainee, 1 external lecturer Frequency of sessions: one meeting per month with local youth, 4-day Local Living Lab in September with external and internal partecipants Description: U-RISE lab Montagna Fiorentina is a laboratory between didactics and action-research that hosts different formats (short schools, events, internships and thesis work) with the aim of immersing students and professionals in a real context (outside the university classrooms), in direct interaction with the places and actors of the territory and, through confrontation with them, promote the construction of practice-oriented skills. Adopting an open innovation perspective, the intervention allows interaction between this highly interdisciplinary and collaborative group of trained young professionals and the actors of the territory, in order to catalyze and activate project ideas and paths and thus produce innovation. The intervention is continuity with Montagna Prossima, the participatory process, followed by LAMA, promoted by the municipalities of Londa and San Godenzo (winners of the PNRR public notice "Projects for cultural and social regeneration of small historic villages - Village attractiveness, line B." with the "Montagna Fiorentina" project) to spread information and awareness throughout the citizenry about the process of cultural and social regeneration that					

will involve the two municipalities in the coming years and to gather contributions that can guide the practical declination of the planned interventions, making the local community the real protagonist of the change taking place.
Twenty external young participants from all over Italy, professionals in a variety of fields-from cultural design, architecture and planning, social economy management to visual arts-came together to form an interdisciplinary team in San Godenzo (FI), in the Tuscan-Romagna Apennines, for four residential days of field teaching on the topics of urban regeneration via social innovation with a focus on Inner Areas.
LLL goals for in-house participants
1. Process Acceleration. Acceleration of local - ongoing - urban innovation processes through an intensive workshop with an interdisciplinary team supervised by experienced U-Rise Community faculty and mentors. Engaging in Co-design with youth to:

- functionalization of a chosen place through a collaborative construction site;
- governance study for the management and activation of the place

2. Prototyping of servicesPrototyping of services designed during the co-design phases initiated-with the Next Mountain project-by local labbers. Enter the Co-design pathway with Women to:

- experiment with the widespread B&B service, from external labbers, during the U-Rise Lab;
- experiment with the Catering service, from external and internal labbers during the U-Rise Lab

LLL goals for external participants
Provide training through:

- experiential teaching in the field;
- involvement of experienced mentors who support the process;
- peer learning;
- inclusion in a national network of urban regenerators;
- empathizing with place

What the U-RISE LAB format is based on:
1.Training and research:

- explore a territory and immerse themselves in a project pathway of the PNRR 'Call for Villages';
- carry out thematic lunges on the territorial regeneration of inland areas together with local and national experts;
- develop practice-oriented skills (i.e., originated from and oriented to practice in the field).

2.Networking:

- work collaboratively, alternating activities of reflection and field experience;
- field, together with professional people interested in the territorial regeneration of inland areas;
- become part of an interdisciplinary network of professional people interested in the territorial regeneration of inland areas;
- become part of the interdisciplinary network on urban regeneration/social innovation connected to the U-Rise master's program at the Iuav University of Venice.

3. Design:

- experience firsthand design activities on real contexts, in direct interaction with places and actors in the area (e.g., individual inhabitants, associations, institutions);
- be the protagonist of a collective self-construction site for the grounding of the design elements elaborated during the workshop.

How the design challenges of the U-RISE LAB were defined: The design challenges were defined within "Montagna Prossima," the participatory pathway that the two municipal administrations of San Godenzo and Londa decided to initiate. Two inhabitant-run services were also co-designed during the participatory journey and tested for the first time at U-RISE LAB, which in this way helped to develop their prototype.

What the U-RISE LAB provided: U-RISE LAB involves plenary and group work tracks, alternating between training and networking moments and workshop moments organized in work teams to carry on the planning activity in a more agile way.
All participants then took part in the debate generated by the discussion with the local city council and its technical office about the current planning activities, reasoned about the theme of Inner Areas thanks to the framework shared by Filippo Barbera, and got in touch with the theme of forest management, a strongly central element for the project area, thanks to the excursion led by Andrea Barzagli. The participants were then divided into 2 groups:

- the " local territorial regeneration strategy" group of the San Godenzo Inner Area, which followed design models drawn from the design thinking approach, coming to share visions for local development, proposals to implement and facilitate connections between San Godenzo and neighboring municipalities, ideas for enhancing the natural heritage with purposes not only for tourism but also for educational, therapeutic, productive and energetic

purposes, possible solutions to implement the service of hospitality and convert underutilized spaces into generative places of culture and technological innovation, ideas to improve the relationship between human beings and the forest environment;

- the "collaborative sel-buildingn site" group to set up a public space designed and built with and for the youth of the village. A team of outside experts and locals, built to imagine together the possible future configuration of the public space in front of Villa Gentili and to design the first installation for the setting up of an equipped area in this space.

The analytical and design process was intensive and culminated in a final moment of restitution with a presentation and debate open to the townspeople.

Over the course of the four days, there was no shortage of informal moments to become part of village life, in particular thanks to the group of young people who took part in the construction site and who organized the GoDenz aperitif and thanks to the restaurateurs of the Falterona Café and the Bachino who welcomed us to their newly opened businesses.

Professionals involved: Adriano Cancellieri Urban Sociologist, founder and coordinator of the U-Rise Master in Urban Regeneration and Social Innovation of the Iuav University of Venice; Elena Ostanel Urban Planner, deputy director of U-Rise Master; Andrea Barzagli Doctor of Agronomy and Forestry and Environmental Hiking Guide; Marika Moscatelli Architect with specialization in Urban Regeneration and Social Innovation, part of the coordination team of the European project EUREKA - Training Urban Innovators of the Iuav University of Venice; Martina Pestarino Trained Architect, specializing in Urban Regeneration and Social Innovation, part of the coordination team of the European project EUREKA; Paolo Robazza Founder of Beyond Architecture Group, expert in urban design and collective self-building sites; Caterina Secchi Architect specializing in Urban Regeneration and Social Innovation; Filippo Barbera Professor of Economic Sociology at the CPS Department of the University of Turin.

IMAGES

REFERENCES

https://montagnafiorentina.com/
https://urise.it/

Example (n.17)

Local Living Lab: Vivere il territorio. Un nuovo modo di abitare					
Author/s: Giorgia Arillotta					
RESEARCH UNIT					
DiARC - Università degli Studi di Napoli					
PROJET TYPOLOGY					
□ Horizon	□ Prin	□ Urban Europe	□ PCTO activity	X PR FSE+ 2021-2027	
European Network of Living Labs (ENoLL)					
□ Yes	X No				
NUMBER OF PEOPLE PARTECIPATING					
□ 0 - 10	□ 10 - 30	X 30 - 60	□ 60 - 100	□ > 100	
TYPOLOGY OF PEOPLE INVOLVED					
X public	X private	X institutions			
TEMPORAL RANGE					
X 0 – 6 months	□ 1 – 3 years	□ > 3 years			
REFERENCE SCALE					
□ urban district	□ macro-district	□ small tourist municipalities	□ natural park	X territorial	
URBAN CONTEXT					
□ city centre	X historic centre	□ industrial area	X periurban area	X entire urban area	
RISKS TAKEN INTO ACCOUNT					
□ natural	X environmental	X anthropic			
TYPE OF INNOVATION					
X Economic	X Environmental	□ Legal	X Political	X Social	□ Technical
FLOWS TAKEN INTO ACCOUNT					
□ waste	□ water	X people	□ metal	□ plastic	
DEGREE OF PARTICIPATION					
□ passive	X active	X co-creation			
PEOPLE'S ENGAGEMENT					
X open call	X social media	X direct contacts	□ local community	X institutional	
STRUCTURE AND PHASES OF THE URBAN LIVING LABS					
Location: Monteroni d'Arbia, Rapolano Terme, Castellina in Chianti (SI) People involved: approximately 60 participants in public meetings including citizens, associations, public and private actors, and 5 technicians from the Public Administration's design offices. Frequency of sessions: 5 public meetings Description The Local Living Lab "Vivere il territorio. Un nuovo modo di abitare" is integral to the territorial strategy of the Municipalities in the Sienese urban belt: Monteroni d'Arbia, Castellina in Chianti and Rapolano Terme. This territorial strategy was financed through the PR FESR Tuscany 2021-2027 Operational Program as part of the Specific Objective OS 5.1 "Promoting integrated and inclusive social, economic, and environmental development, culture, natural heritage, sustainable tourism, and safety in urban areas". The territorial strategy includes 16 interventions aimed at enhancing the local heritage, repurposing public areas, regenerating spaces for services and sports, reusing public buildings for social and cultural purposes, while at the same time ensuring energy efficiency through alternative sources to avoid new soil consumption. The Local Living Lab (LLL), supported by the PR FSE+ 2021-2027 grant, analysed three projects included in the territorial strategy through a co-design and ex-ante impact assessment laboratory:					

- Restoration and functional requalification of buildings defined as "Former public baths" (Castellina in Chianti)
- Restoration and functional requalification of Grancia di Cuna (Monteroni d'Arbia)
- Renewal of the Corpus Domini Church in Piazza Matteotti (Rapolano Terme)

The goal is to inform and engage citizens, as well as public and private stakeholders, about the impacts of interventions. This involves actively involving them in co-design sessions to develop strategies and define the governance and utilization of intervention spaces. The Local Living Lab has promoted the experimentation and dissemination of inclusive methodologies to involve stakeholders facilitating digital participation through the public visualization of the co-design process results.

The "Design Your Impact" tool, found in the Open Impact platform, and questionnaires on expected impacts were used to support the Local Living Lab with a particular focus for young people interested and inclined to use digital technologies.

Phases and Activities

The Local Living Lab took place from September 2023 to January 2024 and was structured in three phases:

a. Phase 1: During the first stage, the creation of a territorial strategy booklet, a desk analysis and focus groups involving public administration technicians was implemented. Following a mapping of key stakeholders and the construction of the knowledge framework of the study territories and a co-design laboratory. Additional attention was given to the visual identity design and communication strategy, community, and actor engagement activities, as well as the database development for Design Your Impact and digital participation.

b. Phase 2: Through an active on-site approach, the second phase was characterised by site visits to the intervention areas, and formation of 2 public focus groups and 3 public co-design meetings. A second aspect of this phase was the sharing of best practices throughout the national territory, ex-ante impact assessment of interventions, and the submitting questionnaires on expected impacts to citizens as well as to public and private actors during public meetings and through official channels of the Municipalities.

c. Phase 3: For the third and last phase, the focus was on the results analysis from Phase 1 and 2 and the public reporting of the Local Living Lab and DYI. During this last phase, a training on DYI management by Open Impact was given to municipal technicians. Meanwhile, a digital report was developed, and the results were open source shared on the OpenToscana platform.

Results

The LLL proved, through a detailed analysis of different governance and use modalities of intervention spaces, to be an integral approach for the involvement of community and key stakeholder. Digital participation, facilitated by tools such as the "Design Your Impact" on Open Impact platform and the sharing of the Local Living Lab phases on OpenToscana platform, has favoured dynamic and proactive collaboration among citizens, public and private actors. As well as orienting solutions towards measurable objectives consistent with the territorial strategy.

As a result, the LLL project has highlighted the importance of actively involving the local community and using existing resources in the territory for the development of an effective territorial strategy. This involvement can occur through territorial animation practices that, over time, aims to mobilise and utilise both social and material capital.

LLL was developed by a multidisciplinary team composed of Architects specialised in urban regeneration and social innovation (Caterina Secchi, Giorgia Arillotta), a philosopher expert in design and cultural mediation (Francesco Romito), a service designer (Ambra di Bernardi), together with the group of experts from Open Impact (Claudio Aceto, Arda Lelo)

IMAGES

Figure 1- Days of the Local Living Lab and co-design activities at Supercinema in Monteroni d'Arbia, City Market in Castellina in Chianti, and the Municipal Palace in Rapolano Terme.

Figure 1-Storymaps archgis

REFERENCES

https://partecipa.toscana.it/web/vivere-il-territorio/home
https://storymaps.arcgis.com/stories/56ca6e9fd9d249aabfca9cce9c338691

KEYWORDS

Co-design; Multi-Stakeholder Engagement; Governance, Impact

2.3 Comparative Analysis

Building upon the recognition that the methodology of Urban Living Labs (ULLs) in multirisk contexts is not yet universally defined, as evidenced by the literature review (Part 1.1), the research conducted a structured synthetic-comparative analysis of selected national and international Living Lab examples.

The cases, spanning various scales and territorial characteristics, were examined to inform the development of a robust and adaptable methodology for the RETURN ULL and city scale exercises specifically tailored for multirisk urban scenarios. The investigation pursued a dual objective: to identify common, recurring, and transversal factors across these diverse ULL experiences, and simultaneously, to pinpoint specific methodological steps and potential exercises applicable within varied urban contexts, considering their unique target groups and distinct project goals.

In order to ensure a structured and comparable interpretation of the data, the case study analysis sheets were organized according to a categorical framework, divided into thematic sections (fig.4), which allowed for a systematic comparison of the information collected. The analysis initially focused on the data included in the first section of the sheets, which contains key information for the methodological and operational framing of each ULL.

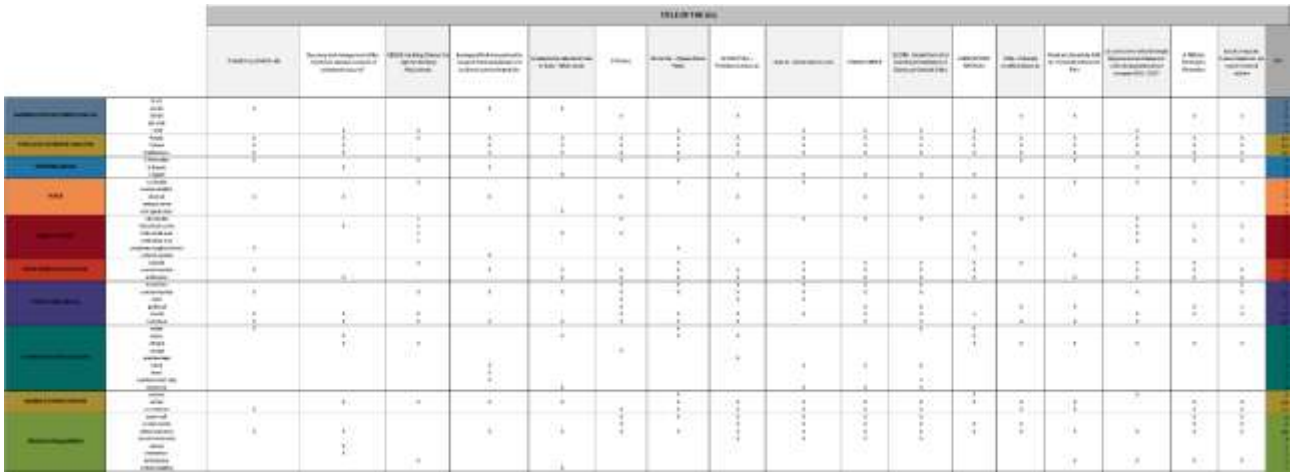


Fig. 4 Example collection: comparative analysis. Source: elaboration of the authors

From the cross-reading of the data, carried out through a synthetic and comparative approach, it emerged that certain categories consistently appear as highly relevant, establishing themselves as central factors regardless of the territorial, institutional, or temporal specificities of the individual cases.

To visually represent both the prevalence of these recurring elements and the distribution of preferences across each thematic category, **radar charts** were developed. This graphic technique was specifically chosen for its ability to illustrate multivariate data in a clear and intuitive manner. By plotting the frequency or intensity of different variables on axes radiating from a central point, these charts allowed for an immediate and comprehensive understanding of the "profile" of the analyzed LLs for each thematic dimension These graphic representations (fig.5) illustrate — for each thematic category — the prevalence of certain variables within the analyzed case studies.

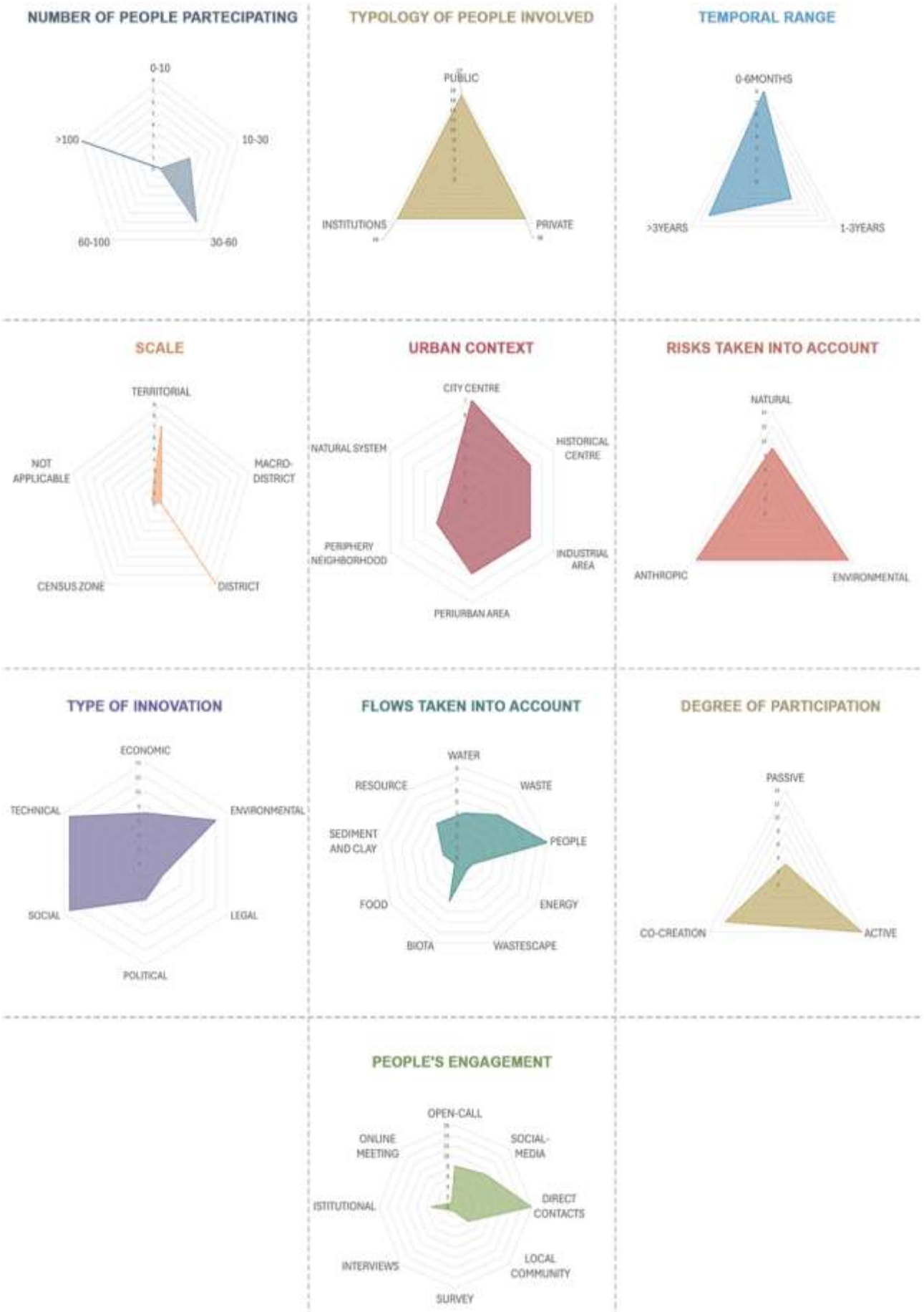


Fig. 5 Example collection: comparative analysis. Source: elaboration of the authors

A consistent pattern emerges regarding participant engagement and typology: there is a significant emphasis on "Public" involvement (Typology of people involved), which often correlates with a high "Degree of participation" manifested in "Active" and "Co-creation" forms. This strongly underscores the inherently collaborative and participatory nature central to the ULL approach. Among the main common elements identified, the active involvement of a wide range of actors — public, private, and institutional — clearly stands out, confirming the multi-level and transdisciplinary nature of effective Living Labs. Complementing this, direct contacts are the overwhelmingly preferred method for stakeholder engagement, indicating the importance of established networks and targeted outreach, followed by public calls and, to a lesser extent, the use of social media as a channel for participatory activation.

From a temporal and spatial perspective, the analysis reveals a distinct preference for short-term projects (0-6 months) within the "Temporal range" suggesting that many ULL initiatives are conceived with immediate, tangible outcomes in mind. Spatially, "Territorial" projects are most frequently represented in the collected cases. When examining the challenges addressed, "Environmental" risks are predominantly considered, strongly aligning with the prevalent application of ULLs for the co-design of Nature-Based Solutions (Lupp et al., 2021)

In terms of location and urban contexts explored, the analyzed case studies cover the full spectrum of possible territorial configurations. However, the most frequently addressed areas include: the neighborhood scale, historic city centers, and peri-urban zones. Notably, the neighborhood scale proves to be particular effective dimension for activating ecological transition processes, as also highlighted in several technical policy documents at both national and international levels.

This scale, in fact, is particularly well-suited to accommodate site-specific experimentation while maintaining coherence with broader urban objectives.

Regarding resource flows, the most actively engaged categories are "People", "Waste," and "Water," highlighting common areas of focus for urban sustainability initiatives within these labs.

Furthermore, the comparative analysis of the types of innovation implemented in the various case studies reveals a predominantly positive impact in three main domains: environmental, technical, and social reflecting LLs' dual capacity to foster community-led solutions and leverage technological advancements. This multidimensional character of innovation represents one of the most distinctive features of contemporary Living Labs, which aim to generate integrated and synergistic outcomes — not only in terms of technical solutions but also in the fields of governance and social cohesion.

In addition to the qualitative analysis, a quantitative investigation was conducted, featuring the graphical representation of summary tables designed to allow a direct comparison between the seventeen analyzed case studies and the main categories of interest.

These tables, organized according to categories identified in the methodology and described in paragraph 2.1, effectively highlight convergences, divergences, and prevailing trends across the various ULL examples.

The "**PARTICIPANTS**" table reveals a distinctly polarized landscape regarding the scale of involvement. While a substantial number of ULLs operate with medium-small core groups (ranging from 10 to 60 participants), a significant subset successfully engages very large cohorts, often exceeding 100 individuals. This sharp division, rather than a continuous spectrum, suggests two predominant models for ULL implementation in terms of participant scale. Importantly, preliminary cross-analysis with the "**TEMPORAL RANGE**" data indicates that projects engaging over 100 participants tend to exhibit longer durations, often extending beyond three years.

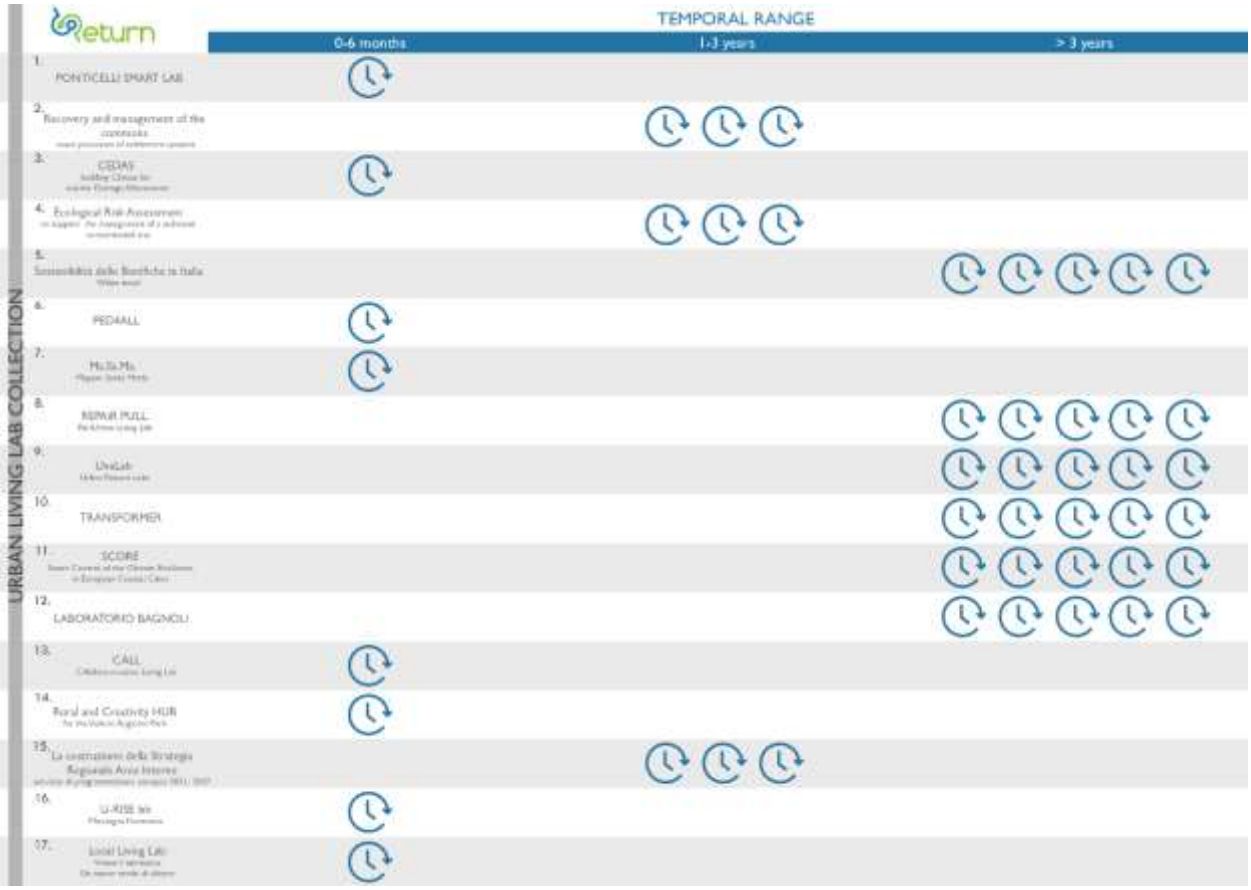
Cross-referencing this with the "**PARTICIPATION PROFILE**" table provides a deeper understanding of *who* is involved. The data confirm the co-presence of different types of participants (institutions, public and private) as a fundamental element for the formation of an Urban Living lab. This also underlines how ULLs

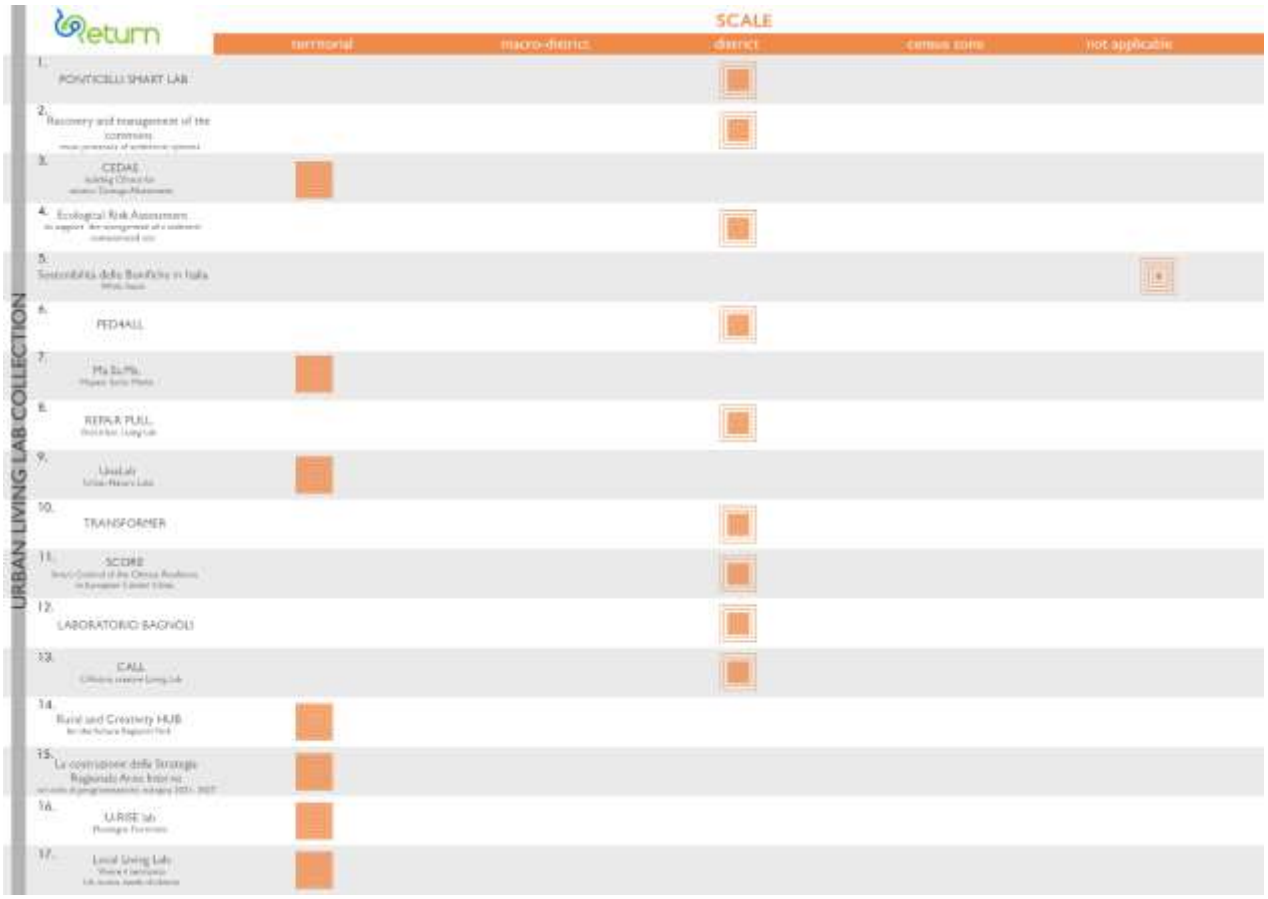
frequently leverage public and institutional frameworks for their activation, aligning with their public good orientation.

A specific cross-analysis between the **"URBAN CONTEXT"** and **"FLOWS TAKEN INTO ACCOUNT"** tables unveils clear thematic alignments. The management of "People," "Waste," and "Water" flows emerges as a transversal concern across almost all urban contexts, from "City Centre" (e.g., ULL like CEDAL) and "Periphery Neighborhood" (e.g., PONTICELLI SMART LAB), to "Industrial Areas" (e.g., LABORATORIO BAGNOLI) and "Periurban Areas" (e.g., CEDAL). This indicates that issues related to human interaction, waste generation, and water resource management are fundamental to urban sustainability regardless of the specific urban morphology, underscoring the crucial role of ULLs in directly addressing circular economy (Engez et al., 2021).

More specifically, "Energy" flow is notably addressed in the ULL situated within "Industrial Areas" suggesting a focus on industrial symbiosis, energy efficiency, or renewable energy integration in such contexts. Conversely, "Biota," "Food," and "Resource" flows exhibit a strong and expected correlation with projects located in "Natural System" contexts (e.g., Ecologic Risk Assessment, Sentinelle delle Biodiversità in Italia, Rural and Creativity HUB), indicating a focus on ecological restoration, sustainable agriculture, or natural resource management. This explicit link between context and primary flow highlights how the physical environment influences the thematic priorities of ULLs, leading to specialized interventions tailored to specific urban challenges and ecological opportunities.

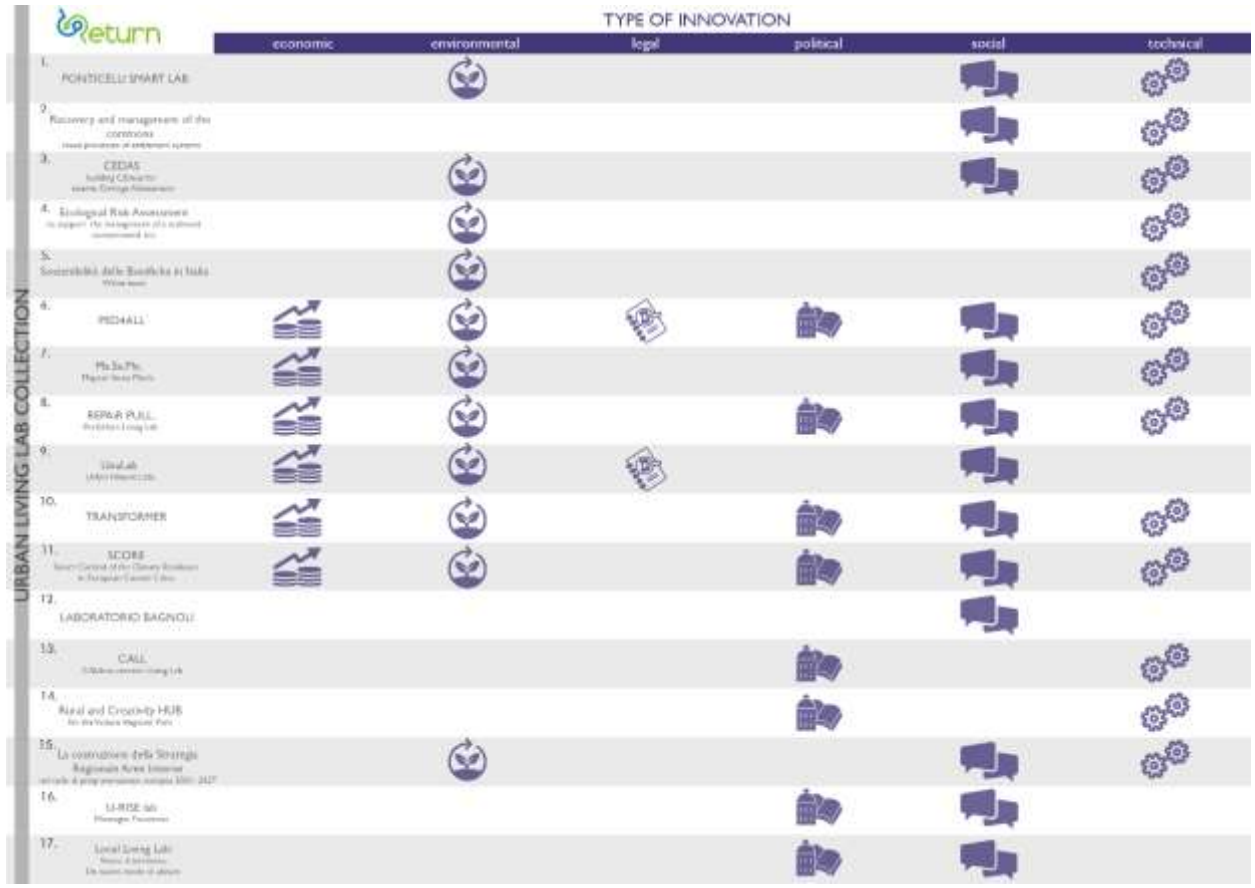

PARTICIPATION PROFILE
public
private
institutions
passive
active
co-creation
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. MoSaMo
8. REPAIR PULL
9. UrbLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Social Living Lab

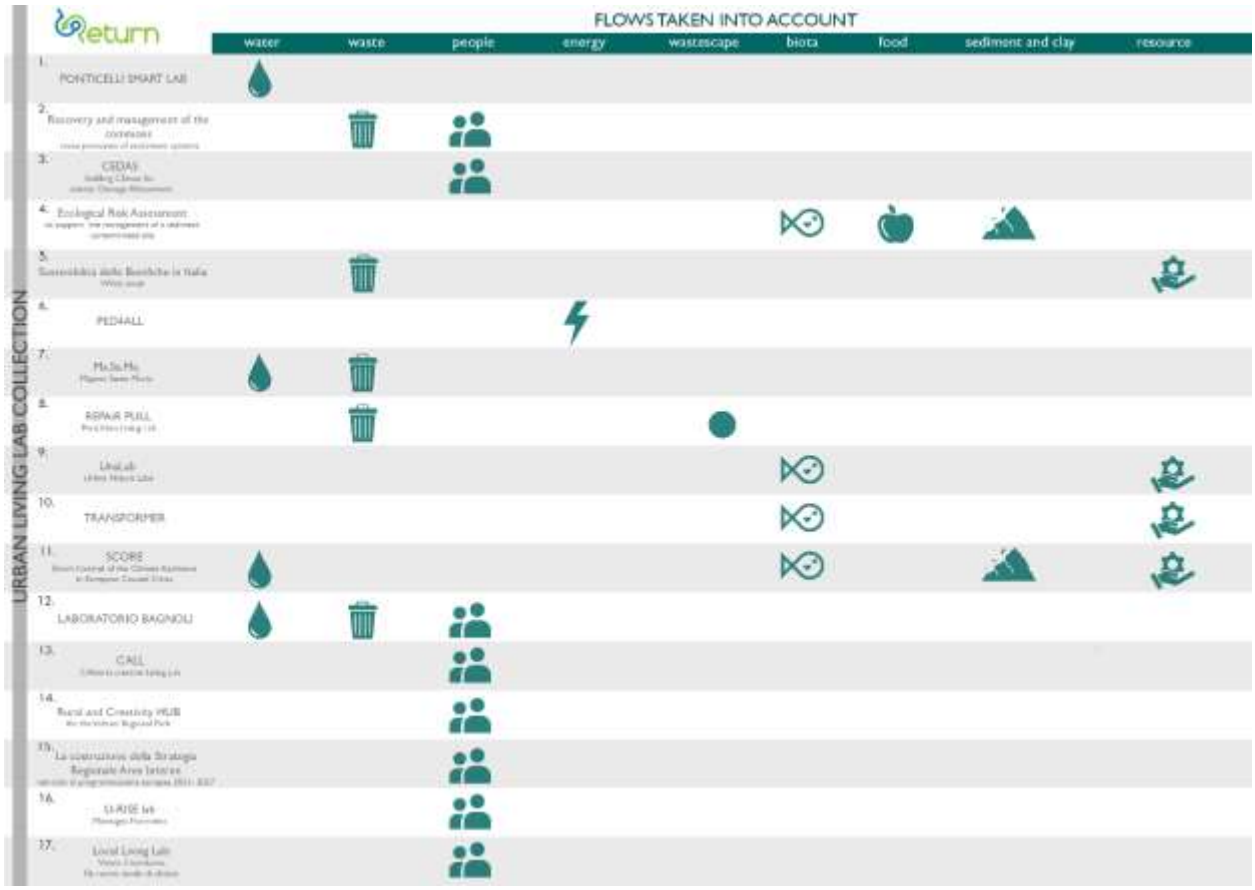

TEMPORAL RANGE
0-6 months
1-3 years
> 3 years
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. MoSaMo
8. REPAIR PULL
9. UrbLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Social Living Lab


SCALE
territorial
macro-district
district
census zone
not applicable
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PEDALL
7. Ma Su Ma
8. REPAIR PULL
9. UrbLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Burial and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U.RISE lab
17. Local Living Lab


URBAN CONTEXT
city centre
historical centre
industrial area
periurban area
periphery neighborhood
natural system
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PEDALL
7. Ma Su Ma
8. REPAIR PULL
9. UrbLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Burial and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U.RISE lab
17. Local Living Lab


RISKS TAKEN INTO ACCOUNT
natural
environmental
anthropic
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. Ma.Se.Ma.
8. REPAIR PULL
9. UrbaLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Local Living Labs


TYPE OF INNOVATION
economic
environmental
legal
political
social
technical
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the commons
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. Ma.Se.Ma.
8. REPAIR PULL
9. UrbaLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Local Living Labs


FLOWS TAKEN INTO ACCOUNT
water
waste
people
energy
wastescape
biota
food
sediment and clay
resource
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the contracts
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. MoSaMo
8. REPAIR PULL
9. UrbaLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Local Living Lab


PEOPLE'S ENGAGEMENT
open-call
social media
direct contacts
local community
survey
interviews
istitutional
online meeting
URBAN LIVING LAB COLLECTION
1. PONTICELLI SMART LAB
2. Recovery and management of the contracts
3. CEDAS
4. Ecological Risk Assessment
5. Sostenibilità delle Bonifiche in Italia
6. PED4ALL
7. MoSaMo
8. REPAIR PULL
9. UrbaLab
10. TRANSFORMER
11. SCORE
12. LABORATORIO BAGNOLI
13. CALL
14. Rural and Creativity HUB
15. La costruzione della Strategia Regionale Aree Interne
16. U-RISE lab
17. Local Living Lab

This data provides a knowledge base for the development of operational guidelines and replicable models for the activation of Urban Living Labs in complex and multirisk contexts.

In the examples collected, it is particularly highlighted how the use of multi-stakeholder engagement processes (UNDP, 2006) enables the definition of shared visions, in order to orient planning processes in a participatory and shared perspective (Bosone & Ciampa, 2021). Moreover, the co-design step appears crucial to identify site-specific challenges and problems, innovative actions and operational methods, through academic activities, meetings and workshops with experts and no-experts (Amenta et al., 2019).

A specific analysis was carried out on the methodological approach, in relation to the temporal range, for each examples (Table 2).

TITLE		REFERENCE AUTHOR/S	PHASES	TEMPORAL RANGE
1	PONTICELLI SMART LAB	C. Visconti - DiARC UNINA	Field work applying ethnographic methods to survey Focus groups, collaborative mapping and storytelling to investigate Co-design and Self-construction of a prototype	0-6 months
2	Recovery and management of the commons: reuse processes of settlement systems	M. Bosone - DiARC UNINA	Multi-stakeholder engagement Definition of a regenerative model Monitoring	1-3 years
3	CEDAS: building CEnsus for seismic Damage Assessment	A. Peresan, C. Scaini – OGS	Workshop with students	0-6 months
4	Ecological Risk Assessment to support the management of a sediment contaminated site	E. Bizzotto, P. Scanferla, CAFOSCARI	Legal context, protection goals and exposure scenarios Risk assessment Risk management Sustainable management decision	1-3 years
5	Sostenibilità delle Bonifiche in Italia – White book	L. Pizzol (GreenDecision srl), E. Giubilato (GreenDecision srl), E.Bizzotto (FCF), P. Scanferla (FCF)	Clean-up implementation process with constant discussion with stakeholders at every stage of the clean-up	>3 years
6	PED4ALL	S. Cristiano – UNIFI	Preparatory stage (on going)	0-6 months
7	Ma.Sa.Ma. – Mapear Santa Marta	S. Cristiano – UNIFI	Preparatory from a distance Preparatory on site Scouting Operational Final presentarion and discussion	0-6 months
8	REPAiR PULL. – PeriUrban Living Lab	F. Vingelli - DiARC UNINA	Co-exploring Co-design Co-production Co-decision Co-governance	>3 years
9	UnaLab - Urban Nature Labs	S. Puzone - DiARC UNINA	Iniziating and scoping Process development and exprimenting Reflecting and closing	>3 years
10	TRANSFORMER	S. Puzone - DiARC UNINA	Strengthening local transition capacities Gearing the transition capacity Accelerating transition through innovation Scling-up transition	>3 years
11	SCORE - Smart Control of the Climate Resilience in European Coastal Cities	S. Puzone - DiARC UNINA	Empathise & define Ideate & co-design Prototype & pilot Test & evaluate	>3 years

12	LABORATORIO BAGNOLI	E. Coppola - DiARC UNINA	Workshop with students	>3 years
13	CALL - CAlabria creative Living Lab	E. Coppola - DiARC UNINA	Analisi fabbisogni della comunità Costruzione database e analisi best practies Definire e valutare gli scenari di domanda e offerta. Costruire piattaforma di gestione e condivisione delle conoscenze per lo sviluppo locale Definizione soluzioni tecnologiche destinate a differenti target	0-6 months
14	Rural and Creativity HUB for the Vulture Regional Park	E. Coppola - DiARC UNINA	COMMUNITY HUB (promotion) RURAL-CULTURAL HUB OPENSCIENCE HUB CREATIVITY HUB	0-6 months
15	La costruzione della Strategia Regionale Aree Interne nel ciclo di programmazione europea 2021-2027	B. Vendemmia - DiARC UNINA	Workshop with students	1-3 years
16	U-RISE lab Montagna Fiorentina	C. Secchi, A. Cancellieri - IUAV University of Venice	Training and research Networking Design	0-6 months
17	Local Living Lab: Vivere il territorio. Un nuovo modo di abitare	G. Arillotta - Università degli Studi di Napoli	Analisi territoriale e coinvolgimento stakeholder Co-design Analisi dei risultati e condivisione conoscenze	0-6 months

Table 2: *collection of best practice methodologies from Urban Living Labs*

The study and comparison of the methodologies showed that, despite the differentiated temporal range, all the cases present an initial phase of territorial/urban knowledge and the definition of the main objectives, continuing with subsequent phases of development and participatory experimentation, and then concluding with a collection of results and discussion, especially in the labs developed in 1-3 and >3 years. Such phases are also found in the case of workshop experiences with students.

The first knowledge step defined in the examples as: theoretical framework and field work, multi-stakeholder engagement, scenarios definition, preparatory and scouting stages, co-exploring, training or analysis phases corresponds to the construction of a shared knowledge to understand the site-specific characteristics and challenges. In these steps it appears also crucial stakeholders' engagement. Shared knowledge activities can include both remote and in situ phases, digital and analogic tools such as collaborative mapping and storytelling.

The second step of development and participatory experimentation also presents different definition, such as: smart labs and workshop, model definition, risk assessment and management, operational phase, co-design, co-production, despite the different terms, this step includes the development of shared strategies and design solutions, and even a potential prototype.

Finally, the result and discussion phase include the verification of the effectiveness, appropriateness, and impact of the solutions, also through testing and inclusion of forthcoming experiments. Also, this phase in the examples is defined in different manner and can include several activities such as report, monitoring, presentation and discussion.

Part 2. City-scale exercise report set-up

3 Methodological approach

3.1 Definition and structure of the phases

The methodology identified for the Return Urban Living Labs consists of three phases: co-exploring, co-design, and co-testing. The phases are investigated in detail below.

Following the relevant scientific literature, the methodology proposed and introduced in the RETURN Urban Living Lab (ULL) of Bagnoli-Coroglio identifies three phases for the co-production of knowledge with a technological-environmental approach oriented toward risk management. These three phases—**co-exploration, co-design, and co-testing**—correspond to specific design stages that serve the dual purpose of transferring and acquiring knowledge in a recursive process that engages various stakeholders both vertically and horizontally. Each phase of the ULL is associated with specific activities called **"city-scale exercises"**, aimed at transferring and sharing knowledge through both top-down and bottom-up processes. Knowledge is transferred, translated, and transformed, fostering socialization among actors and integrating both formal and informal interactions (Clemente, Vendemmia, Amenta, forthcoming).

While the **co-exploration phase** is intended to deepen understanding of the area and uses operational tools such as workshops and *risk storylines* (Marciano et al., 2024), the **co-design phase** aims to support multirisk governance by developing methods, processes, strategies, and solutions for holistic risk management across the four phases: prevention/mitigation, preparedness, response, and recovery. Finally, the **co-testing phase** allows for the implementation and testing of the co-design activities, assessing their appropriateness and effectiveness, including in relation to the feedback and results that emerged during the earlier stakeholder engagement phases.

3.1.1 Co-exploring

The co-exploration phase within the RETURN Urban Living Lab has been defined as the first phase of the participatory planning process for critical urban contexts characterised by multiple risks and constitutes a strategic moment for the shared construction of territorial knowledge among the different actors involved - citizens, public administrations, businesses, researchers, students and other stakeholders (Cuomo, 2022; Voytenko Palgan et al., 2016). This stage lays the foundations for the development of more inclusive and informed decision-making processes by facilitating the identification of needs, priorities and critical issues through collaborative territorial exploration practices (Menny, Voytenko Palgan & McCormick, 2018).

As pointed out by Innella et al. (2024), co-exploring is articulated in a methodological sequence that begins with scouting activities and develops with listening & exploration phases, in which collaborative tools are activated to gather knowledge directly related to the local context (situated knowledge), through activities such as participatory mapping, interviews, explorations of the territory (walkscape) and thematic workshops. This process is driven by an iterative logic, in which the initial analysis cyclically feeds the subsequent project phases. As a transdisciplinary experimental space, the Living Lab is a particularly suitable environment for co-exploring, as it encourages interaction between different knowledge, the hybridisation of languages and the questioning of established approaches through shared practice.

According to Cuomo (2022), the co-exploring phase can be read as an experimental co-production tool, in which territorial actors not only share information, but also collaboratively define urban transformation objectives. The relational dimension is central: through exchanging, comparing and listening to each other, a common language is built, which enables the joint identification of intervention priorities (Menny et al., 2018).

In this context, participants do not play a passive role, but become active co-creators of regeneration and social innovation processes.

A fundamental aspect of the co-exploring phase consists in the collection and systematisation of heterogeneous information, both objective (territorial, environmental, cartographic data) and subjective and perceptual, derived from the impressions that the site arouses or the personal knowledge of those who live there. Through listening and exchange among the participants, it is possible to make visible otherwise neglected elements - such as pre-existing ecological resources, environmental fragilities or land-use dynamics - favouring an integration between expert knowledge and local knowledge (Cognetti, 2022). The information gathered in this phase not only enables the definition of a shared vision of the problems, but constitutes a common interpretative basis from which to derive design parameters for future action.

Moreover, an in-depth knowledge of the environmental and ecological components, as well as of the specific risks present in the site, represents a key element of co-exploring, as it allows for a more conscious orientation of the subsequent regeneration and co-design phases towards resilient and sustainable solutions, even in cases where there is a need to intervene on areas compromised by contamination or abandonment processes. In this sense, ecological assessments play an enabling role in decision-making processes, providing tools to recognise and enhance the ecosystem services already present, while stimulating an integrated approach to urban regeneration (Semeraro & Buccolieri, 2021; Palla et al., 2024).

Finally, co-exploring is also a device for activating citizenship and strengthening collective capacities, especially in vulnerable contexts: it is not limited to the collection of data, but promotes the empowerment of those involved, activating new bonds of cooperation and trust between institutions and local communities. In this sense, co-exploring is not only a preliminary phase, but a transformative moment in which territorial knowledge becomes a strategic lever for a more equitable, sustainable and shared urban regeneration.

3.1.2 Co-design

After establishing the priorities and needs of local communities with reference to risk impacts and perception in the co-exploring phase, the **co-design phase** in RETURN ULL pursues the main objective of defining a shared vision, which results from the joint effort of the different stakeholders involved in the project, and co-developing concepts, ideas, policies and strategies (REPAIR, 2017) based on needs and opportunities emerged in the first phase.

Sanders and Stappers (2008) described co-design as an approach that extends participatory design and co-creation. Co-design allows us to create a shared language between users and designers to understand the new product from the point of view of all participants (Ardito et al. 2012). In this view, co-design attempts to actively involve all stakeholders in any design process activity. Although co-design team members are all equally involved in co-design activities, they play diverse roles: users become co-designers as “experts of their experience” while researchers and professionals become facilitators to ease users’ expression of creativity (Dodero et al. 2014). In the frame of RETURN ULL, co-design works to recognize the components that will be at the base of the different actions for context transformation (Cerreta, Panaro, 2022) in multirisk scenarios. For this reason, the identification of the subjects and the design tools involved in the process is particularly important. Several projects have used ULL and co-design to settle transformation strategies. For example, the REPAIR project actuated the Peri Urban Living Lab methodology (PULL) through workshops and seminars with experts and students together with local stakeholders, selected in six case studies, and identified the so-called “enabling context” where transformations could be easier and faster to be implemented (Amenta, Van Timmeren, 2022).

Important questions need to be defined for the development of co-design:

1) Define one main goal;
2) Define one sub-objectives for each meeting;
3) Define the number and typology of meetings to be held;
4) Identify the places for meetings;

5) Select the stakeholders to be involved according to different roles;
6) understand the tools to be used.

Different types of meetings may be organized, each of them with specific characteristics, such as workshops, learning walks, and mapping activities with experts and students. The places chosen to host these activities may have relevant impacts on the results. Places may be located directly in the study area or around its surroundings, although the choice of venue/location may also depend on the types of activities, the availability of adequate spaces in the nearby areas and the relations already established with local stakeholders. The stakeholders' selection is essential to guarantee a democratic and intersectional participatory co-design process: by inviting to interact with those subjects who usually are invisible or neglected, this phase becomes inclusive, and more effective in delivering a comprehensive vision, composed by shareable actions or solutions. Finally, concerning the co-design tools, variation in tools may be used to increase motivation and engagement of participants, as already highlighted in paragraph 1.2 "Stakeholder Engagement for ULL in multirisk scenarios" and par. 1.2.1 "Stakeholder engagement strategy", and in Task 5.6.2, that emphasizes stakeholder engagement in disaster risk reduction (DRR). In recent years, many scholars highlighted the opportunity for non-user experts to use games as elements of the design process in the early phase to facilitate design activities (Zhang, Zurlo, 2021). Moreover, Brandt (2006) emphasizes that the exploratory design game is a valuable framework for involving people with diverse expertise, interests, and professional languages.

3.1.3 Co-testing

After the co-exploring and co-design phase, the next step is the co-testing phase, an indispensable element of the collaborative approach of the Urban Living Lab (ULL), which focuses on the implementation and testing of solutions proposed by different actors. The objective of this phase is to assess the effectiveness, appropriateness, and impact of the strategies and solutions that emerged in the previous stakeholder consultation phases (in the local context) according to a multidimensional evaluation approach. In the co-testing activities, the identified solutions are put into practice, often through case studies. To ensure that they effectively address the problems and priorities identified in the previous co-design and participatory consultation phases, these ideas are tested in the real-world during the Jane's Walk, organized on 23rd May by the RETURN researchers in the context of Urban Living Lab activities. Specifically, the co-testing phase includes the following four evaluation steps:

In particular, the co-test phase was based on the use of a survey organized in the form of a multidimensional evaluation framework.

1. **Definition of an evaluation framework**: based on the theorisation of the concept of 'Circular Urban Metabolism (CUM)' in multirisk urban and metropolitan settlements, developed in the Task 5.4.4. 'Towards a circular metabolism for urban and metropolitan settlements' of this project, the research group, together with the stakeholders involved in the previous phases, will define a set of objectives and related actions linked to the various aspects that contribute to circularising the metabolism of the case study area.
2. **Strategies and objectives prioritisation**: after defining the evaluation framework, experts and researchers from different scientific fields were engaged in a preference elicitation process aimed to refine the multidimensional evaluation framework selecting only the most relevant strategies considering their expressed preferences and needs.
3. **Multidimensional Co-Evaluation**: in this phase, different stakeholders are involved in the evaluation of the selected proposed strategy through the assignment of a score to each action using a five-point Likert Scale. The participatory multidimensional evaluation will allow designers and stakeholders to dynamically and iteratively evaluate their preferences (Gravagnuolo et al., 2024), following the evolution of the project and of the local needs.

4. **Feedback and refinement**: Steps 2 and 3 of the methodology can be replicated in each subsequent co-design and co-evaluation phase, increasingly refining the identification of the most 'satisfying' final strategy. This method supports the choice of a solution that does not necessarily coincide with one of the strategies identified by the first steps but, rather, that it is the result of a selection and integration of elements and functions of the project proposals that, in the ranking of preferability, were most relevant.

Fig. 6 Evaluation methodology and link among tasks. Source: elaboration of the authors

The activities of the step 1 are linked with the Task 5.4.4 'Towards a circular metabolism for urban and metropolitan settlements' as the objectives and criteria defined in this step are common both for the assessment of CUM and for the experimentation in the case study for risk scenarios evaluation. The activities of the steps 2, 3 and 4 are linked with the Tasks 5.3.3 'Urban systemic vulnerability to multiple hazards' and 5.6.2 'Interaction with local stakeholders, raising awareness' as the stakeholders categories identified in Task 5.6.2 will be the same of those considered for the stakeholder engagement process for the preference elicitation and weighting of objectives. Furthermore, these three steps will be adopted and replicated also in the Task 5.3.3 for define a climate vulnerability index for assessing the urban systemic vulnerability to multiple hazards.

Individuals, public authorities, businesses and other stakeholders are actively participating in the testing phase by providing first-hand observations and experience-based input. During the co-testing phase, quantitative and qualitative data will be collected on the identified tools and strategies, to test the efficacy of the measures introduced. This allows their functionality to be analyzed and possible critical points to be identified. With a view to continuous improvement, the strategies and solutions can be adapted and refined based on the results and feedback received, ensuring a flexible and comprehensive approach. Finally, co-testing provides the opportunity to assess the sustainability and long-term impact of solutions, considering both technical and social aspects. This process makes it possible to assess the feasibility of the final proposals and find a common path to final implementation.

3.2 Tools for RETURN Urban Living Lab

As described in Part 1, growing body of research across diverse disciplinary fields is dedicated to understanding the multifaceted dimensions of risk and developing strategies to address them, particularly in complex urban areas characterized by the superposition and interaction of multiple hazards. Addressing these multirisk environments necessitates a multidisciplinary approach capable of analyzing and comprehending the causal and temporal interconnections between various types of hazards, while integrating physical vulnerability with social, economic, and environmental dimensions.

Urban Living Labs can serve as both the enabling environment and the fundamental methodology for initiating collaborative processes that engage diverse stakeholders — including researchers, local administrators, sector experts, and civil society representatives — through accessible and effective tools.

To effectively implement the RETURN ULL methodology and support its three phases (Co-exploring, Co-design, and Co-testing) in multirisk urban contexts, a suite of dedicated tools is essential. The present section offers a selection of selected tools to engage with exploration and design together with the affected parties (stakeholders, shareholders, ... – ultimately, local communities).

These tools – both digital and analogical - include both phase-specific tools and overarching methodologies that provide continuous support throughout the entire Living Lab journey. They facilitate data collection, analysis, collaborative ideation, and scenario development, ensuring a robust and participatory process.

- **Site Engagement: walks and site visits.** An important, cross-cutting tool utilized across all phases of the Living Lab methodology is experiential site engagement, which encompasses structured walks, site visits, and the direct experience of being in and traversing the study areas. This method goes beyond mere data collection, offering a qualitative and sensory understanding of the urban context, its challenges, and its potential. The practice of walking is increasingly recognized in urban and territorial studies for its ability to highlight the "centrality of bottom-up observation in analyzing contemporary urban and territorial conditions" and to give life to “teaching and research projects that establish a strong proximity relationship with the materials and inhabitants of the territory" (Lazzarini & Marchionni, 2020).
  A prime example of this approach, which was actively implemented during the project, is the participation in **Jane's Walk** initiatives (INU, 2024). Jane's Walks are citizen-led urban walking tours that encourage people to explore their cities, share stories about their neighborhoods, and discover new aspects of familiar places. By participating in such structured walks, stakeholders are empowered to reconnect with their urban environment on a deeper, more personal level.
  This approach is particularly important for locations that are not typically open or accessible to the public, such as former industrial sites or risk-exposed areas. For citizens and other stakeholders, direct access to these often-inaccessible places is invaluable. It helps to counteract the loss of memory, recollection, and a current visual understanding of these environments, fostering a renewed connection and sense of ownership.
  In the Co-exploring phase, site visits allow participants to ground-truth existing data, identify hidden issues, and perceive the site's atmosphere and sensory qualities firsthand. During Co-design, direct engagement with the physical space can inspire more informed and context-sensitive solutions. For Co-testing, revisiting the site allows for the validation of proposed interventions against the lived reality and practical constraints of the environment. By directly experiencing the site, participants gain a deeper, more holistic understanding of the multirisk context, enriching all stages of the collaborative process.

- **The "Green Book" for Biodiversity Awareness.** A unique tool specifically designed to foster knowledge and awareness regarding the local biodiversity is the "Green Book." This type of documentation compiles accessible information on the living species identified within a study site (e.g., plants, insects, birds) as detected by the team's ecologists. For each species, the "Green Book" details their ecological roles, advantages, and impacts on the local ecosystem serving as an accessible resource to diffuse scientific understanding and promote ecological consciousness among stakeholders and the wider community. Yhe

booklet highlights a vital, often overlooked aspect of sustainability in urban areas: demonstrating how places, even those that are abandoned, formerly contaminated (e.g., brownfield sites), or otherwise less accessible to public use, continue to perform essential ecosystem functions for numerous living species. By making this ecological value visible it acts as a bridge between scientific data and public engagement, enriching the co-design and co-testing phases with vital environmental insights.

- **Scenario Co-Building:** Among the diverse methodological approaches contributin to Disaster Risk Management (DRM) studies, the practice of scenario building emerges as a recurrent and versatile tool (Galderisi, & Limongi, 2021). These instruments encompass predictive, transformative, and exploratory approaches, and are utilized to provide public decision-makers with comprehensive models of the territory. Such models enable the evaluation of evolving risk landscapes and the effectiveness of mitigation strategies, as scenarios allow for the exploration of possible futures, providing a framework for strategic planning and management under conditions of deep uncertainty (Walker et al., 2013; Parker & Risbey, 2015). Among the diverse techniques for scenario construction, **Storylines** have proven particularly relevant for the co-exploration and co-design phases, whereas **serious games** are predominantly applied during the co-design phase:
  - **Storylines**: Qualitative scenario storylines have been developed and used in various sectors, ranging from war tactics to business models and, since the 1970s, also widely applied to environmental problems at different scales (Rounsevell et al., 2010). As research on climate change becomes more and more applied, and conventional probabilistic approaches are no longer effective to face climate-related deep uncertainties, the "storyline" approach has recently being used to overcome such limitations (Shepherd et al., 2018), up to having the Intergovernmental Panel on Climate Change (Working Croup 1) dedicating a section of its Sixth Assessment Report (Chen et al., 2021). In the same publication, the approach is presented to explore low-likelihoos, high-impact events and/or cross-scale interactions, "to put historical events in the context of a changing climate", as "information distillation exercise", and as "providing climate information that is integrated with socio-economic information (ibid.). A physical climate storyline (PCR) is defined as the "self-consistent and plausible unfolding of a physical trajectory of the climate system, or a weather or climate event, on timescales from hours to multiple decades" (Shepherd et al., 2018). Baldissera et al. (2024) identify "at least three components that any PCS needs to include according to this definition. First, it needs to be self-consistent and within the realm of physical plausibility, which implies that a causal element grounded in scientific understanding needs to underline the physical trajectory of the climate system, or weather or climate event. Second, it needs to include a climate or weather component (in contrast to traditional scenarios that describe future socio-economic states not necessarily explicitly referring to climate or weather elements). Third, it needs to include a temporal element, that is, the storyline needs to unfold over time, but it is not confined to the future—it can also describe the past or present unfolding of a physical trajectory". Storylines can be applied to risks and multirisks other than just climate-related ones. As noted by Rounsevell et al. (2010), "the credibility, legitimacy, and saliency of future scenario storylines are discussed with respect to personal beliefs, the equifinality of alternative development pathways, the validation and uncertainty of assumptions, stakeholder engagement in visions development, and participatory methods". These are all elements to be therefore taken and kept in consideration when building up qualitative scenario storylines – including its applications to climate risks and, more in general, to multirisks.
  - **Serious games**: Within scenario building, Serious Games emerge as an innovative and participatory tool for constructing risk scenarios and defining adaptation strategies. These playful instruments offer a simulated environment where participants can experiment with complex situations, make decisions, and observe the consequences of their choices in a safe and controlled. Serious Games foster experiential learning, stimulate critical thinking, and promote collaboration among actors with diverse backgrounds, facilitating the understanding of complex systems and the negotiation of shared solutions. The application of Serious Games in urban planning and multi-hazard risk management is a relatively new but rapidly expanding field.

In urban planning, the elaboration of "Images of the City" (Lynch, 1960) traditionally represents a methodology for engaging stakeholders in prefiguring desirable transformations. Over time, techniques for constructing territorial visions have evolved, eventually including a dynamic vision of the city project that, through successive chronological phases, leads to its implementation. The introduction of gamification (Ampatzidou, 2018) into urban co-design within multirisk areas represents an attempt to further enrich the scenario tool. It contemplates not only the dynamics of urban transformation processes but also those of community behaviors and the evolution of risks, as explored through risk storylines. This method can offer a significant contribution to the disciplinary debate, fostering the experimentation of innovative tools for risk mnagement in complex urban contexts and promoting interdisciplinary and generative dialogue among stakeholders.

- Geographic Information Systems (GIS) mapping and surveys can play a fundamental role in supporting the co-exploring and co-design phases of a city-scale risk evaluation exercise. These tools facilitate the collection, analysis, and visualization of spatial data, enabling stakeholders to collaboratively assess and design effective risk mitigation strategies. During the co-exploring phase, GIS tools, such as **ArcGIS Survey123**, allows for real-time data gathering from various sources, helping to identify key risk factors and spatial vulnerabilities within urban and metropolitan settlements. In the co-design phase, GIS tools support collaborative decision-making by providing a shared platform for integrating input from diverse stakeholders, enhancing the planning of risk management scenarios and fostering more resilient urban environments. In particular, ArcGIS Pro allows users to analyse geographical data, create advanced maps and manage complex projects. It offers tools for visualisation, editing and spatial analysis, supporting informed decision-making. It also enables the integration of data from different sources, analysing spatial patterns and generating customised reports.

Fig. 7 *Main functionalities of ArcGIS Survey 123. Source: https://www.esri.com/it-it/arcgis/products/arcgis-pro/overview*

ArcGIS Pro allows users to analyse geographical data, create advanced maps and manage complex projects. It offers tools for visualisation, editing and spatial analysis, supporting informed decision-making. It also enables the integration of data from different sources, analysing spatial patterns and generating customised reports.

- Integration with ArcGIS: Survey123 integrates seamlessly with other ArcGIS tools. Collected data can be visualised, analysed and shared via QGIS, ArcGIS Online, ArcGIS Pro and other Esri applications.
- Survey design: Users can design custom surveys using a web interface called Survey123 Connect, which supports different question types such as multiple choice, text, dates, numbers, ratings and images.
- Georeferencing: Survey responses can be associated with geographic coordinates, allowing the collected data to be displayed on a map, which is useful for projects requiring geographic data, such as environmental monitoring or urban surveys.

- Data collection: Surveys can be completed online or offline via the Survey123 mobile app, available for iOS, Android and Windows devices, enabling data collection even without an internet connection.

  The collected and analyzed spatial data contribute to the development of the **"RETURN ATLAS"** a comprehensive GIS mapping resource that consolidates geographical information. Alongside professional GIS, **collaborative mapping exercises** directly involve stakeholders in collectively delineating and representing their understanding of the territory, its issues, and resources, often leveraging digital platforms or large-scale physical maps. The maps can be a fundamental cognitive and operational tool for understanding the complex dynamics influencing urban processes and the resilience of territories exposed to metabolic risks. Stemming from an in-depth analysis of the study area, the Atlas is configured as a cognitive framework capable of integrating multi-scalar and multidisciplinary data to support the planning of adaptive and nature-based interventions within the Living Lab process. Beyond describing the current state, the Atlas is conceived as an interpretive engine for analyzing potential future events and evaluating territorial risks. The maps produced within the Living Lab will serve as a crucial bridge between theoretical research and on-the-ground actions, enhancing the urban system's capacity to respond to extreme events and structural changes.
  The gis maps constitutes a key component within the Living Lab methodology for information and data management, forming the referential informational structure that supports the subsequent phases of designing and testing adaptive scenarios within the Urban Living Labs. The maping activities are structured to allow for an in-depth reading of the territory through different scales of analysis, enabling the capture of both macro-territorial dynamics and local specificities.

- **Focus Groups:** As a foundamental qualitative research methodology, focus Groups (Freitas et al.,1998; Kleiber, 2003) have been extensively utilized to gather in-depth insights, perceptions, and experiences from diverse stakeholder groups. These facilitated discussions, involving a small number of participants, are particularly effective for exploring complex issues, understanding nuanced perspectives, and identifying shared concerns or points of divergence regarding urban challenges and potential solutions. In the RETURN ULL, focus groups were specifically conducted with a broad spectrum of actors, including students, local residents, technical experts, and administrative representatives. This multi-stakeholder approach ensured a comprehensive understanding of the local context, ranging from daily lived experiences and community needs to specialized technical knowledge and institutional perspectives on risk management and urban transformation. The insights garnered from these sessions were instrumental in shaping a shared knowledge framework, validating initial findings, and laying the groundwork for subsequent co-design activities. Furthermore, these sessions are also valuable during the co-design phase, where they can be effectively combined with other scenario building tools to refine proposed solutions and gather targeted feedback on evolving concepts.

Part 3. City scale exercise. ULL applied to Bagnoli-Coroglio test-case

4 Introduction on city scale exercise

The Bagnoli-Coroglio area in the western part of Naples, in Campania Regin (Italy) has been selected as a critical urban context, and thus as an ideal case study to implement the RETURN Urban Living Lab. As described in part 2, the RETURN Urban Living Lab test case in the Bagnoli-Coroglio Site of National Interest (SIN) has involved a methodology composed of three incremental and recursive phases through the use of various participatory design and interaction tools (see paragraph 2.2). The following paragraphs report the methodological construction of these phases and give an insight of the results collected.

4.1 Co-exploring

The experimentation related to the co-exploring phase of the RETURN Urban Living Labs has been articulated into two distinct workshops:

- *Intertask Workshop with RETURN experts*
- *Focus group with high school students from Bagnoli*

The main goal of the co-exploring phase was to thoroughly examine the socio-environmental characteristics of the Bagnoli territory in order to understand the needs and preferences of the local community (Vendemmia et al., 2024). Using participatory design methodologies, the living lab provided a space for conversation where local experts, citizens, and students could **co-create knowledge**. Specifically, the adopted approach prioritized the use of **interactive tools** such as participatory mapping and creative labs, which allowed participants to collaboratively explore innovative solutions for the regeneration of Bagnoli. The workshops' hands-on activities made it possible to gather qualitative data that is essential for further developing the knowledge and spatial analyses that were primarily based on quantitative data disseminated by institutions, as part of RETURN Task 5.4.4.

In this perspective, **mapping** proves itself a fundamental practice with a renewed purpose. It serves as a crucial tool to communicate information and technical data about territorial risk conditions to the communities involved. Additionally, **participatory mapping** facilitates the collection of qualitative data through interaction and co-mapping, coming from citizen science (Bonney, 2009; Hachmann, 2018). Consequently, the exploration map of the Bagnoli test case area (fig. 8) was the first technological tool developed within the research, serving as the foundation for both laboratories discussed in this phase.

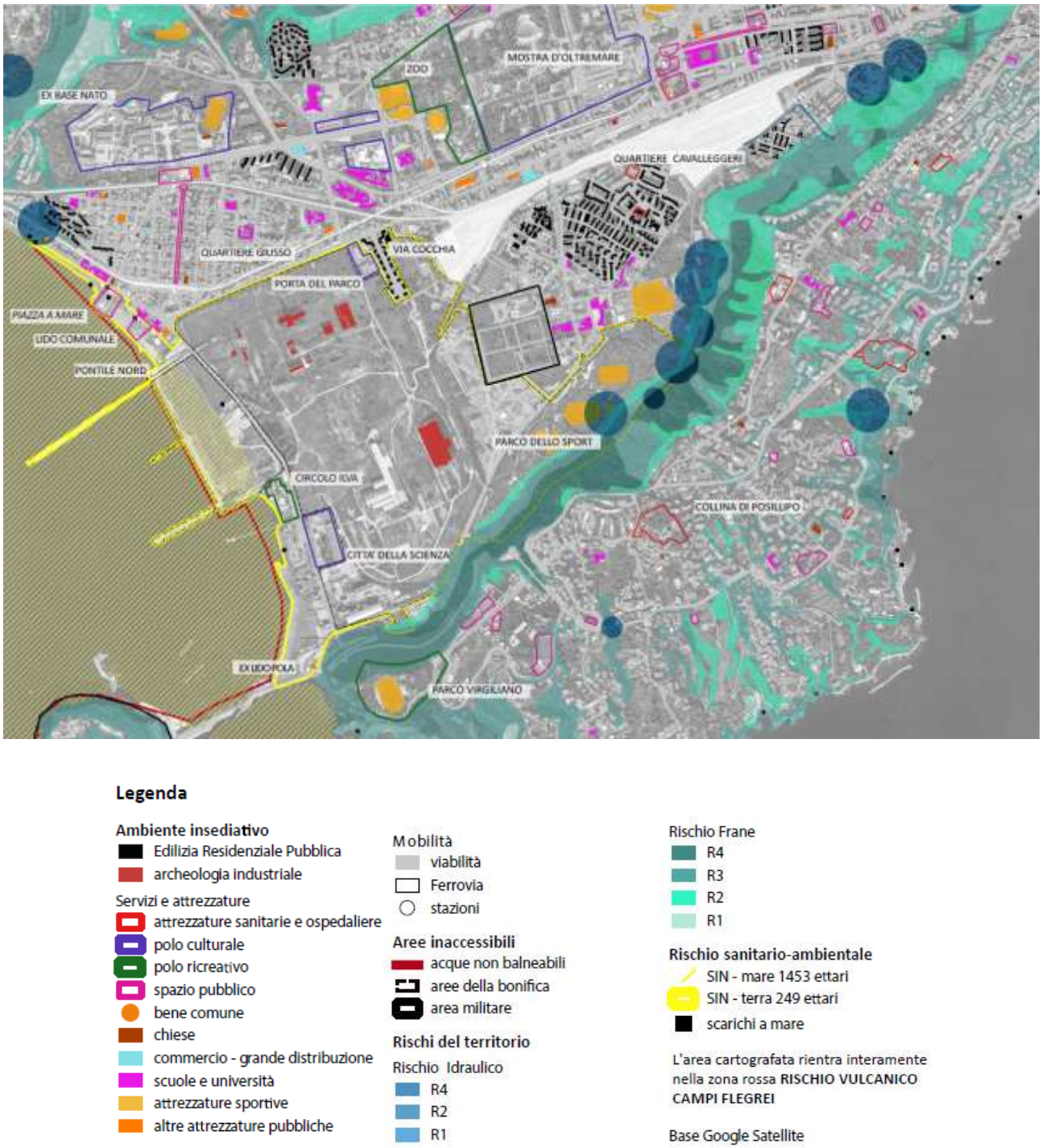


Fig. 8 *Multirisk Exploring Map of the Bagnoli-Coroglio test case from Task 5.4.4.*

1.1.1 Inter-task Workshop with RETURN experts

Within the framework of Spoke TS1, the Intertask Workshop Task 5.4.4 & Task 5.5.2 titled "Towards a circular metabolism: Co-exploring landscapes in transition - Test Case: Bagnoli-Coroglio" was held in Naples on February 22nd and 23rd, 2024. The two-days encounter brought together members of the RETURN Extended Partnership giving partners the opportunity to know each others, their research works and the case study and therefore strengthening the experts' network and knowledge on the test-case.


Towards a circular metabolism
Co-esplorare i paesaggi in transizione
RETURN INTERTASK WORKSHOP TASK 5.4.4 & TASK 5.5.2
TEST CASE: BAGNOLI-COROGLIO
22 febbraio 2024
aula SL 3.7 - Dipartimento di Architettura
via Forno Vecchio, 36 - Napoli
23 febbraio 2024
quartiere Bagnoli-Coroglio
22 febbraio 2024 - Attività di disseminazione ore 14:00 - 19:00 aula SL 3.7
sessione online:
https://shorturl.at/eK356
ore 14:00 Saluti istituzionali
Michelangelo Russo, direttore del Dipartimento di Architettura, UNINA - DiARC
ore 14:10 RETURN PE3 – SPOKE TS1 "Urban metropolitan settlements"
Mario Losasso, coordinatore Spoke TS1, UNINA - DiARC
Andrea Prota, coordinatore Spoke TS1, UNINA - DiSt
ore 14:50 Laboratori del DiARC: la rigenerazione dell'ex area industriale Ilva di Bagnoli-Coroglio
modera Federica Vingelli, UNINA - DiARC
Progetti per architetture adattive e paesaggi in transizione
Giovanni Multari, Vincenzo Gioffrè, UNINA - DiARC
IN-OUT Bagnoli jungle. Usi transitori e progetti evolutivi lungo 4 transetti urbani a Bagnoli
Orfina Fatigato, UNINA - DiARC
Laboratorio Bagnoli: narrazioni, prospettive e progetti
Anna Terracciano, Daniela Colafranceschi, UNINA - DiARC
Restart Bagnoli
Paola Ascione, UNINA - DiARC
Il paesaggio geografico del Parco. Sconfinamenti e penetrazioni del recinto industriale
Lilia Pagano, UNINA - DiARC
7 trampolini per Bagnoli. Progetti autonomi per un immaginario ritrovato
Paola Galante, UNINA - DiARC
Balneolis. La rigenerazione urbana di Bagnoli
Maria Simioli con Mariagrazia Cascone, Alessandro Casolare, Miriam Salzano, Francesco Vozzella, UNINA - DiARC
mostra a cura di Maria Simioli, UNINA - DiARC
ore 16:30 - 19:00 Approfondimenti tematici
modera Libera Amenta, UNINA - DiARC
Contaminated renewable land
Daniele Vettorato, leader WP4, EURAC
Co-design exercises towards circular metabolism of urban settlements
Libera Amenta, Maria Fabrizia Clemente, UNINA - DiARC
Circularity measurement applied to the redevelopment of contaminated sites in a critical urban context
Petra Scanferla, Elisa Chiara Bizzotto, CaFoscari
Waste management: Italian actual context analysis
Resource valorisation in environmental remediation. Eni Rewind examples from the field
Chiara Michelotti, Carlo Montella, Riccardo Puddu, Carla Gambino, Eni Rewind
Evaluation methods for the sustainable regeneration of wastescapes
Pasquale De Toro, Martina Bosone, Pasquale Galasso, UNINA - DiARC
Towards Urban Living Labs. Co-exploration of Bagnoli-Coroglio test-case
Federica Vingelli, Sara Piccirillo, Cristina Visconti, UNINA - DiARC
The test case of Bagnoli-Coroglio: a field to investigate critical multi-risk contexts
Rosaria Iodice, Benedetta Pastena, Sabrina Puzone, UNINA - DiARC
Planning a circular city
Francesca Pirlone, Ilenia Spadaro, Federica Paoli, UNIGE - DICCA
The role of physics-based scenarios and citizen science towards city-scale multirisk evaluation: earthquakes and tsunamis
Antonella Peresan, Hany M. Hassan, Chiara Scaini, Pierluigi Bragato, OGS
23 febbraio 2024 - Attività sul campo ore 9:00 - 17:30
ore 9:00 Ecosistema Bagnoli presso Pontile Nord
Antonio Di Gennaro, Agronomo, Giuseppe Guida, UNICAMPANIA - DADI
ore 10:00 Visita presso il Commissario straordinario del Governo per la bonifica ambientale e rigenerazione urbana del sito di interesse nazionale Bagnoli Coroglio - aree SIN
Daniela Mello, INVITALIA
Filippo De Rossi, Sub-commissario del Commissario straordinario del Governo per la bonifica ambientale e rigenerazione urbana del sito di interesse nazionale Bagnoli Coroglio, UNINA - DiARC
ore 13:00 Visita al Circolo Ilva
Giovanni Capasso, presidente Circolo Ilva
Guglielmo Santoro, vice-presidente Circolo Ilva
Osvaldo Cammarota
Cera una volta la fabbrica
Maria Federica Palestino, UNINA - DiARC
ore 14:00 Pranzo presso il Circolo Ilva
ore 15:00 Laboratorio Bagnoli: note da un'inchiesta sul campo
Gilda Berruti, Emanuela Coppola, UNINA - DiARC
ore 15:30 Attività laboratoriali di restituzione del sopralluogo
Anna Attademo, Federica Vingelli, Sara Piccirillo, Rosaria Iodice, Benedetta Pastena, UNINA - DiARC
Comitato scientifico: Libera Amenta, Anna Attademo, Gilda Berruti, Martina Bosone, Maria Fabrizia Clemente, Emanuela Coppola, Pasquale De Toro, Pasquale Galasso, Rosaria Iodice, Mario Losasso, Maria Federica Palestino, Benedetta Pastena, Sara Piccirillo, Sabrina Puzone, Michelangelo Russo, Maria Simioli, Marilù Vaccaro, Federica Vingelli, Cristina Visconti
Comitato organizzatore: Libera Amenta, Maria Fabrizia Clemente, Emanuela Coppola, Rosaria Iodice, Benedetta Pastena, Sara Piccirillo, Maria Simioli, Federica Vingelli
foto di Mario Ferrara

The first study day, held at the Department of Architecture (UNINA), aimed to build a shared understanding of the challenges related to the territory and the regeneration process of the test-case area, before the field visit. It included two main moments of discussion: in the first part of the day, experts on the test-case, not directly involved in the RETURN research, participated. The main objective of this first part is the local knowledge transfer by the professors of the Department of Architecture. Professors presented and transferred to the RETURN members their teaching and laboratory experiences on Bagnoli, through different approaches, expertise and scales related to landscape, architectural and urban design, urban planning and architectural technology.

During the second session, RETURN members presented their lines of investigation and the tools to be implemented for the in-depth study of the Bagnoli test case, based on the specificity of their background and expertise and focusing on comparable case studies addressed in their research experiences.

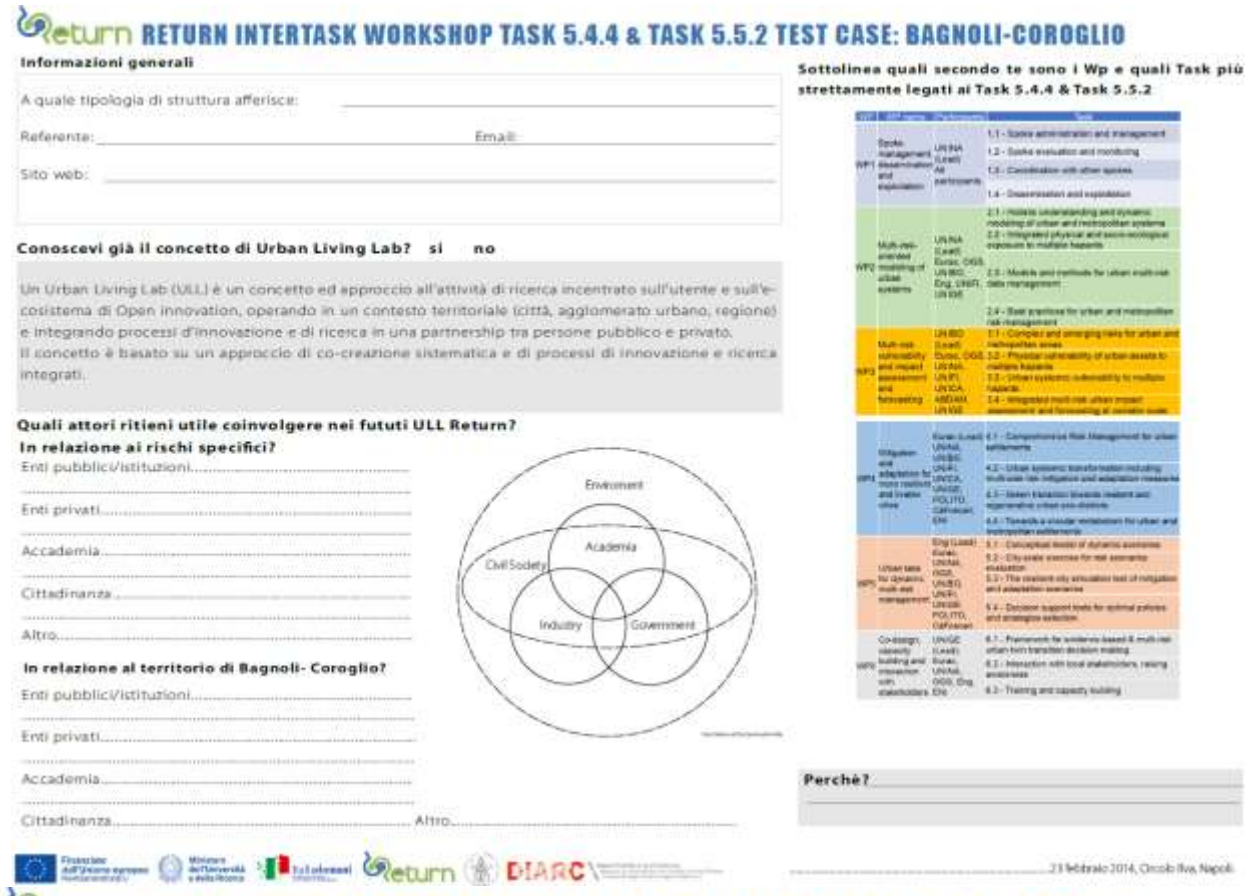
The second day of the workshop focused on field co-exploring activities, which have constituted the first step of the RETURN ULL in the Bagnoli-Coroglio area. This was not only oriented towards exploring the location and the neighbourhood of the test case, but also towards delving into some of the emerging issues while gaining knowledge about them, and meeting some of the main actors involved in the management and complex urban regeneration process of the area.

A range of participatory approaches were used to gather data throughout the co-exploring phase. Participants were directly involved in participatory mapping, and more structured feedback was obtained through questionnaires and interviews.

The workshop involved the participation of the following groups and organizations:

- Circolo Ilva: local sports and cultural association;
- Invitalia s.p.a.: National Agency for Attracting Investment and Enterprise Development (area owner and implementing agency);
- Government Extraordinary Commissioner for Environmental Remediation and Urban Regeneration of the Bagnoli-Coroglio National Site of Interest: Public Administration in charge of the remediation and transformation process)
- DiARC, UNINA
- Enel Rewind
- Fondazione Ca’ Foscari
- EURAC

The first four subjects are local actors, directly involved in the urban transformation of the former industrial area of Bagnoli. The last four are RETURN partners. It is important to observe that the Department of Architecture of Federico II is playing both roles. The interaction between local stakeholders and external experts opened unexplored perspectives on the future of former ILVA steel plant site. The questionnaires and interviews presented to the participants are presented below.



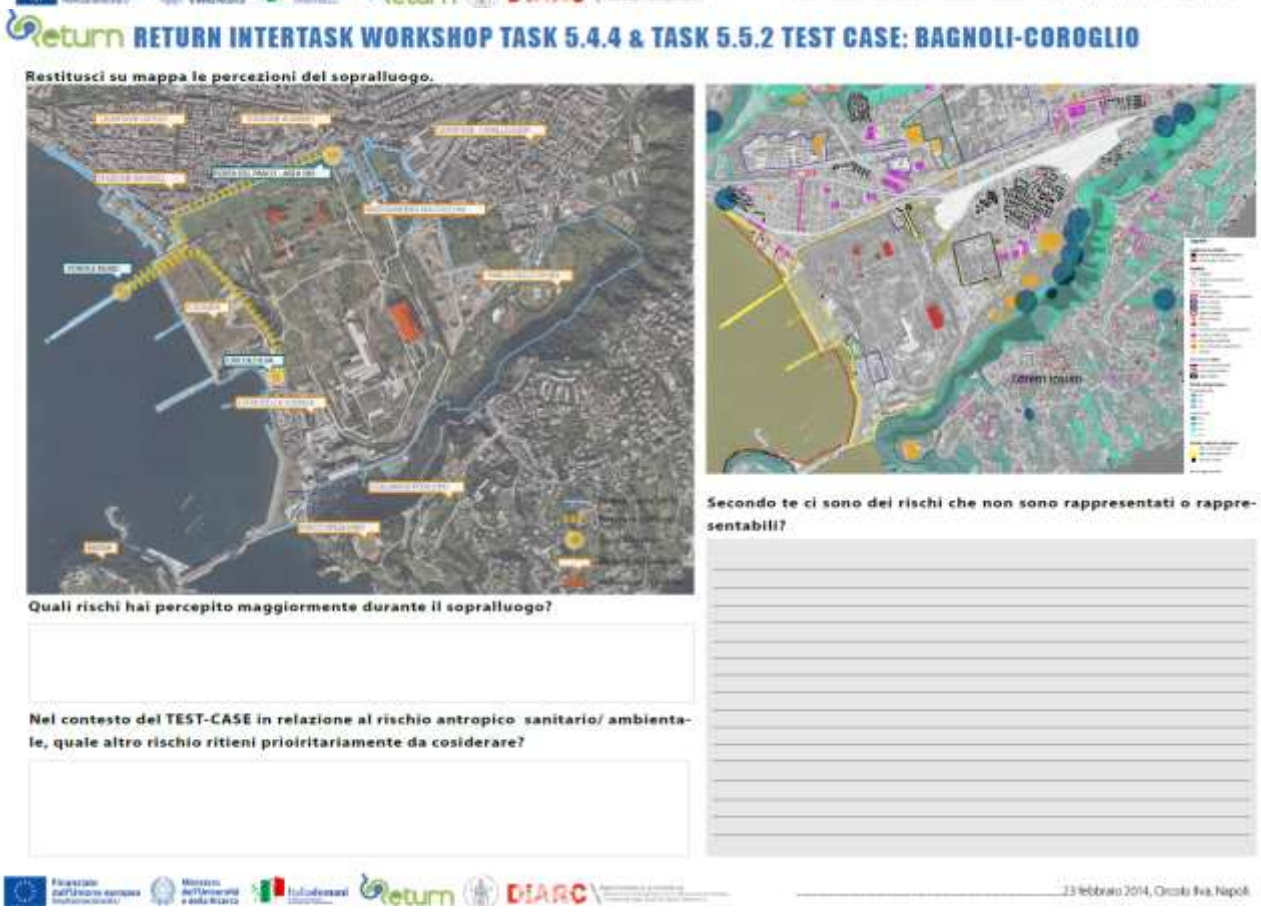


Fig. 9 *Worksheets used for the activities during the inter-task workshop in Bagnoli, Naples, February 23, 2024.*

1.1.2 Focus group with high school students from Bagnoli

Following the first RETURN Intertask Workshop targeted at experts from RETURN tasks 5.5.2 and 5.4.4, a focus group was conducted in February 2024 with high school students from the Bagnoli-Coroglio area. The focus group took place at the Department of Architecture (DiARC) of University of Naples Federico II and aimed to integrate, during the co-exploring phase of the context and emerging issues, the perspective and knowledge of citizens. These individuals, while not technically expert, are deep connoisseurs of the neighbourhood context and bring with them perceptions and experiences related to the stratified risks in Bagnoli.

The selection of participants to be invited in the focus group was based on several criteria:

- participants had to possess familiarity with the neighbourhood;
- participants needed to have a strong relationship of mutual trust with the University institution or the research group involved;
- participants had to be individuals who had gained access to the SIN area (normally restricted);
- participants were required to have diverse educational backgrounds.

Thanks to the activities framed in the National Program "Pathway for Transversal Skills and Orientation" (PTCO) involving Universities and high schools, the DiARC has cultivated robust ties with local high schools within the city of Naples and Bagnoli district. In particular, High School students from Liceo Artistico Umberto Boccioni and Istituto Superiore Francesco Saverio Nitti, located close by the former industrial area of Bagnoli, were invited to the RETURN focus group on February 28th. The lab was attended by approximately 40 students aged 17 to 19.

Despite the shared objective with the first workshop involving experts, the methods of engaging participants, as well as the tools and language used in this case, required a significant adaptation due to the different backgrounds, ages, and types of participants involved. The data collection and co-mapping of context-specific risks were conducted through a game-based approach (Dicheva et al. 2015).

Students, which were in their senior year, were divided into groups, each accompanied by a RETURN tutor and linked to a specific theme (culture/school; public space and green areas; sea and coast; mobility) and given a paper preliminary map of the Bagnoli area, elaborated by the research group from RETURN task 5.4.4, aimed at deepen the spatial effects of multirisk in Bagnoli urban context.

The focus group utilized indeed analogical tools to facilitate a deep exploration of the context, starting with the preliminary GIS-based exploration map. The group was given the time to review, consult, comprehend, and comment on the Bagnoli map developed by the research team. This exercise was essential to ensure a consistent understanding of the mapping tool among all group members since this can facilitate the group's work.

The interactive session was then conducted by consulting the map while answering a five-question survey designed to assess perceptions, awareness of risks, and knowledge of Bagnoli along with aspirations for the area's transformation. The questionnaire also required participants to mark specific responses on the map, providing additional insights into space quality and use.

Students were invited to reflect on the territory they live in from a new perspective, the multirisk one, and gave back unique feedback about local practices and actors, also providing an unexpected interpretation of the concept of risk itself. Results suggest, in fact, that the local young community is most concerned about security issues regarding the public space, especially during nighttime, then they are by the current bradyseismic, seismic, and volcanic emergency in Campi Flegrei (2023-2025), despite the high level of knowledge that the

groups have about the phenomenon and emergency procedures, thanks to the dedicated information activities in the area's schools[3]. Most participants showed a low perception of health and environmental risks from soil and seabed contamination in the SIN area; a small percentage stated that there is no real contamination at sea.

The following figure (figure 10) shows the preliminary map (B&W) used for the group exercise, and an elaboration of the focus group outcome in colour, which collected the results of all the groups.

The enthusiastic exchange between researchers and participants was particularly fertile, revealing the voice of the part of the community to which the planned urban transformation is indeed destined and that never experienced the industrial past of the Bagnoli plain. High school students proved to be 'local experts' about Bagnoli district in their own way by highlighting hidden territorial resources, such as abandoned or underused public spaces forsaken by most and popular hangouts for the young community, and by pointing out potential actors already active in the metropolitan area of Naples that could be interested in spreading their activism in the Phlegrean context. Their engagement in the district's future was also demonstrated by the construction of disruptive future scenarios proposals for the Neapolitan brownfield, in accordance with the theme they were initially assigned.

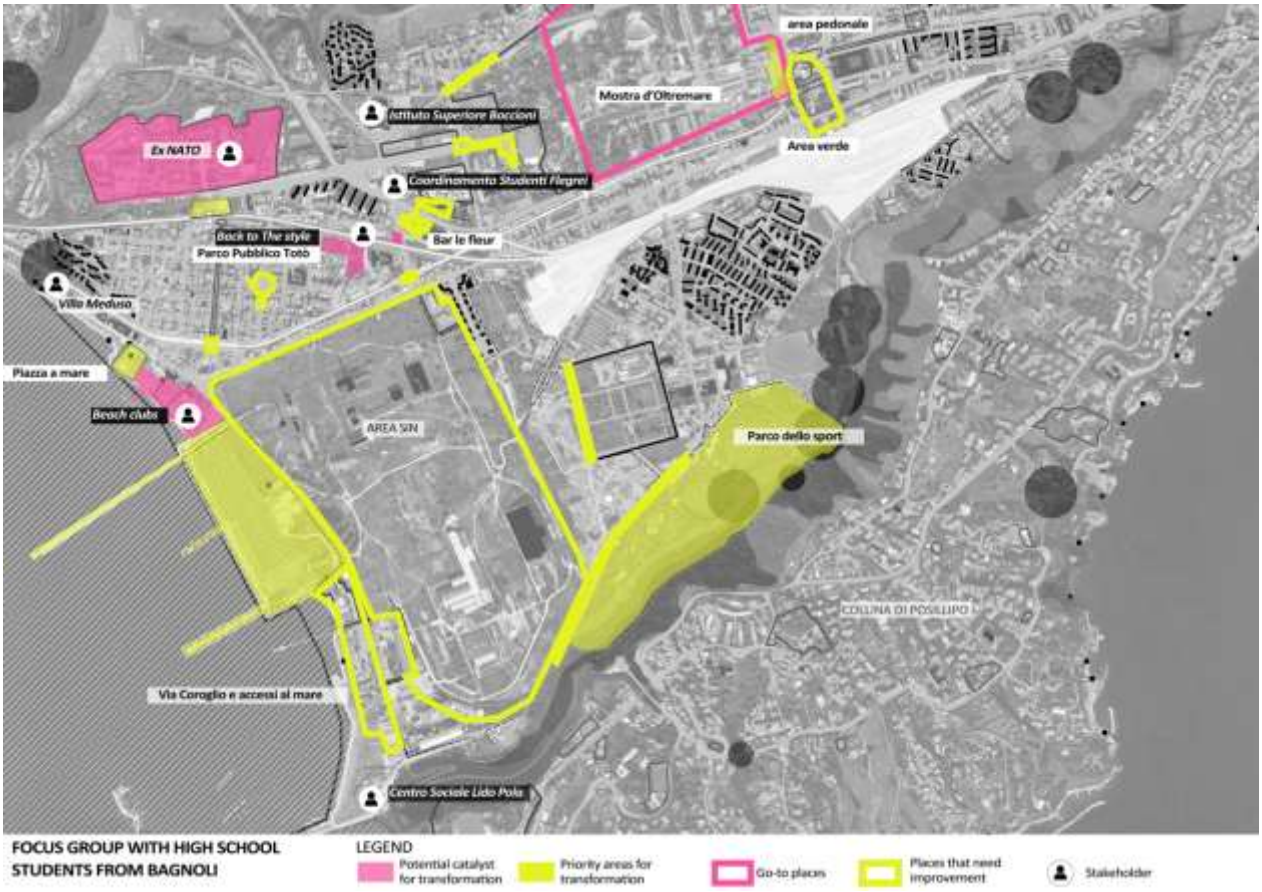


Fig. 10: *Focus groups co-exploring Bagnoli: Results map.*

[3] School-based activities organized by the Italian Civil Protection to prevent seismic and bradyseismic risks in the Campi Flegrei: https://www.protezionecivile.gov.it/it/notizia/exe-flegrei-2024-le-attivita-il-mondo-della-scuola/

RETURN Living Lab

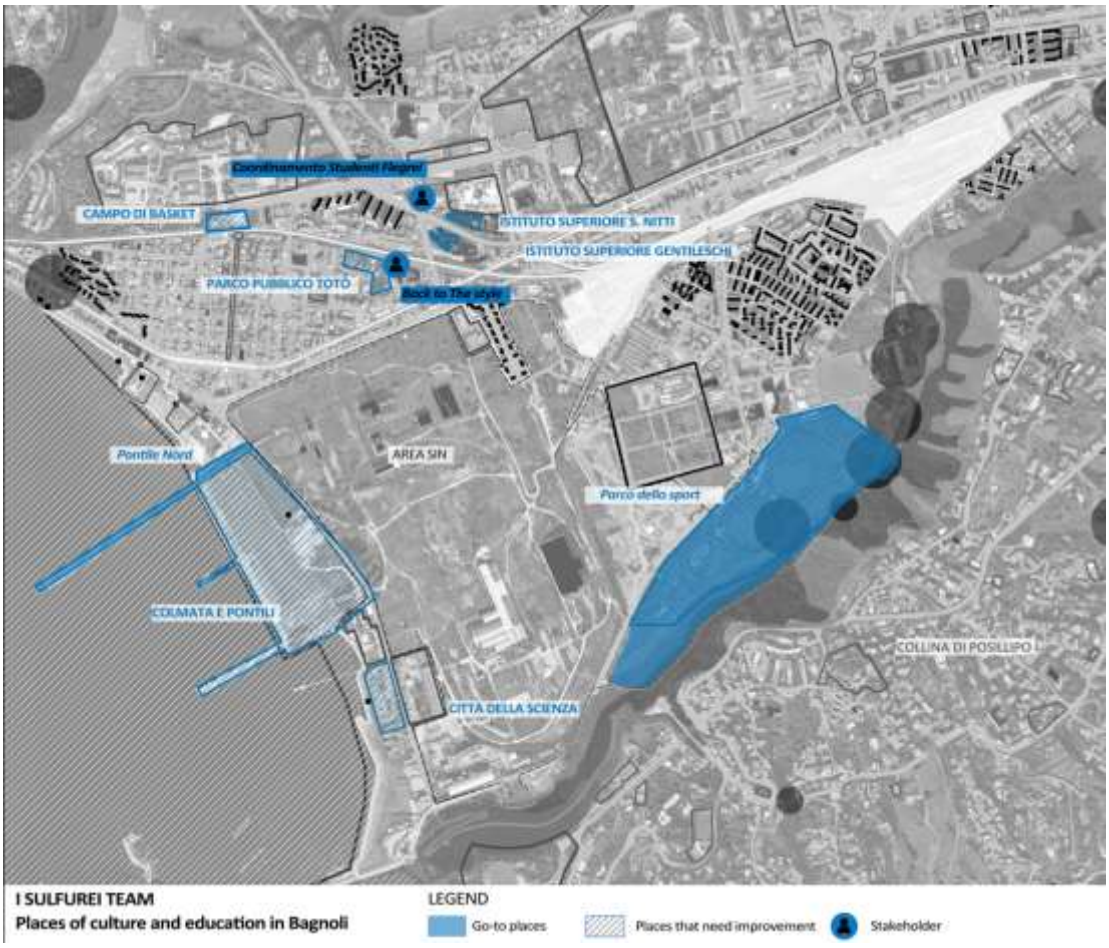
PHASE: Bagnoli Co-exploring

2. Focus group with high school students from Bagnoli: sheets "Co-exploring Bagnoli-Coroglio"

The detailed findings from each focus group are presented below:

Team 1: I SULFUREI
Tutor: Benedetta Pastena (DiARC, UNINA)
Topic: culture and school
School: Liceo Artistico Boccioni
Class: 5° A
Students: Giulia Esposito, Giusi Mirabbella, Giuseppe Alaggio, Antonio De Palma, Noemi Carandente Coscia, Daniela Pagliuca

1. **Our favorite places in Bagnoli** are the Coroglio North Pier, because it is linked to memory, and the closed Sports Park, looking to the future.
2. **The places we would like to improve** and how:
    - The Coroglio north Pier should be equipped with refreshment points and spaces suitable for hosting temporary exhibitions and events, such as a book fair;
    - Throughout the area we foresee info-points for road safety;
    - The Sports Park: make it accessible;
    - Schools: improve the Nitti and Gentileschi school buildings;
    - Città della Scienza "closed": reclaim the abandoned area to establish the Bagnoli Ilva Museum or a new University Campus (laboratory);
    - Bagnoli basketball court and the adjacent square
    - Totò Public Park: introduce new equipment such as children's rides and structures for practicing calisthenics
3. Yes, we know what's **beyond the wall of the former factory. Descriptions:**
    - A large, abandoned park
    - Wasted area
    - Area to be reclaimed
    - Large desolate land
    - A post-apocalyptic scenario
    - Area where nature has reclaimed its own spaces What we would do, if we could enter in the area: University of Marine Biology, Agricultural School, Turtle Points, "Dismountable" Park for events, Culinary Area, Museum of the working-class memory; the fire extinguishing tower should house a slide.
4. Yes, we have **perceived some risks**, some dangers: the lack of public lighting, especially along the road that connects Cavalleggeri and Coroglio; the presence of the circus, that is dangerous for animals.
5. We have identified some active **groups or events** that take place in the neighborhood, along with some groups that could be involved in the future Living Labs: high school students like us; Leggo perché; Open House; Greenblue Days; C.o.s; S.A.C.; Coordinamento Flegreo; Back to the style; Non una di meno; Cultura Napoli.



Team 2: I Cugini di Bagnoli (The Cousins of Bagnoli)

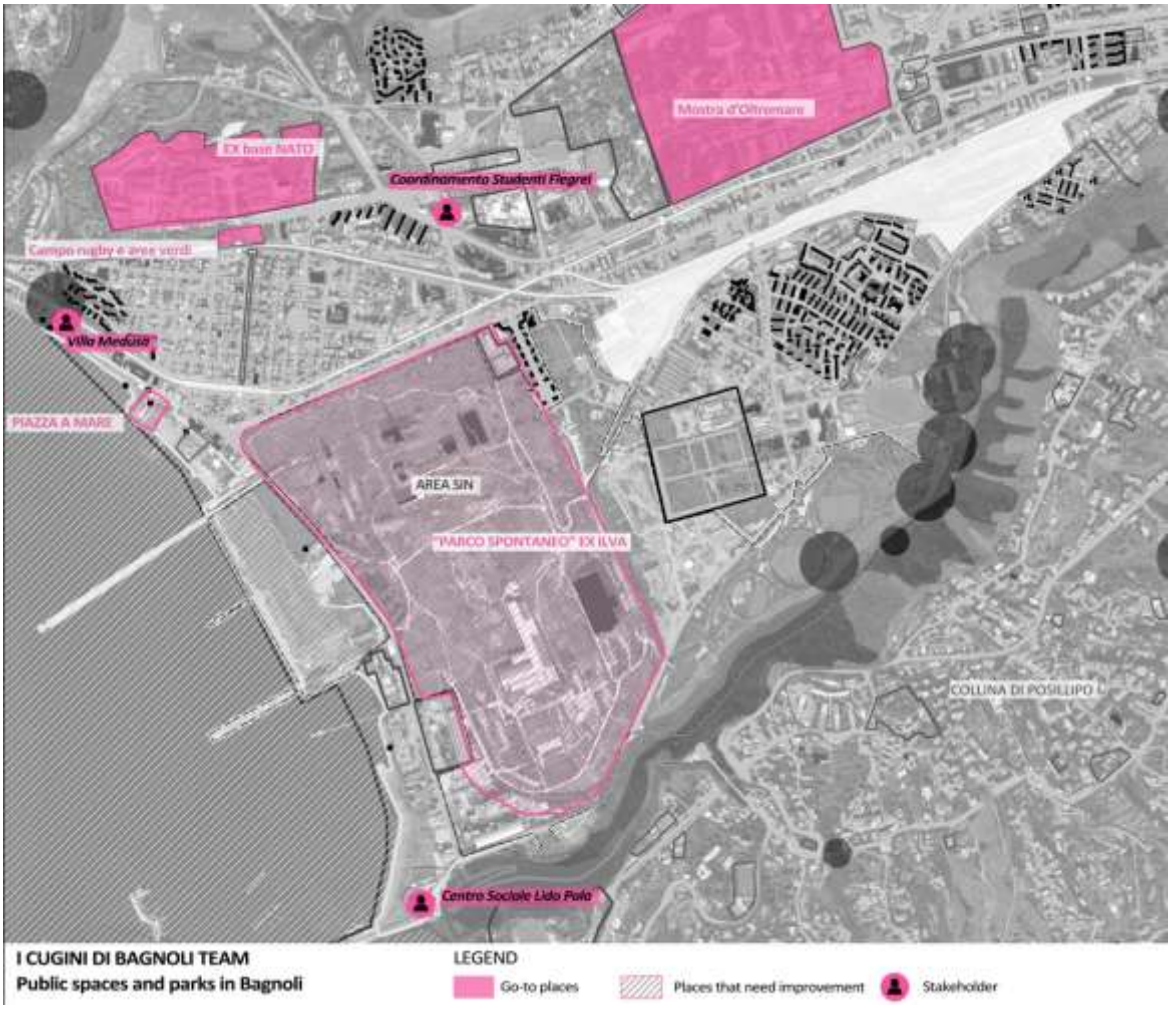
Team members/school/class: Cristina Pellegrini, F.S. Nitti, 5th grade
Tutor: Rosaria Iodice (DiARC, UNINA)
Topic: Public spaces and parks
Before answering the questions, the students marked on the map the public spaces and parks they know within or bordering the Bagnoli neighborhood. The places that were marked are:

- Totò Park: in this small neighborhood square there is a regulation that limits the actions that should be carried out in a park, such as having a picnic or putting a speaker with music. Yellow Park: it is in a state of abandonment but represents a potential for the territory to be redeveloped.
- Virgiliano Park: park in use but little accessible for us who live in Bagnoli.

1. **The places we prefer to frequent in the Bagnoli neighborhood are** the Mostra d'Oltremare park because it is well-kept, it is allowed to have group picnics, play and is large enough for long walks. Moreover, it is also a place where events and various courses are organized and therefore it is very frequented by young people. Generally, we go on foot, but it is also possible to take the Cumana train which has a station nearby. Another partially frequented place is the former NATO base. It is possible to enter only when events take place while the rugby field inside the former NATO area is open to the public. It can be reached on foot, by bus or by car.
2. **With reference to public spaces and parks we would like to improve many places.** Certainly, in the first instance we would like to work on the area of the former Ilva in Bagnoli because we believe that a park already exists there and is denied to the community. To improve it, it would be necessary to complete the soil reclamation, increase the vegetation and trees for shade and insert small kiosks or

spaces to accommodate young people. Another place that has a beautiful view is the seaside square ("Piazza a Mare"). Unfortunately, however, it is poorly maintained and frequented by people for illegal activities (drug dealing). It could be improved thanks to a security presence that could drive away these activities, insert some bars open even in the evening and replace the public furniture that is currently damaged.

3. **Yes, we know what is beyond the wall of the former Ilva area, thanks to some walk and activities that we have done through our school.** The adjectives that come to mind when thinking about that place to describe it are: neglected, underdeveloped, toxic, empty, unusable. If we could enter inside on our own without a guide to show us where to go, what we would like to do is explore the whole area entering the industrial archaeological sites and perhaps organize large events like concerts where anyone can participate.
4. **Within the neighborhood where most of us live (Bagnoli), we perceive danger to our safety.** The neighborhood is not safe and there are often incidents of robberies or fights between people. Another risk we perceive is the seismic one because earthquakes have been stronger and more frequent lately. These risks are widespread and perceived throughout the entire neighborhood.
5. **We know some groups and associations that work in the area, but we do not know the headquarters where they operate.** We know the "Coordinamento degli studenti flegrei" and the association "Essere Napoli". Inside the Lido Pola and Villa Medusa we know that activities are carried out proposed by associations but none of us has ever participated.
6.

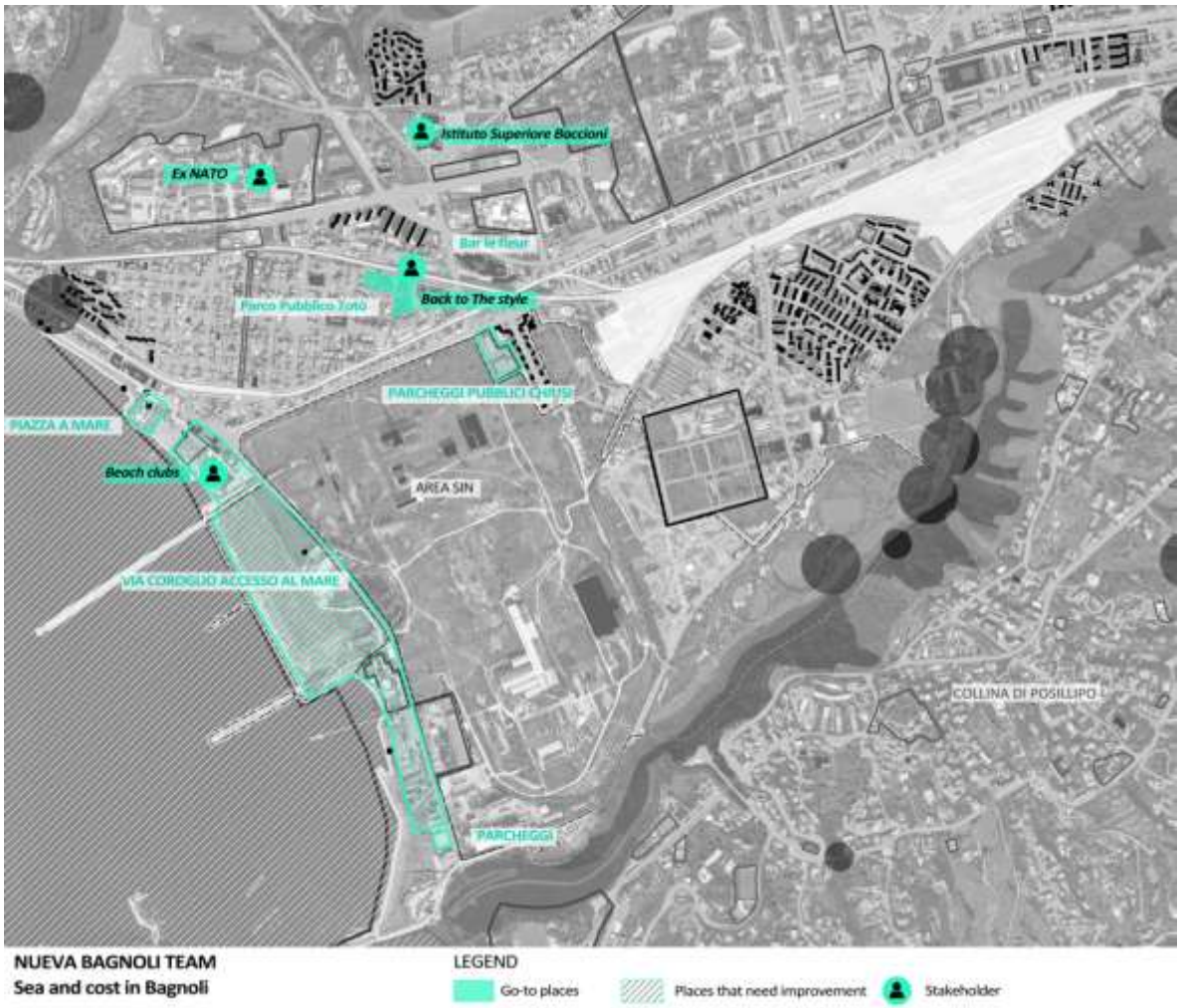


Team 3: Nueva Bagnoli
Team members/school/class: Ciliberti, Marotucci, Pugliese, Petrillo, Ingenito, Del Vecchio.
Tutor: Federica Vingelli (DiARC, UNINA)
Topic: Sea and coast

1. **Among our favorite places in the neighborhood are** those we frequent daily and are close to our school, among these the main ones are Totò Public Park and a meeting place, the Stella bar (see map).
2. **Focusing on the coast and the sea there are numerous places we would like to improve,** among these, the main ones are "Piazza a Mare" and Via Coroglio. The identified critical issues are in fact:
    - The ban on swimming in the sea of Bagnoli;
    - The inaccessibility of the beaches and the coast;
    - The excessive car traffic along Via Coroglio with consequent disorder and difficulty in accessing the coast, also caused by the lack of parking.

3. **We visited the inside of the SIN area of Bagnoli through site visits with the school and, among us, there were divergent impressions and considerations.** While some prevail in the unpleasant perception of an abandoned, degraded site, lacking in maintenance, others report having felt the sensation of accessing a large oasis of greenery, tranquillity and silence, just like finding oneself inside the "Bosco di Capodimonte". For everyone, however, the perception of the industrial memory of the place is still very present, which could be revived in a museum on site.
   If there were the possibility to open the SIN area and access it autonomously, the already existing park areas could be used, such as the sports park which is complete and existing but inaccessible or the existing "natural park". A bridge/footbridge could also be built to visit the area, making it easier to move around and cross; an exhibition or a museum could be set up on the industrial past of the area and large events such as concerts could be held.
4. **Several risks are perceived in the neighborhood, where we live and/or attend school, among these:**
    - The risk to our safety, due to the perceived insecurity in some dark and little frequented places in the neighborhood, such as the railway overpass (see map)
    - The seismic and volcanic risk, which we are informed about through the school and due to the increase in the intensity and frequency of earthquakes in this period (March 2024)
    - The risk to our health, linked to the pollution of the sea and the SIN area.

5. **Some of the active subjects in the area, who could be involved in the next Living Labs, are** the managers of the former NATO base in Bagnoli, the Liceo Artistico Statale Umberto Boccioni (from which the laboratory participants come), the organizers and managers of the annual event "Back to the style" which consists of a "Jam", or a manifestation of street art, graffiti, music and street sport. Although we do not have confidence in their willingness to participate, the managers of the bathing establishments could be invited as they have a great responsibility in the way the coast is used, but we believe that they are not interested in activities outside their own business.



Team Name: S.N.A.I. (Società Nazionale Ambientalisti Italiani)
Tutor: Sara Piccirillo (DiARC, UNINA)
Team members/school/class: Riccardo di Leo, Gabriele Maria Improta, Luca Liccardo, Alessandro Pangliora, Matteo Quinzii, Roberto Reale, Vincenzo Testa.
Topic: Sea and coast

1. **Among our favorite places in the neighborhood are** Piazzetta a Mare and the North Pier because they are easy to reach (on foot, metro line 2 and Cumana) and are meeting places for us young people.

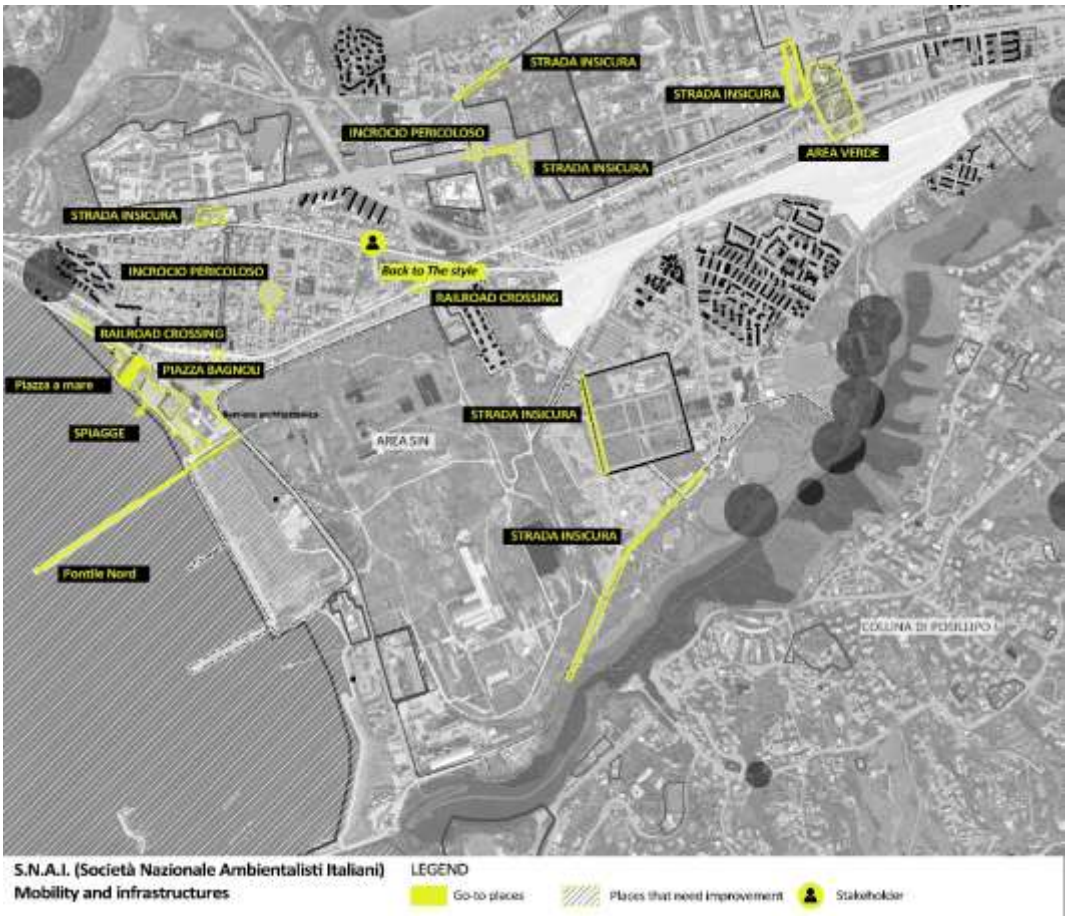
2. With reference to the Bagnoli neighborhood, there are several **places we would like to see changed to improve its liveability**. After the remediation of the SIN site, we would like the removal of all architectural barriers, the strengthening of mobility infrastructures with particular attention to road safety and pedestrian accessibility of the areas. Another thing we believe is important is to strengthen both street lighting, as some streets are unsafe at night, and to implement parking facilities in the area.

3. If there were the possibility to open the SIN area and access it autonomously, sports and cultural activities could be organized.

4. Several risks are perceived in the neighborhood, where we live and/or attend school, among these:

- The risk of seismic and bradyseismic activity. Given the numerous earthquakes in the area, we believe that buildings should be checked and inspected so as not to pose a danger to residents;
- Security risk, particularly in the areas near the Mostra d'Oltremare train station and Via Guglielmo Morconi, because in the evening they become meeting places for gangs and illegal activities.

5. Some of the active subjects in the area, who could be involved in the next Living Labs, are the organizers and managers of the annual event "Back to the style" which consists of a "Jam", or a manifestation of street art, graffiti, music and street sport. The organizers of the "Gazzetta Letteraria" although active in the historic center, organize many cultural events in neglected and abandoned territories. Iskra.



4.2 Co-design

The second phase of the ULL methodology regards the co-design experimentation, articulated using participatory tools such as co-mapping and serious games and whose outcome is discussed in this paragraph. ; .

The co-design phase included various activities:

1) Citizen-led co-design activities
2) Experts-led co-design activities

4.2.1 Citizen-led co-design activitiesThe first RETURN co-design activity for the test case of Bagnoli-Coroglio has been held in October 2024 during *FUTURO REMOTO* science fair in the Neapolitan Science Museum *Città della Scienza*. *FUTURO REMOTO* is a yearly event open to the city and directed mainly to children in primary and secondary schools although also adults like local inhabitants and local experts with a particular knowledge on the treated subjects may usually participate. The event lasted two days andthe location was particularly favourable as a co-design setting in relation to the test-case because *Città della Scienza* is inside the area of the Bagnoli-Coroglio National Site of Interest (SIN).

To deal with the big variety of participants and the difficulty to lead the interaction in such a busy, crowded and interactive environment a serious game was developed in order to attract more people and to engage with them. The game was organised so that results may be collected and analysed.
The RETURN serious game *"Non correre rischi. Attiva il metabolismo della tua città!"* - *Take no risks. Activate your city's metabolism!* - simulates a regeneration process for a multirisk urban marginalized area by implementing actions aimed at reducing the likelihood of one or more risks occurring and limiting their impact. These actions are applied, as an example, to the Bagnoli neighborhood. Considering the environmental and functional redevelopment of the disused Ilva industrial area, the game works on the transformation processof the entire neighborhood, including residential areas, the "Sport Park" zone, and existing public spaces and buildings (including *Porta del Parco*). After selecting the most relevant risk according to their view, participants build possible regeneration scenarios with the goal of mitigating impacts and reducing the likelihood of the risk materializing. In this sense, the use of storyline also informs the game (cfr. 3.2.3). Moreover, the game is played in teams of at least two players, although in some cases we agree to play with a single player.

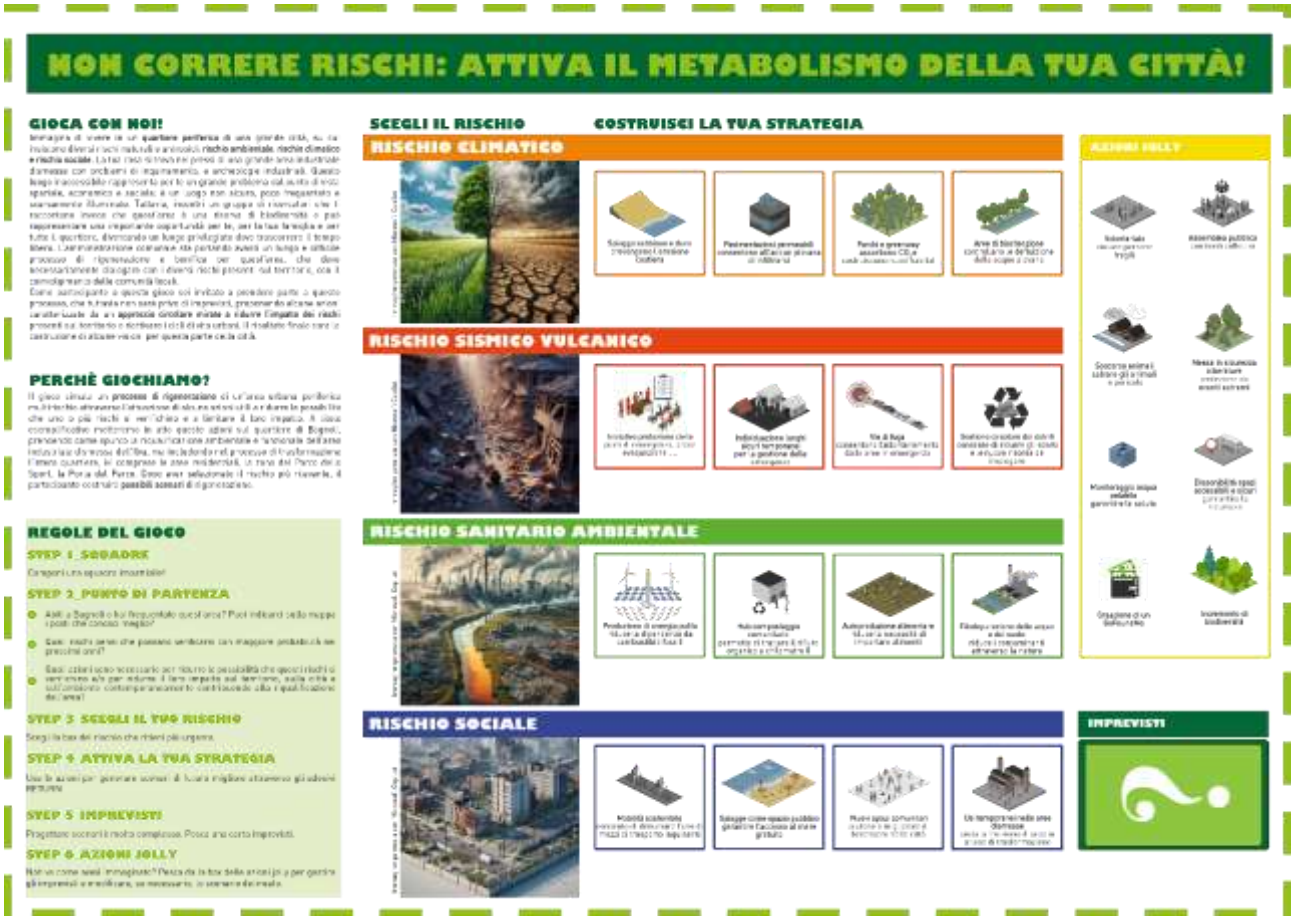


Fig. 11 *Gameboard of the RETURN serious game "Non correre rischi. Attiva il metabolismo della tua città!" - Take no risks. Activate your city's metabolism! -, created by Libera Amenta, Rosaria Iodice, Benedetta Pastena, Sara Piccirillo, Bruna Vendemmia, Federica Vingelli*

The gaming session starts with reading the 1st gameboard (Fig. 11) that illustrates the instructions and presents four main risks represented through an image realized with Artificial Intelligence. For each risk, we selected four actions able to better adapt the context to the possibility that the selected risk occurs or to mitigate its impacts. The actions were represented with 3D axonometric colored schemes, to be easily communicable and recognizable also by non-expert players. Then the player interacts with the game sheet, a 3D bird's eye image of the neighborhood of Bagnoli-Coroglio on which they can localize the strategic actions spatializing their multirisk resilient strategy (Fig. 12).

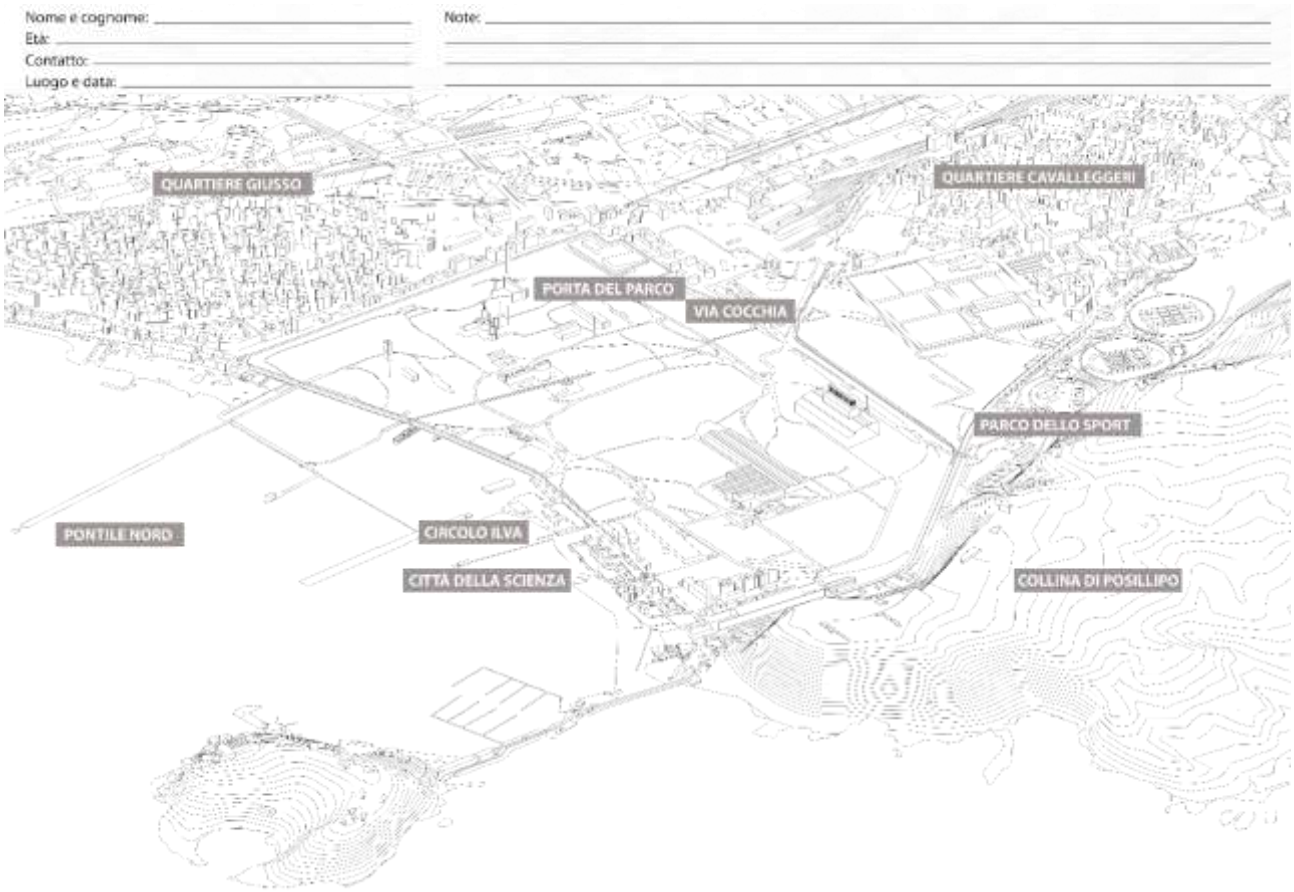


Fig. 12 *Interactive game sheet realized for the RETURN serious game "Non correre rischi. Attiva il metabolismo della tua città!" - Take no risks. Activate your city's metabolism! -, created by Libera Amenta, Rosaria Iodice, Benedetta Pastena, Sara Piccirillo, Bruna Vendemmia, Federica Vingelli*

The participants are driven toward the local risk conditions by the researcher who tells them a story.

"Imagine that you are living in a peripheral neighborhood of a large city, where various natural and anthropogenic risks are present: environmental risk, climate risk, and social risk. Your home is located near a large, abandoned industrial area suffering from pollution and industrial ruins. This inaccessible area poses a significant problem for your community from a spatial, economic, and social perspective: it is an unsafe, poorly frequented, and poorly lit place.

However, you meet a group of researchers who explain that this area is actually a biodiversity reserve and could represent a great opportunity for you, your family, and the entire neighborhood, potentially becoming a prime location for leisure activities. The local government is undertaking a long and challenging regeneration and cleanup process for this area, which must necessarily take into account the various risks present in the region and involve the local communities.

As a participant in this game, you are invited to take part in the process, which will not be without unforeseen challenges. You will propose actions based on a circular approach aimed at reducing the impact of the risks present in the area and reactivating urban life cycles. The outcome will be the construction of visions for this part of the city."

Then, each team is asked to choose the risk based on an image and define a strategy to be applied indicating which action has to be played first.

1) Climate Risk

Fig. 13 *Climate Risk. Image generated with Microsoft Copilot.*

Climate Risk[4] is the risk that a catastrophic event may occur consequently to climate change. A four actions toolkit box was then provided to the player team:

i) **Beaches and dunes**: Sandy beaches and dunes prevent coastal erosion caused by strong winds, waves, and tides. They can also block storm surges from reaching inland areas. The natural services provided by these Nature-Based Solutions (NBS) can be enhanced through artificial sand nourishment;

ii) **Permeable pavements**: Permeable pavements made of porous concrete, asphalt, or pavers allow rainwater to infiltrate where it falls, reducing stormwater runoff;

iii) **Parks and greenways**: The benefits can be substantial: A study on green spaces in Beijing, China, demonstrated that these areas stored 154 million cubic meters of rainwater, roughly equivalent to the annual water needs of the city's urban ecological landscape. They also absorb CO2;

iv) **Bioretention areas**: Bioretention areas, including rain gardens and bioswales, are vegetated trenches designed to capture stormwater runoff at specific locations, helping to manage rainwater effectively.

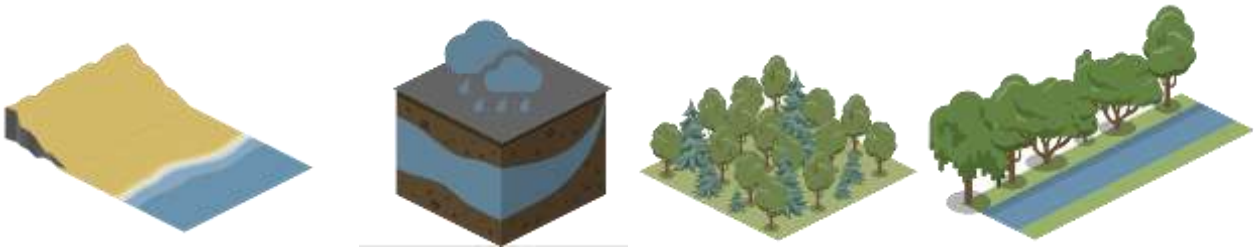


Fig. 14 *Actions to mitigate Climate Risk*

[4] Image Prompt: Create an Image on Climate Risk. A realistic image centered on a tree in a field divided into two halves. The image itself is split: a) left side: A green, blooming field with a clear blue sky and bright sunshine. The tree has a lush, full canopy; b) Right side: A dry, arid field characterized by cracked, parched soil under a gray, stormy sky. The tree is withered and barren.

2) Seismic-Volcanic Risk

Fig 15 *Seismic-Volcanic Risk. Image generated with Microsoft Copilot.*

Seismic-Volcanic Risk[5] is interpreted as the risk to life due to catastrophic events, but also economic risk due to the loss of property and property value. The four proposed actions are oriented toward improve the preparedness of the territory at risk through the redaction of emergency plans or the organisation of escape routes, on one site; on the other site to the management of disaster:

i) **Civil protection initiatives**: Emergency plans, seismic microzonation, and evacuation drills;

ii) **Identification of safe locations**: Strategic buildings, assembly areas, and shelters for emergency management;

iii) **Improvement of connections and escape routes**: Visible and accessible pathways to the site;

iv) **Circular management of debris**: Both during the emergency and in the post-emergency phase.

Fig. 16 *Actions to mitigate Seismic-Volcanic Risk*

[5] Image prompt: Create an Image Depicting Seismic-Volcanic Risk. A historic city center in a plain region, showing rubble and collapsed houses after an earthquake. Small everyday objects are visible among the debris, and displaced individuals and homeless people are present in the scene.

3) Health and Environmental Risk

Fig. 17 *Health and Environmental Risk. Image generated with Microsoft Copilot.*

To deal with Health and Environmental Risk[6] four circular actions are designed to reduce both the likelihood of such events occurring and their impact on the environment and inhabitants, while reactivating interrupted urban life cycles:

i) F**ood self-production activities:** Beekeeping, ecotourism, zero-kilometer markets, local farmers, and urban agriculture;

ii) **Phytoremediation:** Treatment of water and soil pollution using natural processes;

iii) **Clean energy production:** Solar, wind, and biomass energy, along with energy communities;

iv) **Community composting hubs:** Facilities for shared composting to manage organic waste.

Fig. 18 *Actions to mitigate Health and Environmental Risk*

[6] Image prompt: Create an Image on: Health-Environmental Risk. A peripheral area of a large city with a factory in the background, its chimneys spewing smoke that turns the sky gray and creates a suffocating atmosphere. In the foreground, a small polluted river is visible in a general landscape of degradation. The color of the water makes it clear that the river is subject to industrial dumping, and scattered around the area are piles of abandoned waste.

4) Social Risk

Fig 19 *Social Risk. Image generated with Microsoft Copilot.*

To contrast Social Risk[7] the following actions were individuated to improve the availability of public spaces in the area:

i) **Creation of community spaces**: Establish community gardens to foster social cohesion;

ii) **Temporary uses of abandoned areas**: Utilize disused spaces for community support activities;

iii) **Beaches as public spaces**: Designate beaches as public areas for the local community, ensuring free access to the sea;

iv) **Development of sustainable and slow mobility networks**: Promote safe and environmentally friendly transportation options.

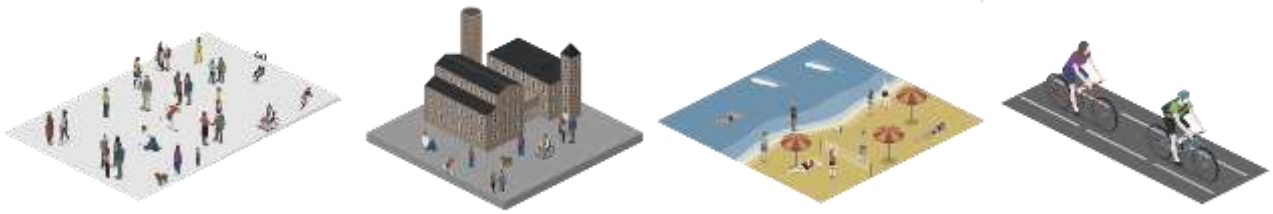


Fig. 20 *Actions to mitigate Social Risk*

[7] Social risk Prompt: Create a realistic image of an abandoned industrial area in a small, low-density city. Depict a small-scale area without skyscrapers, where the streets appear dangerous and associated with crime. Include many physical barriers like walls, with an atmosphere of insecurity. The streets should look desolate, overgrown with weeds, and have small piles of garbage scattered on the sidewalks. Add murals to some walls to enhance the sense of urban decay.

After selecting three actions, the team draws an **"Unexpected events" card**[8] and plays one among six **"Jolly actions"** to manage the unforeseen events, contributing to the definition of the final scenario. The jolly actions are:
i) **Rescue of animals in danger**;
ii) **Monitoring of drinking water**;
iii) **Security/protection of trees and vegetation from extreme events**;
iv) **Volunteering for assistance to vulnerable people**;
v) **Public assembly**;
vi) **Availability of accessible and safe public spaces for local communities in emergency situations**;
vii) **Creation of a GoFoundMe**;
viii) **Increase in biodiversity**.

Fig. 21 *Jolly Actions*

During the FUTURO REMOTO fair, we played the game 26 times together with local participants, mostly organized in groups of min. 2 max. 5 people. All the visions that emerged during the game have been registered and the palying teams were also asked to give their vision a title. For each player, some personal info were also collected: data about their residency or not in Bagnoli together with their knowledge of the area, by, for example, showing on the map the places that they know better or adding notes on the map as well. This data collection validates, enlarges and sometimes questions the knowledge developed during the co-exploring phase. For each player, the registration of age and residence also occurred, to avoid bias in the results. Data will be finally anonymized in the results.

Fig. 22 *Citizen-led co-design activities at FUTURO REMOTO fair.*

[8] Unexpected event cards have been borrowed by the students of Co.De. "Città come rete socio-tecnica, laboratorio di design sociale" prof. L. Amenta

The FUTURO REMOTO Fair in *Città della Scienza* is the first setting in which the serious game "Take no risks. Activate your city's metabolism!" has been tested. More game sessions took place during other temporary and collective events realized from October 2024 till April 2025 in the city of Napoli, among them the "Università svelate" - *Unveiled Universities* -, organized by University of Naples Federico II in the SS. Marcellino and Festo university complex, to boost interactions between citizens and academy, and the DiARC OpenDay, that took place at Palazzo Gravina in order to promote the three-years Degree Course in Sustainable Urbanism. Both events were characterized by an audience of different backgrounds with a major concentration of students and researchers.

Fig. 23 *Citizen-led co-design activities at Università Svelate*

The results of the game are collected and aggregated as percentages, providing an overview of the most frequently selected options. Social Risk is identified as the most significant, accounting for 21,28% of the responses, while Seismic-Volcanic Risk is perceived as the least relevant, with a share of 17,23%. Further and more detailed results are presented and discussed in Deliverable DV 5.4.5 - "Evaluation Framework for monitoring circularity, sustainability and resilience of urban metabolism" ().

Fig. 24 *Percentage of risk choices in the serious game.*

4.2.2 Experts-led co-design activities

The expert-led co-design activities within the RETURN Urban Living Labs materialised in the "Co-design Urban Living Lab Bagnoli-Coroglio" meeting, held in Naples in March 2025. The event represented a key moment to test collaborative strategies in a critical urban context with a high seismic-volcanic, climatic, social, health and environmental risk concentrations, with the aim of defining actions and scenarios for a sustainable and circular multirisk adaptation planning.
Within the framework of the RETURN Academy[9], the co-design meeting involved practitioners, researchers (including RETURN project partners), RETURN Academy students and territorial stakeholders, invited to participate as active participants in the process. The initiative consisted of three main phases: (1) site visit: field exploration; (2) workshop: co-design activities in thematic tables; (3) elaboration of project actions through collaborative action sheets.

At the beginning of the masterclass, participants took part in the RETURN Serious Game, which was useful for becoming familiar with the territorial context, the main risks, and the challenges involved. The first day opened with an exploratory survey in three stages. The route started from the Posillipo hill, from which it was possible to observe the entire SIN area of Bagnoli and receive an initial introduction on the territorial framework and history of the area. Afterwards, the group headed to the Circolo ILVA, an emblematic place of social presidium and working-class memory, where the managers recounted the history and active role of the club in the area. Finally, the participants had the opportunity to enter the disused industrial enclosure, physically crossing the places of the reclamation and activating moments of collective listening and confrontation. This immersive experience made it possible to connect the perceptive level with the environmental, social and historical dimensions of the site.

This was followed by the workshop phase, organised in four thematic tables, each focusing on a different approach to the theme of risk and regeneration. The "MIRACLE: co-designing the multi-hazard trend" table worked on the relationship between infrastructure, public space and accessibility, with an inter-scalar reading of urban vulnerabilities. The "Metabolic Risk Mitigation Actions" table focused instead on the transition from linear to circular urban metabolism, identifying actions for ecological resilience and risk adaptation; the "Systemic Transformative Actions for Adaptation and Emergency Management" table addressed governance, risk communication and the building of local alliances through integrated adaptation and social innovation actions; and finally, the "storyline workshop" table constructed a narrative and visual account of perceived risk by creating shared narrative scenarios shaping collective visions and understanding of urban, environmental and risk dynamics.
Each group used a project action sheet as a guiding tool in which the proposed interventions, the actors involved, the expected benefits and the necessary resources were defined. The workshop concluded with a plenary session of restitution and debate, in which each table publicly presented its reflections, highlighting the transformative potential in contexts at risk.
This experience demonstrated how ULL can operate as an integrated listening and co-designing device, facilitating dialogue between expert, local and institutional knowledge, and contributing to the shared construction of sustainable scenarios for risk adaptation.

[9] The RETURN Academy

Return Academy
TS1-Insediamenti urbani e metropolitani

PARTENARIATO ESTESO PE3 – Progetto RETURN
multi-Risk sciEnce for resilienT commUnities undeR a chaNging climate
SPOKE TS1 – INSEDIAMENTI URBANI E METROPOLITANI
Corso di Formazione: Gestione dei rischi e cambiamento climatico. Strategie per la resilienza degli insediamenti urbani

Co-design Urban Living Lab Bagnoli-Coroglio

Napoli, 27-29 Marzo 2025
DiARC Dipartimento di Architettura, Università di Napoli Federico II

Foto di Francesco Sammarco

Giovedì 27 Marzo, ore 15.00 -19.00
DiARC, TLab, Palazzo Latilla, via Tarsia 31, 80135 Napoli
15.00 – 15.10
Saluti
Maria Rosaria Santangelo, Mario Losasso, Michelangelo Russo, DiARC - UNINA
15.10 – 15.30
Rischi climatici urbani in contesti multirischio. L'integrazione negli strumenti urbanistici
Francesco Musco, IUAV
15.30 – 15.50
Focus su valutazione e gestione del rischio per i siti contaminati, identificazione di soluzioni sostenibili e circolari per la riqualificazione
Petra Scanferla, Fondazione Ca' Foscari
15.50 - 16.10
Progettare la città resiliente: azioni sismiche trasformative per l'adattamento e la gestione dell'emergenza in contesti multirischio
Mattia Federico Leone, DiARC - UNINA
16.10-16.30
Loss and Damage come espressione dell'abitare in aree multirischio. L'esempio di Bagnoli
Maria Federica Palestino, DiARC - UNINA
16.30- 16.40
Question Time
Modera **Federica Vingelli**, DiARC - UNINA
16.40 - 16.55
Introduzione all'approccio Urban Living Lab: definizioni e strumenti
Libera Amenta e Maria Fabrizia Clemente, DiARC - UNINA
17.00 – 19.00
Tavoli di lavoro

Venerdì 28 Marzo, ore 08.30 - 19.00
08.30 - 13.00
Incontro a Via Claudio 21
Visita del Circolo ILVA, incontro con C. Santoro e O. Cammarota, Circolo Ilva Bagnoli
Sopralluogo nell'area ILVA, incontro con D. Mello, Invitalia
13.00 - 14.00
Pranzo – Asilo Auditorium della Porta del Parco, via Diocleziano 341, 80124 Napoli
15.00 – 19.00
DiARC, TLab, Palazzo Latilla, via Tarsia 31, 80135 Napoli
Tavoli tematici
Partecipano alla discussione: **A. Auricchio** e **R. Battarra** (Struttura di supporto al Commissario straordinario per la bonifica ambientale e rigenerazione urbana dell'area di Rilevante Interesse Nazionale Bagnoli Coroglio), **G. Cavotti** (presidente commissione traffico Viabilità e Mobilità Urbanistica – X Municipalità), **M. Correra** (Docente di Valutazione – DiARC, responsabile ULL PSUGC), **S. Cuntò** (Dottorando in urbanistica, collettivo needle), **O. Cammarota** (operatore di sviluppo territoriale Circolo Ilva Bagnoli), **E. Coppola** (docente di Urbanistica – DiARC, e abitante di Bagnoli), **A. Di Gennaro** (agronomo), **F. Escalona** (Nunige Campania Associazione per la rigenerazione urbana), **S. Ragozino** (CNR, responsabile ULL PSUGC), **D. Mello** (urbanista, Invitalia spa)

Sabato 29 Marzo, ore 09.00 - 13.00
DiARC, TLab, Palazzo Latilla, via Tarsia 31, 80135 Napoli
09.00 – 11.20
Tavoli tematici
11.20 – 11.30
Urban Living Lab Bagnoli-Coroglio: risultati preliminari dell'attività di co-design
Bruna Vendemmia, DiARC - UNINA
11.30 – 12.30
Presentazione degli esiti dei lavoli tematici a cura degli allievi della RETURN Academy: **G. Alfonsi, L. Ascione, F. Banfi, F. Berrino, L. Biagini, M.Buglione, G. Cerasa, G. Cherchi, R. Cordella, F. D'Onofrio, M. Della Ragione, G. Di Benedetto, S. Elia, M.P. Esposito, P. Floramo, C.C. Funston, G. Grassi, A. Iaiza, A. Lanna, C. Leone, F. Maresca, L. Messina, E. Miele, S. Moretti, C.M. Napolitano, M. Palombella, A. Pane, P. Portella, L. Ricucci, A. Rocco, M. Romano, O. Sabbatino, A. Scala, L. Scarpa L., V. Tomassoni, T. Tufaro, L. Vorlicek, A. Zampella, R.D. Zotei.**
12.30 – 13.00
Discussione finale e conclusioni
Daniela Di Bucci, Mario Losasso, Michelangelo Russo

Coordinatori RETURN Academy TS1: M. Losasso (UNINA DiARC), Daniela Di Bucci (Dipartimento della Protezione Civile).
Coordinatore ULL co-design Bagnoli-Coroglio : M. Russo (UNINA DiARC)

4.3 Co-testing

4.3.1 Jane's Walk "Bagnolinside ILVA. Attraversare i luoghi, dalla fabbrica al parco"

The multidimensional evaluation framework, elaborated during the phases 1 and 2 of the co-test phase, allowed participants to express their views on the effectiveness of a set of proposals, assessing their impact across four dimensions: social, cultural, economic, and environmental. The occasion for using this tool was the Jane's Walk, a participatory walk during which citizens, activists, and stakeholders symbolically crossed the former industrial site while reflecting on its possible futures. On-site discussions were guided by visual aids and structured around four scenarios, each associated with a specific set of proposed actions.

The first scenario, *'Building community between the city and the park'*, aimed to reconnect human, environmental, and urban relationships through actions such as removing physical and visual barriers between the city and the former ILVA area, establishing a renewable energy community, setting up neighborhood composting sites, promoting sustainable mobility and green routes, and creating shared spaces for urban agriculture. The second scenario, *'Accessible archaeologies'*, sought to preserve the cultural and identity value of the former factory by proposing the temporary use of abandoned spaces for cultural and social activities, designating emergency gathering areas, reusing demolition waste, and designing communal venues to strengthen ties with local heritage. The third scenario, *'The park that already exists'*, focused on safeguarding spontaneous rewilding and enhancing biodiversity through the creation of a local seed market, nature-based decontamination solutions, environmental monitoring activities involving flora and fauna, and identifying areas where traditional remediation would be avoided in favor of natural regeneration. The fourth scenario, *'Rediscovering the sea'*, was aimed at restoring the land-water ecotone and proposed actions such as reconfiguring and opening the coastline for free public access, rehabilitating coastal ecosystems with dune restoration and eco-compatible marine structures, introducing flexible public uses of the beach, and regularly monitoring bathing water quality. The multidimensional evaluation matrix was organized in a way that, for each action, participants could espress their opinion about the expected impact to each dimension.

During the Jane's Walk participants were asked to assign a value from 1 to 5 to each action and each dimension where: a value of 1 means that, in their opinion, the action has no impact on that dimension, while 5 means that the action has the maximum impact on that specific dimension. The multidimensional evaluation matrix proved to be an effective tool for stimulating collective reflection on Bagnoli's possible futures, actively engaging Jane's Walk participants in assessing the proposals. By completing the matrix, different stakeholders were able to share their individual evaluations, opening up a space for dialogue that highlighted the value of participation. The tool facilitated the translation of design visions into concrete, multidimensional feedback and provided a solid foundation to guide future interventions in a shared, sustainable, and informed way.

5. Annex 1: Handbook proposal/Synthetic guidelines for Urban Living Labs under multirisk scenarios

6. References

Amenta L, van Timmeren A. (2018) Beyond Wastescapes: Towards Circular Landscapes. Addressing the Spatial Dimension of Circularity through the Regeneration of Wastescapes. Sustainability, 10(12):4740. https://doi.org/10.3390/su10124740 REPAiR 2018_01

Amenta, L., Attademo, A., Remøy, H., Berruti, G., Cerreta, M., Formato, E., Palestino, M. F., & Russo, M. (2019). Managing the transition towards circular metabolism: Living labs as a co-creation approach. *Urban Planning*, *4*(3), 5–18. https://doi.org/10.17645/up.v4i3.2170

Amorim, E.E.R.; Menezes, M.; Fernandes, K.V.G. (2022) "Urban Living Labs and Critical Infrastructure Resilience: A Global Match?" *Sustainability* 2022, 14, 9826. https:// doi.org/10.3390/su14169826

Ampatzidou, Christina, Katharina Gugerell, Teodora Constantinescu, Oswald Devisch, Martina Jauschneg, and Martin Berger.(2018), "All work and no play? Facilitating serious games and gamified applications in participatory urban planning and governance.", in Urban Planning 3, no. 1: 34-46.

Ardito, C., Buono, P., Costabile, M. F., Lanzilotti, R., and Piccinno, A. (2012) End Users as Co-designers of their Own Tools and Products. J. Vis. Lang. Comput. 23, 2 (Apr. 2012), 78–90.

Ascione, G.S., Corazza, L., Cuomo, F., Mariotti, N. (2021) "Urban Living Labs, Circular Economy and Nature-Based Solutions: Ideation and Testing of a New Soil in the City of Turin Using a Multi-stakeholder Perspective". In *Circular Economy and Sustainability* (2021) 1:545–562 https://doi.org/10.1007/s43615-021-00011-6

Baccarne, B., et al. (2014). Urban Living Labs as Multi-stakeholder Platforms for Sustainable Innovation. *Sustainability Science*, 9(3), 459–475.

Bajgier S.M, Maragah H.D., Saccucci M.S., Verzilli A., Prybutok V.R. (1991) "Introducing Students to Community Operations Research by Using a City Neighborhood As A Living Laboratory". *Operations Research* 39(5):701-709.https://doi.org/10.1287/opre.39.5.701

Barth, T. D. (2011). The Idea of Resilient Communities. *Public Administration and Development*, 31(3), 206–217.

Beisheim, M., & Simon, N. (2016). Multi-stakeholder Partnerships for Implementing the 2030 Agenda: Improving Accountability and Transparency. *Analytical Paper for the 2016 ECOSOC Partnership Forum.*

Benson, C., & Twigg, J. (2007). *Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations.* ProVention Consortium.

Bergyall-Kåreborn, B., Eriksson, C., Ståhlbröst, A., Högskolan i Halmstad, Svensson, J. (2009) "A milieu for innovation: defining living labs" *Proceedings of the 2nd ISPIM innovation symposium: Simulating recovery - the Role of innovation management*, New York City, USA 6-9 December 2009 / [ed] K.R.E. Huizingh; S. Conn; M. Torkkeli; I. Bitran, 2009

Berrone, P.; Ricart, J.E.; Duch, A.I.; Bernardo, V.; Salvador, J.; Piedra Peña, J.; Rodríguez Planas, M. (2019). An Evaluation Model for Public–Private Partnerships Contributing to the Sustainable Development Goals. *Sustainability*, 11, 2339.

Bizzotto et al., 2022. Ecological risk assessment for contaminated sites in Italy: Guidelines and path forward. Integrated Environmental Assessment and Management — Volume 00, Number 00—pp. 1–7

Bonney, R., Cooper, C. B., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K. V., & Shirk, J. (2009). Citizen science: a developing tool for expanding science knowledge and scientific literacy. BioScience, 59(11), 977-984.

Booth, L., Schueller, L. A., Scolobig, A., & Marx, S. (2020). Stakeholder Solutions for Building Interdisciplinary and International Synergies Between Climate Change Adaptation and Disaster Risk Reduction. *International Journal of Disaster Risk Reduction*, 46, 101616.

Bortolotti, A., Verga, G. C., & Khan A.Z. (2023). Which circularity for urban design and planning? A compass to navigate circular economy research knowledge and methods, Planning Practice & Research, DOI: 10.1080/02697459.2023.2262128

Bosone, M. Recupero e Gestione dei Beni Comuni: Processi di Riuso dei Sistemi Insediativi. Ph.D. Thesis, University of Naples Federico II, Naples, Italy, 2019.

Bosone, M., and Ciampa, F. 2021. "Human-Centred Indicators (HCI) to Regenerate Vulnerable Cultural Heritage and Landscape towards a Circular City: From the Bronx (NY) to Ercolano (IT)" Sustainability 13, no. 10: 5505. https://doi.org/10.3390/su13105505

Bradley, S.; Mahmoud, I.H. (2024). "Strategies for Co-Creation and Co-Governance in Urban Contexts: Building Trust in Local Communities with Limited Social Structures". In *Urban Sci.* 2024, 8, 9. https://doi.org/10.3390/urbansci8010009

Bulkeley, H., Coenen, L., Frantzeskaki, N., Hartmann, C.,Kronsell, A., Mai, L. Marvin,S., McCormick, K., van Steenbergen, F., Voytenko Palgan, Y. (2016) Urban living labs: governing urban sustainability transitions. Current Opinion in Environmental Sustainability, Volume 22, October 2016, Pages 13-17

Bulkeley, H., et al. (2016). Urban Living Labs: Experimenting with City Futures. *European Planning Studies*, 24(4), 743–756.

Bulkely, H., Coenen, L., Frantzeskaki, N., Hartmann, C., Kronsell, A., Mai, L., Marvin, S., McCormick, K., van Steenbergen, F., Voytenko Palgan, Y. (2016), "Urban living labs: governing urban sustainability transitions", *Current Opinion in Environmental Sustainability 2017, System dynamics and sustainability*, 22:13–17, Elsevier.

Carayannis, E. G., & Campbell, D. F. J. (2010). Triple Helix, Quadruple Helix and Quintuple Helix and How Do Knowledge, Innovation and the Environment Relate To Each Other? International Journal of Social Ecology and Sustainable Development, 1(1), 41–69. https://doi.org/10.4018/jsesd.2010010105

Carayannis, E. G., & Campbell, D. F. J. (2010). Triple Helix, Quadruple Helix and Quintuple Helix. *Journal of Innovation and Entrepreneurship*, 1(1), 1–12.

Cerreta M., Panaro, D. (2022) Collaborative Decision-Making Processes for Local Innovation: The CoULL Methodology in Living Labs Approach. In Amenta, L., Russo, M., ·van Timmeren, A., (eds) Regenerative Territories. Dimensions of Circularity for Healthy Metabolisms. GeoJournal Library

Chen, D., Rojas, M., Samset, B. H., Cobb, K., Niang, A. D., Edwards, P., Emori, S., Faria, S. H., Hawkins, E., Hope, P., Huybrechts, P., Meinshausen, M., Mustafa, S. K., Plattner, G.-K., & Tréguier, A.-M. (2021). Framing, context, and methods. In V. Masson- Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, & B. Zhou (Eds.), Climate change 2021: The physical science basis. Contribution of working group I to the sixth assessment report of the intergovernmental panel on climate change. Cam- bridge University Press.

Chronéer, Diana & Ståhlbröst, Anna & Habibipour, Abdolrasoul. (2019): Urban Living Labs: Towards an Integrated Understanding of their Key Components. Technology Innovation Management Review. 9. 50-62.

Ciaffi, D., & Mela, A. (2015). El Salvador verso la pianificazione di città e territori: un'esperienza partecipativa pilota a Santa Marta. *Visioni LatinoAmericane, 12*, 73-88.

Clemente, M. F. (2024), Social-ecological-technological systems, in *Innovazioni convergenti per lo spazio abitabile* (pp. 45-56).

Cognetti, F. (2022). Beyond a Buzzword: Situated Participation Through Socially Oriented Urban Living Labs. In: Urban Living Lab for Local Regeneration. Springer, Cham, pp. 19–37. https://library.oapen.org/bitstream/id/d7a4aa23-0e75-4b38-b850-ddbc08dd1ba1/978-3-031-19748-2.pdf

Conti, G., Grimaldi, R., & Hockaday, T. (2024). *Knowledge Share: the (R) evolution of Technology Transfer*. Springer Nature Switzerland, Imprint: Springer.

Cristiano, S., Falchetti, C., Miacola, F., Dinatale, V., Ronco, F., Savio, R., Schiavon, D.I., Bindi, V., & Deriu, M. (2018). Cooperation beyond development. Rethinking international aid for the self- determination of recipient communities. *Journal of UNiversities and international development COoperation, 1/2018*, 42-50 [ISSN: 2531-8772]

Cristiano, S., Falchetti, C., Vasilescu, V., & Orefice, E. (2015). Effective participatory processes and multi-disciplinary approaches for the analysis of a territory and the fostering of durable and sustainable self-managed strategic planning: the Ma.Sa.Ma. project, a rural case study in El Salvador. Rinforzare il capitale umano nei Paesi a risorse limitate. Health and wealth for all by the year 2030. Abstract proceedings of the IV Congress of the University Network for Development Cooperation (CUCS), Brescia, 10-12/09/2015.

Cuomo, F. (2022). "Urban Living Lab: An Experimental Co-Production Tool to Foster the Circular Economy". In *Social Sciences* 11: 260. https://doi.org/10.3390/ socsci11060260

D'ambrosio, V., & Leone, M. F. (Eds.). (2018). *Environmental Design for Climate Change adaptation. Innovative models for the production of knowledge*. Naples, Italy: CLEAN.

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in education: A systematic mapping study. *Journal of educational technology & society*, *18*(3), 75-88.

Djalante, R. (2012). Adaptive Governance and Resilience: The Role of Multi-stakeholder Platforms in Disaster Risk Reduction. *Natural Hazards and Earth System Sciences*, 12(9), 2923–2942.

Dodero,G., Gennari,R., Melonio, A., Torello, S., Gamified co-design with cooperative learning. In Extended Abstract 2014 Conference procedings of CHI Conference on Huma Factors in Computing Systems. Pp. 707- 718.

E. Coppola (2018), "L'Urbanistica a scuola come strumento per contrastare la povertà urbana e accrescere il senso di città" in Urbanistica n° 162 - INU Edizioni – ISNN 0042-1022, pp.67-73.

E. Coppola (2020), "Laboratorio Bagnoli" Edicampus Edizioni– ISBN 978-88-7603-145-8

E. Coppola, G. Sica (2023), "Rural and Creativity HUB for the Vulture Regional Park: making community, starting with the construction of a participatory LAB", in Bevilacqua (Carmelina), Kakderi (Christina), Provenzano (Vincenzo), Balland (Pierre Alexandre) New Metropolitan Perspective. Transition with Resilience for Evolutionary Development - Open Access TREnD edito Springer, pp. 389-404 – Riconoscimento SCOPUS ISSN 2367-3370 ISSN 2367-3389 (electronic) Lecture Notes in Networks and Systems ISBN 978-3-031-34210-3 ISBN 978-3-031-34211-0 (eBook) https://doi.org/10.1007/978-3-031-34211-0

Engez, A.; Leminen, S.; Aarikka-Stenroos, L. (2021). Urban Living Lab as a Circular Economy Ecosystem: Advancing Environmental Sustainability through Economic Value, Material, and Knowledge Flows. *Sustainability* 2021, *13*, 2811. https://doi.org/10.3390/su13052811

Esposito De Vita, G., Visconti, C., Ganbat, G., & Rigillo, M. (2023). A Collaborative Approach for Triggering Environmental Awareness: The 3Rs for Sustainable Use of Natural Resources in Ulaanbaatar (3R4UB). *Sustainability*, 15(18), 13846.

European Commission (2021). Horizon Europe Mission: A Soil Deal for Europe – Mission Implementation Plan. Brussels. https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/soil_mission_implementation_plan_final_for_publication.pdf

European Commission (2024). Living Labs in Urban Areas for Healthy Soils – Horizon Europe Call HORIZON-MISS-2024-SOIL-01-02. https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-miss-2024-soil-01-02

Evans, J., et al. (2016). The Experimental City: Urban Living Labs and the Politics of Urban Innovation. *Geoforum*, 79, 45–54.

Falchetti, C., Cristiano, S., & Mela, A.(2018). Failing while succeeding? On the delicate effects of a yet sincere cooperation. *Journal of UNiversities and international development COoperation, 1/2018*, 67-79 [ISSN: 2531-8772]

Florez Ayala, D.H.; Alberton, A.; Ersoy, A. (2022) "Urban Living Labs: Pathways ofSustainabilityTransitions towards Innovative City Systems from a Circular Economy Perspective". In *Sustainability* 2022, 14,9831. https://doi.org/10.3390/Su14169831

Freeman, R. E., Harrison, J. S., Wicks, A. C., Parmar, B. L., & De Colle, S. (2010). *Stakeholder Theory: The State of the Art.* Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511815768

Freitas, Henrique, Mírian Oliveira, Milton Jenkins, and Oveta Popjoy (1998). "The Focus Group, a qualitative research method." *Journal of Education* 1, no. 1: 1-22.

Gaillard, J. C., & Mercer, J. (2013). From Knowledge to Action: Bridging Gaps in Disaster Risk Reduction. *Progress in Human Geography*, 37(1), 93–114.

Galderisi, A., & Limongi, G. (2021), "A comprehensive assessment of exposure and vulnerabilities in multi-hazard urban environments: A key tool for risk-informed planning strategies", in Sustainability, 13(16), 9055.

Giacomini, D., Rocca, L., Zola, P., & Mazzoleni, M. (2021). Local Governments' environmental disclosure via social networks: organizational legitimacy and stakeholders' interactions. *Journal of Cleaner Production*, 317, 128290. https://link.springer.com/chapter/10.1007/978-3-030-78536-9_12

Gravagnuolo A., Angrisano M., Bosone M., Buglione F., De Toro P., Fusco Girard L. (2024). "Participatory evaluation of cultural heritage adaptive reuse interventions in the circular economy perspective: A case

study of historic buildings in Salerno (Italy)". *Journal of Urban Management, (13)*1, March 2024, pp.107-139. https://doi.org/10.1016/j.jum.2023.12.002

Greer, R.; von Wirth, T.; Loorbach, D. (2020) "The Diffusion of Circular Services: Transforming the Dutch Catering Sector". J. Clean. Prod. 2020, 267, 121906.

Habibipour, A., Ståhlbröst, A., Zalokar, S., & Vaittinen, I. (2020). Living lab handbook for urban living labs developing nature-based solutions.

Hachmann, S., Arsanjani, J. J., & Vaz, E. (2018). Spatial data for slum upgrading: Volunteered Geographic Information and the role of citizen science. Habitat international, 72, 18-26.

Healey, P. 2003. Collaborative planning in perspective. Planning Theory, 2(2), 101-123.

Hemmati, M. (2012). *Multi-stakeholder Processes for Governance and Sustainability: Beyond Deadlock and Conflict.* New Delhi, India: Routledge. https://doi.org/10.4324/9781849772037

Hillgren, P. (2013). Participatory Design for Social and Public Innovation: Living Labs as Spaces of Agonistic Experiments and Friendly Hacking. In: *Public and Collaborative: Exploring the Intersection of Design, Social Innovation, and Public Policy.* Santa Monica: DESIS Network.

http://www.edicampus-edizioni.it/images/ebook/laboratorio-bagnoli.pdf

https://unalab.eu/en

https://www.transformer-project.eu/

Iandolo, Francesca, Antonio La Sala, Lorenzo Turriziani, and Francesco Caputo. (2024). Stakeholder Engagement in Managing Systemic Risk Management. *Business Ethics, the Environment & Responsibility.*

Innella, C.; Ascione, G.S.; Mariotti, N.; Corazza, L. (2024). Experimenting urban living lab methodology on circular economy co-design activities in some Italian urban territories. Frontiers in Sustainable Cities, 6, 1406834. https://www.frontiersin.org/articles/10.3389/frsc.2024.1406834/full

Intille, S.S., Larson, K., Beaudin, J., Tapia, E.M., Kaushik, P., Nawyn, J., & McLeish, T.J. (2005). THE PLACELAB: A LIVE-IN LABORATORY FOR PERVASIVE COMPUTING RESEARCH (VIDEO).

INU (2024) Regolamento Jane's walks 2024 a cura dell'Istituto Nazionale di Urbanistica. Online link: /https://inu.it/wp-content/uploads/regolamento-def-2024-jane-s-walk-italy.pdf

Juujärvi, S., & Pesso, K. (2013). Actor Roles in an Urban Living Lab: What Can We Learn from Suurpelto, Finland?

Kabisch, S.; Finnveden, G.; Kratochvil, P.; Sendi, R.; Smagacz-Poziemska, M.; Matos, R.; Bylund, J. (2019). New Urban Transitions towards Sustainability: Addressing SDG Challenges (Research and Implementation Tasks and Topics from the Perspective of the Scientific Advisory Board (SAB) of the Joint Programming Initiative (JPI) Urban Europe). Sustainability, 11, 2242. https://doi.org/10.3390/su11082242

Kleiber, P. B. (2003). Focus groups: More than a method of qualitative inquiry. In *Foundations for research* (pp. 103-118). Routledge.

Kujala, J.; Sachs, S.; Leinonen, H.; Heikkinen, A.; Laude, D. (2022). Stakeholder Engagement: Past, Present, and Future. *Business & Society*, 61, 1136–1196.

Lazzarini, L., S. Marchionni (2020). "Spazi e corpi in movimento. Fare urbanistica in cammino." Ricerche e Studi Territorialisti. ISBN 978-88-945059-1-7

Leminen, S. (2013). Coordination and Participation in Living Lab Networks. *Technology Innovation Management Review*, 3(11), 5–14.

Leminen, S.; Westerlund, M.; Nyström, *A. Living Labs as Open-Innovation Networks. Technol. Innov. Manag. Rev. 2012, 2, 6–11*

Lupp, G., Zingraff-Hamed, A., Huang, J. J., Oen, A., & Pauleit, S. (2021). Living labs—a concept for co-designing nature-based solutions. *Sustainability*, *13*(1), 188.

Lynch K. (1960). *The image of the city.* MIT Press.

Manzini, E. (2015). *Design, When Everybody Designs: An Introduction to Design for Social Innovation.* Cambridge: MIT Press.

Martin, E., Kodukula, S., Rony, Y.I., Manala, B., Rybski, D., Lah, O. (2023). Urban Living Labs as Tools for Just Transition: Adapting the Living Lab Approach into the Development Cooperation Context.

Marziali et al., 2015. Methodologies and Approaches for Sediment Characterisation and Ecological Risk Assessment Based on Experience Gained in an Italian Case Study – poster presented at the Europe SETAC 2015

McCormick, K., & Hartmann, C. (2017). The Emerging Landscape of Urban Living Labs: Characteristics, Practices and Examples.

Menny, M., Palgan, Y. V., & McCormick, K. (2018). Urban Living Labs and the Role of Users in Co-Creation. GAIA-Ecological Perspectives for Science and Society, 27(1), 68–77.
Menny, M., Palgan, Y. V., & McCormick, K. (2018). Urban Living Labs and the Role of Users in Co-Creation. *GAIA-Ecological Perspectives for Science and Society*, 27(1), 68–77.
Mensink, Birrer e Dutilleul, (2010) Unpacking European Living Labs: Analysing Innovation's Social Dimensions Central European Journal of Public Policy – Vol. 4 – No 1 – June 2010 pp 60-84
MIBACT 2018. Piano Strategico per lo sviluppo delle aree comprese nel Piano di Gestione del sito UNESCO "Aree archeologiche di Pompei, Ercolano e Torre Annunziata", www.open.pompeiisites.org
Moynihan, D. P. (2008). Combining Structural Forms in the Search for Policy Tools: Incident Command Systems in U.S. Crisis Management. *Governance*, 21(2), 205–229. https://doi.org/10.1111/j.1468-0491.2008.00395.x
Nguyen, H. T., & Marques, P. (2021). The promise of living labs to the Quadruple Helix stakeholders: exploring the sources of (dis)satisfaction. *European Planning Studies*, *30*(6), 1124–1143. https://doi.org/10.1080/09654313.2021.1968798
Noble, K., Enseñado, E.M. (2022). Analyzing co-creation levels of urban living labs in Europe. Visions for Sustainability, 18, 7060, 37-52. http://dx.doi.org/10.13135/2384-8677/7060
Ocean & Climate Platform. (2022). Adapting Coastal Cities and Territories to Sea Level Rise in the Mediterranean Region: Challenges and Best Practices. Ocean & Climate Platforme. 48 pp.
Palestino M.F., Visconti C., 2017, Resilient Ponticelli Tackling Climate Change with Community, https://vimeo.com/246951600, https://vimeo.com/243534401
Palestino, M. F. (2018). Ponticelli Smart lab: A hybrid environment for the implementation of experimental approaches to climate change. In V. D ambrosio, & M. F. Leone (Eds.), *Environmental Design for climate Change adaptation. Tools and Guidelines for climate risk reduction*. Naples, Italy: CLEAN.
Palla, A.; Pezzagno, M.; Spadaro, I.; Ermini, R. (2024). *Participatory Approach to Planning Urban Resilience to Climate Change: Brescia, Genoa, and Matera—Three Case Studies from Italy Compared.* Sustainability, 16(5), 2170. https://doi.org/10.3390/su16052170
Paskaleva, K., & Cooper, I. (2021). Are living labs effective? Exploring the evidence. *Technovation*, *106*, 102311.
Peresan, A., Scaini, C., Barnaba, C (2023). "Crowd-Sourced Buildings Data Collection and Remote Training: New Opportunities to Engage Students in Seismic Risk Reduction". Earth Science, Systems and Society 3, 10088. doi: 10.3389/esss.2023.10088
Ranga, M., & Etzkowitz, H. (2013). Triple Helix Systems: An Analytical Framework for Innovation Policy and Practice in the Knowledge Society. *Industry and Higher Education*, 27(3), 237–262.
Ranzato, M., Vanin, F., & Cristiano, S. (2022). Il progetto PED4ALL a Roma, Bruxelles e Istanbul. *Diritto & Società*, *4*, 971-980.
Reed, M. S., et al. (2009). Who's In and Why? A Typology of Stakeholder Analysis Methods for Natural Resource Management. *Journal of Environmental Management*, 90(5), 1933–1949.
Remøy H., Wandl A., Ceric D., van Timmeren A. (2019) Facilitating Circular Economy in Urban Planning. Urban Planning, Vol 4, No 3, p. 1-4. DOI: 10.17645/up.v4i3.2484 REPAiR 2019_05
REPAiR. (2017). *PULLs Handbook REPAiR Deliverable 5.1 EU Commission Participant portal. Brussels. Grant Agreement No 688920*. https://doi.org/10.4233/uuid:321f152a-0fe7-4125-bb98-c8c253e5b39f
REPAiR. (2018). *Handbook: how to run a PULL Deliverable 5.4.*
Rizzo, A. Habibipour A., e nStåhlbröst A (2021)"Transformative thinking and urban living labs in planning practice: a critical review and ongoing case studies in Europe", *European Planning Studies*, 29:10, 1739-1757, DOI:10.1080/09654313.2021.1911955
Robazza, G.; Priego-Hernández, J.; Caputo, S.; Melis, A. (2024) Temporary Urbanism as a Catalyst for Social Resilience: Insights from an Urban Living Lab Practice-Based Research. *Buildings*, *14*, 1513. https://doi.org/10.3390/buildings14061513
Rounsevell, M. D., & Metzger, M. J. (2010). Developing qualitative scenario storylines for environmental change assessment. *Wiley interdisciplinary reviews: climate change*, *1*(4), 606-619.
Sanders E. B.N. and P. J. Stappers (2008)Co-creation and the new landscapes of design. In CoDesign Vol. 4, No. 1, March 2008, 5–18

Scaini C., Peresan A., Tamaro A., Poggi V., Barnaba C. (2022) "Can high-school students contribute to seismic risk mitigation? Lessons learned from the development of a crowd-sourced exposure database. International Journal of Disaster Risk Reduction, 69, art. no. 102755. DOI: 10.1016/j.ijdrr.2021.10275

Schaffers, H., Guzman, J., and Merz, C. (2008) "An Action Research Approach to Rural Living Labs Innovation". In *Collaboration and the Knowledge Economy: Issues, Applications, Case Studies*, P. Cunningham, M. Cunningham (eds)

Schuurman, D., et al. (2012). Living Labs as Open Innovation Systems for Knowledge Exchange. *Technology Innovation Management Review*, 2(9), 27–36.

Semeraro, T.; Buccolieri, R. (2021). *Editorial: Urban Ecosystem Service Assessments. Frontiers in Environmental Science.* https://doi.org/10.3389/fenvs.2022.825002

Shepherd, T. G., Boyd, E., Calel, R. A., Chapman, S. C., Dessai, S., Dima-West, I. M., ... & Zenghelis, D. A. (2018). Storylines: an alternative approach to representing uncertainty in physical aspects of climate change. *Climatic change*, *151*, 555-571.

Sica, G., VULTURE PARK LIVING LAB: A people place-based cultural Lab for the Vulture Regional Park". In: AGATHON PROJECT | Saggi e Ricerche ISSN online: 2704- 615X, pp.46-68, 2022, (doi.org/10.19229/978-88-5509-446-7/732022).

Simos, J. (1990). *Evaluer l'impact sur l'environnement: Une approche originale par l'analyse multicritere et la negociation.* Presses polytechniques et universitaires romandes.

Ståhlbröst, A., Habibipour, A., Chronéer, D., Vaittinen, I., Zalokar, S., & Mafe, C. (2018). UnaLab ULL Framework.

Steen, K., & van Bueren, E. (2017a). The Defining Characteristics of Urban Living Labs. Technology Innovation Management Review, 7(7), 13. https://doi.org/10.22215/timreview/1088

Steen, K., Van Bueren E.M., (2017) "Urban Living Labs: A Living Lab Way of Working". In *AMS Research report 2016-2017* Steen Amsterdam Institute for Advanced Metropolitan Solutions Delft University of Technology

Steen, M. (2013). Co-Design as a Process of Joint Inquiry and Imagination. *Design Issues*, 29(2), 16–28.

SURF Italy, 2015. Libro Bianco - Sostenibilità nelle Bonifiche in Italia. Available at http://www.reconnet.net/Docs/SuRF_Italy_Libro_Bianco_rev_Ottobre2015.pdf

Tiwari, A., Rodrigues, L. C., Lucy, F. E., & Gharbia, S. (2022). Building Climate Resilience in Coastal City Living Labs Using Ecosystem-Based Adaptation: A Systematic Review. *Sustainability*, 14(17), 10863.

Torma, V. (2023). Analysing Stakeholder Engagement: Stakeholder Involvement in Urban Living Labs and the Main Processes Needed to Establish a Living Laboratory (Doctoral dissertation, Anglia Ruskin Research Online (ARRO)).

Trogrlić, R. Š., Reiter, K., Ciurean, R. L., Gottardo, S., Torresan, S., Daloz, A. S., ... & Ward, P. J. (2024). Challenges in assessing and managing multi-hazard risks: A European stakeholders perspective. *Environmental Science & Policy*, *157*, 103774.

UNDP. 2006. Multi-Stakeholder Engagement Processes. Capacity Development Group, Bureau for Development Policy, UNDP: New York, NY, USA, 6 November 2006. Available online: http://content-ext.undp.org/aplaws_publications/1463193/Engagement-Processes-cp7.pdf (accessed on 24 October 2023).

UNDRR (2019). *Global Assessment Report on Disaster Risk Reduction.* United Nations Office for Disaster Risk Reduction.

van Timmerman (2017) Preface to *Urban Living Labs: A Living Lab Way of Working* AMS Research report 2016-2017 First edition: June 2017 Fourth edition: February 2019 ISBN: 9789082976212

Varvaris I. et al., "Review on Quintuple Helix Innovation Model and Introducing Co-Eco- Approach in Support of Climate Change Mitigation and Adaptation within the Framework of the New European Bauhaus Initiative," IGARSS 2024 - 2024 IEEE International Geoscience and Remote Sensing Symposium, Athens, Greece, 2024, pp. 2889-2893, doi: 10.1109/IGARSS53475.2024.10642797.

Vendemmia, B., Amenta, L., Clemente, M. F., & Iodice, M. R. (2024). Applicare la metodologia degli Urban Living Lab (ULL) per la co-progettazione della transizione nei Siti di Interesse Nazionale (SIN). Il caso di Bagnoli. In *Progettare nel Disordine–Progettare il Disordine. Riordinare le fragilità urbane* (pp. 231-235). INU Edizioni.

Visconti, C. (2017a). *Water sensitive measures in context of socio-environmental vulnerability: Resilience practices for climate change adaptation in East Naples*. University of Naples Federico II. http://www.fedoa.unina.it/view/creators/Visconti =3ACristina=3A=3A.html.

Visconti, C. (2017b). Community-based adaptation measures for Water Sensitive Urban Design in context of socio- environmental vulnerability [S.l.]. *TECHNE - Journal of Technology for Architecture and Environment*, 352–361. https://doi.org/10.13128/

Visconti, C. (2023). Co-production of knowledge for climate-resilient design and planning in Naples, Italy. *Habitat International*, *135*, 102748.

Vittiglio, V., Iodice, S., Amenta, L., Attademo, A., Formato, E., Russo, M. (2018) Eco-innovative strategies towards peri-urban sustainability: the case study of the metropolitan area of Naples. Europa XXI (2018) vol. 34, pp. 23-40. doi: https://doi.org/10.7163/Eu21.2018.34.2

Volume 128 pp. 193-212. Spriger:Cham

von Wirth T, Fuenfschilling F, Frantzeskaki N, Coenen L (2018) "Impacts of urban living labs on sustainability transitions: mechanisms and strategies for systemic change through experimentation". *European Planning Studies* 27:229–257. https://doi.org/10.1080/09654313.2018.1504895

von Wirth, T., Fuenfschilling, L., Frantzeskaki, N. & Coenen, L. (2019) Impacts of urban living labs on sustainability transitions: mechanisms and strategies for systemic change through experimentation, European Planning Studies, 27:2, 229-257, DOI: 10.1080/09654313.2018.1504895

Voytenko, Y., et al. (2016). Urban Living Labs for Sustainability and Low Carbon Cities in Europe. *Journal of Cleaner Production*, 123, 45–54.

Voytenko, Y., McCormick, K., Evans, J. & Schliwa, G. (2016). Urban Living Labs for Sustainability and Low Carbon Cities in Europe: Towards a Research Agenda. *Journal of Cleaner Production*, 123, 45–54.

Zhang, Z., Zurlo, F. (2021) 'How Game and Game Principles Facilitate the Co-Design Processes: RIeCfleEcDtio2n1s on Two Case Studies', in *Proceedings of the International Conference on Engineering Design (ICED21)*, 1 Gothenburg, Sweden, 16-20 August 2021. DOI:10.1017/pds.2021.436

7 Authors' contribution

Part 1. "Theoretical framework and sample collection for city scale exercise"

1. Urban Living Lab in multirisk urban contexts

1.1 "State of the art" *Libera Amenta, Benedetta Pastena, Bruna Vendemmia*

1.2 "Stakholder Engagement for ULL in multirisk scenarios" *Cristina Visconti*

1.2.1 "Stakeholder engagement Strategy" *Cristina Visconti*

1.3 Urban Living Labs for knowledge share *Maria Fabrizia Clemente*

2. Urban Living Labs examples Collection towards a methodology

2.1 "Methodology for Urban Living Lab case study analysis" *Libera Amenta, Maria Fabrizia Clemente, Bruna Vendemmia*

2.2 "Collection" *Giorgia Arilotta, Elisa Chiara Bizzotto, Martina Bosone, Pierluigi Bragato, Adriano Cancellieri, Emanuela Coppola, Silvio Cristiano, Elisa Giubilato, Antonella Peresan, Lisa Pizzol, Sabrina Puzone, Chiara Scaini, Petra Scanferla, Caterina Secchi, Bruna Vendemmia, Federica Vingelli, Cristina Visconti*

2.3 "Comparative Analysis" *Maria Fabrizia Clemente, Maria Di Rosa, Sabrina Puzone, Federica Vingelli*

Part 2. City-scale exercise report set-up

3. Methodological approach

3.1 "Definition and Structure of the phases CO-EXPLORING, CO-DESIGN, CO-TESTING" *Bruna Vendemmia*

3.1.1 "Co-exploring" *Libera Amenta, Elisa Chiara Bizzotto, Rosaria Iodice, Michelangelo Russo, Federica Vingelli*

3.1.2 "Co-design" *Maria Fabrizia Clemente, Benedetta Pastena, Michelangelo Russo, Bruna Vendemmia*

3.1.3 "Co-testing" *Martina Bosone*

3.2 "Tools for RETURN Urban Living Lab" *Martina Bosone, Silvio Cristiano, Pasquale De Toro, Pasquale Galasso, Federica Vingelli*

Part 3. City scale exercise. ULL applied to Bagnoli test-case

4. Introduction on city scale exercise

4.1 "Co-exploring" Gilda Berruti, Emanuela Coppola, Rosaria Iodice, Federica Palestino, Benedetta Pastena, Sara Piccirillo, Federica Vingelli

4.1.1 "Living Lab with RETURN experts" Benedetta Pastena, Federica Vingelli

4.1.2 "Focus group with high school students from Bagnoli" Benedetta Pastena, Federica Vingelli

4.2 "Co-design" Benedetta Pastena, Bruna Vendemmia

4.2.1 "Citizen-led co-design activities" Benedetta Pastena, Bruna Vendemmia

4.2.2 "Experts-led co-design activities" Rosaria Iodice, Benedetta Pastena

4.3 "Co-testing" Martina Bosone, Pasquale De Toro

4.3.1. Jane's walk "Bagnolinside ILVA. Attraversare i luoghi, dalla fabbrica al parco" Martina Bosone, Maria Di Rosa, Benedetta Pastena

5. Conclusions

6. Annex: Handbook proposal/Synthetic guidelines for Urban Living Labs under multirisk scenarios ALL