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Carmelina Bevilacqua Pierre-Alexandre Balland Christina Kakderi Vincenzo Provenzano *Editors*

New Metropolitan Perspectives

Transition with Resilience for Evolutionary Development







Lecture Notes in Networks and Systems

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New Metropolitan Perspectives

Transition with Resilience for Evolutionary Development



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Rural and Creativity HUB for the Vulture Regional Park: Making Community, Starting with the Construction of a Participatory LAB

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Abstract. The Vulture Regional Park is a unique territory for its geomorphologic and vegetation characteristics but also because of its strategic position between Basilicata, Campania and Puglia which preserves the signs of different ages, territorialization and deterritorialization that have affected it over the centuries. This territory represents a great scientific challenge for our Center that has proposed an innovative technical-operational methodology based on the territorialist approach [1] and on interpretation planning [2]. This tool allows one to recognise the relationships between the nodes of the identity of places, the development of society and the modification of the behaviors of consumption of resources. Our goal is to make the Vulture Regional Park a model of study and experimentation of a Rural and Creativity Living Lab, through a "place-based and people-oriented" approach. We strongly believe that the value and potential of the territory's resources must be considered as a driver for sustainable development and quality of life in an evolving society. It is necessary to highlight the importance of a broad knowledge of the resources that must be respected and defended.

Keywords: Natural Park \cdot Living Lab \cdot Partecipation \cdot Community \cdot Cutlural Heritage \cdot Engagement

1 Introduction

The current EU rural development policy is based on a history of activities that recognise the fundamental role and the benefits that innovation and creativity offer to citizens in rural areas, as well as to the wider users of the European countryside. In particular, fostering innovation, cooperation, knowledge exchange, as well as strengthening the links between agriculture, food production, forestry with research and innovation is the first of the 18 specific focus area defined by the European agricultural fund for rural development [3]. Almost 100 billion euros have been budgeted by the EAFRD between 2021 and 2027 to help address the challenges related to rural development. EU countries implement EAFRD funding through rural development programmes. These programs are co-financed by national budgets and may be prepared on either a national or regional basis. While the European Commission approves and monitors them, decisions regarding the selection of projects and the granting of payments are handled by national and regional managing authorities. It is therefore fundamental to reach a cultural European identity which ensures equal opportunities among citizens from different countries, social contexts, and backgrounds.

The strengthening of the European cultural identity is therefore not only a rhetorical necessity; it is a primary political objective which has been included in the the Community Strategic Guidelines for Rural Development [4]. For instance, president Von der Leven, in setting out the objectives of the Recovery and Resilience facility, has identified as its primary mission the "economic, social and territorial cohesion", even before "green" and "digital" [5]. The twin green and digital transition is clearly a central topic for the European Commission to better shape the future of our countries in the long-term. While these two simultaneous transitions, can reinforce each other in many areas, they are not automatically aligned. Clearly, if we aim at enhancing the developing of rural and green areas, we need to make sure to have under control and limit the environmental footprint of digital technologies. But this is not enough. The role of cultural and territorial resources, and of the Cultural Industry as such, must come into force as a social, political and economic leverage. An effective means to amplify those "marginal" voices. Digitalization has a huge (positive and negative) impact on the society and on human's life. Hence everybody has the moral and ethical right to be a part of the digital transition and transformation processes, also and foremost in rural areas. This is in line with the "participatory design" approach [6, 7].

Social innovation practices involve a deep understanding of the new emerging needs of society and individuals and are based on multiple dimensions of sustainability: economic, social, cultural and environmental. This kind of innovation also goes beyond the obsolete concepts of innovation linked exclusively to the technological component, such as that of the Smart city [8]. Social innovation, which is born from citizens, probably represents the best way to achieve local community regeneration and citizen participation in urban dynamics, with then results in social and cultural as well as economic advances [9]. Technology must be considered only as a tool to pursue social innovation, acting as the conduit between territorial capital and territorial innovation. The role that technology acquires in this context can be also extended to urban heritage management processes, where it accompanies the transition to restore continuity to the process of landscape change, supporting the local community in the re-appropriation of a critical knowledge linked to the specificities of the place they inhabit.

The main objective of social innovation is to have a positive social impact on a community of reference, with the ultimate goal of improving the quality of life of individuals. For this reason, it is necessary that social innovation becomes the main driver of territorial development, replacing the classic economic engines that have driven the sector until now.

Furthermore, innovation is considered a particularly important factor in promoting sustainable development systems that foster a balance between economic growth and the protection of "public goods" such as biodiversity and other environmental resources. Finally, creative thinking is also an essential tool for rural development practitioners and policy makers, engaged in addressing key issues such as competitiveness, quality of life, diversification and territorial cohesion.

One of the most successful examples of creative innovative thinking, involving the society of rural areas, are Living Labs (LLs): open innovation environments in reallife settings, in which user-driven innovation is fully integrated within the co-creation process of new services, products and societal infrastructures [10]. This also allows the creation of collaborative nets at local, transregional and inter-social levels [11].

The living labs have been proposed as an inclusive and sustainable approach involving various stakeholders, focusing on individuals in their role as citizens, inhabitants, end-users etc., are engaged throughout the digital and green transition process in their real-life setting [12]. Accordingly, LLs can be seen as an approach for facilitating innovation processes, as they allow one to simultaneously focus on individuals, technologies, tasks and structures, and the interactions between different stakeholders [13] To date, much attention has been paid to urban areas as the context of LL activities, the so-called Urban LL [14, 15], e.g., the initial list of key components of the traditional LLs were further revised and modified for the context of Urban LL.

In this essay we will present the case of study of the Vulture Park as a practical application of the LL model, presented in Sect. 2, highlighting the current plan to develop 4 different rural creativity hubs within the biggest natural park in the rural area of the Region Basilicata (Sect. 3).

The park is a unique territory for its geomorphologic and vegetation characteristics (as there is a volcano that visually characterises the panoramic and landscape profile and two lakes that make the fauna unique), but also because of its strategic position between Basilicata, Campania and Puglia [16]. Indeed, thanks to this special geographical position, the park has gained a special path in the history of southern Italy and preserves today the signs and evidence of different ages, according to the phases of territorialization and deterritorialization that have affected it over the centuries [17].

The protection and implementation of ecological networks, takes on a multi-scalar role for the enhancement of connection systems and ecological, landscape and environmental continuity: from the interregional level (joining the European ecological networks), to the local scale, through ecological corridors able to create connections between the fragmented portions of the park and the surrounding natural territory [18]. This theme is fundamental in the park's planning to create itineraries of protection and enhancement through several specific strands: blue ways, green ways, etc. [19].

Moreover, the Volture Park is not only unique from the point of view of geomorphology and history, but also allows us to experience the concept of participation and community, starting from the social, cultural and human stratification.

In fact, if the foundation of cultural heritage is the "generation" of territory and landscapes, the witnessed restitution of what it has given and how it has influenced the identity of those who live it, is the "re-generation".

The participation of the community is particularly necessary in the case of revitalization, also from the point of view of tourism, where various decisions are made that will have effects, more or less strong and more or less reversible, on the local population. The value and potential of the territory's resources must be considered as a driver for sustainable development and quality of life in an evolving society. It is necessary to highlight the importance of a broad knowledge of the resources that must be respected and defended [20]. It is also essential to rethink the assets of the territory, especially in regions of profound social transformation, as a path that must belong, with full awareness, to the community in which it is located. This represents one of the opportunities for the development of the territorial economy, and an important occasion to test good government practices that require the ability to link the different forces that insist on a territory [21].

For these reasons, each territory, and above all the Vulture Park, can be considered as an ideal and privileged "planning site" to carry on in-depth research on the cultural identity of a society with a diversification of history, religion, art, food and wine, etc. In other words, a "return to the territory" is desirable, or rather an "ecological conversion of socio-territorial models", built from the bottom up through the reconstruction of cognitive, cultural, and productive relationships between active citizenship and territorial heritage, and of solidarity-based and non-hierarchical relationships between inhabitants, producers and local societies.

2 Methodology: The Living Lab Model

The Living Lab (LL) model was defined, for the first time, in 2003 by the **MIT Media Lab**, an interdisciplinary research lab that encourages the unconventional mixing and matching of seemingly disparate research areas [12].

Since then, in the last years, LLs have become a powerful instrument to effectively involve the user at all stages of the research, development and innovation process, thereby contributing to European competitiveness and growth [13].

They are today strong instruments that support cities and regions in their transition towards a resilient and sustainable future based on open and inclusive innovation. LLs represent a key element in empowering citizens to co-create their cities and regions while enhancing their ecosystems through emerging technologies. As protagonists of open innovation environments, Living Labs involve all stakeholders to tackle real-life problems and co-create concrete, long-term impacts which can be scaled-up. Living Labs can support their cities and regions in becoming Green and Digital and they can have a real impact in society by supporting decision and policy-making towards sustainability and zero pollution.

Additionally, Living Labs allow to reach a bottom-up policy coherence that starts from the needs and aspirations of local and regional stakeholders. Therefore, Living Labs can be considered as transversal tools to strength the synergy between EU support policies in the area of research and innovation while placing regions and cities as leading actors in Europe's innovation strategies.

The most innovative aspect of the LL model resides in the fact that they allow for an active and proactive participation of the community that has the great opportunity to shape the future of the territory in which they live. In fact, with the LL model, citizens and communities have the possibility to express their needs through working groups and activities, users are able to generate innovation in the places where they live and hence generate and regenerate them [22]. They are not only testers of a final product, but they act as project managers at the same level as the other LL partners (universities and research centres, private and public sectors, see Fig. 1) and have the possibility to participate and organise innovation initiatives such as masters, summer schools or bar camps [23]. In the specific case of Rural LLs, as the one proposed here, these concepts are applied in particular to inland and rural communities and realities. Moreover, with respect to urban LLs, Rural LLs do not consider LLs as an environment or a context only. The Rural LL is a general approach that is meant to facilitate the processes of digital transformation in the "green" context of rural areas, where the identified key components and stakeholders will be a part of the overall innovation process, such as piloting and experimentation. Hence, in Rural LLs, smaller activities (e.g., hubs, see Sect. 3.1) will follow the LL approach and become an "instantiation" of LLs.

The innovation based on the concept of active participation is a crucial factor to promote the sustainable development that in turns favours the balance between economic and social growth. Therefore, LLs are a strategic opportunity to switch from a PPP formula (public and private partnership) to a 4xP one (people, public and private partnership) [24], where open innovation, generation and re-generation are driven directly by the users [25]. In conclusion the LL model eliminates the distinction and separation between producers and consumers but activates an equal cooperation mechanism. It creates the theoretical and methodological infrastructure necessary to join together collaboration pacts and patrimonial communities [26], which are shortly described in Sect. 2.1 [27].

LLs can be of precious help in the digital and green transition too. In particular, in Rural LLs, digitalization means much more than merely digitalizing a business a city or an industry. Digitalization becomes an important tool for inclusion and access to broad societal services. Digital innovation is the key component that integrates both digital innovations that will be co-created by various stakeholders and rural residents, as well as the digital infrastructures such as hardware, software, data (open or closed data), networks (e.g., 4G, 5G, fiber, Wi-Fi), smart cameras, sensors in smart agriculture, and wearables.

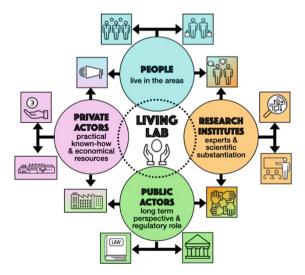


Fig. 1. The Living Lab Model and its main actors.

2.1 Examples of Rural Living Lab in Europe

The innovation potential of rural areas and parks plays an important role in the European Commission's plan to develop a long-term vision for inland and rural areas. Nevertheless, and despite the many successful applications of Living Labs in the European landscape (see e.g. the European Network of Living Labs, ENoLL, 2006, which, with more than 480 members, is the largest international no-profit association of benchmarked Living Labs), there are still too few EU-funded projects within the Horizon 2020 programme that have dedicated capacity and expertise to address the problems of rural and green areas, with the aim of improving their potential and analysing the opportunities they offer in contributing to Europe's future [28].

In this section, some international projects are introduced and briefly described as examples of the importance of the concept of Rural Living Labs and how they can contribute to enhance the potential of inland territories and rural areas. It should be noted that the pilot programme proposed in this essay, together with the examples given below, is among the very first to bring the 'placed-based and people-oriented' Living Lab methodology into a Park, also focusing on the digital transition. Digital transformation has received increasing attention in recent years. Despite this, most of the current studies focus on digital transformation in more advanced societies, particularly urban areas, and the concept has not been investigated enough within rural contexts.

1. The Social Innovation in Marginalised Rural Areas Project (SIMRA). The main objective of the SIMRA Project is to study, through numerous case studies, the notion of social innovation and innovative governance in the agricultural and forestry sectors, to then be able to promote these sectors in rural areas in the Mediterranean regions of Europe and beyond [29]. Specifically, the Project partners (also including 4 Italian entities) analysed 24 regions and 7 innovation actions, divided into 8 work packages, in order to provide concrete solutions to address the challenges of marginalised rural areas. The covered topics included forest management, social agriculture, local development, energy, child and health care and social networking. The final product produced by SIMRA is a systematic collection of empirical evidence of the drivers, processes, outcomes and impacts of social innovations in Europe, North Africa and the French Caribbean. The main strength of this Project is the systematic work carried out on a statistical sample of case studies that allowed the construction of a solid theoretical and operational framework.

2. Heritage for Rural Regeneration (RURITAGE) [30] is a research project that establishes a new paradigm of heritage-led rural regeneration, capable of transforming rural areas into practical examples and laboratories of sustainable development, through the valorization of their potential. Ruritage has identified 6 Systemic Innovation Areas (pilgrimages; sustainable local food production; migration; art and festivals; resilience; integrated landscape management) that, integrated with transversal themes, show the potential of heritage as a powerful engine for the economic, social and environmental development of rural areas [31].

The knowledge, constructed in 14 Role Models (RM) and assimilated within the project, was transferred to 6 Replicators (R) across Europe, led to the development of the Ruritage Atlas (an integrated and interactive web-based atlas capable of mapping territories on the basis of human-landscape interactions), of Ruritage Replicator Tool Box &

My Cult-Rural Toolkit (a comprehensive set of good practices and innovative solutions for rural regeneration), Ruritage Serious Games kit, DSS, Regeneration Guidelines (a wide range of tools to promote change and gather feedback from rural communities).

3. The Living Lab research concept in Rural Areas project (LiveRur) [32], coordinated by the Spanish Fundaction Universitaria San Antonio (UCAM), put the Living Lab concept at the forefront of rural development with thirteen Living Lab initiatives in selected pilot areas in eleven countries (Portugal, Azores, Czech Republic, Slovenia, Spain, Malta, Turkey, Italy, Latvia, Austria, France and Tunisia).

The project identifies Living Labs as innovative business models that are currently being developed in rural areas as they foster a more sustainable mobilisation of resources, better cooperation between actors along the value chain and lead to new services. The LiveRur Living Labs use the concept of open innovation in a broad sense, with success/failure rates determined by key empirical research factors.

The main goal of the LiveRur project is to improve the knowledge of business models growing in rural areas, including the understanding of their potential.

2.2 Collaboration Pacts and Patrimonial Communities

Collaboration Pacts are the tool to govern the co-design and shared management of activities, the start of new community enterprises and the redevelopment of buildings and public spaces [33].

There are three possible forms of pacts:

- A) Pacts that concern disused buildings, made available for redevelopment interventions and the creation of new services and activities.
- B) Pacts that involve public places (schools, social and welfare services, cultural spaces, etc.) that have a potential for greater use than the current ones.
- C) Pacts that promote the care and shared use of public spaces, green areas, underutilized facilities, even proposed by citizens (Art.118, co. 4, Cost; Regolamenti sull'amministrazione condivisa dei beni comuni).

These actions introduce a procedural technique based on "collaborative dialogue" as they favours the construction of non-authoritative (horizontal, collaborative, cooperative) relations between the government and the inhabitants of the cities, and/or the enabling of forms of cooperation between the inhabitants and other local actors [34].

This implies that different actors interact on an equal footing, which, in turns, requires changes in the action and mentality of both public, social and private actors. Public administration is thus transformed into a platform for fostering the construction of these cooperative relationships between different urban actors. The practice of pacts of collaboration wants to be a "push" between communities and other local actors ready to take a level of risk and invest a significant amount of time as "civic entrepreneurs."

Hence, collaborative pacts represent an unprecedented form of institutional innovation and public governance that leverages a non-authoritative form of action by the city government. Pacts should enable active citizenship and collective action by inhabitants as a new way of governing and managing urban resources, services, and local infrastructure. Patrimonial (or heritage) community is defined as a set of people who value features that identify and characterise the cultural heritage, that they consider relevant and commit themselves, within the framework of public action, to support and transmit the contents and expressions of heritage to future generations [35]. Belonging to a heritage community is, therefore, connected with the fact that all the people who are part of it, and recognise a value to the cultural heritage that they themselves have contributed to define and safeguard. Heritage communities, in fact, are committed to representing, transmitting, and enhancing this value without discrimination or selectivity on the basis of ethnicity, class or geographic location with all forms of expression and communication channels that are available to them, including the most advanced and performative digital technologies.

The idea of heritage as a shared cultural capital and as a fundamental right of citizens, proceeds with the empowerment of the subjects that are part of the heritage communities as direct bearers and custodians of the heritage itself [36].

The heritage communities' recognition around cultural resources and identities sets the context for dialogue and alternative settlement of conflicts. This allows the development of the intercultural policies' dialogue, democratic debate and cultural inclusiveness. At the same time, it becomes necessary to use the knowledge and skills learned and passed on as resources for development, and to actively engage Member States in a community-based and participatory approach, like the one of LL, to the care of cultural heritage.

3 An Open Laboratory for the Vulture Park, the Experimentation of a Rural Creative HUB

Our goal is to make the Vulture Regional Park a model of study and experimentation of a Rural and Creativity Lab, but attributing to it a transdisciplinary [37] aspect with a "place-based and people-oriented" approach [38]. The LL model in this case will be applied in the form of a "rural laboratory" where the economy of inner areas, culture and innovation live in a sustainable perspective as a heritage community. From this point of view, virtuous solutions of production and consumption, inspired by the organisational model of community-based social enterprises play a fundamental role [39].

The global process which is stressing our rural and environmental systems, business, processes of social inclusion and local economic development, aims to be a pilot for a new organisational model. It will help to bring out the potential of innovation that comes from the areas considered "inner" and to connect them with the external system of innovations.

The experimentation of the LL methodology in the Vulture region starts from the experience of the PRIN Sound project [40], which aims to understand how the connection of the urban/territorial dimension with the place-based innovation approach, determines "nodes" [41], as activators, of innovation and knowledge.

The project is at its early stage and therefore we still do not have results nor a concrete timeline. However, in the following section (Sect. 3.1), we describe the four main hubs that have been identified as LLs in the Vulture Park, briefly highlighting the methodology and the planning, the audience to which they are dedicated, the actors taking part in them as well as their main deliverable [42], objectives and goals.

3.1 Hubs and Activities

The project sees the creation of four main hubs, each structured 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 [43]:

<u>1.Community Hub</u> - 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. As main deliverable of 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. Moreover, we aim to use the advocacy principle whereby different territories can be rented at a symbolic very low price by young business managers under 40, that in return commit themselves to enhance the local supply chain and local products. This allows the flowering of new industries, while preserving the local craftsmanship and regional excellence, and, at the same time, it is a great growth and learning process for young entrepreneurs.

<u>2.Rural-cultural Hub</u> - a shared experimentation space for new generative welfare practices through the hybridization of culture, citizenship, and agriculture. The main products of this hub will be community-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. Specifically, village fairs with diverse performances - culinary shows, labyrinths, storytelling, etc. – will be organised. During these fairs, the hub will provide a space for experts to discuss on a meta level the situation and the possibilities of the development of villages and perspectives in front of the urban-rural cooperation in the context of growing urbanism and global economic crisis. This will certainly contribute to enhance the tourism in the region too.

<u>3. OpenScience Hub</u> - a study centre on open innovation applied to the environment and creativity and sustainable development. This hub will be an on-site research observatory that will allow exchange of information and new collaborations between students/researchers and farmers/citizens/local artisans. Another goal will be to create new and specific training paths to create and qualify professional profiles able to accompany territories in the definition and management of development projects based on creativity and social innovation, responding to local needs and specificities. This will also further help in obtaining funding through participation in regional, national, and European calls for proposals.

<u>4. Creativity and digital Hub</u> - 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 sharing 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.

An important objective of this hub and the previous one 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. The hubs are perfectly in line with the digital and green transformation, in particular developping a human-centric

approach to digitalization, in order to achieve an inclusive and thriving global digital society that at the same time, respect, valorise and enhance the potential of rural and green areas.

The creativity-based model of innovation that we have planned for the Vulture park (also sketched in Fig. 2) is coherent with the broader trends that define innovation itself. Indeed, the main difference with respect to traditional innovation policies is not so much in the object of the policy but in the way we view the innovation-related processes that policy is acting on. Traditional innovation theories describe a linear progression that starts with an idea that is then developed [44].

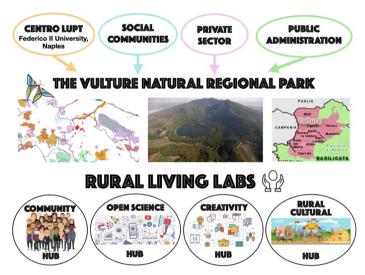


Fig. 2. Rural and Creativity HUB's model for the Vulture Regional Park

3.2 Risks and Critical Aspects

The Project described in this essay, is still in an early stage of its development. Hence, a detailed risk and criticality analysis has not yet been carried out.

However, in this paragraph, the most common risks associated with the Living Lab model and its application in rural areas, and which could occur in the specific case of Vulture are highlighted. Generally speaking, participation within the Living Lab is a fundamental aspect for the success of the project, and as such, it also represents a risk, which may be logistical (albeit positive) if participation is larger than expected, but more often negative if it is lower.

As already described in the introduction, in fact, for Living Labs to be successful, it an active participation of multiple actors, who make their own resources (human, financial, assets, etc.) available to the network, is indispensable. It is even more fundamental that the activities are 'inhabitant-friendly' and specifically designed with and for the population basin to which they are dedicated. A series of preliminary meetings has

therefore being organised between the L.U.P.T. Centre and the park communities with a view to cooperation and co-creation of activities.

It is also impossible to establish rigid rules to be imposed on the stakeholders for governance. Appropriate communication is therefore indispensable for smooth and elastic planning and the proper implementation of hubs and activities. There are numerous plans and strategies that can be implemented to ensure smooth internal communication between stackholders and thus avoid problems of poor planning and conflicts. The scheduling of monthly meetings, grouping the partners by category rather than by type, could facilitate the creation of synergies; quarterly reports could demonstrate the positive trend (but also highlight the criticalities and aspects that need to be corrected/revised) of the experiments, as well as the professionalism and commitment of the experimenters and stimulate investment also by private individuals; the creation of a web platform, if used correctly, has the potential to guarantee the dissemination of all the news concerning Living Labs (new experiments, events, etc.) to all interested stakeholders quickly and concisely.

As far as governance is concerned, by eliminating the distinction and separation between producers and consumers, it is possible to activate a mechanism of equal cooperation that creates the theoretical and methodological infrastructure necessary to unite collaborative pacts and heritage communities.

Finally, one of the greatest critical issues that must be addressed in the realisation of the project is the availability of funds, both private, from partners and private companies, and public, from research institutions. These funds are indispensable for hiring new personnel, purchasing hardware and software, as well as for publicising activities and sharing results. The L.U.P.T. Centre is already moving in this direction, negotiating the allocation of dedicated funds for this pilot programme.

4 Conclusions

This essay presents a pilot program application of a Living Lab to the Vulture Park, in Basilicata. Living Labs are tools that support cities and regions in their transition to a resilient and sustainable future based on open and inclusive innovation. They are a key element in enabling citizens to co-create their cities and regions while improving their ecosystems through emerging technologies. Therefore, as laboratories of open innovation environments, they engage all stakeholders to address real problems and co-create concrete, long-term impacts that can be scaled up.

In our opinion, it's not too much to claim to be today in an "invisible cultural revolution", indicating the start of a phase of acceleration of economic development, based on new technologies (digital transition) and the new centrality of information and knowledge in production processes [45]. At the same time, the world is nowadays forced to face the huge threat of climate change and environmental degradation. Hence, it is urgent and necessary to design and implement reforms that support the green transition and that contribute to achieving the goals of the European Green Deal. It is also necessary to design new procedures in central and local administrations establishing new structures and guidelines that are needed for implementing green policies. To overcome these challenges, the European Green Deal Search for available translations of the preceding is Europe's new growth strategy, which will transform the Union into a modern, resource-efficient and competitive economy. The European Green Deal aims to make Europe climate neutral by 2050, boost the economy through green technology, create sustainable industry and transport, and cut pollution. Turning climate and environmental challenges into opportunities will make the transition just and inclusive for all.

The production and consumption of culture favour an enhancement of the social fabric (in terms of community cohesion, quality of human relations, feeling of trust, willingness to cooperate, sense of territorial identity), which transforms local identity into a key concept for safeguarding the cultural peculiarities of the territories. It also establishes a close relationship between creative processes and supports "identity policies" that enhance the cultural authenticity of places [46].

The fact that these phenomena are taking place precisely in the era of economic globalization, confirms the thesis that they represent a natural reaction to the cultural homogenization. The internationalization of markets, in fact, reinforces the role of places through a twofold order of consequences: one of a social kind, which tends to safeguard and respect culture, the survival of the most distinctive popular expressions, cultural heritage, and feelings of social belonging. The other is economic, and gives new vigour to products that are given a strong symbolic value, nourished by details that have to do with culture, traditions and local taste.

The rural and creativity lab's model proposed for the Vulture Park, dealing with the theme of economic, social and environmental resilience of the innermost areas of the Vulture, is therefore intended as an experimentation in the internal areas. This is one of the first cases in which the living lab methodology is directly applied to a natural park, with a people-oriented and place-based approach, build with and for the users. In fact, it consistes of 4 hubs which are specifically designed for and co-created by the communities of the parks. Directly from the needs of the territories, the necessity to strengthen and consolidate networks between operators of the same sector with related sectors and with subjects of the knowledge system clearly emerges to promote innovation and internationalization and to increase the spread of training. The experience will lead to the definition of some pilot cases of heritage community [47].

The idea behind the Vulture Park Rural Creative Hub project, and any other project based on the LL model, must be to enhance the identity of the community, the needs of the area, keeping intact the objectives that the public administration proposes in common with the community. Hence, the current effort to involve the real users of the landscape, the people who inhabit it: the "Framework Convention of the Council of Europe on the value of cultural heritage for society" [48], signed by Italy in 2013, considers landscapes as fully belonging to the cultural heritage and able to highlight the cultural essence of the territory. Since they enhance the relationship between the environment and the communities, they need to be self-preserved, and their value needs to be transmitted to future generations.

Our pilot project is clearly and completely inserted in the framework of the main European and international policy lines. For instance, looking at the Sustainable Development Goals in the Global Agenda for Sustainable Development approved by the United Nations, to be achieved by 2030, one can find concrete definition of new development models that are sustainable in their three dimensions – environmental, economic, and social. Moreover, one of the main aims of the European Green Deal and the 9th European

Framework Programme for R&I 21–27 "Horizon Europe", is to improve the well-being of citizens and make Europe climate neutral by 2050.

However, this vision requires a fundamental basis: a wide and complete knowledge of what it is necessary to respect, protect and enhance. In particular, contexts such as those of inland areas, present a differentiated ecological and social forms, with sectors still active in their continuity of use but threatened by deconstructive dynamics attacking the territory [49].

Participation must therefore be a way to involve the local population more, and to create an endogenous type of destination management that takes into account the needs of the community. In fact, within the community, there are shared objectives which simplify the use of participation. Participatory economic development focuses on the community itself and therefore differs from the traditional approach to economic development that tends instead to attract resources from outside.

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References

- 1. Magnaghi, A.: Il principio territoriale. Bollati Boringhieri, Torino (2020)
- 2. Carta, M.: L'armatura culturale del territorio. Il patrimonio culturale come matrice di identità e strumento di sviluppo, Franco Angeli, Milano (1999)
- 3. European Commission, Rural Development. https://agriculture.ec.europa.eu/common-agricu ltural-policy/rural-development_en. Accessed 05 Dec 2021
- Wiingaard Stoustrup, S: The re-coding of rural development rationality: tracing EU Governmentality and Europeanisation at the local level: In European Planning Studies, (2021). https://www.tandfonline.com/doi/full/10.1080/09654313.2021.2009776. Accessed 05 Dec 2021
- European Commission, Recovery and Resilience Facility. https://ec.europa.eu/info/businesseconomy-euro/recovery-coronavirus/recovery-and-resilience-facility_en. Accessed 05 Dec 2021
- Bansler, J.: Systems development research in Scandinavia: three theoretical schools: In: Scandinavian journal of information systems, 1, 3–20. https://aisel.aisnet.org/cgi/viewcontent.cgi? article=1208&context=sjis. Accessed 05 Dec 2021
- Bjerknes, G., Bratteteig, T.: User Participation and Democracy: A Discussion of Scandinavian Research on System Development: Scandinavian J. Inf. Syst. 7(1), 73–98 (1995). https://citese erx.ist.psu.edu/viewdoc/download?doi=10.1.1.91.6452&rep=rep1&type=pdf. Accessed 02 Dec 2021
- Sica, G.: Rigenerazione ed approccio transdisciplinare: come creare innovazione sociale e culturale: ÆS 9(5) (2021). https://www.bbs-lombard.com/2021/02/17/aes-9-5-giusy-sicarigenerazione-ed-approccio-transdisciplinare-come-creare-innovazione-sociale-e-culturale/. Accessed 02 Dec 2021
- Puerari, E., De Koning, J.I.J.C., Von Wirth, T., Karre, P.M., Mulder, I.J., Loorbach, D.A.: Co-Creation Dynamics in Urban Living Labs: Sustainability 10(6) (2018). https://doi.org/10. 3390/su10061893. Accessed 02 Dec 2021

- González-Méndez, M., Olaya, C., Fasolino, I., Grimaldi, M., Obregón, N.: Agent-based modeling for urban development planning based on human needs. Conceptual Basis Model Formulation, Land Use Policy 101, 105110 (2021). ISSN 0264-8377, https://doi.org/10.1016/j.landusepol.2020.105110 (2021)
- Cattivelli, V.: European urban-rural typologies: a first overview. J. Urban Regenerat. Renewal 14, 3 (2021)
- Bergvall-Kåreborn, B., Eriksson, C.I., Ståhlbröst, A., Svensson, J.: A milieu for innovation: defining living labs. In: Proceedings of the 2nd ISPIM Innovation Symposium - Stimulating Recovery - the Role of Innovation Management (2009). http://ltu.diva-portal.org/smash/get/ diva2:1004774/FULLTEXT01.pdf. Accessed 12 Nov 2021
- Schaffers, H., Guerrero Cordoba, M., Hongisto, P., Kallai, T., Merz, C., van Rensburg, J.: Exploring business models for open innovation in rural living labs. In: International Conference on Concurrent Enterprising (ICE), Nottingham, UK, pp. 49–56 (2007)
- Chronéer, D., Ståhlbröst, A., Habibipour, A.: Urban living labs: towards an integrated understanding of their key components. Technol. Innovation Manage. Rev. 9, 50–62 (2019) https:// doi.org/10.22215/timreview/1224. Accessed 12 Nov 2021
- Steen, K., Bueren, E.: The defining characteristics of urban living labs. Technol. Innovation Manage. Rev. 7, 21–33 (2017). https://timreview.ca/article/1088. Accessed 12 Nov 2021
- Spicciarelli, R.: ZSC Monte Vulture IT9210210, Monticchio Laghi: valutazione dello stato ecologico dell'habitat con analisi ed elaborazione dei dati rilevati. Relazione Finale. Progetto di Ricerca nell'ambito INN GREEN PAF Regione Basilicata, Parco Naturale Regionale del Vulture (2021)
- 17. Carella, R.: Castagneti del Vulture, In: Agnoletti, M. (a cura di), Paesaggi rurali storici. Per un catalogo nazionale, Bari, Laterza (2010)
- 18. Coppola, E: Infrastrutture sostenibili urbane, INU Edizioni, Roma (2016)
- Coppola, E.: The Landscape planning and the green infrastructure in Campania Region, In: Arcidiacono, A., Ronchi, S. (a cura di) Ecosystem Services for Green infrastructures design. Practices, lessons and new perspectives from Italian Spatial Planning, pp. 87–100. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-54345-7
- Coppola, E.: Valorisation actions against abandonment of minor historical centers of Cilento. In: M. Cerreta, L. Fusco Girard (a cura di), Smart landscapes. Hybrid decision-making processes for the spatial innovation. Clean Edizioni, pp. 117–126 (2017)
- Sica, G.: Archeologia pubblica, paesaggi e società: l'Ancient Appia Landscapes tra risultati scientifici e comunicazione. In: Foma urbis, Anno XXI, n. 9, pp. 12–17 (2016), https://static1.squarespace.com/static/53fcb647e4b03fec4b2c1bb0/t/5ea93bd4c27d 5f467eff48b3/1588149217684/FV settembre2016.pdf. Accessed 02 Nov 2022
- Cleland, B., Mulvenna, M., Galbraith, B., Wallace, J.G., Martin, S.: Innovation of e Participation strategies using living labs as intermediaries. J. Electron. J. e-Gov. 10(2), 120–132 (2012)
- 23. Arnkil, R., Järvensivu, A., Koski, P., Piirainen, T.: Exploring quadruple helix outlining useroriented innovation models, Tampereen yliopistopaino Oy Juvenes Print (2010)
- Westerlund, M., Leminen, S.: Managing the challenges of becoming an open innovation company: experiences from living labs. Technol. Innov. Manage. Rev. 19–25 (2011)
- Nesti, G.: Urban living labs as a new form of co-production, in: Insights from the European Experience. In: Paper for the ICPP-International Conference on Public Policy II. Milan, pp. 1–4 (2015)
- CoreLabs, I.: Living labs roadmap 2007-2010: recommendations on networked systems for open user-driven research, development and innovation, Luleå Univ. Technol.-Cent. Distance-Spanning Technol, (2007)
- 27. Ballon, P., Pierson, J., Delaere, S.: Test and experimentation platforms for broadband innovation: Examining European practice. SSRN 1331557 (2005)

- Zavatrinik, V., Superina, A., Duh, E.S.: Living labs for rural areas: contextualization of living lab frameworks, concepts and practices. Sustainability 11(14) (2019) https://www.mdpi.com/ 2071-1050/11/14/3797. Accessed 02 Nov 2022
- Secco, L., et al.: Towards developing a method to evaluate social innovation in forestdependent communities – a science-stakeholders collaboration. Forest Policy Econ. 104, 9–22. (2019). https://doi.org/10.1016/j.forpol.2019.03.011. Accessed 02 Nov 2022
- 30. Heritage for Rural Regeneration RURITAGE, ruritage.eu/project/. Accessed 02 Dec 2021
- De Luca, C., López-Murcia, J., Conticelli, E., Santangelo, A., Perello, M., Tondelli, S.: Participatory process for regenerating rural areas through heritage-led plans – the RURITAGE community-based methodology. Sustainability 13(9), 1–22 (2021). article 5212 https://doi. org/10.3390/su13095212. Accessed 02 Nov 2022
- 32. The Living Lab research concept in Rural Areas project LiveRur. https://liverur.eu/. Accessed 07 Jul 2021
- Arena, G.: I beni comuni nell'età della condivision. In: Arena G e Iaione C. (a cura di), L'età della condivisione, Carocci, Roma (2015)
- Baccarne, B., Mechant, P., Schuurman, D.: Empowered Cities? AN ANALYSIS OF THE STRUCTURE AND GENERATED VALUE OF the Smart City Ghent. In: Dameri, R.P., Rosenthal-Sabroux, C. (a cura di), Smart City, pp. 157–182. Springer, Cham (2014). https:// doi.org/10.1007/978-3-319-06160-3_8
- Bindi, L.: Restare. Comunitá locali, regimi patrimoniali e processi participativi. In: AA.VV (a cura di) Perspectives on rural development" ESE – Salento University Publishing, (2019)
- Sica, G.: Public engagement nei processi di recovery post-Shock: reti sociali ed il caso "SO-LIVID, In: XII Giornata Internazionale di Studio INU Benessere e/o salute? 90 anni di studi, pp. 10–14 (2020)
- 37. Nicolescu, B.: La transdisciplinarité, Manifeste, Monaco (2006)
- European Commission. Creatività e innovazione per lo sviluppo rurale nell'UE (2009) https://enrd.ec.europa.eu/sites/default/files/645FC555-CDFB-B21F-57AFF8275545 2083.pdf. Accessed 07 Dec 2021
- Chiarullo, L., Colangelo, D., De Filippo, M.: Il turismo nei Parchi. Analisi del potenziale competitivo delle aree protette: il caso Basilicata, FEEM press (2016)
- 40. SOUND Smart Open Urban-rural Innovation Data. https://www.cluds.unirc.it/project/ sound-project-smart-open/. Accessed 07 Dec 2021
- 41. Porter, M.E.: The technological dimension of competitive strategy. Division of Research, Graduate School of Business Administration, Harvard (1981)
- Pierson, J., Lievens, B.: Configuring living labs for a "thick" understanding of innovation. In: Ethnographic Praxis in Industry Conference Proceedings. Wiley Online Library, pp. 114–127 (2005)
- 43. Manzini, E., Staszowski, E.: Public and collaborative: exploring the intersection of design, social innovation and public policy. DESIS network (2013)
- Barata, F.T., Molinari, F., Marsh, J., Cabeça, S.M.: Creative Innovation and Related Living Lab Experiences A MEDITERRANEAN MODEL, Évora, Portugal: Cátedra UNESCO (2017). ISBN 978-989-99442-5-1
- Verganti, R.: L'impresa dell'innovazione: la gestione strategica della tecnologia melle Pmi. Il Sole 24 ore libri (2004)
- 46. Sica, G. Lusini, G.: Dal New Public Management culturale alle Imprese Culturali e Creative: umanizzare e rigenerare comunità e territori. In: Rivista Internazionale di Studi Europei (RISE), n.1, Volume VII, Edicampus (2021)
- 47. Annual Work Programme for the implementation of the Creative Europe Programme. https://culture.ec.europa.eu/sites/default/files/2022-01/creative-europe-2022-workprogramme-c_2022_36_f1.pdf. Accessed 02 Feb 2022

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- Council of Europe Framework Convention on the Value of Cultural Heritage for Society. Faro Convention. https://www.coe.int/it/web/venice/faro-convention. Accessed 03 Dec 2021
- 49. Beel, D.E., et al.: Cultural resilience: The production of rural community heritage, digital archives and the role of volunteers. J. Rural Stud., 459–468 (2017)

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