
What makes Living Labs Work? Rethinking Rigor, Action and Value Creation

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Abstract: Living Labs (LLs) have gained prominence as a collaborative approach to innovation in real-life contexts. However, empirical evidence remains fragmented and conceptual clarity limited. This study addresses this gap by identifying core LL characteristics and drawing on complementary literature to strengthen methodological rigor and outcome evaluation.

Building on research in innovation ecosystems, Business Model Innovation, and design-based approaches, LLs are conceptualized as multi-layered systems involving multiple stakeholders, multiple collaborations, and multiple real-life contexts. Action is identified as the central integrative mechanism enabling alignment across layers under conditions of uncertainty.

The findings suggest that rigor in LL research emerges from flexible, participatory, and context-sensitive approaches rather than standardized methods. Value creation is framed as a multi-dimensional construct encompassing instrumental, moral, and intrinsic dimensions. The study provides a cross-disciplinary framework to enhance methodological rigor and evaluation in LLs.

Keywords: Living Labs; Innovation Ecosystems; Innovation Management; Project Management; Uncertainty; Value proposition; Participatory Action Research; Design Action Research; Organizing; Behavioural Preferences.

1 Introduction

The notion of Living Labs (LLs) has evolved since the seminal work of William Mitchell at the Media Lab, School of Architecture and City Planning at MIT, in the early 2000s. In its initial conceptualization, LLs were framed as a user-centric research methodology for sensing, prototyping, validating, and refining complex solutions in multiple and evolving real-life contexts. Since then, the concept has developed further, supported in part by funding from the European Commission and the establishment of the European Network of Living Labs (ENoLL) in 2006 (McPhee and Schwarz, 2024). This rapid development has led to a proliferation of LL approaches characterized by increasing diversification and expansion, thereby enhancing knowledge sharing on the capabilities required for complex innovation processes (Schuurman et al., 2025).

Despite this development, a paradox persists between the appealing promise of LLs and the limited empirical evidence available to substantiate and validate outcomes derived from LL-based research. These empirical challenges were explicitly highlighted by Veeckman, Schuurman, Leminen, and Westerlund (2013), who emphasized the importance of the LL “triangle” within innovation, consisting of outcome, environment, and approach. Although subsequent research has contributed to a more nuanced understanding of LLs and their societal contributions, it has not resulted in substantially stronger empirical evidence, nor in more rigorous methodological approaches and outcome evaluation (Schuurman et al., 2025). Consequently, this paradox remains and may have been reinforced by research streams that claim affiliation with the LL concept without fully adhering to its defining characteristics (Schuurman et al., 2025).

It has been suggested that other knowledge domains may provide valuable perspectives on LLs by offering alternative analytical lenses and explanatory frameworks for conceptualizing and operationalizing rigor in LL contexts (Schuurman et al., 2025). Accordingly, this study conceptually explores potential contributions by examining the phenomena embedded in LL definitions and key characteristics, and by relating these to complementary research streams within the social sciences.

The research question guiding this study is therefore:

How can insights from other knowledge domains strengthen methodological rigor and outcome evaluation in LL research?

This study focuses on the phenomena underlying the definitions and key characteristics that shape the overlapping conceptualization of LLs in current literature. These include: (1) the complexity of LL research, arising from strong context dependency and uncertain environments (Santonen et al., 2024); (2) the value proposition concerning LL contributions to stakeholders and society (Borda et al., 2024; Santonen et al., 2024); (3) the innovation ecosystem perspective, emphasizing multi-stakeholder collaboration for societal value creation (McPhee and Schwarz, 2024); and (4) project management approaches to multi-stakeholder engagement (Ballon, Van Hoed and Schuurman, 2018).

These dimensions inform both the point of departure in identifying defining LL phenomena and the selection of aligned literature streams that provide relevant empirical evidence. Empirical research in related domains emphasizes the need to integrate data collection across multiple analytical layers (Wilke & Ritter, 2006), requiring congruence across the phenomena under investigation. Such congruence is also central to the LL concept. In this regard, Santonen et al. (2024) highlight the importance of real-life actions in revealing and understanding LL contributions. As these actions unfold across multiple layers, action research emerges as a particularly relevant methodological approach, enabling a focus on practices through which both processes and outcomes can be examined.

The study proceeds with a conceptual review of current LL definitions and key characteristics. Based on this review, patterns of overlapping phenomena are synthesized into a model that guides the analysis of similar phenomena in related literature streams. The aim is to strengthen the empirical foundation of LL research and to enhance methodological rigor and innovation outcome evaluation.

2 Literature Review

A key characteristic of Living Labs (LLs) is their role in promoting and facilitating innovation through collaboration and interaction among diverse stakeholders (Santonen et al., 2024). This inherently entails a high degree of context dependency, resulting in complex collaborations in uncertain environments, often with limited prior knowledge available for generating new societal value.

Definitions of LLs exhibit considerable overlap, as illustrated by the recurring emphasis on open collaborations, multi-stakeholder involvement, and real-life contexts:

- "LLs are regarded as an emerging open innovation approach that involves multiple stakeholders, including users, to co-create value that eventually leads to innovation." (Veeckman et al., 2013: 6)
- "They [LLs] are platforms with shared resources, which organize their stakeholders into collaboration networks that rely on representative governance, participation, open standards, and diverse activities and methods to gather, create, communicate, and deliver new knowledge, validated solutions, professional development, and social impact in real-life contexts. As open innovation intermediaries, LLs link the domains of open and user innovation and consist of three distinct, but intertwined levels of analysis: the LL organization, LL projects, and user and stakeholder involvement activities." (Schuurman, 2015: 316; Schuurman, McPhee and Leminen, 2025: i)
- "The concept of a LL refers to the involvement of multiple stakeholders, including users, in the exploration, co-creation and evaluation of (usually ICT-related) innovations within a realistic setting." (Ballon et al., 2018: 1201)
- "As orchestrators of open innovation environments, LLs aim to involve all relevant stakeholders to co-create concrete, long-term solutions based on real-life problems with the goal to scale-up eventually." (Borda et al., 2024: 01)
- "LLs promote and facilitate research and innovation through the collaboration and interaction between various stakeholders, such as universities and researchers, businesses, policymakers, and citizens/users, by using a participatory approach. According to the European Network of LL's members' catalog (ENoLL, 2023), LLs operate in over 20 different areas, the most common being social innovation, health & wellbeing, smart cities & regions, education and/or vocational training and environmental & climate change." (Santonen et al., 2024: 251–252)

Across these definitions, several recurring elements emerge: innovation as a central objective, open collaboration as a prerequisite for participation, and the involvement of multiple stakeholders engaging in collaborative activities within real-life contexts. While

shared resources are less consistently emphasized (Schuurman, 2015; Schuurman et al., 2025), they remain a critical enabling condition for collaboration and action. Resource constraints may limit the capacity for innovation and value creation, while ambitions to scale innovations (Borda et al., 2024) further underline the importance of resource availability.

Taken together, LLs can be conceptualized as comprising an overlapping trinity of multiple stakeholders, multiple collaborations, and multiple real-life contexts, through which innovation and societal value creation are pursued.

The derived key characteristics of LLs both reinforce and extend these definitional elements. In addition to recurring themes, the literature highlights further characteristics and critical perspectives:

- "Main merits are the ecosystem approach and the level of openness for value creation with shared motives for collaboration and strong communication among participants (Veeckman et al., 2013: 13–14)
- "The LL approach to innovation consists of three separate, but interrelated levels of analysis. On the macro level, LLs are a Public-Private-People partnership organized to exchange knowledge and conduct innovation projects. We regard these LL innovation projects, that are characterized by active user involvement, co-creation, multi-method and multi-stakeholder, as the meso level. These projects consist of different research steps that are aimed at generating user input and contribution to the innovation process, which we consider to be the micro level." (Schuurman, 2015: 316–317)
- "At the "meso-level" of LL innovation projects, ideally a "macro-level" open innovation environment is coupled with "micro-level" user involvement approaches. However, there is often a disconnection,....., most LLs tends to reinforce the theoretical and methodological inconsistencies across the various initiatives" (Ballon et al., 2018: 1202)
- "Five principles which should guide the assessment of their (LL) impact:
 1. *Value*: whether LLs are able to create value not just for all partners involved in the project but also for eventual customers and users;

2. *Sustainability*: the question of whether LLs take responsibility for the environmental, social and economic effects they create;
 3. *Influence*: the degree to which influence of users on the innovation and development processes shaping society, is stimulated and enacted;
 4. *Realism*: the degree to which results are generated that are valid for real markets by orchestrating realistic use situations and understanding users' behaviour, and
 5. *Openness*: whether the adequate level of openness is employed in terms of ideas, activities and results to be able to cooperate and share in a multi-stakeholder milieu" (Ballon et al., 2018: 1204)"
- "Combination of three core principles that make "a LL" a LL":
 1. *user-centred innovation* through the involvement and contributions of users in the innovation process,
 2. *multi-stakeholder collaboration*,
 3. developing, testing, and validating innovations in *real-world contexts*. (McPhee and Schwarz, 2024 – XI)

When combined through an iterative innovation cycle involving co-creation and integrating multiple research and collaboration methods, these core principles are the key ingredients that reveal great promise in the approach.' (McPhee and Schwarz, 2024: XI)

The analysis of these characteristics reveals both overlap with existing definitions and the introduction of additional dimensions. Notably, the ecosystem perspective emphasizes broad networked collaboration across stakeholders, while value creation is increasingly framed as dependent on shared motives and strong communication. These characteristics underscore the need for active orchestrated collaboration within LLs.

Furthermore, LLs are frequently conceptualized as operating across macro-, meso-, and micro-layers. However, this layered distinction has been challenged for creating

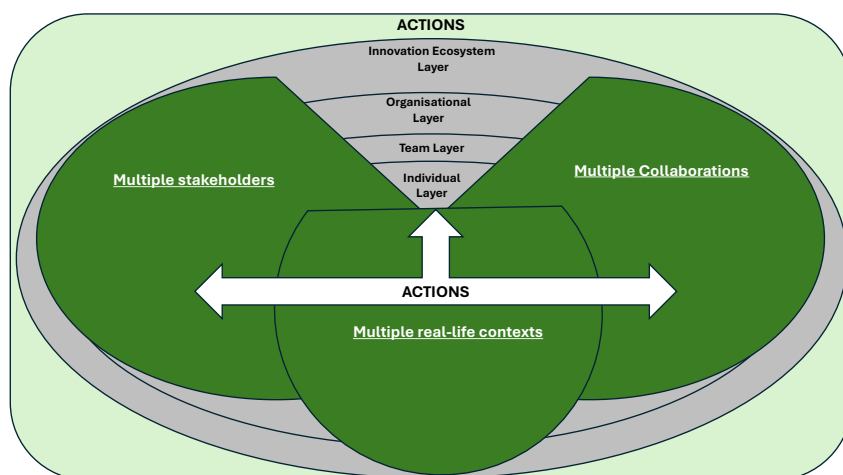
theoretical and methodological inconsistencies, as real-life contexts often involve overlapping and blurred boundaries between layers (Ballon et al., 2018).

LLs fundamentally require action to generate value and ensure sustainability. Transparency and stakeholder influence are critical for enabling collaboration in uncertain, real-life contexts. Iterative processes are therefore essential, supporting participants' sensemaking and guiding actions toward value creation outcomes.

Based on this review, an empirical action research approach is particularly suitable, as it enables a focus on actions as the point of convergence across multiple analytical layers. To strengthen the empirical foundation of LL research, further insights are sought from related literature streams, including innovation ecosystems, organizational, team, and individual layers. These perspectives collectively address the interplay between multiple stakeholders, collaborations, and real-life contexts in addressing societal innovation challenges.

This multiplicity implies that diverse participants, activities, and contexts form the foundation of LL research. Within this complexity, the central analytical focus becomes the meaning and relevance of actions in enabling innovation and value creation. These meanings are likely to evolve during the research process as new insights emerge, requiring methodological rigor to be grounded in how meaning and action are constructed and evaluated over time.

Figure 1 Essential phenomena within LLs.



Accordingly, Figure 1 synthesizes the key phenomena identified in the review, illustrating the foundational elements for advancing empirical research on LLs. It highlights how insights from related literature streams—spanning innovation ecosystems, organizational, team, and individual layers—can contribute to a more integrated understanding of LLs. This is complemented by an action-oriented methodological approach that supports the development of flexible rigor in both research processes and outcome evaluation.

3. Complementary Literature Review to Shed Light on LLs

As established, Living Labs (LLs) are fundamentally characterized by the interaction of multiple stakeholders, multiple collaborations, and multiple real-life contexts. The multiplicity across these dimensions implies a high degree of uncertainty, as no single focal actor can possess or coordinate all the knowledge required to achieve innovation and value creation in real-life settings for societal benefit. This renders LLs both unique and inherently complex.

Comparable conditions can be identified in literature on innovation ecosystems without a focal firm, where coordination emerges across distributed actors. Innovation ecosystems consist of organizations that mobilize knowledge and resources to support open contributions across stakeholders, collaborations, and contexts. These organizations are composed of teams, which in turn consist of individuals who generate and apply knowledge and resources through action. However, the integration of these interdependent layers—innovation ecosystems, organizations, teams, and individuals—further amplifies uncertainty. The configurations through which value is created are context-specific, continuously evolving, and inherently non-replicable.

Accordingly, this complementary review adopts a structured approach. It begins with uncertainty and the development of value propositions, followed by innovation ecosystems without a focal firm. It then examines individuals as the essential contributors to innovation, before addressing teams as loci of informal coordination and organizations as structures for formalized action. The integration of these layers provides a basis for understanding both potential and realized value creation, thereby informing evaluation dimensions relevant to LLs. Finally, methodological approaches grounded in action are considered to support the flexible rigor required for meaning and sensemaking of future relevance in LL contexts.

3.1 Uncertainty and the Development of Value Propositions

Uncertainty constitutes a fundamental condition for innovation. As argued by Frank Knight (1921), probabilities and outcomes cannot always be known *ex ante*, as future actions may not have previously been undertaken. This perspective distinguishes between varying degrees of uncertainty, including “known knowns,” “known unknowns,” and “unknown unknowns.” Within such conditions, heterogeneous participants can support collective sensemaking by drawing on diverse experiences and knowledge derived from prior actions, thereby enabling innovation and value creation (Brink, 2022, 2024).

Value creation is a central component of Business Model Innovation (BMI), which provides insights into how organizations achieve goals such as profitability, growth, and societal impact (Massa et al., 2017). While this perspective primarily addresses value creation at the organizational layer, it remains relevant as a foundational lens. BMI integrates both supply and demand perspectives on innovation and relaxes traditional assumptions, such as perfect information, unlimited cognitive capacity, absence of externalities, and supply-side dominance (Massa et al., 2017) – relevant for ecosystems and LLs.

However, BMI research is also characterized by conceptual dispersion, with diverse and fragmented approaches (Andreini et al., 2021). Massa et al. (2017) identify four core dimensions of value creation within this literature: (1) customer identification, (2) value proposition, (3) value creation mechanisms (activities and capabilities), and (4) realized value. Among these, the value proposition is particularly central, as it extends beyond the firm to create value for other actors within a broader environment (Nailer & Buttriss, 2020).

At the ecosystem level, value creation becomes more complex and dynamic. Multi-layered processes and actions support alignment across actors, either through focal firm interventions or through feedback-driven learning, where ecosystem value propositions are treated as experimental and evolving (Walrave et al., 2018). Extending this perspective, Adner (2017) emphasizes that analysing value propositions at the ecosystem level enables societal engagement and cross-layer coordination for future innovation.

In such contexts, value creation extends beyond individual or organizational self-interest toward collective interests and outcomes. This requires addressing multiple forms of value, including instrumental (economic), moral (fairness), and intrinsic (learning)

value creation (Clegg et al., 2021). However, perceptions of value differ across participants (Vargo & Lusch, 2016), leading to challenges in governance and coordination. While these differences may hinder innovation processes, they also create opportunities for developing more comprehensive and aligned value propositions over time (Brink, 2023).

In summary, high levels of uncertainty in real-life contexts necessitate the involvement of multiple stakeholders engaging in collaborative processes to construct shared understandings of value propositions. These processes must integrate heterogeneous perspectives across multiple layers, enabling coordinated action toward innovation and value creation for societal benefit.

The following section therefore reviews literature at the innovation ecosystem level to further develop this understanding.

3.2 Innovation Ecosystem

The concept of innovation ecosystems refers to systems encompassing all stakeholders contributing to shared value creation (Autio, 2021). This represents a broad and loosely coupled conceptualization, spanning multiple analytical layers to enable innovation. Möller et al. (2020) emphasize that ecosystems are inherently nested and layered, bridging the traditional dichotomy between macro-level structures (institutional phenomena) and micro-level perspectives (actor behaviour and interaction).

Within such ecosystems, value creation emerges from configurations of independent yet interdependent actors. Collaborative value creation thus becomes the starting point for future-oriented sensemaking and innovation. The literature suggests that ecosystem participants can develop a shared understanding of ecosystem characteristics and collectively pursue value creation at the ecosystem level (Adner, 2017; Reypens et al., 2020; Möller et al., 2020). Open dialogue is critical in this process, enabling the integration of heterogeneous knowledge domains and behavioural patterns across individuals and organizations (Gattringer et al., 2021). This is supported empirically by recent case-based studies (Shen et al., 2024; Brink, 2024).

In summary, multiple stakeholders must integrate across layers to overcome the macro–micro dichotomy, share resources, and engage in transparent collaboration to

construct and refine value propositions at the ecosystem level. These value propositions must subsequently be enacted in cross-layer projects addressing real-life challenges.

These insights suggest several methodological implications for LLs. First, heterogeneity should be actively integrated and leveraged. Second, time must be allocated for collective sensemaking among participants. Third, project management should emphasize multiple dimensions of value creation across layers and time horizons.

Evaluation of LL outcomes should therefore take its point of departure in the emergent ecosystem-level value proposition, while acknowledging its dynamic and evolving nature. Measurement should include the degree of heterogeneity, the time allocated for sensemaking, and the extent to which shared understanding is achieved across layers and over time. These dimensions collectively capture both process and outcome.

The following section examines the individual layer as an essential component of innovation ecosystems.

3.3 Individual Layer

At the individual layer, action is shaped by cognitive interpretation processes. Argyris (1983) introduced the concept of the “ladder of inference,” demonstrating how individuals select and interpret information through implicit filters before acting. These filters—shaped by norms, experiences, and assumptions—lead to abstraction processes that may produce divergent interpretations and misaligned actions across individuals, teams, and organizations. Such divergence is particularly pronounced in innovation contexts characterized by uncertainty and complexity (Brink and Madsen, 2015).

The question then arises: how do individuals select relevant information in contexts of informational abundance? Jung (2009; Jacobi, 1973) provides insight through the concept of psychological archetypes and behavioural preferences for action. His framework distinguishes between introversion–extroversion and thinking–feeling dimensions, resulting in four dominant orientations toward action. These preferences influence how individuals process information and engage in innovation activities.

Building on this, Csikszentmihalyi (1997, 2002) highlights that highly creative individuals are capable of integrating opposing behavioural tendencies, often described as achieving a state of “flow.” Such integrative capacity enables more effective engagement in innovation processes and contributes to meaningful and value-creating outcomes.

Thus, individual differences in cognition and behaviour are not merely sources of misalignment but also critical resources for collaborative sensemaking. Diverse participants contribute complementary perspectives that enhance collective understanding and enable more robust innovation processes.

In summary, individual participants use their own experiences as a basis for action, while benefiting from the perspectives of others to overcome limitations in understanding. Iterative trial-and-error creative processes support learning and enable future-oriented action for value creation.

Methodologically, this implies the need for openness toward alternative ideas and actions, combined with reflexivity regarding one’s own behaviour. Evaluation at the individual level should therefore consider: (1) openness to new ideas (both self-generated and externally introduced), (2) the degree of inspiration derived from ecosystem-level value propositions, (3) awareness of personal behavioural preferences, and (4) the extent to which new actions and learning are developed and shared.

The next section examines the team layer as a critical locus for integrating individual contributions.

3.4 Team Layer

At the team layer, innovation emerges through the integration of diverse behavioural orientations. Cameron and Quinn (2011) develop a framework of organizational behaviour that aligns closely with established categorizations of how individuals think, process information, and act. Drawing on insights from Jung (2009), they link individual behavioural preferences to broader team and organizational dynamics. Their framework is structured around two key dimensions: (1) internal versus external focus, and (2) stability versus flexibility. These dimensions give rise to four dominant modes of organizing: hierarchy (control), clan (collaboration), adhocracy (development), and market (competition) (Cameron & Quinn, 2011). While these modes may appear contradictory, they often coexist and overlap within organizations.

In innovation ecosystems, however, coordination cannot rely solely on formal structures or planning. As Reypens et al. (2020) and Wenzel et al. (2020) note, organizing innovation across boundaries involves open-ended, evolving processes that require ongoing relational work. Collaboration and relationships thus become the “glue” enabling future value creation (Brink, 2025).

Integrating diverse individual behaviours within teams is therefore essential for avoiding fragmentation and fostering innovation. Openness to alternative perspectives enables teams to transcend individual limitations and co-create more advanced solutions (Jung, 2009; Csikszentmihalyi, 1997, 2002).

In summary, effective innovation at the team layer requires deliberate integration of heterogeneous behavioural orientations. Teams must engage in collaborative sensemaking processes that leverage diversity to enhance innovation outcomes across all layers and contexts.

Methodologically, this implies prioritizing the integration of heterogeneity and fostering openness in collaboration. Evaluation should focus on: (1) the degree of openness in collaboration, (2) the extent of shared resource utilization, and (3) both value creation and value destruction across layers and over time. This enables a more comprehensive assessment of LL impact.

The following section addresses the organizational layer.

3.5 Organizational Layer

At the organizational layer, innovation is closely linked to processes of sensemaking and organizing. Karl Weick (1995) conceptualizes sensemaking as the retrospective construction of meaning based on actions taken. This perspective highlights tensions between established interpretations and the need for novel actions in uncertain contexts. Innovation thus emerges from extending past sensemaking into future-oriented possibilities through collaborative action.

Strategic management literature further distinguishes between planned and emergent strategies. Grant (2022) argues that complexity necessitates adaptive strategic direction supported by flexible organizational structures. Given that organizations consist of both vertical and horizontal units, continuous cross-layered and cross-functional

collaborations are required to align direction and enable innovation (Scott & Davis, 2016; Grant, 2022). Cameron and Quinn's (2011) framework supports this by enabling organizations to navigate competing behavioural logics. This aligns with a "compass-based" approach, where direction is continuously adjusted rather than rigidly predefined in plans (Grant, 2022).

Within innovation ecosystems, value creation extends beyond organizational self-interest toward broader societal outcomes. This requires organizations to engage with multiple forms of value—instrumental, moral, and intrinsic (Clegg et al., 2021)—and to move beyond purely economic perspectives. However, differing value perceptions across actors (Vargo & Lusch, 2016) introduce governance and coordination challenges. Organizational sensemaking processes must therefore integrate diverse value perceptions to enhance value creation across dimensions without diminishing value in others. This requires openness, transparency, and active engagement in cross-organizational collaboration.

In summary, organizations must integrate and mobilize resources across boundaries to engage in heterogeneous collaborations aligned with ecosystem-level value propositions. Innovation is enabled through iterative, action-based processes situated in real-life contexts.

Methodologically, this implies extending beyond organizational boundaries to align internal value propositions with those emerging at the ecosystem level. Evaluation should consider: (1) openness in collaboration, (2) cross-layer value creation, and (3) both value creation and value destruction over time. This allows for a comprehensive assessment of LL impact at both ecosystem and organizational levels.

3.6 Summary of Contributions from Complementary Literature to LLs

The review of complementary literature reveals a set of overlapping phenomena across analytical layers. While these phenomena are integrated, each layer contributes distinct implications, as summarized in Table 1.

Table 1. Understanding of LLs and contributions from complementary literature

Contribution Layer	Understanding of Living Labs	Empirical contribution to methodology	Empirical contribution to evaluation
Innovation ecosystem	<p>Multiple Stakeholders to Integrate shared resources transparently.</p> <p>Collaborations to Heterogeneous sensemaking of value propositions.</p> <p>Real-life contexts to Focus challenges for projects to create value</p>	<ul style="list-style-type: none"> • Uncertainty high – integration of heterogeneity. • Value proposition can be revealed. • Emphasize heterogeneity of stakeholders, collaborations and real-life contexts across layers. • Time allocated for sensemaking collaborations. • Project management to emphasise value creation across all layers short and long term. 	<ul style="list-style-type: none"> • Point of departure for evaluation taken in the value proposition at the innovation system layer. • Open for pursuing and advancing value creation. • Degree of heterogeneity • Degree of time allocated for sensemaking • Actual value creation across layers and across time.
Organisational	<p>Multiple Stakeholders to Integrate and organize shared resources transparently.</p> <p>Collaborations to Heterogeneous sensemaking of value propositions</p> <p>Real-life contexts to Try the collaborative actions to advance innovation</p>	<ul style="list-style-type: none"> • Uncertainty high – integration of heterogeneity beyond own organisation • Value proposition can be revealed both for the ecosystem and for the participating organisations. • The self-interest of organisations need to take point of origin in the value proposition in the innovation ecosystem layer • Collaborative participation in projects. 	<ul style="list-style-type: none"> • Degree of collaborative heterogeneity beyond own organisation. • Value propositions revealed and how they are connected in the self-interest of the organisations • Degree of participation in collaborative projects and measurement of actual <ul style="list-style-type: none"> • Value creation in all layers • Value destruction in all layers
Team	<p>Multiple Stakeholders to Integrate shared resources transparently.</p> <p>Collaborations to Heterogeneous sensemaking of value propositions</p> <p>Real-life contexts to Try collaborative actions in projects for innovation</p>	<ul style="list-style-type: none"> • Uncertainty high – openness for ‘other’ shared innovation activities to utilize further innovation. • Value proposition in the ecosystem layer forming innovation opportunities in collaboration. • Improve value creation in all layers without reducing value in other layers. 	<ul style="list-style-type: none"> • Degree of openness for sharing and collaboration • Degree of collaboration on opportunities • Measure actual: <ul style="list-style-type: none"> • Value creation in all layers • Value destruction in all layers
Individual	<p>Multiple Stakeholders to Integrate actionable resources transparently.</p> <p>Collaborations to Take point of departure in own actions - add others.</p> <p>Real-life contexts to Try the actions in projects for further advancement.</p>	<ul style="list-style-type: none"> • Uncertainty high – openness for ‘other’ innovation activities. • Value proposition in the ecosystem layer forming ideas and actions to pursue opportunities. • Reveal own preferences for action and ‘other’ preferences for action. • Try interesting actions in project context and learn to advance capabilities 	<ul style="list-style-type: none"> • Degree of openness to ‘other’ activities. • Degree of inspiration from the revealed value proposition in the innovation ecosystem layer. • Distribution of preferences for action. • Degree of new actions taken in projects by the individual • Degree of useful learning obtained and shared with others

Table 1 synthesizes empirical insights from related literature streams operating under similar premises. While contributions to the understanding of LLs vary across layers, they are grounded in shared foundational assumptions. In contrast, contributions to methodology and evaluation exhibit greater variation, reflecting the complexity of operationalizing LLs across contexts. Nevertheless, these dimensions remain closely interrelated.

The overall approach is situated within a constructivist paradigm, where multiple stakeholders continuously construct meaning through participation in evolving collaborations. Participation remains voluntary, and stakeholders may disengage when perceived relevance diminishes. This dynamic underscore the need for evaluation approaches that capture processes across all layers.

Measurement is therefore required at multiple levels, often relying on self-reported data due to limited formalized data collection mechanisms across contexts. The empirical contributions summarized in Table 1 provide guidance on key methodological and evaluative dimensions, emphasizing the need for flexibility in pursuing the overarching objective of maximizing value creation for all. Further research is required to refine and operationalize these dimensions.

Given that action constitutes the central point of convergence across layers, a dedicated methodological perspective is required. The following section therefore examines action research approaches in LL contexts.

3.7 Contributions from the Methodological Action Research Approach

Methodological insights from innovation ecosystems without a focal firm suggest combining participatory action research (PAR) and action design research (ADR) to align empirical inquiry with real-life contexts while generating theoretical contributions (Creswell & Poth, 2018; Sein et al., 2011). This combined approach has been applied in studies of early-phase innovation ecosystems, which are characterized by volatility and critical influence on subsequent innovation trajectories (Dedehayir et al., 2018). These insights are directly relevant for LL methodologies.

Innovation direction and innovation processes are understood as complementary dimensions. Both enable engagement among independent yet interdependent participants through flexible, co-evolutionary collaboration. While the Business Model Innovation (BMI) perspective provides a foundation for structuring collaborative innovation direction, it offers limited insight into how innovation processes unfold in practice. Complementary theoretical perspectives are therefore required.

Design-oriented approaches, such as the Knowledge–Concept–Proposal (KCP) framework derived from CK theory (Hatchuel & Weil, 2002; Hatchuel, et al., 2028; Pluchinotta et al., 2019), provide such complementary insights. These approaches facilitate the development of innovation through iterative interactions between knowledge and conceptual exploration. Empirical studies demonstrate that KCP processes enable heterogeneous participants to generate radical innovation, particularly under conditions of high uncertainty (Hooge et al., 2016).

In LL contexts, where uncertainty is often pronounced, such approaches are particularly relevant. Diverse participants contribute heterogeneous knowledge and behavioural orientations, enabling collective exploration of uncertain problem spaces. KCP processes support the emergence of new knowledge, concepts, and actionable proposals, thereby facilitating sensemaking and guiding innovation toward value creation.

Importantly, CK/KCP approaches bridge a fundamental tension in innovation research: the trade-off between structured, rule-based methodologies that limit creativity and open-ended creative approaches that may lack rigor. By integrating both dimensions, KCP supports systematic yet flexible innovation processes (Hatchuel & Weil, 2002; Pluchinotta et al., 2019). These approaches have been successfully applied at ecosystem levels and in energy innovation contexts (Brink, 2025; Hooge et al., 2016).

In summary, BMI and KCP offer complementary methodological contributions. BMI supports the structuring of innovation direction to aim for value propositions, while KCP enables the generation of actionable innovation processes through the integration of heterogeneous knowledge. Together, they provide a coherent framework for aligning direction and process in innovation ecosystems and LL contexts.

Figure 2. Complementary use of the BMI and KCP methodologies

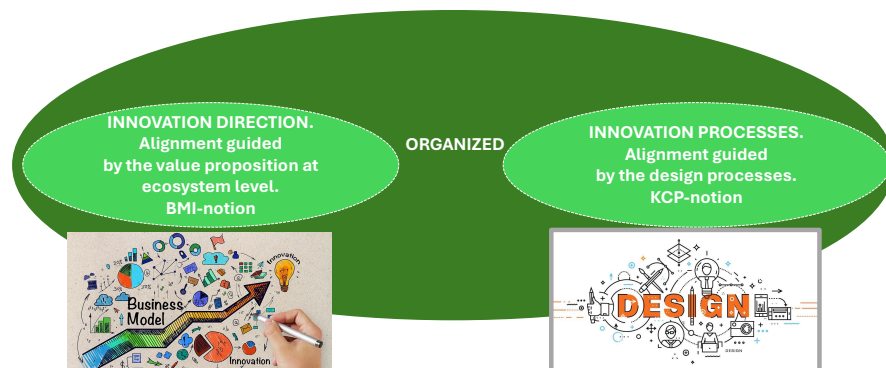


Figure 2 illustrates the interwoven application of BMI and KCP to support stakeholders and collaborations in real-life contexts.

3.8 Overall Summary of Contributions to LLs from Complementary Literature

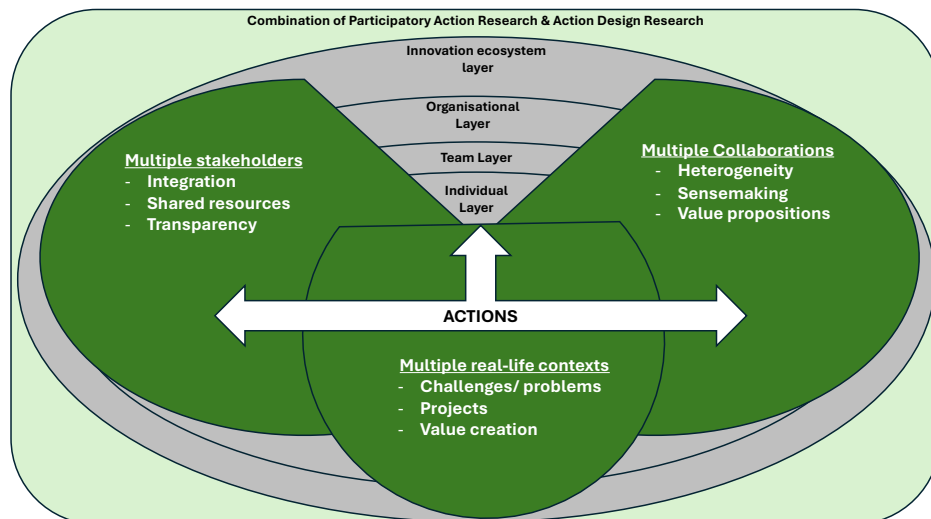
This review has focused on literature within innovation ecosystems without a focal firm, characterized by multiple stakeholders, collaborations, and real-life contexts—conditions

that closely resemble those of LLs. Empirical insights from this literature have been translated into contributions to both methodology and evaluation in LL research.

Across layers, the findings highlight the importance of integrating heterogeneous actors, enabling collaborative sensemaking, and aligning actions with evolving value propositions. Methodologically, the combination of BMI and KCP further strengthens this approach by linking innovation direction with innovation processes.

The synthesized contributions are summarized in Figure 3, which provides an integrated overview of how complementary literature informs a more rigorous and empirically grounded understanding of LLs.

Figure 3. Overall summary of contributions to LL methodology and evaluation



The theoretical contributions thus emphasise the Integration of complementary theoretical lenses and the extension of value creation to a multi-dimensional and cross-layer construct. Alternatively, the managerial implications emphasise the prioritization of stakeholder engagement as a key performance indicator and allocation of time and resources for collective sensemaking. Managers should explicitly design processes that allow heterogeneous stakeholders to align around shared value propositions, particularly in early and uncertain project phases.

Further research is needed in LL context to verify and elaborate the suggested contributions.

4. Discussion

Alternative approaches to reviewing literature and contributing to LL methodology and evaluation remain possible. The innovation ecosystem perspective without a focal firm represents only one analytical lens through which LL phenomena can be examined. Future research may benefit from exploring additional perspectives to further advance the understanding of LLs (Schuurman et al., 2025).

The study proposes methodological and evaluative approaches across multiple layers. However, in real-life contexts, participants are often subject to competing priorities and short-term performance pressures. As a result, they may disengage from LL activities if participation is perceived as lacking relevance or meaning. In this regard, stakeholder participation itself may serve as a critical indicator of LL impact, as participants effectively “vote with their feet” (Brink, 2025). This raises an important avenue for future research: whether participation dynamics can serve as a proxy for evaluating LL effectiveness, potentially complementing or substituting more resource-intensive measurement approaches.

The action research approach is particularly relevant in LL contexts due to its focus on action as a driver of impact. However, its effectiveness depends on participants’ willingness to engage. Even when actions are perceived as relevant or potentially impactful, they may not be undertaken, resulting in missed opportunities for innovation and value creation (Creswell and Poth, 2018). The systematic study of such missed opportunities represents a promising direction for future research.

Finally, while this study proposes specific evaluation and measurement approaches, practical constraints may limit their implementation. In many real-life contexts, data collection is hindered by the absence of digital tracking systems, and manual data collection may be prohibitively resource-intensive. This highlights a critical trade-off between data richness and resource allocation, which warrants further investigation in LL research.

5. Conclusion

This study has reviewed definitions of Living Labs (LLs) to identify their core characteristics and has used these as a foundation for engaging with complementary empirical literature streams. The purpose has been to derive insights into methodologies and evaluation approaches that can enhance rigor in LL research.

A key finding is that rigor in LLs does not emerge from rigid standardization, but rather from flexible, context-sensitive approaches grounded in the meanings constructed by participants in processes of innovation and value creation. The defining characteristics of LLs are identified as the interaction of multiple stakeholders engaging in multiple collaborations within multiple real-life contexts across societal layers.

Comparable conditions are found in innovation ecosystems without a focal firm, where coordination emerges across distributed actors under conditions of uncertainty. In such settings, a unifying element is required to navigate complexity. This study identifies **action** as this central integrative factor. Actions undertaken by participants—across layers and contexts—enable innovation and value creation, understood broadly as encompassing instrumental, moral, and intrinsic dimensions.

Drawing on cross-disciplinary empirical literature, the study proposes methodological and evaluative insights for LL research. These emphasize the importance of integrating heterogeneous stakeholders and resources, fostering collaborative sensemaking around value propositions, and engaging in iterative, action-oriented processes in real-life contexts.

In summary, LLs can be strengthened by approaches that support the integration of diverse actors and perspectives, enabling the co-creation of innovation and value for societal benefit.

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