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# Why we failed: Exploring the context of establishing a living lab in Korea

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**Abstract:** Living lab is widely adopted for renewing public services and policy. In establishing living labs, however, practitioners face the realities of the locale that influence the formation and operation of living labs. This paper reports on a single case-study, in which a group of design researchers attempted to set up a smart mobility living lab in Korea. By thematically analyzing meeting notes and a workshop, we uncover the challenges faced during *preject* phase. Our findings suggest that, while the uncertain and iterative nature of living lab is incompatible with the operational model of the public-sector in Korea, its name and participatory aspect are being enforced upon by ministries in distributing funds for grass-root actions and R&D projects albeit mostly on the surface level. The limited engagements predetermined by the funding schemes may impair learning and evolution – the key benefits of living labs as an open and participatory innovation process.

**Keywords:** Living lab; Preject; Public-private partnership; Case study

## 1. Introduction

Living lab has been frequently employed in tackling ill-defined problems of daily life (e.g., Baran, 2020; Bendavid & Cassivi, 2012; Kalinauskaite et al., 2021). It has been adopted as one of the emerging methods for social and public innovation (e.g., Dekker et al., 2020; Schuurman & Tönurist, 2017) to address wicked problems surrounding energy (Sahakian et al., 2021), healthcare (Fotis et al., 2023), mobility (Jin & Qiu, 2019), rural development (Tofolini et al., 2021), and urban planning (Aquilué et al., 2021). In design, living lab has been used in exploring socio-material assemblies for social innovation (Björgvinsson et al., 2012), behavior-based design from the systemic perspectives for more sustainable consumption (Scott et al., 2012), socio-technical experiments for sustainability transition (Ceschin, 2014), and hybrid modes of social innovation (Manzini, 2014).



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Every living lab goes through an inception stage – the process of building the mission of the public-private-people partnership, identifying key stakeholders and their roles, and envisioning and optimizing the potential scenarios of collaborative operation (Santoro & Conte, 2009). Coined by Darsø, this “preject” phase entails an open, chaotic, and non-linear process, hence challenging to be systematically planned (2007). In a report published by the European Network of Living Lab, *preject* is described as a critical, yet poorly understood phase of the lifecycle of a living lab (CoreLabs, 2007). Despite the abundance of examples demonstrating the benefits of employing living labs for various innovation initiatives, those that attempt “to set up a living lab and its activities [...] find limited reference models for developing and managing a living lab” (Hossain et al., 2019, p. 988). This is a significant gap, as practitioners can suffer from numerous unexpected challenges without such guidance.

This paper reports on a single case study, in which design researchers attempted to establish a smart mobility living lab in Korea. By thematically analyzing the transcripts from seven meetings and a participatory workshop with fourteen potential stakeholders and experts, we explore the real-life contexts that influence the formation and operation of living labs. We unveil four challenges that may occur during *preject* in establishing living labs in Korea: (1) the concept of living lab seems poorly understood at large, while (2) its name and participatory aspect are being enforced upon by ministries in distributing funds. (3) The bureaucracy and impartiality of the public sector conflicts with the collaborative aspect of living labs; (4) while there is an expectation mismatch between concrete outcomes and the iterative and uncertain nature of living lab.

## 2. Method

Inquiring into “the context of professional practice” (McDonnell, 1997, p. 473), this study reports on a single case study (Barzelay, 1993) where the authors, as design researchers in a research-oriented university have attempted to establish a smart mobility living lab with various potential stakeholders. With a clear aim and sampling strategy, a single case study can achieve significant knowledge acquisition (Flyvbjerg, 2006). We present the following case as a lens through which one can gain an overview of how living lab is understood and utilized in South Korea. To enable idiographic diffusion of knowledge (Mariotto et al., 2014, p. 368), we provide a detailed and extensive description of our recent project case below.

### *2.1 Case: Our attempt to establish a smart mobility living lab in a rural-urban fringe in Korea*

The authors are design researchers that work in one of the four national science and technology universities in South Korea. Having received a substantial seed funding<sup>1</sup> from the recently established center for carbon neutrality within the university, the authors sought to establish a smart mobility living lab collaborating with various stakeholders to tackle the mobility challenges of one of the surrounding cities (referred to as the *City* hereinafter). As

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<sup>1</sup> 1 million KRW (approximately 74,000 USD as of October 2023) per year in 2022 and 2023.

members of a design research group that consists of an assistant professor and research assistants ranging from doctoral students to undergraduate interns, the authors have been involved in service and policy-oriented design projects since 2019, primarily working with public-sector organizations.

The university is situated in one of the most industrialized cities in the nation. With a large land area and low population, its urban planning in the past decades has revolved around expanding car roads with no alternative mode of mass transit. Today, buses are the sole means of public transportation in the city except for intercity trains and taxis, and due to the limited options, car ownership has increased steadily to 0.49 cars per capita (Park & Kim, 2021). Meanwhile, the public demand for buses has been on a downward spiral, and the municipality (referred to as the *Municipality* hereinafter) today is spending roughly 100 billion KRW (appx. 74 million USD as of October 2023) annually in subsidies for bus services (Cho, 2021). People in the rural-urban fringe of the City are experiencing more severe challenges, as longer intervals of the bus schedule are more pronounced in such areas. Despite unpleasant bus experiences for passengers, unprofitable bus routes have continuously been discontinued (Korea Transportation Safety Authority, 2021). The Municipality has also been subsidizing taxi services to ensure the mobility of the population in rural areas where bus services do not make strong economic sense. Under such a scheme, people pay only 1,000 KRW (less than one USD) for a substantial distance of taxi ride worth 10-fold.

Perhaps interestingly, the overall population residing in such rural-urban fringes is still significant and steadily increasing in South Korea. Recent statistics show that 54 so-called “urban-rural integrated cities”<sup>2</sup> exist as administrative districts, with more than 34% of the total population inhabiting 44-46% of the entire territory of South Korea (Ministry of the Interior and Safety, 2021). With rising costs of housing in city centers, elders and young families are migrating to the outskirts of large cities, forming ever-greater rural-urban fringes (Kim et al., 2018; Kim & Hwang, 2017). In other words, such inefficiency of public transport can become costly for the city in the long run.

It is this very context where the authors saw an opportunity for innovation through establishing a smart mobility living lab, exploring alternative mobility options in the rural-urban fringe of the City and beyond. From March to September 2022, the authors met potential stakeholders and experts to discuss collaboration and establish a living lab. In short, our attempt to establish a smart mobility living lab through a consortium of various stakeholder groups did not succeed. As will be discussed in the findings, the concept of living lab was poorly understood at large, while the bureaucracy and pursuit of short-term outcomes conflicted with one of the key aspects of a living lab – that is, iterative process with various participations as innovators. Further, both the public-sector organization and the technology company expressed difficulties in participating in a living lab that is to be established through mutual interests alone. They required formalization through a project funding

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<sup>2</sup> 도농복합지 in Korean.

backed by a governmental organization, such as a ministry. By fall 2022, the authors attempted to formalize the collaboration by applying for a cross-ministerial research funding call. Unfortunately, our proposal could not be fully formed due to a lack of participation from the Municipality that was caused by the internal conflict of roles and responsibilities within the organization.

## 2.2. Data collection and analysis

In our attempt to establish a smart mobility living lab, the authors have organized meetings and a participatory workshop with 14 stakeholders from March to September 2022. Through selective sampling (Coyne, 1997) and snowball sampling (Faugier & Sargeant, 1997), the authors met the potential stakeholders and experts, including employees from a leading ride-hailing service, public servants overseeing the public transportation system, experts from a local living lab network, intermediary organizations, and a research institute that focuses on regional development. Table 1 summarizes our journey and data corpus.

Table 1 Data corpus

Date	Format	Stakeholders and experts	Length (mins.) <sup>3</sup>	Data type	Points discussed
March 21	Meeting	<ul style="list-style-type: none"> <li>Brand experience director (designer), tech firm</li> <li>Business strategy lead, tech firm</li> </ul>	96	Extended note based on stenography	<ul style="list-style-type: none"> <li>Context of rural-urban fringes, but a scarcity of business potential</li> <li>Requirements for a detailed proposal for internal meetings</li> </ul>
April 13	Meeting	<ul style="list-style-type: none"> <li>Public servant, bus route optimization and transportation planning, the Municipality (P01)</li> <li>Public servant, transportation data system, the Municipality (P02)</li> </ul>	89	Audio recording	<ul style="list-style-type: none"> <li>Characteristics of the public sector organization</li> <li>Role of the public servants in a living lab</li> </ul>
April 18	Meeting	Public servant, transportation in remote areas, the Municipality (P03)	45	Audio recording	<ul style="list-style-type: none"> <li>Current challenges faced with, and vision of the municipality</li> </ul>
May 10	Meeting	<ul style="list-style-type: none"> <li>Secretary general, local living lab network (E01)</li> <li>Associate, local living lab network (E02)</li> </ul>	73	Audio recording	<ul style="list-style-type: none"> <li>Previous living lab projects they experienced</li> <li>Job and challenges of intermediary organization</li> </ul>
	Meeting	Three public servants in charge of innovation-related policy, the Municipality (P04, P05, P06)	68	Audio recording	<ul style="list-style-type: none"> <li>Mismatch of expectations about living lab</li> <li>Ministry-led R&amp;D projects and grassroots actions by citizens</li> </ul>
May 16	Meeting	Public servant, transportation data system, the Municipality (P02)	102	Extended note based	<ul style="list-style-type: none"> <li>Infrastructure, opportunity and implications</li> </ul>

<sup>3</sup> The four phone calls at the lowest end of Table 1 were not recorded, as these phone calls were made spontaneously either by us or the public servants. For this reason, it is currently challenging to identify the exact length of the calls. That said, we meticulously documented the discussion we had with the public servants and those are summarized accordingly.

				on stenography	for using an IT-system in smart mobility
May 18	Meeting	<ul style="list-style-type: none"> <li>• Director, business support, intermediary organization A (E03)</li> <li>• Director, policy planning, intermediary organization A (E04)</li> </ul>	78	Audio recording	<ul style="list-style-type: none"> <li>• Role of intermediary organization</li> <li>• Ministry-led R&amp;D projects and grassroots actions by citizens</li> </ul>
June 3	Participatory workshop	<ul style="list-style-type: none"> <li>• Public servant, bus route optimization and transportation planning, the Municipality (P01)</li> <li>• Public servant, public transportation data system, the Municipality (P02)</li> <li>• Public servant, innovation-related policy, the Municipality (P05)</li> <li>• Director, business support, intermediary organization A (E03)</li> <li>• Research fellow, Citizen Happiness Lab, local research Institute (E05)</li> <li>• Executive director, intermediary organization B (E06)</li> </ul>	144	Audio recording & extended note based on stenography	<ul style="list-style-type: none"> <li>• Comment upon the initial findings and group discussion</li> <li>• Ideation of creating a living lab consortium with an exemplary topic (Adopting the ICT technology into a context of remote taxi service in the rural area of the Municipality)</li> </ul>
June 20	Phone call	Public servant, bus route optimization and transportation planning, the Municipality (P01)	–	Note summarized after hanging up	<ul style="list-style-type: none"> <li>• Seed funding for initiating a smart mobility living lab</li> <li>• Roles and resources of the Municipality</li> </ul>
August 25	Phone call	Public servant, transportation in remote areas, the Municipality (P03)	–	Note summarized after hanging up	<ul style="list-style-type: none"> <li>• Suggestion to prepare the cross-ministerial research funding call</li> <li>• Necessity of well-organized proposal</li> </ul>
August 29	Phone call	Public servant, transportation in remote areas, the Municipality (P03)	–	Note summarized after hanging up	<ul style="list-style-type: none"> <li>• Objection to participate in a living lab by supervisor although P03 really wanted to join</li> </ul>
September 1	Phone call	Public servant, bus route optimization and transportation planning, the Municipality (P01)	–	Note summarized after hanging up	<ul style="list-style-type: none"> <li>• Internal conflict of roles and responsibilities in the Municipality</li> </ul>

We arranged seven meetings with potential stakeholders and experts from March to May 2022. The authors prepared an introduction slide deck for open-ended discussion about a potential partnership. The deck was structured to describe the mobility issues of rural-urban fringes, the concept of the living lab, and our research group. After delivering the material, discussions were preceded by a topic guide, facilitated by the second author (see Appendix A). All meetings were conducted in Korean, and most meetings were audio-recorded under the consent of the meeting participants except two – during which the participants of the tech firm wanted to avoid audio recording (March 21), and when the authors were making an ethnographic observation while discussing with a public servant (May 16). The length of meetings varied from 45 to 102 minutes, with a mean of around 78 minutes. The interviewees were assured that they would be speaking about their experiences under confidentiality

and anonymity. These meetings helped us understand how living lab is perceived overall in Korea and the heavy reliance on government funding schemes, which made it difficult for the authors to advocate for establishing a living lab based on the budget received from the university.

To establish a common ground in looking for the ways in which a smart mobility living lab for the rural-urban fringe can be established, we arranged a participatory workshop inviting potential stakeholders and experts under confidentiality and anonymity. Using maximum variable sampling (Marshall, 1996), we invited four potential stakeholders we previously met through the meetings above and two local experts by snowball sampling (Faugier & Sargeant, 1997). The workshop was held at a conference room in the university on June 3 and lasted for 2 hours and 24 minutes. We organized the workshop in two phases (Table 2): (1) inviting comments and reflections on our initial insight from the meetings notes with visual-aids and (2) ideating for a smart mobility living lab consortium and having a group discussion (see Figure 1). The visual-aid materials consisted of short descriptions for representing each category and exact quotations during the first-round interviews and meetings.

Table 2 Summary of the participatory workshop process

Phase	Duration (mins.)	Activity	Materials	Points discussed
1	15	<ul style="list-style-type: none"> <li>Brief explanation of the workshop</li> <li>Self-introduction of participants</li> </ul>	Slides	<ul style="list-style-type: none"> <li>Premise and schedule of today's activities</li> <li>Self-introduction among participants (Name, affiliation and position, personal/organizational goals)</li> </ul>
	10	<ul style="list-style-type: none"> <li>Introduction of the research group</li> <li>Explanation of living lab and rural-urban fringes</li> </ul>		<ul style="list-style-type: none"> <li>Research interests, competence &amp; past project of the research group</li> <li>Concept, characteristics &amp; expected impact of living lab</li> <li>Context of rural-urban fringes based on literature and statistics</li> </ul>
	55	<ul style="list-style-type: none"> <li>Comment on initial findings</li> <li>Group discussion</li> </ul>	Handouts (A3 size)	<ul style="list-style-type: none"> <li>Job rotation system</li> <li>Unfamiliarity with the nature of living lab</li> <li>Problem (re)framing without "real" users</li> <li>Expectation mismatch about the outcome of living labs</li> <li>Korean living labs heavily relying on government funding</li> </ul>
	10	Break	–	–
2	25	Imagining potential stakeholders for a living lab consortium in two teams, within a topic about mobility issues	Handouts & sticky notes	<ul style="list-style-type: none"> <li>(Re)framing the problems of the given context, and (re)defining the stakeholders</li> <li>Expected interactions among potential stakeholders</li> </ul>
	30	<ul style="list-style-type: none"> <li>Sharing the ideation outcomes with another team</li> <li>Further discussions</li> </ul>	Outcomes produced by teams	<ul style="list-style-type: none"> <li>Feasibility of a living lab collaboration in the City</li> <li>Requirements for a sustainable management of living lab (e.g., funding sources)</li> </ul>

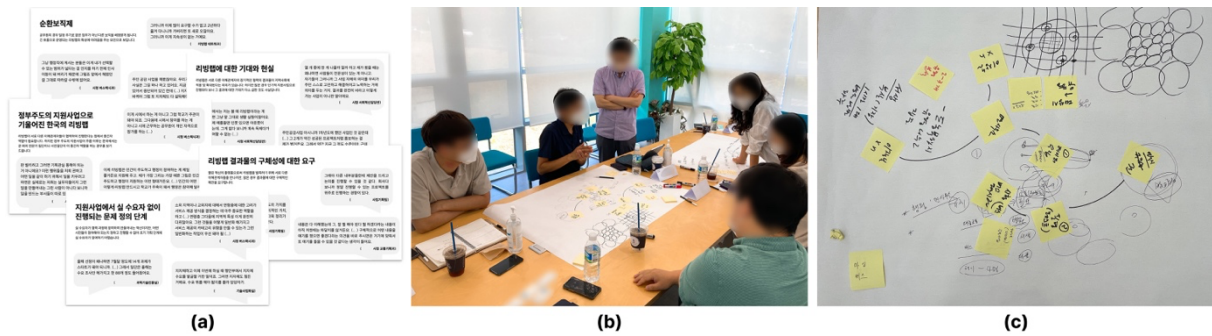


Figure 1 Images of materials used, discussions among participants, and the outcome of the workshop include: (a) Handouts of A3 size for our initial insights from meetings in Phase 1, (b) sharing ideation outcomes and further discussions in Phase 2, (c) the outcome of living lab consortium ideation from one team

In uncovering the challenges faced during the *preject* in establishing a living lab, we conducted inductive thematic analysis (Braun & Clarke, 2006) of the meeting minutes and workshop discussions. The first author transcribed the audio recordings with the aid of speech-to-text software and corrected errors by closely listening to the sources. Also, the meeting minutes and stenography were turned into extended notes by both authors and other members of the research group that joined the meetings. The first author coded the qualitative data following initial and in-vivo coding (Saldaña, 2021, pp. 137-152) for the purpose of familiarization with the data set using digital coding software. The initial coding scheme was then discussed by both authors in an iterative manner. The final coding scheme was developed through focused coding (Saldaña, 2021, pp. 302-308) with strong focuses on the context of potential collaborators, necessary partnerships required in establishing a living lab consortium, ideas for mobility innovation in rural-urban fringe, and requirements which the potential collaborators demand in order to join a living lab.

### 3. Findings

We hereby present the inductively found themes from our single case study. As will be evident, the themes presented below are all dependent on each other, which is a common feature of thematic analysis (Braun & Clarke, 2006, pp.91-96). For transparency and better evaluation of qualitative studies (Pratt, 2008), we include the author-translated quotations in English within the presented themes and the original and fuller quotations in Korean as appendix (Appendix B).

#### 3.1. Limited understanding about, and the applications of, Living Labs

Through the meetings and workshop discussions, we find that living lab is often poorly understood and has been adapted by various actors to serve their own institutional purposes in Korea. Perhaps surprisingly, while each person or entity varyingly conceptualized what a living lab is, the reasons why living lab is adopted is remarkably similar in all entities: research- and innovation-funding schemes planned and distributed by the ministries, influencing the ways a living lab is conceptualized:



“Our approach can be seen as being somewhat similar to the living lab networks [in Korea], but it goes against the grain with their approach. Most people in the living lab network or those who talk about living labs in Korea tend to focus on technology. But we think that technology is not the priority; people are the priority.” (Public Servant\_P04, bracket added by the authors)

As a staff at the social innovation team in the Municipality, Public Servant 04 emphasized the importance of exploring local challenges with citizens, and in doing so, technology was described as of secondary importance. This is understandable as the team in the Municipality receives funds mostly from the Ministry of Interior and Safety for urban regeneration and solving local problems. Such projects do not start with technology but by empowering the citizenry to identify local problems to be solved through living labs.

Coming from a different direction, the following statement of a director at the intermediary organization corroborates this analysis:

“In a sense, a living lab’s outcome should not only be an idea but something that should be feasible and commercialized. This is the process model we pursue. [...] We are demanded by [government agencies] to engage in earlier phases exploring problems, but that’s not our role. [Our role is on] the later phases. [...] that’s why we often have conflicts [with the key people in the living lab network].” (Director\_E03, brackets added by the authors)

“For that [to receive funding], we have to use terminology that aligns with the government’s policy direction. That’s why we’re doing it that way. [...] But when we get asked, ‘Is this a living lab?’, we tend not to be able to defend our position.” (Director\_E04, brackets added by the authors)

As exemplified in the quotations above, many of those we met expressed difficulties in describing what they mean by living lab. This seems to stem from the fact that the use of living lab has long been bundled with funding calls from ministries as a requirement for social innovation and/or research and development projects. Evidently, one of the recent funding calls by two ministries was framed as *Problem-Defining Living Lab*<sup>4</sup> and required a codified process with seven so-called ‘living lab meetings’ with citizens with a budget to be spent within a four-month period. Criticizing such rigid framing predefined by ministries and the hurried execution of it by municipalities, the secretary general of a local living lab network expressed a concern that living lab may become a formality with monetary incentives involved:

“Different entities initiate and run living labs in fragmented ways [...] if we leave it to the governmental organizations, it becomes just casual meeting or official hearing, not a living lab. [...] The reason it turned out that way in the first place is that citizens don’t come [and the public sector] just tried to attract people with other stuff without helping them understand what living lab is. So, people come saying, ‘they give us something, some money.’” (Secretary general\_E01, brackets added by the authors)

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<sup>4</sup> 문제기획리빙랩 in Korean.

Adapting the concept of living lab to serve one's own purposes is not new, since living lab as a concept and practice is known for its varying definitions and operation models (Westerlund & Leminen, 2014). However, there seems to be a lack of clarity as to why one establishes a living lab and what is supposed to be achieved when it becomes a mere series of meetings required by the funders in quantitative terms without meaningful engagements and experimentation.

### *3.2 The form and scope of Living Labs shaped by government funding*

Upon our analysis of the existing and past living lab projects discussed by our counterparts and workshop participants, we find that the form and scope of living labs in Korea are rigidly shaped by government funding schemes. Such schemes often require appointing collaborators and stakeholders upfront and also designating how much budget each party involved is entitled to spend. According to the scale and the funding sources, living lab projects in Korea today can be broadly categorized into two types: (1) smaller and shorter-term grants that allow citizens to solve problems in their locales and (2) larger research and development (R&D) funding for research-oriented organizations.

Often smaller than 20 million KRW (approximately 15K USD as of October 2023) and lasting up to six months, smaller grants for living lab projects are often funded by the Ministry of the Interior and Safety via citizen-driven innovation teams under municipalities or through intermediary organizations. With these grants, citizen groups can address a range of issues, from neighborhood problems to municipal-level challenges. They often try out existing solutions for known problems, for instance, the floor-type pedestrian crossing light to reduce accidents or CCTV or hotline buttons for crime prevention. As these grants are formed to empower citizens, citizen participation is often seen as the aim itself, and the structure of the funding scheme often restricts the role of experts only to be advisors at the periphery rather than playing the role of equal members in operating living labs. This is why, according to the public servants and the experts, these living lab projects often turn into a mere funding scheme for existing interest groups to pursue existing agendas rather than fostering new champions and networks in a neighborhood to discover unknown problems.

Typically exceeding 500 million KRW (approximately 370K USD as of October 2023) and spanning slightly over a year, the focus of a ministry-funded R&D living lab project depends heavily on the mandate of each ministry that funds these projects. For example, the Ministry of SMEs and Startups aims to accelerate commercializing products of companies using living lab as a testbed with consumers, while the Ministry of Land, Infrastructure and Transport aims to get innovative ideas from pre-defined problems, allowing private firms and researchers to participate. Undertaken only by the consortiums selected through the multi-round application process, these ministry-led projects follow a predefined and rigid process of planning, development, testing, and scaling-up. For this reason, the majority of consortiums that win such R&D living labs tend to be led by a seasoned project coordinator from a company or a university that deals with many government-funded R&D projects.

The two types of funding schemes discussed above may limit the potential of employing living lab as a process for participatory innovation. The smaller funding scheme would allow only low-level innovation that entails “context-defined adaptations that facilitate the adoption and use of new products and service” (Almirall & Wareham, 2011, p. 98) or mere “exploitation” of existing solutions (March, 1991, p. 71). With both funding schemes spanning shorter than two years with no extension allowed, especially the smaller one being shorter than six months, it will be extremely challenging to leave room for iteration and long-term collaboration through living labs (e.g., Guzmán et al., 2013; Hillgren et al., 2011). In other words, neither scheme would allow an iterative process in terms of how a problem is supposed to be tackled (technologically or otherwise), the involved parties, and the planned budget.

### *3.3 Bureaucracy in the public sector preventing effective collaboration for Living Labs*

Chiefly funded by the ministries often through municipalities as discussed earlier, living labs for social innovation and socio-technical experiments heavily rely on public-sector organizations in Korea. However, our inductive analysis reveals that the ways in which public-sector organizations operate are incongruous with some of the key aspects of living labs, which tends to prevent forming fruitful partnerships and lead to inefficient collaboration.

We notice that municipalities are cautious about building public-private partnerships with firms considering both impartiality and continuity of solutions to be piloted in a living lab:

“Civil servants in municipalities proposing new ideas can be seen as unreasonable or thoughtless trials on citizens. We cannot tell citizens that submit official complaints, ‘this new idea is good, and we’ve verified it, so try using it.’ Such conversations cannot happen. [...] Moreover, if governmental organizations use the budget to support a certain company, it might raise concerns among other stakeholders.” (Public servant\_P01, bracket added by the authors)

Public servants described piloting a solution in a living lab as potentially problematic for two main reasons: (1) such piloting can stir citizens to react negatively as they might feel that they are being used as subjects of an experiment, and (2) external parties may perceive the situation as partial, as a company is receiving government funds without being under the scrutiny of public procurement. This precaution for citizen complaints and impartiality from the public servants seems to be at odds with effectively engaging and collaborating with other stakeholders, which conflicts with the collaborative nature of a living lab across sectors.

Further, frequent job rotation across all public sector organizations in Korea was discussed as being disruptive and unproductive for the operation of living labs:

“Oh, there seems to have been another job rotation on top of a job rotation from [a public servant’s name] to another one earlier [...] The public servants of the municipality change all the time due to job rotation, then [the researchers] need to persuade the new person in charge, we hear that all the time.” (Director\_E03, bracket added by the authors)

In the current structure of the Korean public sector, public servants are required to change their positions and move to different functions typically every six months to two years. This rotation takes place every January and July, meaning a public servant may have even three different positions in the same year. Job rotation was mentioned during six out of seven meetings as one of the most disruptive factors for living lab operations, as it is common for collaborators in a living lab to be working with a new person in charge from a municipality amid ongoing projects. Often, a member of the living lab team needs to repeatedly brief new public servants about the purpose and progress of the project. Sometimes it is necessary to persuade the new member if he/she is genuinely uninterested, which may happen as the fruit of a successful living lab belongs to the one who initiated the project, not the one who finished it.

Finally, even when public servants desire to be engaged in a living lab, they encounter barriers from the existing public sector structure. Municipal regulations currently prohibit public servants from directly joining a project outside the role officially recognized within the organization, which must undergo a complicated internal process. For instance, in our efforts to establish the smart mobility living lab, we approached and held meetings with public servants whose roles were closely related to planning and adjusting public transport systems in the City. To our surprise, these public servants were more inclined to assume temporary roles in their private time (taking a half-day leave, for instance) without officially representing the Municipality. To be officially involved, according to them, the planning and coordination office<sup>5</sup> of the Municipality must establish a new committee, notify all public servants across various departments, and proceed with the selection process. Only then can the work hours be officially endorsed within the Municipality, justifying the reasons for their participation in meetings and workshops.

Bureaucracies embedded in the organizational structure, work culture, and surrounding policies have been recognized as one of the main reasons for inefficiency in the work of public sector organizations (e.g., Parker & Bradley, 2004). The tendency of public sector organizations to avoid scrutiny for impartiality can also be found around the world, for example in the procurements of IT services in Switzerland (Warland & Mayer, 2017) or service design expertise in Finland (Park-Lee, 2020; Park-Lee & Person, 2018). Despite the well-intended purpose of preventing inertia and corruption, frequent and excessive job rotation in the Korean public sector has been criticized as a key factor undermining the accumulation of knowledge and expertise required for solving complex problems (e.g., Kim, 2008, pp. 62-75; Kim, 2021). Our analysis adds to these insights: job rotation of the public servant in charge and the bureaucracy in the public sector may limit not only efficient collaboration in living labs but also the continuity and integrity of the innovation process living labs supposedly enable.

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<sup>5</sup> 기획조정실 in Korean

### *3.4 Mismatch between the expectation for short-term outcomes and the uncertain nature of Living Lab*

As discussed thus far, living lab projects are rigidly formulated as either citizen-driven activities or R&D projects driven by ministries, and their pre-shaped formats limit the scope of living labs for design researchers or other practitioners in setting up the coalition during *preject*. In addition to this challenge, we find the mismatch between their expectations for clarity for short-term outcomes and the uncertain and iterative nature of living labs through discussions with both private- and public-sector players.

Such mismatch could first be observed during our meetings with key people of the tech firm. In discussing the partnership with other possible entities, the business strategy lead demanded a concrete outcome and direct business impact instead of open-ended explorations:

“[For a project or idea] To become sustainable, it needs to produce some value. And upon that, it would be better if there is an improved proposal with clearer benefits, such as ESG, profit, or values for each stakeholder. [...] Only then I can share it with others in our firm and drive the discussion. As this is a company, we tend to initiate projects that we can actually implement.” (Business strategy lead, tech firm, bracket added by the authors)

As evident in the quotation above, we were asked to address both the high-level aspects, such as value proposition and scalability, as well as the specific details for operation, including cost estimates, expected profits and losses, maintenance of outcomes, and roles of specific stakeholders. Crafting such a plan necessitates following a more traditional business planning process, which requires a top-down and linear way of working.

Analogously, as public organizations in Korea are yet to be familiar with the concept of living lab, they tend to expect to discuss a tangible solution when discussing potential collaboration. When we met the public servants of the Municipality in charge of public transportation, they sought a comprehensive and foreseeable outcome to start the discussion with: “We just keep our arms crossed because we cannot have a discussion unless there is a clear matter to be discussed” (Public servant\_P02). Such expectations for concrete outcomes were also pronounced for citizen-driven living labs with smaller grants (see: 3.2.). As discussed earlier, the value of such living labs centers around empowerment and citizen participation, and thus, the participation of experts and firms as partners is often excluded. Yet, our discussions with those public servants in charge of managing them reveal that their annual performance review relies on the quality of project outcome of such living labs:

“Barely one out of ten seem to be [with successful outcomes] to me. Because the citizen teams don’t have much expertise, our program supports them to address daily-life problems by literally experimenting. [...] Although I fully understand the significance of [citizen participation] as the person in charge, the organizational structure is so that my superior and others go, ‘You’ve produced nothing with that much budget!’” (Public servant\_P05, bracket added by authors)

As evident in the quotation above, the purpose of a citizen-driven project should be participation itself to encourage the citizens to proactively contribute to their community. However, this appears to be not the premise for his/her performance evaluators. Given this, the public servants in charge remain passive toward living lab projects since they ultimately become responsible for the repercussions of the mismatch between the outcome and expectation.

The incompatibility between the short-termism of typical R&D projects and the open-ended nature of living labs has been recognized. In their consultations with potential stakeholders, Brankaert and den Ouden find that businesses require “a clear buyer” or “a clear customer willing to pay” upfront before establishing a living lab (2013). In their SWOT analysis for living labs’ support toward user innovation, Guzmán et al. define demonstrating the “long-term value of a living lab for businesses” as one of the main threats in establishing and sustaining living labs (2013, p. 38). Analogously, this paper shows that the hesitation of potential stakeholders – public or private – due to the lack of predictable outcome could hinder successfully forming a coalition of diverse stakeholders, which may severely impede realizing the ideal of pursuing living lab as an open and iterative innovation approach (e.g., Westerland & Leminen, 2011).

#### 4. Discussions and conclusion

This study uncovers the context of *preject* (Darsø, 2007) in establishing a living lab and shows how the uncertain and iterative nature of living lab is incompatible with the existing operational model of the public sector in Korea. Albeit on the superficial level, living lab as a concept and its participatory aspect are being actively utilized by the ministries in Korea in distributing funds for grass-root actions and R&D activities. This study uncovers some of the challenges living labs may undergo in Korea due to the scope shaped by the funding schemes and the frequent job rotation and bureaucracy of public-sector organizations. We find that the limited understanding about living labs, along with the expectation for short-term outcomes from both public sector and the private company, may also hinder efficient communication during *preject*.

Scholars emphasize the significance of long-term interactions when collaborating with stakeholders, which is also central to initiation of living labs. Exploring different means of democratic innovation, Asenbaum and Hanusch point out that living lab can be differentiated from other types of labs, as it maintains “larger, durable networks situated in real-life contexts” (2021, p. 3). Analogously, scholars propose “infrastructuring” that allows a long-term and open-ended collaboration with trust for innovative alternatives (Björgvinsson et al., 2010; Hillgren et al., 2011), while Huybrechts et al. put forward “institutioning” for long-term engagements to overcome challenges that occur from political nature of participatory design and co-design (2017). For such engagements to be successful, long-term and sustainable funding is essential for the difficulty of demonstrating the value of living labs for businesses and users in the short-term (Guzmán et al., 2013, p. 38). Our analysis supports these insights, as the limited engagements in living labs predetermined by the government funding

schemes may impair learning and evolution – the key benefits of employing living labs for open and participatory innovation projects. For these reasons, perhaps a multi-year funding scheme could be proposed as an alternative based on phased aims and year-to-year monitoring. Such scheme, with gradually higher goals along with increased budget each year, may allow various stakeholders to build a dynamic learning coalition for exploring the problem, setting up the governance structure and creating solutions (e.g., Hakkarainen & Hyysalo, 2013, pp. 21-22; Mahoney & Thelen, 2009)

This paper reveals four challenges design scholars and practitioners face that influence the initiation stage of living labs. Albeit little on *preject* specifically, scholars explored similar challenges and potential remedies. For instance, Knickel et al. found that professional facilitation can deal with potential conflicts by examining four-year-long living lab projects on rural-urban relations (2023, p. 13). Similarly, Hakkarainen and Hyysalo emphasized the importance of having an able intermediary who is “an independent and innovative negotiator [that can] convince all the stakeholder groups of each other's good intentions and react quickly to changing circumstances” (2013, p. 19, bracket added by authors). In her analysis of eight living labs in care homes, Kanstrup finds that the effort required for collaborative innovation is often overlooked and calls for greater attention to treating participants as equal innovation partners (2017, p. 61). Although it is beyond the scope of this study and somewhat distant from our findings, we conjecture that our inexperience as an intermediary may have played a role in not being able to form a sound coalition for establishing a living lab successfully. Alternatively, we could have focused on uniquely providing “design infrastructures” for collaboration (Simeone, 2019) rather than leading the coalition as the main research body.

As one of the early studies that explored the context of *preject* phase, this study was conducted as a single case study with meeting minutes as the primary data chiefly for the merit of unveiling the real-life contexts of attempting to establish a living lab. This methodological choice proves to be fruitful as we could observe the moment of discussions in-situ that would otherwise be difficult to gain access to. That said, this study is limited to the firm and public-sector organizations the authors had the privilege to have conversations with and thus may bear biases of specific organizations or individuals. As it would practically be challenging to conduct multiple single case studies in various parts of the nation to ensure transferability (e.g., Slevin & Sines, 2000), future studies could make use of naturally occurring data for triangulation (e.g., Flick, 2018, pp. 527-544), for instance by analyzing online videos from the national living lab network or keynote speeches by public servants in living lab events.

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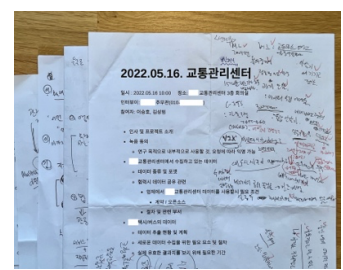
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## Appendices

### Appendix A Summary of the meeting process

Phase	Length (mins.)	Materials	Topics	Images
1. Introduction	15	Slides	<p><i>Rural-urban fringes and the City</i></p> <p>(1) Definition and characteristics of rural-urban fringes, (2) statistical data of rural-urban fringes and the City, (3) reasons for employing a living lab</p> <hr/> <p><i>Explanation of living lab</i></p> <p>(1) Concept of living lab, (2) examples of living lab projects, (3) expected impacts</p> <hr/> <p><i>Introducing the research group</i></p> <p>(1) Research interests, competence, and projects the research group performed in the past (2) funding source of center for carbon neutrality within the university</p> <hr/> <p><i>Partnership</i></p> <p>(1) Public-private partnership in the City, (2) the preparation required to initiate a living lab, (3) potential stakeholders – tech firm, the Municipalities, and local experts</p> <hr/> <p><i>Mobility issues of other areas in Korea</i></p> <p>(1) Mobility service managed through public-private partnership, (2) conflicts between citizens and municipalities</p>	
2. Interview discussion	45	Topic guide	<ul style="list-style-type: none"> <li>• Work processes and environments of each organization</li> <li>• Mobility issues in the City</li> <li>• Previous experiences of public-private partnership and/or living lab projects</li> <li>• Roles and responsibilities of involved parties in a living lab consortium</li> <li>• Managing conflicts among stakeholders</li> <li>• Willingness of joining a living lab</li> <li>• Expectations and concerns about becoming a formal member of a living lab</li> </ul>	

### Appendix B Original and translated quotations used in Section 3

In section	Original quotes in Korean (brackets added by the authors)	Translated quotes in English (brackets added by the authors)
3.1.	<p>이제 저희는 방향은 비슷하데 리빙랩 네트워크랑은 조금은 결이 다른게, 리빙랩 네트워크나 리빙랩을 국내에서 얘기하시는 분들은 대부분 기술을 얘기하시거든요. 그런데 이제 저희가 생각하는 거는 기술이 우선이 아니라 이제 사람이 우선이라는 거죠.</p> <hr/> <p>어떻게 보면 리빙랩이 제대로 그게 결과물이 아이디어로서 끝나는 게 아니고. 실현 가능성을 하고 상용화까지도 갈 수 있는 거죠. 그런 프로세스가 우리가 원하는 모델인 거예요. [...] [정책연구원]도 그렇고 자꾸 앞단의 문제 이런 식의 리빙랩을</p>	<p>Our approach can be seen as being somewhat similar to the living lab networks [in Korea], but it goes against the grain with their approach. Most people in the living lab network or those who talk about living labs in Korea tend to focus on technology. But we think that technology is not the priority; people are the priority.</p> <hr/> <p>In a sense, a living lab's outcome should not only be an idea but something that should be feasible and commercialized. This is the process model we pursue. [...] We are demanded by [government agencies] to engage in earlier phases exploring problems, but that's</p>

<p>해야 한다 [요구하지만] 우리는 알지만 그게 우리의 룰은 아니다 [우리의 룰은] 그 뒷단이다. [...] 그러다 보니까 [리빙랩네트워크를 이끄는 인물과] 맨날 충돌을 해서</p>	<p>not our role. [Our role is on] the later phases. [...] that's why we often have conflicts [with the key people in the living lab network].</p>
<p>그러려면 정부의 정책 방향에 맞춰서 응어같은 걸 쓸 수밖에 없거든요. 그래서 그렇게 하고 있고 [...] 이게 리빙랩이야? 이러면 막 디펜스가 잘 안 된다거나. 또 리빙랩이 뭐야?라고 하면 안 된다거나. 이런 것도 좀 저는 있었었어요.</p>	<p>For that [to receive funding], we have to use terminology that aligns with the government's policy direction. That's why we're doing it that way. [...] But when we get asked, 'Is this a living lab?', we tend not to be able to defend our position.</p>
<p>다양한 곳에서 이제 리빙랩을 파편적으로 하는데, 어차피 행정에서 하는 거를 뭐라 할 수는 없어요. [...] 그런데 행정한테 맡겨 놓으면 리빙랩이 아니라 간담회가 되어버려요. [...] 근데 처음에 왜 그렇게 됐냐 하면은. 안 와요 사람들이. 리빙랩이 뭔지도 모르고 일단 오라 하니까. 가니까 뭐 좀 주더라 돈도 좀 주고 하더라 이렇게 오는 거예요.</p>	<p>Different entities initiate and run living labs in fragmented ways [...] if we leave it to the governmental organizations, it becomes just casual meeting or official hearing, not a living lab. [...] The reason it turned out that way in the first place is that citizens don't come [and the public sector] just tried to attract people with other stuff without helping them understand what living lab is. So, people come saying, 'they give us something, some money.'</p>
<p>3.3 지자체 공무원들이 제안을 하는게 사실은 시민을 담보로 무리수를 두는 게 될 수도 있거든요. 민원을 제기하시는 분들에게 '이게 아이디어가 좋아서 우리가 검증해 봤더니 좋더라. 새로 나오니까 한 번 이용해 보세요.' 이런 얘기를 못하거든요. [...] 그럼 정부 기관이 비용을 들여서 [특정 기업]을 더 도와준다고 그러면 이걸 다른 관계자들이 봤을 때 뭐라고 생각할거냐 하는 거죠. 그러니까 이제 지자체에서는 그런 외부의 눈을 굉장히 의식할 수밖에 없는 겁니다.</p>	<p>Public servants in municipalities proposing new ideas can be seen as unreasonable or thoughtless trials on citizens. We cannot tell citizens that submit official complaints, 'this new idea is good, and we've verified it, so try using it.' Such conversations cannot happen. [...] Moreover, if governmental organizations use the budget to support a certain company, it might raise concerns among other stakeholders.</p>
<p>원래 [이름] 주무관님에서 또 중간에 한 번 누구 바뀌었는데, 또 바뀌었는가 보네. 그래서 연구자들이 항상 힘드신 거였는데. [...] 지자체 공무원이 다 바뀌어요. 그럼 [연구자들이] 또 지자체도 다 설득해야 되고 이런 애로가 있다고 계속 말씀하시거든요.</p>	<p>Oh, there seems to have been another job rotation on top of a job rotation from [a public servant's name] to another one earlier [...] The public servants of the municipality change all the time due to job rotation, then [the researchers] need to persuade the new person in charge, we hear that all the time.</p>
<p>3.4 [프로젝트/아이디어가] 지속 가능하려면 어느 정도의 가치를 만들 수 있어야 하고 거기에 ESG 나 수익적인 가치, 이해관계자들마다의 가치 같은 것들이 더욱 정리가 된 형태로 제안서가 있다면 더 좋을 것 같아요. [...] 그래야 다른 내부 분들에게 제안을 드리고 논의를 진행할 수 있을 것 같습니다. [여기가] 회사다 보니 정말 진행할 수 있는 프로젝트를 위주로 진행하는 경향이 있습니다.</p>	<p>[For a project or idea] To become sustainable, it needs to produce some value. And upon that, it would be better if there is an improved proposal with clearer benefits, such as ESG, profit, or values for each stakeholder. [...] Only then I can share it with others in our firm and drive the discussion. As this is a company, we tend to initiate projects that we can actually implement.</p>
<p>어떤 문제를 가지고 해야 할지를 포인트가 없으면은 다들 얘기를 안 하거든요. 팔장만 끼고 있지.</p>	<p>We just keep our arms crossed because we cannot have a discussion unless there is a clear matter to be discussed.</p>
<p>[결과물이 좋다고 느껴지는 프로젝트는] 열 개 중에 한 개 나올까 말까 하고 제가 봤을 때는. 왜냐하면 사람들이 전문성이 있는 게 아니고.우리가 했던 사업은 일반주민들로 구성된 단체들이 이제 생활하면서 불편을 느꼈던 부분에 있어서 이거 이렇게 해보자 실험을 말 그대로 하는 거지. [...] 근데 담당자 입장에서는 그런 거 자체에 의미를 두고 이해를 한다고 하지만, 상급자라든지 주변에서는 '너네 예산 이렇게 넣었는데 나오는 게 없어!' 이렇게 보여질 수밖에 없는 구조입니다.</p>	<p>Barely one out of ten seem to be [with successful outcomes] to me. Because the citizen teams don't have much expertise, our program supports them to address daily-life problems by literally experimenting. [...] Although I fully understand the significance of [citizen participation] as the person in charge, the organizational structure is so that my superior and others go, 'You've produced nothing with that much budget!'</p>