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Living Labs – a tool for inclusive urban innovation

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METHODS

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Origins of Living Labs

The concept of «Living Lab» is credited to William J. Mitchell, a professor of Architecture and Media Arts and Sciences at the Massachusetts Institute of Technology (MIT). Reflecting on the innovation possibilities offered by ICT, he suggested that «living» spaces such as a city or a building can be laboratories to generate and test hypotheses by monitoring users' interactions with new technologies¹. The Living Lab technique was soon adopted in the US and Europe by the corporate sector, and in particular by ICT firms, to organize more open and rapid innovation of products and services whose potential applications could not be fully anticipated without the inclusion of end users. Initially the focus of Living Labs was to test technologies in a homelike, constructed environment (a good example is MIT's own Living Lab, «Spacelab», an apartment specially equipped to observe its inhabitants and their interactions with technologies), but more recently the concept has expanded to include real world context, aiming not only to produce technical innovation but also to foster civic involvement and co-creation². In particular, this approach attracted the interest of the European Commission, which starting

¹ B. Dutilleul, F. Birrer and W. Mensink, *Unpacking European Living Labs: Analyzing Innovation's Social Dimensions*, in K. Müller, S. Roth and M. Zak (eds.), *Social Dimension of Innovation*, Prague, Linde, 2010.

² M. Brask, *The Role of Urban Living Labs in Fostering Sustainable Cities – Insights from Sweden*, paper (master thesis), Lund, Lund University, 2015.

from 2006 promoted a common European innovation system based on Living Labs³, in order to sustain the Lisbon Strategy goal of enforcing the economic competitiveness of the Old Continent. Those actions led to the creation of the umbrella organization ENoLL – «European Network of Living Labs», an association including (in 2019) over 150 active Living Labs worldwide. ENoLL defines a Living Lab as a real-life test and experimentation environment where producers and users co-generate innovations, exploring emerging usages, behaviours and markets. Importantly, the concepts tested in the labs are evaluated to ensure learning and progress. This definition of Living Lab integrates user-centred research and open innovation⁴, and it has been associated with many interrelated meanings: it may refer to the monitoring of experimental technologies in real-life systems, to an approach to the development of technologies based on the involvement of users, to an innovation system consisting of structured multidisciplinary networks fostering interaction and collaboration, or to the organizations facilitating those networks. In practice, most initiatives labelled as «Living Labs» adopt parts of the multi-faceted concept and operate according to different interpretations of it⁵.

The emerging of Urban Living Labs

The term Urban Living Lab (ULL) has emerged to describe Living Labs set up in urban areas seeking to address issues occurring there. In the transition to the urban context, Living Labs emphasized the importance of inclusion (to actively engage citizens in urban research projects with socially-oriented research agendas) and the focus on the development of place-based solutions, embedded in the particular socio-economic dynamics of each city.

³ European Commission, *Living Labs for User-driven Open Innovation: An Overview of the Living Labs Methodology, Activities and Achievements*, Brussels, European Commission, Information Society and Media, 2009.

⁴ H.W. Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Boston, Harvard Business School Press, 2003.

⁵ A. Følstad, *Living Labs for Innovation and Development of Information and Communication Technology: A Literature Review*, in «The Electronic Journal for Virtual Organizations and Networks», vol. 10, 2008, pp. 99-131.

The real-world setting promises to produce more useful knowledge than experimentation performed under more controlled circumstances, and could also inspire social and technical transformations of city. ULL are a tool for urban innovation that has rapidly proliferated across cities: in recent years, ULL have been widely used, in Europe and worldwide, as forms of experimental governance whereby urban actors develop and test new technologies and ways of living to address a variety of challenges, from sustainability and climate change to energy and transportation systems, social innovation, quality of life, quality of the built environment⁶.

In the current scenario of strong urban competition at national and global level, cities are in need of governance forms that are able to produce innovation and sustainability connecting public institutions, research organizations, associations, the private sector and communities. Towards this goal, ULL are often seen not only as «protected spaces» for experimenting new ideas and projects, but also as ways to enable collaborations and gain public support, stretching and reforming existing regimes⁷. Thus, involvement of the users is considered a central element of ULL: generally, the users are urban populations who would be affected by the product or service tested in the lab, lending credibility to the success of potential future applications. They play a big part in the operation of the lab by giving feedback and being an active partner through the entire innovation process, interacting and negotiating with key stakeholders⁸. In addition, inclusive decision making allows for a better consideration of all variables and interests involved, may help the gathering of all knowledge, information and

⁶ H. Bulkeley, V. Castán Broto, M. Hodson and S. Marvin (eds.), *Cities and Low Carbon Transitions*, London, Routledge, 2013; J. Evans, A. Karvonen and R. Raven, *The Experimental City*, London, Routledge, 2016.

⁷ S. Marvin, H. Bulkeley, L. Mai, K. McCormick and Y. Voytenko (eds.), *Urban Living Labs. Experimenting with City Futures*, London-New York, Routledge, 2018.

⁸ F. Nevens, N. Frantzeskaki, L. Gorissen and D. Loorbach, *Urban Transition Labs: Co-creating Transformative Action for Sustainable Cities*, in «Journal of Cleaner Production», vol. 50, 2013, pp. 111-122.

resources needed to fulfill the project's objectives and may be useful to reduce opposition to policies from specific social groups⁹.

The ULL model also highlights the public element of urban innovation, based on the quadruple helix model, with a crucial role for knowledge partners (universities, private or public research institutes etc.), and intermediaries (organizations operating between social interests and/or technologies) in the production of place-based solutions, in the absence of a «one best way» to innovation and sustainability. But such processes can take different forms, and may involve many different actors: all ULL seem to share some basic features (the place-based approach, the emphasis on experimentation and learning of new technologies and solutions in real-world conditions, the involvement of end users and communities in all stages of the project), yet at least three distinct models of ULL can be distinguished¹⁰, with important consequences for their organization and goals (Table 1).

Strategic ULL are characterized by some degree of conditioning by national or regional authorities, and are often organized with multi-level mandates. As a consequence, they are less place-embedded than the other ULL models. They are usually activated to test and develop experimental applications which later will be diffused elsewhere. Cities are considered to be optimal test-beds for those innovative actions, and are expected to compete with each other for state funding, assembling partnerships with local stakeholders and global enterprises. Investments for such ULL are often awarded as a lump sum for specific activities and for short periods of time, since the priority is on supra-local diffusion strategies.

Civic ULL are instead the product of collaborations between local governments (usually acting as project leaders) and universities and private

⁹ L. Susskind and J. Cruikshank, *Breaking the Impasse. Consensual Approaches to Resolving Public Disputes*, New York, Basic Books, 1987.

¹⁰ L. Mai, *Placing Sustainability in Communities. Emerging Urban Living Labs in China*, in S. Marvin, H. Bulkeley, L. Mai, K. McCormick and Y. Voytenko (eds.), *Urban Living Labs...*, cit.

Table 1. Different ULL models

| | Strategic ULL | Civic ULL | Organic (or grassroots) ULL |
|------------------------|--|---|--|
| Lead actors | Innovation agencies, supra-local governments, corporate business | Local authorities, universities, local companies, SMEs | Civil society, NGOs etc. |
| Primary purpose | Innovation and technological priorities | Urban economic and employment priorities | Social, economic and environmental priorities |
| Organization form | Competitive (urban selected as a site for experimentation) | Developmental (partnership formed by local actors) | Micro/single (multiple forms of community organization) |
| Funding type | One-off/competitive | Co-funding/ partnership | Improvised |
| Urban imaginary | Urban as a test-bed that can be replicated or generalized | Urban as a contingent and historically produced context | Urban understood in particular ways by local communities |
| Governing responses | Governing by authority/ governing with provisions | Governing by authority and through enabling | Self-governing |
| Translation/scaling up | No plans on scaling up | Policy plan on translation | Policy plan on scaling up |
| Similar to... | National innovation programs | Urban innovation policies | Grassroot innovation projects |

Source: Adapted from L. Mai, *Placing Sustainability in Communities...*, cit.

companies, which pool their resources to intervene on specific, place-based urban priorities, often regarding the transfer of research into demonstration. These ULL may be one-off experiments, or programs taking place over a long period of time and supported by *ad hoc* local agencies. In every case, they aim to embed new knowledge, infrastructures and benefits in the urban context, and to sustain urban competitiveness.

Grassroot ULL show a strong bottom-up nature, and emerge from the demand of particular urban communities, regarding highly contingent local problems (i.e. social needs, pollution, lack of infrastructure, unemployment), looking for experimental solutions by the activation of local resources, tacit local knowledge, social capital. They are focused on the self-governing of urban dynamics, yet they often propose radical innovations, which can be diffused in other areas or cities. The budget of those ULL is often limited, relying on municipal or supra-local funding programs and on volunteers' engagement.

Overall, a socio-technical split exists between different ULL models: strategic ULL generated by top-down programs tend to be techno-centric,

while, at the opposite end, grassroots ULL are much more socially grounded and include a wider variety of actors. Civic ULL can be situated in the middle of this spread, depending on their specific characteristics and goals.

Evaluation is another discriminating characteristics across ULL models: grassroots ULL are often subject to constant evaluation from funding agencies and programs (in particular, the social impacts of these initiatives is commonly considered to be a decisive component of their evaluation). On the other hand, in civic and strategic ULL evaluation can be less important and more informal (except for procurement procedures conducted by leading public actors with private project partners) and self-evaluation is rarely produced, outside mechanisms for policy learning. But some aspects of the ULL, which are crucial in the assessment of the effects of such experiments in urban transition processes¹¹, are difficult to evaluate. While direct impacts can be easily measured from an economic (i.e. costs of the product, job creation, reduction of bills, lifecycle costs), ecological (i.e. resource efficiency, energy efficiency, pollution reduction) or social perspective (i.e. acceptance of technologies, quality of life, number of participants involved in the project), and indirect impacts could be estimated analyzing follow-up activities of diffusion, knowledge transfer or policy reform, diffuse impacts are more problematic, since they often refer to changes in normative or cultural values which may influence the perception of problems and the design of future urban infrastructures. Such changes require some time to stabilize and may be hard to link to their generative causes¹².

Critical aspects of Urban Living Labs |

ULL are often described as a means to provide responses to critical urban problems involving sustainability, quality of life, urban development.

¹¹ D. Sharp and R. Salter, *Direct Impacts of an Urban Living Lab from the Participants' Perspective: Livewell Yarra*, in «Sustainability», vol. 9, 2017.

¹² S. Schliwa, J. Evans. K. McCormick and Y. Voytenko, *Living Labs and Sustainability Transitions – Assessing the Impact of Urban Experimentation*, paper presented at the conference «Innovations in Climate Governance», Helsinki, 12-13 March 2015.

However, the extent to which ULL can address those urban challenges has yet to be proved. The strong enthusiasm for ULL by institutions such as the European Union sustained their diffusion, but an extensive critical analysis of the practices and impacts of Living Labs has not been undertaken by scholars until very recently¹³, nor it has been established whether or not they can facilitate comprehensive urban innovation and sustainability (producing outcomes that would not have been possible by other processes¹⁴) or exchanges of best practices among cities. Scalability is certainly very limited for the solutions developed in many grassroots ULL, due their strong embeddedness in the local socio-economic and geographical context¹⁵, but also in civic and strategic ULL evidence of take-up is limited, even where there is an explicit intention to translate innovations into other places or to scale them to upper levels of governance. This is a consequence of the absence of learning structures and evaluation across individual programs. So far, ULL in different cities and countries produced a fragmentation of the singular discourse of the sustainable city, developing new urban imaginaries which are rooted in locality and experimentation rather than on comprehensive and replicable programs. Such fragmentation may be a sign of the need for a novel approach to the «smart» or «sustainable» city, focused on a lower scale than metropolitan, which will require a re-thinking of traditional concepts of ecological modernization, economic growth and social justice in the urban environment.

Another aspect of ULL that should be more deeply questioned is their approach to urban governance: ULL are often presented as a completely new phenomenon, but they share many similarities with already-existing inclusive arenas (urban forums, strategic plans, grassroots innovation initiatives, community planning etc.). In a certain sense, they merely represent

¹³ T. von Wirth, L. Fuenfschilling, N. Frantzeskaki and L. Coenen, *Impacts of Urban Living Labs on Sustainability Transitions: Mechanisms and Strategies for Systemic Change Through Experimentation*, in «European Planning Studies», vol. 27, n. 2, 2019, pp. 229-257.

¹⁴ H. Bulkeley and K. McCormick, *Governance of Urban Sustainability Transitions: Advancing the Role of Living Labs – JPI Urban Europe*, in «Impact», vol. 4, 2018, pp. 17-19.

¹⁵ L. Mai, *Placing Sustainability in Communities...*, cit.

a new stage in the diversification of partnership-based governance modes organized by cities over the past decades as a response to the increasing limitations of municipal funds and financial transfers from national governments¹⁶. Yet, in the European Union, ULL had an important role in the development and diffusion of innovations in urban sustainability, thanks both to financial and policy support from the European Commission and to their capacity to accelerate the adoption of new technologies through experimentation in real settings, and end-users involvement¹⁷. But it has been argued¹⁸ that ULL often contribute to a redesigning of existing urbanity rather than to radical transformations: given the strong role played in many Living Labs (namely, in civic and strategic ULL models) by existing economic or political urban partnerships and by traditional urban priorities, there is often a tendency to experiment contextually and on users according to external interests, without giving their preferences a real voice in the process. In order to avert the threat of «constrained experimentation» and to allow for a real and effective integration of communities and users in the development of new place-based solutions for urban problems, designers and facilitators of an ULL should pay attention to local factors, in particular when the process takes place in the urban and social contexts of the Souths of the world, where operative conditions may be very different from the ones in which ULL methodologies were originally developed and tested.

Urban Living Labs in the Souths of the world

ULL organized in Asia, Africa and Latin America are not always explicitly labelled as Living Labs, mostly because in many countries the term has not yet become popular, due to differences from Europe and USA in official science and technology agendas and in public financing models for urban

¹⁶ S. Percy, *New Agendas*, in C. Couch, C. Fraser and S. Percy (eds.), *Urban Regeneration in Europe*, Hoboken, John Wiley and sons, 2003.

¹⁷ T. von Wirth, L. Fuenfschilling, N. Frantzeskaki and L. Coenen, *Impacts of Urban Living Labs...*, cit.

¹⁸ S. Marvin, H. Bulkeley, L. Mai, K. McCormick and Y. Voytenko (eds.), *Urban Living Labs...*, cit.

initiatives¹⁹. Nonetheless, such processes adopt an approach to planning and decision-making which is very similar, if not identical, to the ULL's one, based on the inclusion of end-users and on the open nature of the process. The differences with European experiences are caused by the social context of cities in the Souths of the world, where inequality is greater and problems are bigger.

Inclusive participation, which is crucial to the successful organization of ULL, requires citizens with high levels of education, and the organization and outcomes of the process may be strongly affected by the capacity of communities to voice their interests and needs in formalized, visible ways, which itself depends on power relations and social practices.

Moreover, concepts such as «smart city» or «sustainable city» cannot be used without regards to the local context. Vanesa Castán Broto describes the difficulties encountered by «smart city» programs aimed at improving energy efficiency in Asia and Africa²⁰. A peculiar case is the city of Maputo, in Mozambique, where the local public utility company tried to improve accessibility to electricity with the implementation of a pre-paid system, through which local people could control their consumption and share the payment in relation to available resources, but this new technology had only little impact because many families were not connected to the electric grid, and those who were only used electricity for lighting and communication purposes, relying on charcoal-fueled stoves for cooking. A more effective approach to the energy problem in Maputo has been developed by local NGOs and community leaders, with programs intended to connect households to the grid, and to improve cooking stoves' performance in order to reduce indoor pollution and domestic accidents. In such contexts the vision of the «smart city» focused on technologies and infrastructures which are not accessible to all citizens, may have only a limited impact

¹⁹ L. Mai, *Placing Sustainability in Communities...*, cit.

²⁰ V. Castán Broto, *Urban Living Labs, «Smart» Innovation and the Realities of Everyday Access to Energy*, in S. Marvin, H. Bulkeley, L. Mai, K. McCormick and Y. Voytenko (eds.), *Urban Living Labs...*, cit.

on economic growth, quality of life or environmental sustainability, and it could even produce new forms of inequality among urban populations. For a better consideration of user needs, ULL aimed at making cities «smarter» should adopt an enlarged concept of innovation, focusing less on novel technologies and more on the potential for social innovation, cultural innovation and innovation in the public and voluntary sectors.

Experiments of ULL in cities of the Souths of the world already showed a strong focus on the identification and solution of social and cultural issues, and managed to include an original approach to humanitarian aid development and assistance. The participation of beneficiaries in the identification of their problems and the search for solutions makes it easier to identify innovative and alternative ways to reach their goals, notwithstanding the lack of power, voice and resources²¹.

A good example is the grassroots program organized by URBZ (a collective of architects, designers, urban planners, anthropologists, economists and policy makers) in the Dharavi area of Mumbai, one of the largest and more densely populated slums in Asia with between 600,000 and a million inhabitants (estimates vary widely). The Municipality of Mumbai, considering the whole Dharavi an «informal settlement zone», planned to concentrate the existing residents in 20% of the redesigned space, allowing the construction of expensive new buildings to attract new residents and economic actors in the area – the slum is located in the center of the metropolis, and land value could potentially be sky-high. Yet, this project implied the eradication of the existing social context and the dynamic circular economy of Dharavi, where thousands of small activities sprung up and prospered over the past decades²².

²¹ S. Duarte Masi, *Social Labs: Identifying Latin American Living Labs*, in «Humanities and Social Sciences», vol. 4, n. 3, 2016, pp. 76-82.

²² M. Echanove and R. Srivastava, *The Slum Outside: Elusive Dharavi*, Moscow, Strelka Press, 2014.

As an alternative to this development vision, URBZ organized an alternative program of micro-interventions focused on the progressive improvement of the existing context, envisaging solutions which won't force residents to relocate elsewhere their lives and activities. Recognizing that residents' everyday life experiences constitute an essential knowledge for urban planning, development and policy-making, URBZ promoted research and workshops with local residents and non-local experts aimed at producing more knowledge of the urban context and to start projects for housing, education, cultural and economic development. The most important projects realized by URBZ in Dharavi are the ones on sustainable housing: providing technical competences (about home design, materials, financing) and mediating with local small building constructors and providers of building materials to fulfill the needs of the residents (usually, the demand is for the renewal and raising of the existing house, often comprising the family's shop or artisan workshop, in order to accommodate new residents, new activities, roof gardens etc.). But the program also developed many low-cost, user-centred initiatives for the design of public spaces and green areas, for the improvement of infrastructure (water and drainage, electricity), for the organization of community governance arenas, for the development of local economic activities (including projects for the design of market stalls, new farmer's markets, and the creation of the «Dharavi Design Museum» to showcase local talent through a nomadic exhibition space).

URBZ experiments in Dharavi produced a grassroots vision of urban planning, without resorting to «standard» models and techniques, but focusing instead on place-based issues through projects co-generated with the users. A similar approach has also been applied in strategic ULL, such as the Neighbourhood Recovery Program «Quiero mi barrio» («I Want My Neighbourhood») created in 2006 by the Ministry of Housing and Urban Development of Chile (MINVU) with the aim of improving the quality of life and security of people living in vulnerable neighbourhoods. Unlike prior MINVU programs, the *Programa Quiero Mi Barrio* (PQMB) is not focused on housing projects, but on the recovery of public spaces and strengthening the social fabric: it supports the building of community centres, telecentres, green ar-

eas, sports fields, playgrounds, and the improvement of street furniture. Another primary objective of the PQMB is the funding of social projects to help local communities improve the identity, security and environmental sustainability of their neighbourhood. All investments in public spaces and urban infrastructures are chosen and prioritized through a participatory and inclusive process: a *Consejo Vecinal de Desarrollo* («Neighbourhood Development Counsel»), involving the municipality, community leaders, neighbourhood boards, local cultural associations and citizens, is created in each «barrio» and is charged with producing a *Plan Maestro* («Master Plan») describing the vision and long-term development strategy for the area, and a *Contrato de Barrio* («Neighbourhood Contract») detailing the physical works and social initiatives that will be activated during the three years of the program's execution. Initially the PQMB was set out to intervene in 200 neighbourhoods, varying in size from 100 to 3,000 homes each, with a budget of US\$ 1.2 million for the period 2006-2009. Since then, the program grew to encompass 570 neighbourhoods in all 16 regions of Chile, reaching over a million people and undertaking more than 3,000 urban projects. The originality of the PQMB lies in its capacity to intertwine infrastructure and social projects, but also in its attention to user-generated urban change, which led to a strong focus on the inclusion of residents in the decision-making process and in the implementation of the projects.

In both the Dharavi and the Chilean project, the difficult social context required an extra effort to empower local communities, which is typical of initiatives for urban and social development in cities of the Souths of the world. But the approach to ULL developed by those initiatives, focused less on technological innovations and more on social issues, may constitute an important milestone towards the construction of more open societies, conceiving original governance models for the XXIst century's cities.

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