

**Enhancing resident engagement  
through a community-based  
approach for *The Green Village***



# Enhancing resident engagement through a community-based approach for *The Green Village*

## **Master Thesis**

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## Executive summary

This graduation project focuses on enhancing resident engagement in innovation testing at The Green Village (TGV), a living lab situated on the TU Delft campus. TGV serves as a field lab for testing sustainable innovations in real-life environments. While residents play a crucial role by providing feedback on these innovations, they often feel disconnected from the process, perceiving their contributions as undervalued or obligatory. This project aims to explore **how residents can feel more valued and engaged in innovation testing and the broader TGV community.**

The research was guided by two key sub-questions:

1. What challenges do residents currently face in the innovation testing process?
2. What factors contribute to resident engagement within the TGV community?

To answer these questions, the research employed a human-centered design approach, utilizing interviews, focus groups, and auto-ethnographic research. The findings revealed several key challenges that hinder resident engagement. Residents expressed dissatisfaction with the unstructured feedback process, a lack of clear communication, and limited recognition for their contributions. These factors led residents to undermine their roles, influenced by perceptions of how others view their contributions, compounded by the fact that their primary need is housing, not innovation.

The research on factors influencing resident engagement within the TGV community highlighted that community itself is both a cause and an effect of other engagement factors. Based on these findings and relevant literature, a strategic approach was developed to leverage community as a vehicle for connecting residents to the innovation process. Consequently, a community-based resident engagement framework was created to inform and support TGV in developing strategies and interventions that foster resident engagement. This framework is structured around four key elements: Identity, which helps residents form a collective identity within TGV; Interaction, which encourages meaningful exchanges between residents, employees, and innovators; Influence, which reassures residents that their contributions matter; and Impact, which ensures residents can see the tangible outcomes of their input. Together, these elements work to create a sense of community, serving as the foundation for increasing resident participation in innovation activities.

In addition to the framework, several actionable tools were developed to enhance resident engagement. These include the Moments of Intervention-Opportunity Map, which identifies key moments for TGV employees to foster engagement; a sensitizing booklet designed to help TGV employees understand residents' perspectives and better align their roles in the innovation process; and a quick insight & impact template grounded in the framework. This template enables TGV employees to gain a deeper understanding of the challenges residents face and identify issues requiring attention. Accompanying this is an evaluation template to assess which ideas could have the most positive impact. Further recommendations involve integrating the framework into TGV's innovation testing process and conducting additional research to evaluate and iterate the tools for maximum effectiveness. The research also uncovered interesting areas for exploration, including employees' perspectives on community building within TGV and the influence of gender differences in perceiving empathy.

In conclusion, this project underscores the significance of aligning resident needs with TGV's innovation goals. By fostering a stronger sense of community and ensuring that residents feel valued, TGV can cultivate a more engaged and motivated resident base, ultimately enhancing the success of its sustainable innovation testing. The framework and tools developed provide a foundational starting point for TGV to establish a more user-driven and collaborative living lab environment.

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# 01 | Introducing the project

This chapter introduces the project context, key stakeholders, the problem space, and the approach that will be followed throughout the project



Figure 1.1. The Green Village

## 1.1. Context of the project

### Introducing The Green village (TGV)

The Green Village (TGV) is a field lab situated on the TU Delft Campus, designed to foster sustainable innovations in the built environment. Unlike typical environments, TGV operates free from standard rules and regulations, including the Buildings decree (Bouwbesluit). This flexibility enables innovators to test their innovations and experiment at the neighbourhood, street, and building levels. Open to knowledge and educational institutions, entrepreneurs, government bodies, and civilians alike, TGV provides a collaborative space for research, experimentation, validation, and demonstration of sustainable innovations.

TGV's test-bed allows for research on various innovations related to the living environment. Research themes include applying new materials, testing new

services, water innovations, DC grids, and innovative appliances. The Green Village features office buildings, terraced houses, streets, a DC, and networks for hydrogen and heating. Everything is designed for easy and cost-effective integration of new innovations. In collaboration with DUWO, the houses are inhabited by real residents (TUD students), ensuring that innovations undergo real usage, consumption, and feedback. TGV hosts many thousands of visitors each year, showcasing the innovations being tested. Tours demonstrate the various sustainable technologies and approaches in use. TGV also hosts a data platform that collects technical data (e.g., energy consumption, air quality, and water consumption) to analyse the performance of tested technologies in and around the built environment. This data, gathered by sensors and loggers installed in and on the buildings and streets, provides critical information to improve these solutions.

## Stakeholders

The stakeholders of TGV include its employees, residents, innovators, visitors, and other collaborators.

### Innovators



Innovators, including researchers and entrepreneurs, choose TGV to conduct their research and test projects. These projects are often initiated by the innovators themselves and may be brought in by other collaborators, such as social housing corporations aiming to create sustainable solutions for the housing sector. Additionally, TGV initiates research through graduation opportunities for TU Delft students, with project topics evolving from existing or past research, innovation projects, or operational needs.

### Residents



Residents are the inhabitants of the buildings within TGV. The terrain includes various types of residences, such as studios and two-bedroom houses, and tenants come from diverse backgrounds. The housing, managed by DUWO, is primarily offered to students and PhD candidates.

### Employee



Employees of TGV facilitate innovation projects and maintain the terrain. Their roles span project management, operations, and communication. They also become users and test innovations.

### Visitors



Organisations and institutions visit TGV for tours and events. The terrain features an event space called the co-creation space, which is available for event rentals. Tours are organised to showcase the installed innovations, highlighting the sustainable technologies and practices in place.

### Other collaborators



Collaborators are the early adopters, including public and private organizations that fund or adopt the innovations. Some notable collaborators are the social housing corporation WoonFriesland, tenant associations, as well as government and municipal bodies.

## Terminology Clarification

**Users:** In this report “User” is a collective term to denote the residents and TGV employees who gets involved in innovation research and testing.

**Key stakeholders:** In this report “Key stakeholders” is a collective term to denote the primary stakeholders involved in the innovation testing and feedback process – Residents, TGV and Innovators.

## Understanding TGV’s role in innovation

TGV offers comprehensive support for the development of innovations aimed at creating sustainable living, working, and living environments with social relevance. This support encompasses various themes, including homes, offices, outdoor spaces, mobility, energy, water, circularity, and data.

Innovators retain ownership of their projects throughout the entire process. This means that individuals, organisations, or consortia are responsible for the design, financing, realisation, and implementation of their research. TGV accelerates sustainable innovation projects by facilitating the building, testing, and dismantling of innovations on its premises. Additionally, TGV assists in scaling up innovations, making it easier for innovators to transition from theory to practical implementation.

TGV has a structured process to ensure a smooth innovation journey, consisting of four phases: Intake, Preparation, Live at TGV, and Moved on. Throughout the entire process, innovators maintain ownership of their projects.

### Intake Phase

The intake phase begins with a personal interview conducted by a member of the management team. During this phase, the idea is defined, and the scope of a viable innovation project is collaboratively established. This project will be developed or implemented at TGV or within one of its test-beds. The successful completion of the intake phase results in outlining the project’s parameters and signals the start of the preparation phase.

### Preparation Phase

In the preparation phase, detailed discussions take place to determine the specific type and level of support required. Innovators are connected with a project manager from TGV, who collaborates with them to integrate their innovation into TGV’s physical and data infrastructure. The project manager also facilitates discussions to address any matchmaking needs within TGV’s business, scientific, or government network. Throughout this phase, the initial management team member continues to provide background support.

Comprehensive development and realisation planning, along with research and innovation processes, converge in formulating the contributions and terms outlined in a jointly drafted project plan.

### Live@TGV Phase

The live phase involves the active implementation of the project. The project manager guides innovators through addressing questions outlined in the project plan. TU Delft collaborates with institutions like The Hague University of Applied Sciences, using the project’s challenges as educational cases for students. This practical application of knowledge is a cornerstone of TGV’s approach.

TGV approaches innovation project questions from four perspectives: science, business, legislation and regulations, and public engagement. This holistic view ensures that all necessary domains align seamlessly for successful project scaling. The team helps overcome challenges through various means, such as knowledge sessions with officials, thematic discussions with researchers and entrepreneurs, and networking events with potential clients.

### Moved on Phase

Towards the end of the term, a final evaluation is conducted to formally conclude the project. Key lessons and conclusions drawn from the project’s outcomes are documented. This output serves as a foundation for advancing to the next phase, whether it involves engaging potential launch customers or pursuing spin-off projects. Often, these opportunities have already been initiated during their tenure at TGV.

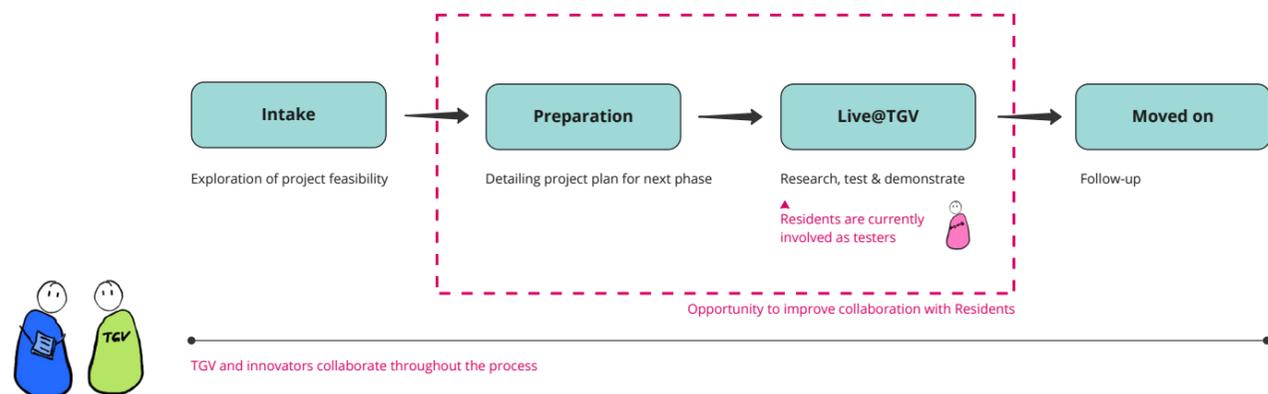


Figure 1.2. TGV innovation process

### Existing feedback approach in TGV

During the live phase at TGV, innovations are tested on one of the buildings or on the terrain. The users, including inhabiting residents and TGV employees, report any issues and concerns to TGV team or the innovator and provide feedback when requested. The testing period varies depending on the project. The most common feedback methods are interviews and questionnaires, chosen for their efficiency and ease for both the inquirer and the respondent. Inquirers select the methods they are most comfortable with, as TGV does not enforce a specific structure for feedback collection. In addition to the technical data hosted on the data platform, innovators can install additional sensors and loggers to measure relevant technological data.

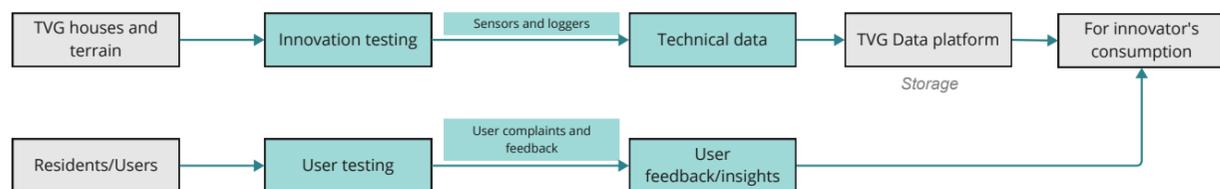


Figure 1.3. Data sources (own visualisation based on discussion with TGV)

### Challenges in collecting and utilizing resident feedback in TGV's Innovation testing

Residents are recruited by TGV through conducting interviews to align interest on sustainability and to share the contribution expectation. The house rent at TGV is set below market rates as an incentive for residents, serving as compensation for their cooperation and contribution to innovation testing within the field lab. Innovators involve the users in the research and innovation testing and get feedback on the innovations. At the end of the testing, the project is evaluated by TGV and relevant collaborators to take it for further pilot testing. User feedback is an important criteria for this evaluation and further decision making by the collaborators.

However, this innovation ecosystem faces several challenges when it comes to collecting resident feedback that could enhance innovations. While TGV has a robust data platform that hosts technical data, the generation and collection of resident feedback are not yet streamlined. This is due to several factors: the diversity of innovation projects at TGV, the stage at which these projects enter TGV (usually in the prototype testing phase), the varying research requirements, and the innovators' experience and expertise with user research.

Currently, innovators at TGV gather feedback from residents through interviews or questionnaires at the end of the testing phase. However, these methods are not used frequently or in a detailed manner, focusing primarily on the functionality of the innovation and basic aspects of user experience. The quality and effectiveness of these feedback sessions, as well as the mediums used, heavily depend on the individual innovator's expertise. These methods are not structured to collect in-depth user insights that could be valuable for improving the innovation.

This poses a significant challenge for innovators, particularly as they move toward implementation and scaling up their innovations. Since these innovations are related to the built environment, early adopters, such as social housing corporations, often focus on the innovation's suitability for their target group—something that could be better informed by user insights. When testing fails to generate reliable user insights, adopters struggle to make informed decisions, which affects both the success of the innovation and TGV's overall impact.

Additionally, while residents test innovations and provide feedback when prompted, they often feel that their feedback is not being used effectively. They rarely hear back about how their feedback has been integrated or receive project updates, leading them to question the value of their input in the innovation process and their role within the TGV community.

### Aim of the project

This project, in collaboration with TGV, was initiated to explore the challenges in gathering resident feedback on innovation testing and resident satisfaction with TGV. The project initially sought to explore the feedback process and develop a solution to address challenges in collecting reliable data. However, following the initial research (section 2.2), the problem was reframed to focus on the research question: "How can residents feel more valued and engaged in innovation testing and within the TGV community?" Through identifying the specific needs and challenges residents experience during the innovation testing and feedback process and within TGV, the study aims to develop an intervention to foster resident participation and engagement in the innovation process and within TGV community.

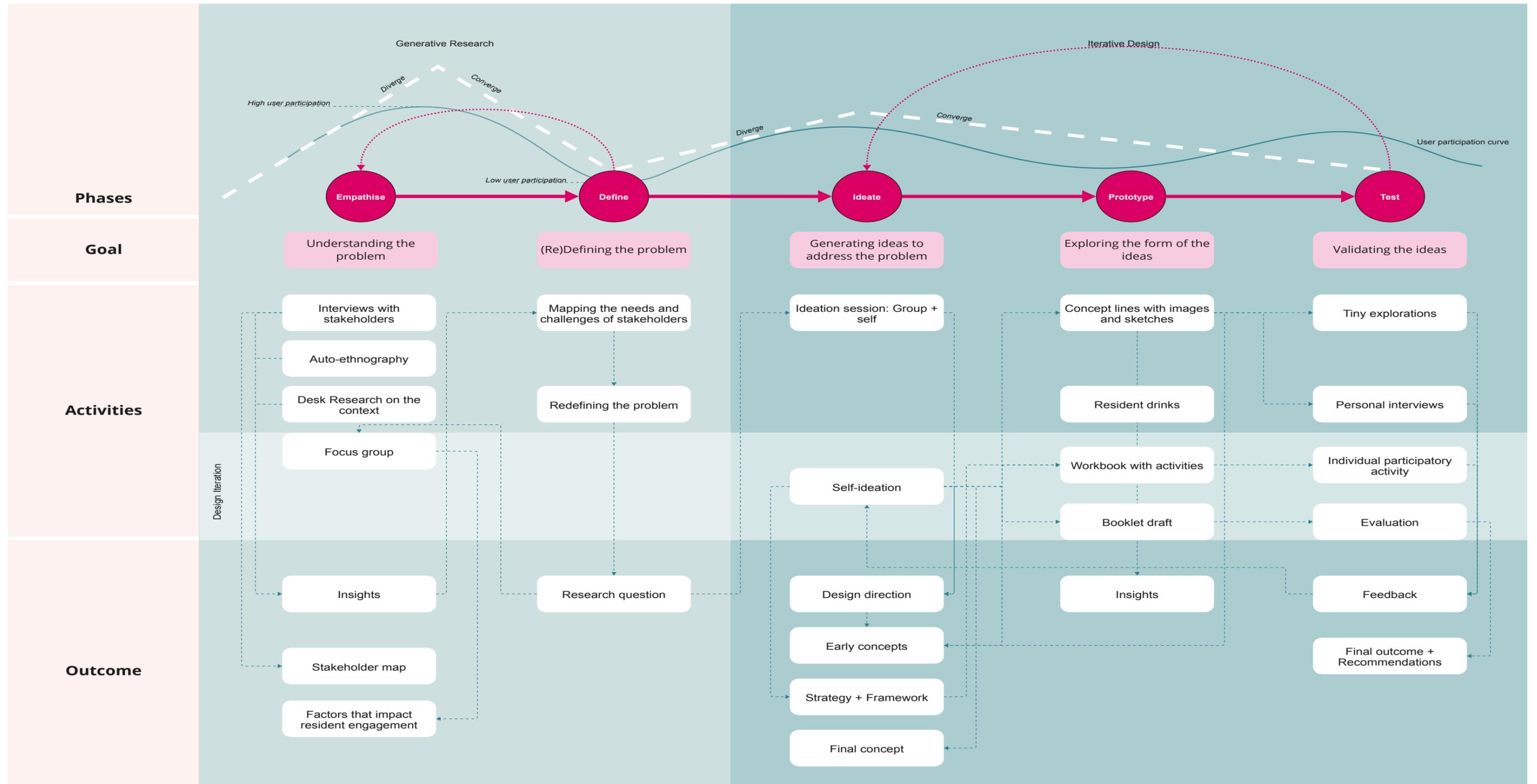
## 1.2 Project approach

The initial project brief highlighted the complex multi-stakeholder environment and interdependencies, illustrating how various challenges are interconnected. It emphasized not only quantifiable issues but also sensitive aspects, such as residents feeling that their

feedback was overlooked. In light of this, I chose a participatory and iterative approach that prioritizes the needs of all stakeholders. This strategy allows me to uncover deeper insights into the context and address the root causes of the challenges.

To achieve this, I employed a human-centered design thinking approach, which centers on people throughout the problem-solving process. This ensures that the solutions developed resonate with the actual needs, desires, and challenges of the community. The approach consists of five stages: empathize, define, ideate, prototype, and test (Designers Academy, 2024). By using this human-centered methodology, users are

actively involved in identifying issues, generating ideas, and validating solutions, ultimately fostering a more effective and inclusive outcome.



# 02 | Understanding the context

This chapter focuses on exploring the context more deeply through a combination of literature and qualitative research methods, providing a clearer understanding and insight into the problem. The aim is to build on earlier insights, uncover the root causes related to resident involvement and experiences in innovation testing and feedback processes, and ultimately redefine the problem that the project seeks to address

## 2.1 Understanding Living labs

TGV operates as a living lab, and this section explores the importance of user involvement in driving innovation. It examines how living labs facilitate user participation, the challenges associated with this process, and offers an overview of key considerations when addressing the challenges within TGV. By understanding these aspects, we can gain valuable insights and inspiration to guide the development of effective solutions.

### *Why is user involvement necessary for innovation?*

Research highlights that incorporating customer insights into product innovation significantly enhances both product novelty and the likelihood of success (Brockhoff, 2003). Von Hippel (1978) explains that customer descriptions of their needs often include valuable hints about the type of solution they want and how the product should function, which can be overlooked by researchers who focus solely on needs without considering these design insights. Therefore, it is crucial to engage continuously and frequently with users throughout the design and development stages (Shaw, 1985).

The role of users in innovation has been extensively studied, showing that early and close collaboration in the innovation process between producers and customers often results in effective design and successful outcomes. Gardiner and Rothwell (1985) argues that users should be actively involved and regarded as partners in the innovation process. Conway (1993) outlines two models of user involvement: the Manufacturer Active Paradigm (MAP), where users mainly act as passive respondents providing input only when asked, and the Customer Active Paradigm (CAP), where users develop product ideas and approach suppliers. Conway argues that this strict division oversimplifies the complex role users play, which is consistent with Foxall and Johnston's (1987) observation that user involvement is a dynamic process that cannot be neatly categorized. Shaw, (1985) mentions when product development is more focused on how the product will be used in real-world situations rather than just in controlled lab settings, users become much more important in the innovation process. This is because users provide practical insights and feedback based on actual use, which can lead to more effective and relevant product improvements.

### *What is a living lab?*

A living lab, as a type of open innovation that incorporates external participants into the innovation process ("Open Innovation," 2006), offers a real-life environment that encourages collaborative innovation among individuals to address challenges. Living labs are generally driven by two main ideas: Users are considered as co-creators, experimentation is conducted in real life settings (Almirall et al, 2012). Living labs focus on collaboratively developing ideas, exploring possibilities, testing innovations, and assessing outcomes (ERAC, 2019), all while using various methods and actively engaging users in the process(ENoLL, 2019).

### *What is the role of users in a living lab?*

Living Labs engage end-users deeply in the innovation process and for an extended period using various research methods in an iterative manner (Georges et al., 2015). This approach leverages the creativity and insights of end-users to better understand the possibilities and limitations of innovations. A key aspect to this approach is studying how users interact with technology or prototypes in their natural environment early in the innovation process (Ballon et al., 2005). This interaction is facilitated through methods like field trials, which test new technologies, products, or services in real-life settings rather than controlled lab environments. These field studies help uncover how technologies are used and adopted in real-world contexts, capturing all relevant social and technological factors (Kjeldskov and Skov, 2014). Data collection methods in these trials include sensor logging, interviews, observations, and user reports. The goal is to understand users' perspectives, practices, and eventual uses of the system, with users actively testing and providing feedback (Brown et al., 2011).

**Some of the common methods and tools used by living labs to involve users in its activities...**

Huang and Thomas (2021) categorized methods and tools for living labs based on a review of 42 empirical studies across various fields, such as urban living labs, ICT, and health.

Structured interaction	Design approaches
Observation survey usability testing user testing self-reporting methods	Bottom-up approach Design thinking Design-driven focus approach Participatory design Practice-oriented design
Flexible interaction	Techniques
Interview, focus groups co-creation workshop co-joint analysis Follow-up visit social/co-working space User meeting User-experience field studies	Storytelling Hackathon Cultural probe MoSCoW method Round table Serious game simulation Virtual engagement/community World cafe
Extended network	Operational guidelines
"Living room" for users Community workshop Create/use local user community Inter-disciplinary groups Public awareness campaigns Broader network of participation	Iterative approach The "living" aspect Combined tools Communication Testing initiation process Multi-methodological approach Incentives The benefits & co-creation aspect
Special actors	Tools
Ambassador Helpdesk Lead user Mediator Prime mover	Blog Call/text message/chat/email Diary Feedback form Feedback software Individual workbook Mobile application Multi-media tool Newsletter Shared web portal for co-creation and/or reporting Postal service Sensor toolkit Service point Social media platform Website
Learning and engaging	
Idea Competition/campaign Tailoring Team building User training "Having fun"	

Figure 2.1. Summary of methods and tools used for user involvement in Living labs (Huang and Thomas (2021))

**Here comes the challenge...**

The user-centric approach of living labs encourages active involvement, incorporating users' insights into the value creation process and enhancing innovation capabilities (Leminen et al., 2012). However, despite the aim of fostering co-creation, users have yet to reach the expected level of active participation (Greve et al., 2017). Many remain passive throughout the innovation process (Nyström et al., 2014), which makes it difficult to demonstrate their true impact. Thus, the challenge extends beyond securing participation to meaningfully engaging users in living lab activities.

**Barriers to user engagement**

Ståhlbröst et al. (2013) highlight four factors that affect user engagement in online Living Lab processes and communities - First, the innovation process itself is crucial. If an innovation is too new (innovative), users might not see its relevance to their daily lives. If it's too developed, late in the innovation development process, users may feel their feedback won't make a difference to enhance the innovation. Second, the community matters. This includes the number of participants, having a facilitator, offering rewards, and ensuring people are motivated to join. Third, the content needs to be high-quality, interesting, and timely. Finally, the platform should be capable of supporting, storing, monitoring, and encouraging user participation effectively. Though their study isn't directly about field trials, the insights are still useful for this study context.

Additionally, there are several practical considerations that could impede field trials. Participants may alter their behavior based on what they believe is important, and social interactions can affect results (e.g., enthusiastic participants may influence others). Furthermore, the design and presentation of the trial can impact how the innovation is used. To address these issues, researchers should engage as participants rather than merely controlling the trial (Brown et al., 2011). An open, interactive approach to field trials can be more effective and insightful. Researchers must make careful methodological choices regarding the realism of the context and the sophistication of the prototype (Korn and Bødker, 2012).

Veeckman et al. (2013) suggest that living labs should have a dedicated user group to avoid the time-consuming process of recruiting new users for each activity. Additionally, strong community support is crucial to maintain user engagement. One major issue is recruiting enough motivated and engaged users for the long term (Finland, 2012). The Living Lab approach emphasizes the difficulty of finding such users, and there is limited research on how to keep them engaged throughout the trial. Georges et al. (2015) highlight that a decrease in users' interaction with the innovation during the trial is itself an important insight, but it is essential to gather detailed feedback from users to understand the reasons behind their behavior. This feedback is critical for refining the innovation to better meet user needs. Since setting up a field trial is resource-intensive, maximizing user contributions is essential to achieve the intended benefits.

**How to engage users?**

Engaging users in field trials effectively requires a multifaceted approach. Community support plays a crucial role in keeping users motivated and committed throughout the trial (Haukipuro & Väinämö, 2019). Georges et al. (2015), in his case study analysis of living labs, outlined several considerations that influence user engagement. Considering the functional maturity and specific characteristics of the innovation is essential when engaging end-users, as these factors influence user interest and engagement levels. While high functional maturity resembles go-to-market innovation, it decreases the users' willingness to test it. Interaction and trust between test-users and other stakeholders are vital for active participation. Building a strong community and providing a robust platform can significantly enhance user engagement. Stimulating users with specific tasks and incentives can further motivate them. Many Living Labs tailor their approaches to empower users through co-creation, ensuring that users feel valued and integral to the process. Regular contact and interaction with test-users can increase their trust in the innovation and the trial itself. Additionally, implementing improvements based on user feedback not only enhances the innovation but also motivates users by demonstrating that their input is valued and impactful.

**Research gap**

Studies have shown that the heterogeneity of methods used in living labs complicates broader adoption and comparison (Mulder, 2012). The diverse methods, activities, communication channels, and reporting in living labs hinder effective knowledge exchange. Social outcomes are hard to measure, and the project and organisational diversity within living labs further obstructs the flow of knowledge. Additionally, the methods and tools used often fail to demonstrate the unique aspects of living labs. There is inadequate information about how living labs actually involve users (Puerari et al., 2018). Additionally, measuring the effectiveness of user-centric approaches remains an underexplored area (Ballon et al., 2018). The term "living labs" is often used loosely, leading to varied practices and methodologies that may lack clarity and precision (Huang & Thomas, 2021).

According to a literature review by Følstad (2008), the methods for involving users in living labs generally include ethnographic techniques like observation, as well as interviews, questionnaires, and focus groups. This suggests that although these traditional methods are useful and are appropriate for some living labs, they have not evolved or improved significantly in the context of living lab research. With the rise of ICT, new technology-enabled innovation methods are gaining attention. There's a shift from user-centric to community-centric involvement, but studies on the potential of digital living lab user communities are still few (Haukipuro & Väinämö, 2019).

**In summary...**

Living labs involve users in the innovation process deeply in their natural environment. Literature research indicates that users play a key role in contributing to innovations in a living lab setup, and user involvement/engagement is a key challenge in any living lab. Studies suggest various methods and strategies to enhance engagement, but the challenge is that the context of each living lab is so different that it is difficult to transfer the knowledge and methods used in one to another.

## 2.2 Understanding TGV stakeholders

### Interviews with stakeholders

**Aim:** To understand the needs and challenges of the stakeholders involved in the innovation testing & feedback process

I conducted 8 interviews with stakeholders of the TGV (Figure 2.2) - Residents, researcher, entrepreneur, collaborators of TGV like the social housing corporation and tenant association and a project manager of TGV. The interviews were semi structured with questions around the motive, needs and challenges of working with TGV and also their needs and challenges with the feedback approach (See appendix B for the interview questions). It was a 45-60 minutes interview and most interviews were conducted online on Microsoft Teams. I used Microsoft Teams and Microsoft Word to transcribe the audio and used Atlas.ti to perform thematic analysis as it helps to identify and interpret patterns or themes within a data set, often providing new insights and deeper understanding (Thomas, 2006). I adopted inductive thematic analysis and performed multiple rounds of coding and clustered them in miro (Figure 2.3) as it helped to visually group and map their connections. Based on similarities, I clustered the data into themes and sub-themes (Figure 2.4), which will be discussed in this section. Themes represent general concepts or ideas expressed by the participants, while more specific concepts are organized under sub-themes.

Code	Role
P1	Resident
P2	Resident
P3	Resident
P4	Representative from Social housing corporation- Woonfriesland
P5	Representative from Tenant association- De Bewonersraad Friesland
P6	Researcher at TGV
P7	Entrepreneur at TGV
P8	Product manager of TGV

Figure 2.2. Interviewed participants

### Insights from the interview

#### TGV's Contribution to Sustainable Innovation

TGV is dedicated to creating sustainable, affordable, and accessible technologies for the built environment and see themselves as a testing facility for sustainable innovation. The transition to sustainability involves three key dimensions: social, economic, and technical. Innovation, sustainability, and collaboration are TGV's core values and they act as a threshold for the innovation projects. TGV is highly preferred by innovators for its controlled, authorized real-world conditions and offers opportunities for research involvement to residents and staff, supported by comprehensive services.

*"If new products are tested at the Green Village, then they also get a lot of exposure to, let's say, to visitors and that is not something you would have had in different buildings" (P6)*

*"The Green Village staff also help with organising events around the research project and they have a large network for that, so that makes it also a lot easier" (P6)*

*"The Green Village gets a lot of start-ups who are just knocking at the door, like, 'We have a great innovation, can we maybe test here?' because they're a well-known brand in the innovation and startup world." (P4)*

*"I think that's the value of TGV—that you have a controlled and authorized, and also highly recommended, university where you do a pilot." (P7)*

#### TGV Innovation projects and Stakeholders

Stakeholders in TGV have diverse needs and goals, including knowledge acquisition, feedback, access to research facilities, testing space, and living accommodations. Evaluation criteria include sustainability impact, affordability, user-friendliness, ease of installation, low maintenance, broad applicability, and user experience. Currently, there is no structured feedback approach; instead, resident complaints are often used to assess user-friendliness, while behaviour questions evaluate product suitability. However, innovators do not view this as a robust data source for meaningful impact. Collecting feedback from a larger sample would provide broader perspectives, which are essential for making informed decisions.

*"If they had trouble with if one of the owners, one of the tenants of the homes, had some trouble with the product, we will most likely hear it and I think right now that's the the benchmark for user friendliness, so there's not really like a number or a statistic we use or like even a questionnaire we use." (P4)*

#### User feedback in the innovation process

Residents, TGV employees, and in some cases, external participants like students and researchers from TU Delft participate in innovation testing and provide feedback on the same. The current feedback approach most often involves user interviews or questionnaires during testing, however they are not frequent. WhatsApp is used as an official communication platform for employees to share information regarding testing plans and announcements with residents, as well as for TGV residents to report complaints. Residents find it effective for sharing immediate concerns and feedback.

*"But to be fair, like I said, there's only been 2 questionnaires" (P2)*

*"If it's very specific to an innovation that is installed at the moment, that's usually like a WhatsApp group with the innovator and someone from the Green Village who is managing the project. I would just, you know, put a message" (P2)*

#### Common challenges impacting innovation in TGV

Testing challenges at TGV include contextual differences from real-world scenarios and its non-representative size compared to Netherlands, alongside infrastructural constraints requiring careful planning for space and resident availability. Funding remains a significant bottleneck for startups. Most projects here focus heavily on technology, often overlooking user contributions, with researchers and innovators typically not seeking feedback unless prompted by TGV. Limited interaction among stakeholders impedes broader collaboration and co-creation in innovation. The extent of collaboration often depends on innovator's individual attributes, their expertise and personal traits. Also, most projects arrive at TGV in prototype stages, further limiting opportunities for active co-creation.

*"..the user group is too small to be representative for Holland, right? But it could be a pre step in terms of,ok so in this small user group we have learnt this and this and we can take this on into a bigger user group and do another test.." (P6)*

*"A lot of cases they don't know. Because to be honest, like a lot of those innovations are kind of technically grounded or the tech-*

*nology is the starting point. And then, yeah, during the process they discover, hey, there are also like real people around it. So my project is not only technology, it's also like a lot of other factors. And we try to tell them that in beginning, but usually it takes a bit before they understand it. And usually they understand it better when they discover themselves" (P8)*

#### Role and perceptions of TGV Residents in Innovation and Feedback Processes

The main purpose of having residents in TGV is to simulate a real living environment where they are expected to just reside and provide honest feedback when requested. They are viewed as both naturally motivated users and obligated participants by other stakeholders. Residents also perceive their role as primarily being a resident who follows rules and offers feedback, with uncertainty about their broader contribution. Their main motivation to participate stems from rental and contractual commitments, with only a limited reflection on their contribution to innovation. While they desire greater involvement in innovation, they feel they may lack the necessary knowledge and express concerns about how such involvement could affect their comfort.

*"Yeah. Well, I think we don't have problems with the tenants in Delft because they signed like a Guinea pig contract. So they know they live in a test building. So they know they're sometimes asked to evaluate some of the some of the stuff. That's why they have a lower rent." (P4)*

*"And of course we can make use of the people working there so the people of the Green Village as Guinea pigs..." (P6)*

*"and the tenants in in Delft (TGV), they know we are renting a very cheap place and they know they are part of the experience, so they are very motivated of being asked about innovations to test it to use it." (P5)*

*"No, I think when when we had some discussions with the users themselves, they know that they are living in the Green Village and that they have a cut on their rental costs and their energy bills, they don't pay any energy and water bills. So they know that in return they need to help with these innovations." (P7)*

*"For next year, they might introduce new innovative thing in my house. OK, I learn how to use that. That's it. But I don't feel I'm contributing this." (P1)*

*"I thought there would be more innovations and more and more people installing things and checking up on things, but that's not necessarily a bad thing to not have met that expectation because it means less people in my house." (P2)*

## TGV Residents experiences and challenges

Residents arriving at TGV, get basic information about the innovations on the terrain during interviews and tours which prepares them for what to expect. Despite this preparation, adjusting to the living environment, advanced home technologies, and ongoing research activities proves challenging in the first few weeks but TGV employees are quick to help with any problems. Over time, residents get used to the technologies and innovation activities, but they often face unexpected utility and maintenance issues because the tour didn't give enough practical details about how things work at home. Confusion about whom to contact leads to unnecessary calls, and residents aren't always informed about activities or changes. Privacy is also a concern because of sudden visits and visitors on tours especially on weekends. There's not much interaction among residents, which makes some feel lonely. TGV tries to foster socialising with monthly drinks and keeps residents informed. Residents used to have dinners that don't happen anymore, and the WhatsApp group isn't as active, reflecting a fading community spirit.

*"Some sometimes, yeah. I feel a bit lonely because neighbours are quite separate." (P1)*

*"Sometimes a lot of the people visiting the Green Village, yeah. I*

*mean, yeah, it's not very often, sometimes people tour or visit on weekends, early morning where they walk starting from 8:30 or 9:00 (implies that its bothering)" (P1)*

*"Well, I suppose privacy and the tours mostly (is the challenging aspect of living in TGV)" (P2)*

## Factors influencing overall resident satisfaction in TGV

Residents in TGV generally express satisfaction with their living conditions, appreciating the affordable housing, facilities, and support provided by TGV staff. However, their overall contentment can be impacted by issues related to utility and maintenance, as well as concerns about comfort and privacy. These challenges often arise when innovations do not function as intended, leading to some inconveniences.

Working towards common goals can foster a sense of community; however, some residents feel lonely and disconnected from that community. Although residents have previously experienced a strong community spirit largely nurtured by their diverse backgrounds and mutual support, this sense of connection has unfortunately weakened over time.

*"Like as an outsider, either as an international person, sometimes you feel a bit outside of the community" (P3)*

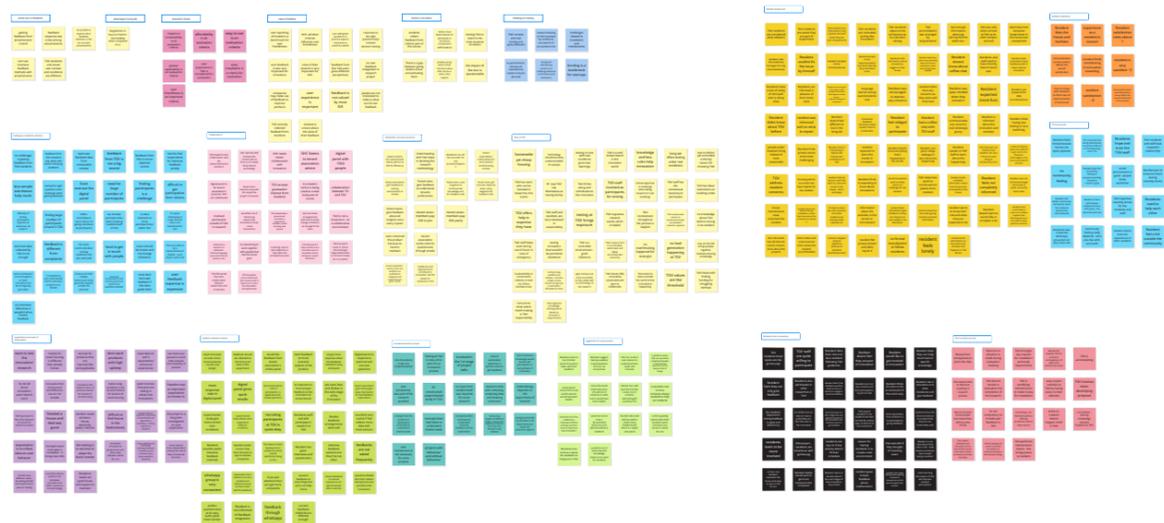


Figure 2.3. Clustering interview codes into sub themes\_snip from miro



Figure 2.4. Emergence of themes and sub themes

# Stakeholder Map

This stakeholder map has been created based on insights from stakeholder interviews. It outlines the stakeholders and their relationships within the project, highlighting their needs, expectations, and challenges. The map also illustrates the direct and indirect influences of key stakeholders in the innovation testing and feedback process.

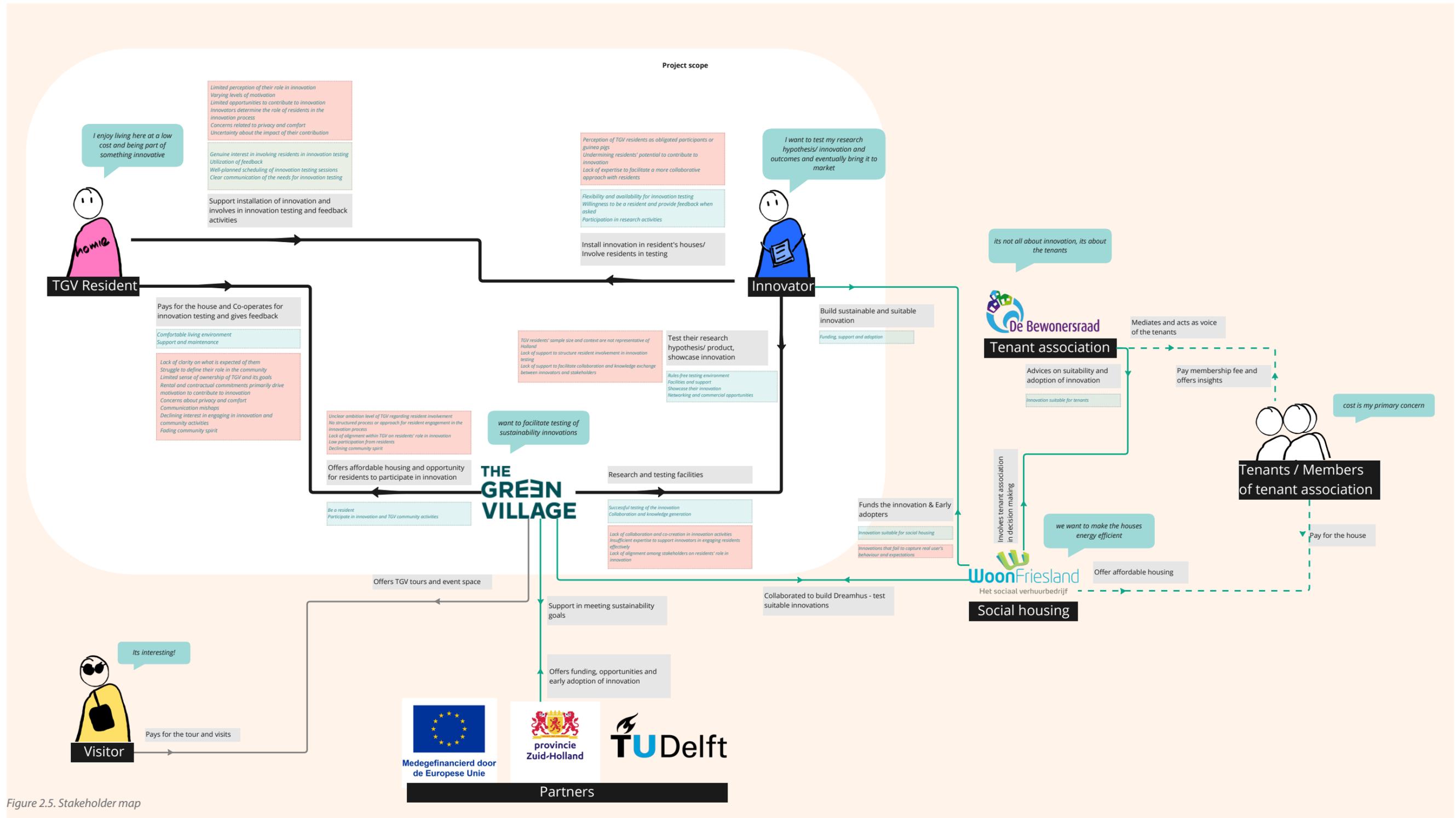
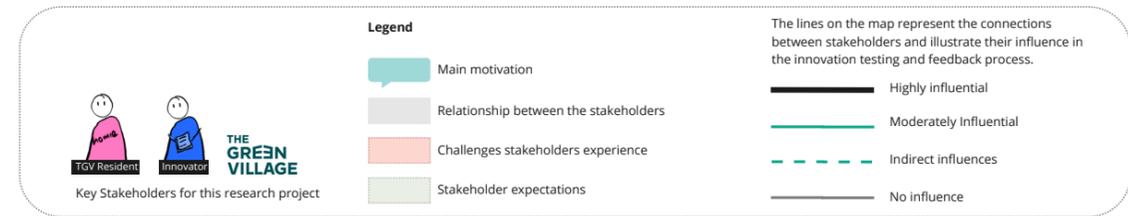


Figure 2.5. Stakeholder map

## Auto-ethnography

### What is auto-ethnography?

"Autoethnography" is an approach where the researcher studies a setting they are directly part of. By living or working in that setting, the researcher uses their own experiences and insights to gather materials for the study. The key difference between autoethnography and traditional ethnography is that, in autoethnography, the researcher is studying a place they are personally involved in, rather than observing from the outside (Alvesson, 2003).

As part of the project, I was fortunate to live in TGV during my entire graduation project. This turned out to be the best way to truly understand TGV from the perspective of a resident. I carefully documented my experiences during the first month, including my onboarding process, getting familiar with TGV's innovations, reporting systems, support structures, and the community itself. Although I stopped documenting after the first month, my ongoing research and insights were shaped by living there and seeing things through a resident's eyes.

While this approach gave me valuable insights into the residents' experiences, which might not have been

as clear through interviews alone, it may have also introduced some bias into my research. To minimise this, I made sure to validate and compare my experiences with those of other residents, only noting patterns that were commonly shared.

Personally, I found this method very effective and helpful. It allowed me to experience life as a typical resident, form connections with the community, and empathise better as a designer. It has also created a strong desire in me to design something meaningful for the community I became a part of.



Figure 2.6. Author from her studio in TGV

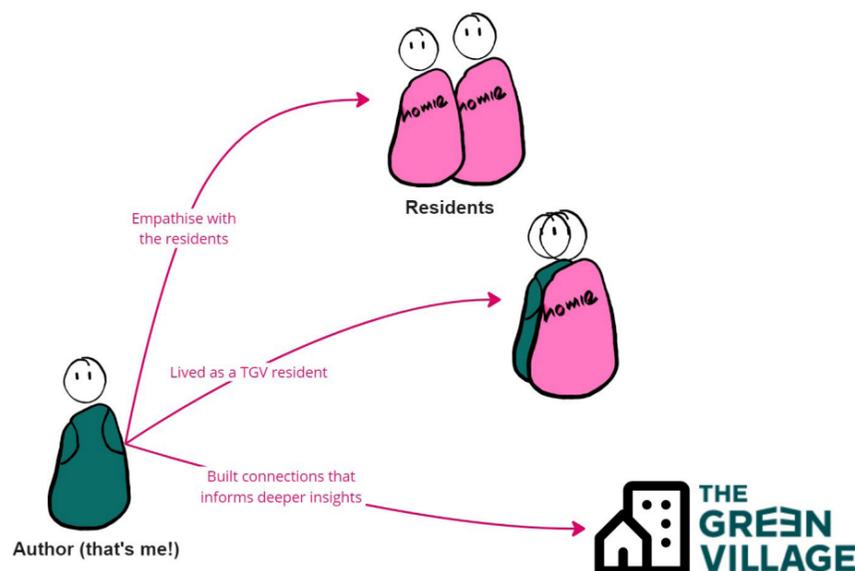


Figure 2.7. Illustration of how autoethnography contributed to this research.

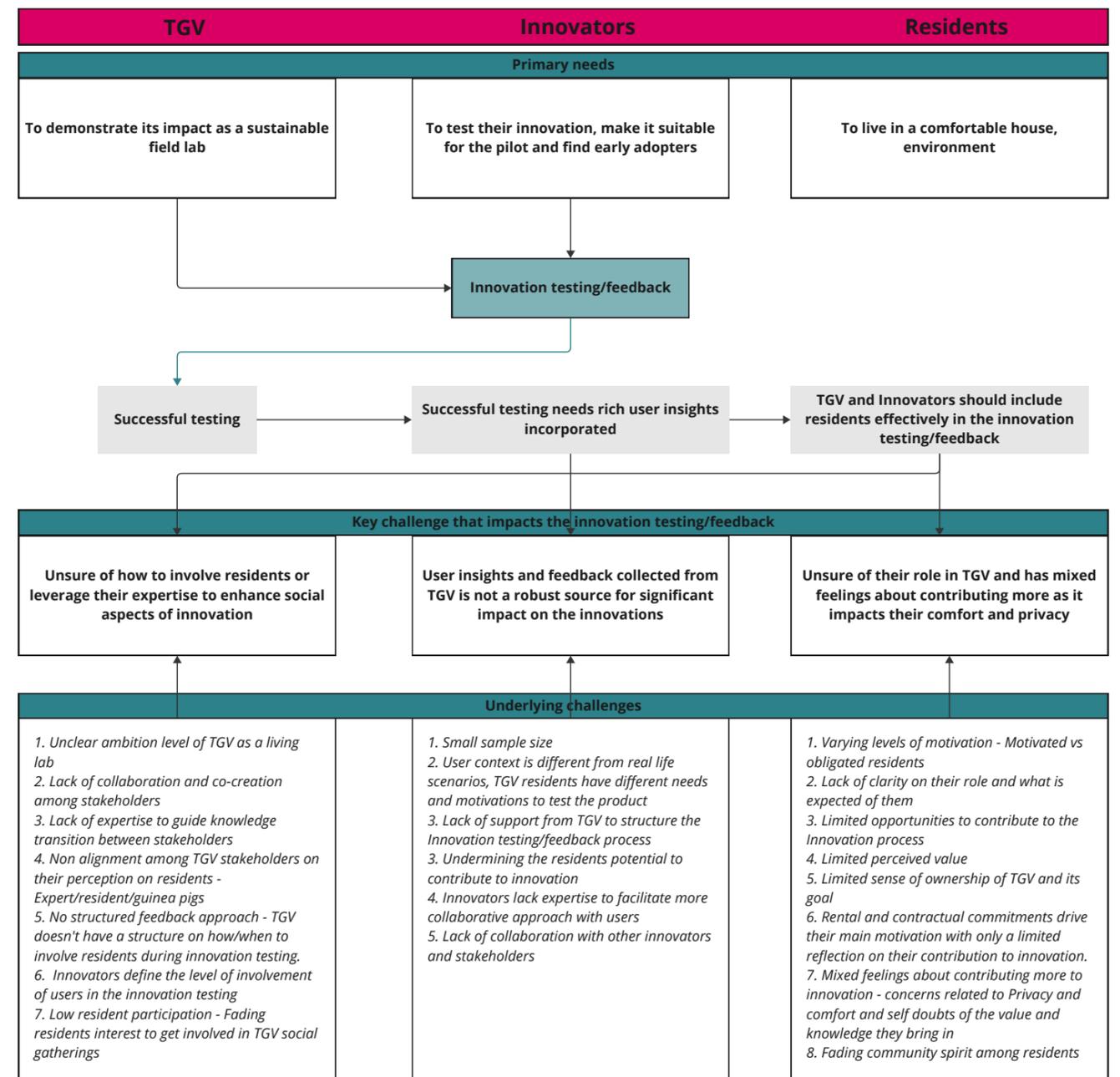


Figure 2.7. Primary needs and challenges experienced by key stakeholders identified from interviews

## 2.3 (Re) defining the problem

The interviews with the stakeholder revealed that the problem is not with the feedback collection methods but with stakeholders' limited interest to involve residents in the innovation process and resident's limited interest to get involved. The interviews also exposed the declining community spirit. The literature study on living labs also highlighted resident engagement as one of the key challenges in living lab. To summarise, the key Issues Identified related to resident engagement are:

### Suboptimal use of residents' expertise to enhance innovation

Innovators feel that the resident sample at TGV is too small and not representative of the broader population in the Netherlands to effectively study and use to enhance the societal fit of the innovations. Additionally, they believe residents participate in research out of obligation. Innovators also lack the skills to effectively engage residents in the innovation process. Currently, TGV does not have a structured feedback system, leaving it up to the innovators to determine the residents' role and level of involvement in innovation efforts.

### Implications for TGV:

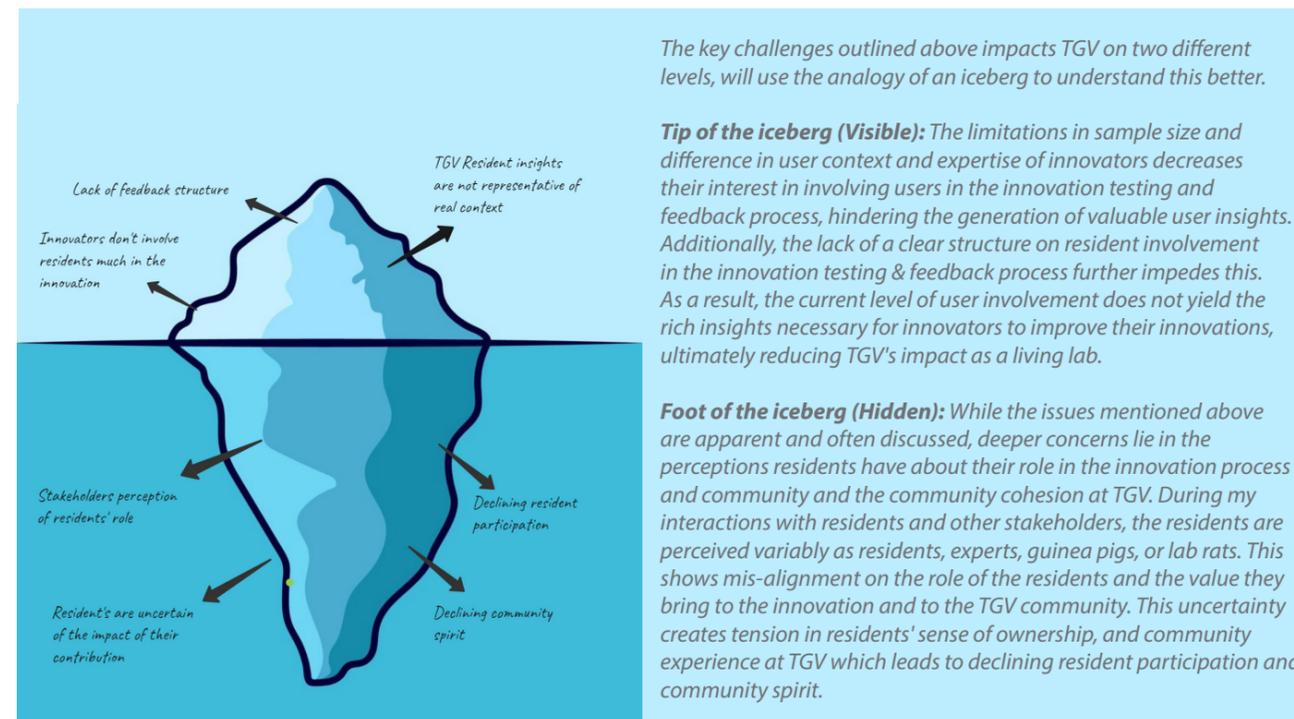


Figure 2.8. Analogy to explain visible and hidden challenges

### Declining resident engagement and community cohesion

Residents are seen as both motivated and contractually obligated users, but many are unsure about the impact of their contributions. While they are interested in supporting innovation, they have mixed feelings due to challenges with comfort and privacy during their stay at TGV. Some residents also mentioned feeling lonely and noticed a decline in social interaction and community spirit. This was also observed by TGV, as residents don't participate much in community events like the monthly drinks. Overall, there seems to be a lack of cohesion both among residents and between the residents and TGV.

## Why should this issue be addressed?

### User's insights play a critical role in innovation

In living labs, it is crucial that problems are addressed and solutions are developed collaboratively with various stakeholders. Notably, users often serve as the primary drivers of innovation (Leminen et al., 2012). Undermining the user's role and conducting inadequate user studies can negatively impact the innovation process.

### Example case of Innovation that highlights the significance of user insights:

To illustrate the critical role of user insights in innovation and the necessity for TGV to facilitate effective feedback, consider the case of "The Flatmate," the first plug-and-play heat exchanger for showers. This innovation was tested at the Dreamhuis within TGV for a year, involving a number of residents. While the heat exchanger proved successful and eventually found its way into social housing units managed by WoonFriesland, it encountered significant issues. The social housing tenants provided critical feedback regarding the inconvenience of cleaning the Flatmate. Despite simulating real-life conditions and involving actual users, the testing at TGV did not adequately validate aspects related to practical usage and user behaviour.

"Tenants are satisfied after a period of getting used to it," Joris continues. "After the tests, we always conduct a survey. How did the residents experience the new application? Cleaning the Flatmate is a point of attention. We assume user-friendliness for applicable innovations, but it requires some flexibility from the residents." - Joris, Woonfriesland (DreamHuis: Waar Betaalbaar Wonen En De Toekomst Samenkomen, n.d.)

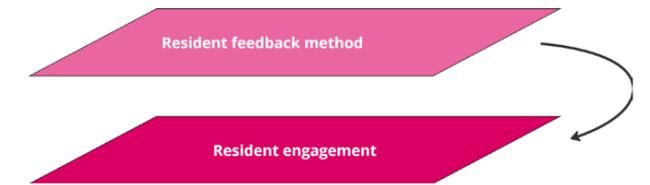
### Resident satisfaction is important to the vitality of TGV community

Residents are one of the key stakeholders in the TGV community, providing a realistic testing environment, which is a major reason innovators are drawn to TGV. However, as discussed in the previous section and based on my observations—having also been a resident at TGV—it is evident that residents often feel obligated, rather than naturally motivated, to participate in research activities. Additionally, participation in social gatherings and interactions with TGV employees is noticeably low.

This disconnection among residents, as well as between

residents and TGV employees, has led to declining engagement in both research and social activities. Such low participation negatively impacts TGV as a community, which, in turn, affects the value TGV offers as a living lab. This decline in engagement is precisely why TGV initiated this project. The original brief from TGV focused on gathering feedback and measuring resident satisfaction to better understand and address these challenges.

## Problem (re)framing



## Research Question

**How can residents feel more valued and engaged in innovation testing and within the TGV community?**

### Sub-Questions (R-SB):

1. What challenges do residents currently face in the innovation testing process?
2. What factors contribute to resident engagement within the TGV community?

# 03 | Identifying barriers and enablers

This chapter seeks to address the research question posed in the previous chapter by identifying the challenges residents face during innovation testing. By reflecting on the tensions and obstacles that impact community engagement, this chapter highlights key factors that could help address the problem. It presents findings from focus groups, observations, and auto-ethnographic research.

## 3.1 Factors influencing resident engagement

### R-SB 1: What challenges do residents currently face in the innovation testing process?

To explore this question, a focus group with TGV residents and employees was conducted. It was designed to assess their motivation to increase their contributions to innovation and to identify the challenges they face or anticipate in the process.

#### Focus group

**Aim:** To explore how users would like to be involved in the innovation process, assess their motivations and challenges, and understand the obstacles that hinder their participation.

The group included 8 participants: 3 residents, 4 TGV employees, and 1 PhD researcher at TGV. All participants were asked to reflect on their roles as “users” of the innovations being tested at TGV. The participants were given a booklet (See appendix C) that involved 8 activities including ice breakers, mapping out their current and desired levels of contribution and discussing how these levels make them feel and exploring the challenges in engaging more and potential solutions for the discussed challenges. These activities included both individual self-exploration and group collaboration.

Code	Role
FP1	Resident
FP2	Resident
FP3	Resident
FP4	TGV employee
FP5	TGV employee
FP6	TGV employee
FP7	TGV employee
FP8	Researcher at TGV

Figure 3.1. Focus group participants

#### Insights from the focus group

##### Users desire to make meaningful contribution

All participants expressed a desire for a higher level of involvement in the innovation process than what they currently have. The activity prompt was “Innovation Process,” intentionally broad to allow participants to choose to contribute beyond innovation testing and engage more deeply if they wished. They cited reasons such as wanting to make an impact, learning about innovation, understanding energy savings to make better future decisions, and contributing to the improvement of innovations for the greater good.

##### Current contribution Vs Desired contribution

The Employees and the Researcher felt they are not being involved much as Residents, and they don't interact with the innovations much or even if they do, they feel that their interaction doesn't matter much. Whereas residents feel they are the “lab rats or the try person or alarm person” who uses the innovation, reports on the product functionality and gives feedback when asked.

*"As a user i don't interact with the innovations that much or don't do too much with my interactions with the innovations." (FP4)*

*"(their current contribution makes them feel like)try person or alarm person" (FP1)*

*(their current contribution makes them feel like)tester or lab rat"(FP2)*

*"testing the innovation at our house. Sometimes provide feedback when asked" (FP3)*

All participants feel that as a user they have the knowledge and experience to add value to the innovation and stated it would make them feel more useful and satisfied. Some felt their professional expertise could also help the innovations at TGV. It was interesting to observe that all participants expressed an interest to improve their contribution but not role wise. They still preferred to be a tester but who's feedback matters more, which also has the potential to improve the innovation and contribute to making a greater impact to the environment. This helps us understand they don't expect to be involved more in the innovation but to be heard more, valued more, recognised more and involved for real.

"I want to make an actual contribution...Because that's why I live here(under such good circumstances, so I want to play my part in return).. This way i can.. It makes be feel useful, makes me feel like i matter." (FP2)

"To share my experience and in the way hope to have a (positive) effect on the innovation..." (FP7)

"I think my feedback can be helpful and valuable for further development...because I'm an open person and can think critically from my own perspective" (FP5)

All participants expressed that having a more meaningful contribution could make them feel more useful, impactful and satisfied.

"Helpful, knowledgeable, reliable, impactful"

"less as if i am complaining or finding something very cool myself but more as if it matters that i interact with the innovation"

"satisfied, happy and curious"

"useful and happy"

"valuable. you could really help the innovation process if your experiences are being heard/analysed and used for improving a product"

"Involved and appreciated - as though my view is appreciated and I have a say/impact on the innovation/development like I'm contributing to a better world would bring satisfaction (if it will be applied)"

### Challenges in contributing to innovation

#### Difficulty accessing information/stay updated about innovation

There is no centralised location to gather information about all the innovations, leading to frequent forgetfulness about their specific functions. This gap in knowledge means that users may not be aware of existing innovations or their roles in interacting with them. Additionally, there is a need for easily accessible updates on the innovations to which they have contributed.

"no place to gather info about all innovations - so we forget what they do exactly"

#### Unclear Feedback Process – unstructured and spontaneous

The feedback process is currently unstructured, with no formal plan in place, making it easy to fall off the agenda or to-do list as no one has been held accountable over the past years. There are no established rules, leading to

situations where feedback is requested spontaneously and without prior notice. The process is seen as a one-time activity rather than an ongoing dialogue, resulting in limited accessible feedback opportunities and loops.

"no rules about the feedback process - someone came by unannounced and we had to think of feedback on the spot"

#### Prioritising task and planning time is a challenge

Finding time to engage with the innovation, reflect on thoughts, provide actionable feedback, and translate interactions into actions is challenging for participants. They often struggle to offer qualitative feedback due to being occupied with other responsibilities. Participants must actively seek a suitable moment to complete questionnaires, which frequently conflicts with their work schedules and other priorities. Consequently, contributing to the feedback process often falls lower on their to-do lists and may disappear altogether. Additionally, the limited opportunities to contribute outside of working hours further restrict their ability to participate effectively.

"as its not my priority, it disappears on my to do list"

#### Uncertainty about the value users bring in and how they are valued

There is resistance to providing feedback largely due to uncertainty about whether it will reach someone who can effectively act on it. Individuals may doubt their own knowledge on the topic, leading to hesitance in offering feedback. Personal opinions about the viability or sustainability of certain innovations also contribute to reluctance. Additionally, the fear of trying something new, such as giving feedback, and the challenge of deciding which innovations will benefit most from their involvement further complicate the process. Participants may also feel uncomfortable giving feedback while still learning how to engage in the process.

"The hassle of giving my feedback when i dont know whether it will end up to someone who can put it into action"

#### Lack of clear interest from innovators to involve residents

The current situation reflects a lack of proactive communication and collaboration between Innovators and Users. There is no clear process for feedback and response sessions, leading to uncertainty about when feedback will be sought, how many times it will be requested, and the level of detail required from innovators. Requests for feedback from innovators often

lack clarity regarding the purpose, method, timing, and deadlines. Additionally, residents are not actively solicited for their opinions on specific innovations, and there is a noticeable absence of updates, surveys, or detailed information beyond general updates on innovation readiness. This gap in communication has resulted in reduced motivation on both sides, with innovators sometimes failing to respond or missing scheduled meetings.

"motivation (both sides) - the innovator didnt respond anymore and missed meetings"

"the lack of not actively being asked on what i think about a certain innovation"

#### Request for feedback setup / activities is not attractive

The current request for setup and activities is often perceived as unengaging and one-sided, with minimal interaction. The existing approach to requesting feedback is considered boring and lacks creativity. There is a clear need for more user-friendly and interactive tests that focus on engaging users more effectively. Additionally, finding more creative methods for soliciting feedback would enhance overall participation and interest.

"boring to do, very one sided, no interaction"

"need for more creative ways of asking for feedback"

#### Knowledge barrier

Individuals face limitations in their knowledge of technology rules and the specific applications of each innovation. The wide range of available technological solutions necessitates relearning how to use each new innovation, which can be time-consuming. Additionally, catering to a diverse array of entrepreneurs makes it challenging to provide effective input across such a broad scope.

"limited knowledge of technology rules and how to use the technology (innovation)"

#### Resident participation is not valued/appreciated enough

Residents feel that their participation in innovation activities are not valued, and appreciated enough. They expect recognition as a way to overcome their doubts about their own expertise and scope within TGV innovation process to make a meaningful impact. This stems from several factors. Some of Participants

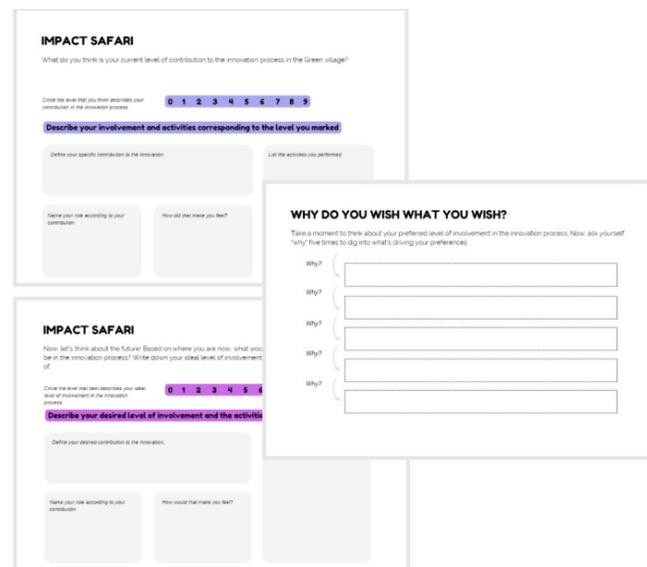


Figure 3.2. Participants engaging in an activity (left) and activities in the booklet (right)

often do not feel a direct connection to the innovation because it is not implemented in their own homes, and the scale of the project appears too small to make a meaningful impact. Additionally, there is a disconnect between the participants' experiences and those of real end-users, such as not being able to test certain features like green paving spots if they do not use a car. This gap can lead to a feeling of inadequacy in providing useful feedback. Participants often feel that their input is not valued, leading to concerns that they are providing feedback that might seem irrelevant to a highly driven entrepreneur.

*"feeling as giving unwanted feedback to a very driven/focused entrepreneur"*

*"feeling uncomfortable to give feedback in the process of learning how to do this"*

The challenges are unclear feedback process, prioritising the task and planning time for it, Uncertainty about the value they bring in and how they are valued, lack of clear interest from innovators to involve residents, request for setup / activities is not attractive, difficulty accessing information/stay updated about innovation, knowledge barrier, Resident participation is not valued/appreciated enough.

## R-SB 2: What factors contribute to resident engagement within the TGV community?

To understand this research question, I reflected on the resident experiences shared by the residents during interviews, focus groups and also based on my observation and auto-ethnographic study.

### Relationship between residents and TGV

The needs of key stakeholders at TGV largely revolve around innovation, but for residents, their primary need is having a comfortable living environment. Residents participate in innovation activities as part of a give-and-take relationship with TGV. They expect a comfortable living experience in exchange for their contributions to innovation. However, they also want their contributions to be meaningful and valued.

For this relationship to remain healthy, the value exchange between residents and TGV must be reinforced and balanced. A strong value exchange benefits both sides in significant ways. When repeated, it strengthens the relationship by building trust, encouraging further collaboration, and fostering mutual support (Michaels, 2023).

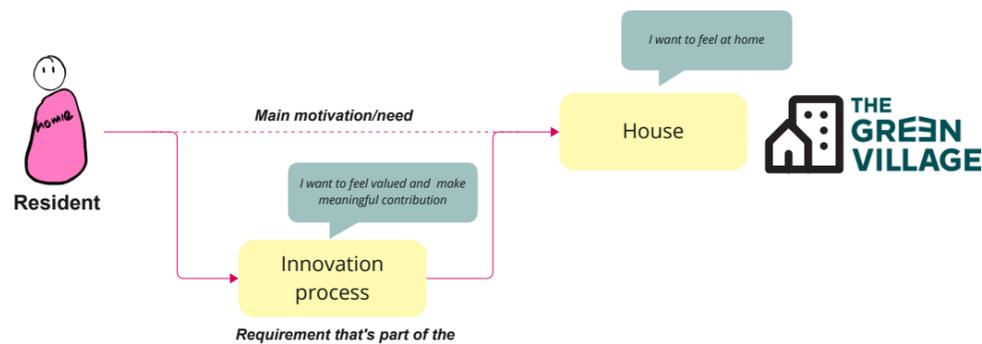


Figure 3.3. Illustration showing resident's main motivation to come to TGV

## Fulfilment of Resident's primary needs

For residents, the ability to live at home in a comfortable environment is their primary need.

This includes several important aspects, such as:

**Safety:** Residents value the safety of their location, as well as the safety measures implemented by TGV to ensure their well-being.

**Affordability:** The rent at TGV is lower than the market rate, allowing residents to comfortably afford their living space.

**Facilities and Maintenance:** The availability of necessary facilities and the upkeep of homes and surrounding terrain are essential for a high quality of life.

**Privacy:** Residents need to feel that their personal space is respected and that they have the privacy they require.

**Support from TGV:** Assistance from TGV in resolving issues related to living conditions and innovations helps residents feel secure and supported.

**Control:** Residents should have the ability and the right to decline participation in activities they are uncomfortable with, ensuring their autonomy.

**Community:** Feeling like an integrated part of the TGV community

Fulfilling these needs are essential to encourage them to contribute to the innovation.



Figure 3.4. Aspects that influence the feeling of comfort for the Residents based on interviews and auto-ethnographic study

## Balancing Ownership and Shared Goals in the TGV Community

TGV, as a living lab, serves many purposes—it's a home, office, lab and event space. However, because many decisions about the houses and community are made by TGV to support its broader innovation goals, residents often feel only partial ownership of the space they live in. This feeling extends to the surrounding area, which is regularly used by visitors and for TGV activities, often without residents being fully informed. As a result, residents may struggle to feel fully at home in their own environment.

Moreover, while innovation is central to TGV's mission, residents' primary need is for a place to live. Their contribution to innovation is secondary to their desire for a comfortable living space. The lack of clarity about their role in the innovation process and how their contributions align with TGV's larger goals creates uncertainty. This, in turn, weakens the sense of a shared purpose between residents and TGV, leading to a disconnect within the community.

### 3.2 Synthesis of the research

The insights gathered from all research activities—interviews (Section 2.2 ), focus group discussions, and my observations (Section 3.1) are synthesized into the following key factors that influence residents' engagement in the TGV innovation process and within the community.

#### Resident awareness and access to information

Residents shared that while the current TGV website has a lot of information about innovations, it is hard to navigate, making it difficult for users to find relevant innovations for their homes. One resident noted that he struggles to explain what is being tested in his home when talking to friends or family. A TGV employee highlighted the importance of residents being aware of what is happening in their homes and the community because of safety concerns. When a resident forgets how to use a specific function in an innovation, it becomes challenging for them to even interact with it.

#### Residents' roles and the value they bring in

There is uncertainty regarding the role of residents, not only among the residents themselves but also among other stakeholders. Residents often see their role as mainly following rules and providing feedback, with little clarity about their broader contributions. In my interactions with the residents, they used terms like "guinea pigs," "lab rats," "test subjects," and "alarm bells" to describe their involvement in the innovation process. This perception stems from residents' self-doubt about their ability and knowledge to contribute meaningfully to innovation, as well as a lack of recognition and appreciation for the value they bring to the TGV community. They expect recognition as a way to overcome their doubts about their own expertise and their role within the TGV innovation process. Additionally, they question how relevant their feedback is to highly driven entrepreneurs. This uncertainty is compounded by the fact that innovators do not seem enthusiastic or interested in involving residents. Focus group participants expressed that they lack clear information and communication from innovators, and they receive no updates on their inputs. This disconnect has resulted in reduced motivation among residents.

#### Impact of innovation activities on resident comfort

Residents feel they must compromise their comfort when engaging more in innovation activities due to inefficiencies in the structuring, scheduling, and communication of these activities. Currently, TGV and the innovators determine the schedule and type of activities, which are then communicated to the residents. Although residents have the right to decline requests, they often feel obligated and uncomfortable saying no, which varies based on cultural and personal attitudes. Innovation testing and feedback activities (such as installation, maintenance, and interviews) take up their time and space, requiring adjustments to their personal schedules. This is exacerbated when activities are not planned or communicated well in advance. Unannounced visits and visitor tours further intrude on residents' privacy. This experience contrasts with that of a typical resident in a rental or owned home, where they have more control over such activities.

#### Resident's sense of community

The sense of community among residents is weakening, as shown by their declining participation in TGV social gatherings. Many residents feel lonely and disconnected, highlighting how this issue affects both individuals and the community as a whole. This decline stems from reduced interaction among residents, tensions during innovation testing due to a lack of clear communication and structure, and the misalignment of residents' roles and the impact of their contributions between the residents and TGV. These factors erode trust and deepen the sense of disconnection. The sense of community is twofold—both a cause and an effect of these challenges.

*All of the above factors impact and influence each other, collectively contributing to the decline in resident engagement in the innovation process and weakening community cohesion.*

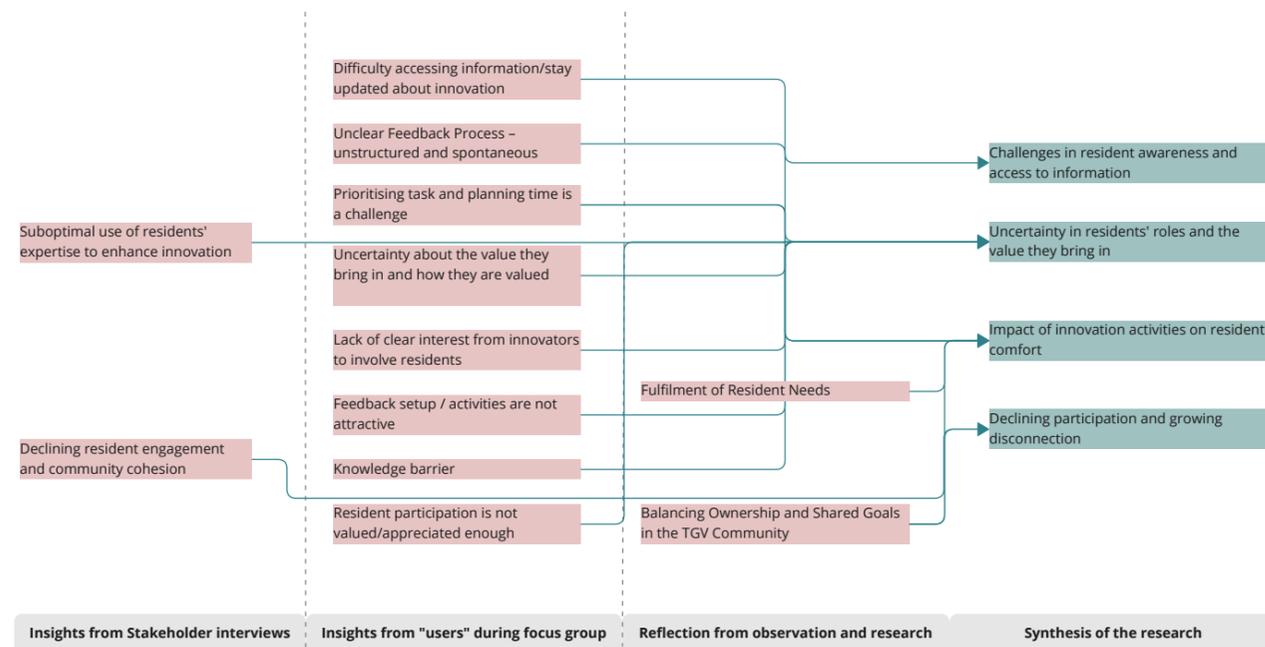


Figure 3.5. Mapping key insights from all research activities to synthesise

# 04 | Design Exploration

This chapter outlines the iterative approach used to address the design goal. It presents ideas generated through group and individual ideation sessions, and details the iterative process of validating and refining these early ideas, ultimately presenting them as concise design concepts

## 4.1 Design goal

To design an intervention that promotes resident engagement in the innovation process and within TGV community

## 4.2 Ideation

### Ideation session

This ideation session took place during the latter part of the focus group session (discussed in Section 3.1), where participants explored the challenges they face or might encounter when becoming more involved in innovation activities. Participants were asked to work together to cluster these challenges based on affinity and frame “How might we” questions to transform those challenges into design opportunities (IDEO & IDEO.org, 2015). They then engaged in brainstorming solutions to these questions.

The well-known brainstorming method, 6-3-5 brainwriting, which involves six participants generating three ideas in five minutes before passing their papers around (Van Boeijen et al., 2014), was adapted for eight participants. During the session, all eight participants wrote down three ideas each within five minutes. There were six rounds, and at the end of each round, participants exchanged their papers, read the ideas written on the new sheets, and added three new ideas or improved upon existing ones. As a result, they generated a total of 125 ideas and suggestions (Figure 4.3, see appendix C for more).

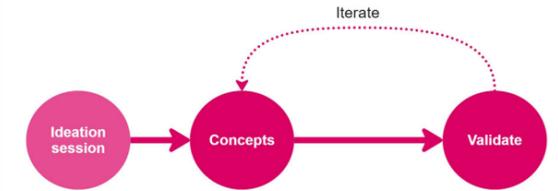


Figure 4.1. Ideation process

### How might we questions generated by the participants during the session:

1. How might we create a feedback process for users so that the process is clear and the users know what to expect?
2. How might we improve communication for users so they can stay in the loop?
3. How might we give unbiased feedback to entrepreneurs so that they get inclusive feedback?
4. How might we motivate users so that giving feedback is a more attractive task?
5. How might we show users appreciation for their feedback so they feel safe to provide it?
6. How might we involve users more structurally so that it's not a one-time thing?
7. How might we inform the users basic knowledge about the innovation so they can give feedback on?
8. How might we prioritise feedback moments for entrepreneurs so that we can cover the demand of feedback?
9. How might we help the users to plan the moment to allow them to give feedback?



Figure 4.2. Participants engaging in the ideation activity



Figure 4.3. Brainwriting sheets from the ideation session

## Ideas/suggestions from Brainwriting activity

Post the ideation session, all the ideas were analysed for duplicates and were grouped based on similarities giving 8 themes and interesting ideas were shortlisted and merged to form solid ideas.

### Themes

- Interesting ways to consume information
- Structure the feedback process and moments
- Guide residents, TGV employees and innovators to plan and navigate feedback planning
- Streamline communication channels
- Make the feedback methods more engaging
- Power to the user - ask the user what they want to do and how?
- Inform residents of their contribution and impact
- Reward the residents

(These were taken into account when drafting strategies in the later part of the project)

### Merged ideas

**Feedback portal:** Develop a portal on the website for residents to easily access and provide feedback. Implement an interactive dashboard where residents can learn about the innovations and provide feedback. Provide a clear roadmap outlining the feedback process

and expectations. With options for residents to schedule feedback moments or share calendar options, allowing entrepreneurs to visit based on these arrangements.

**Resident guide:** Create a comprehensive guide for residents detailing existing innovations, feedback expectations, info sheets, contact list, user manuals of the innovations and how to report issues.

**Interactive map and tablet:** Provide an interactive map of TGV with live innovations and a tablet with information available at all times for feedback. Also allow open feedback for visitors through dashboards, pop-up interviews, or voting with stickers.

**Feedback podcast:** Create a podcast featuring episodes about resident experiences and how their feedback has influenced innovations.

**Incentives:** Use incentives such as food, sweets

**Gamify feedback process:** Make the feedback process a task in a game to encourage feedback participation.

**Personalised feedback methods:** Allow users to choose their preferred method of providing feedback.



Figure 4.4. Clustering ideas into themes- Snip from Miro

## Early concepts

Drawing inspiration from the ideas generated by participants during the ideation session, I further ideated and developed two design concepts that explore two design directions: one focused on streamlining information and communication, and the other aimed at enhancing community engagement. These brief concept outlines were validated with residents and employees of TGV to gather early insights.

### Virtual TGV, a digital platform for residents to streamline information, communication and their participation

An integrated feedback platform - a virtual twin of TGV with realistic 3D simulation accessible via an app or browser. In this virtual space, one can explore all the innovations installed in the houses and on the terrain, learn about them, and provide feedback on various aspects. Residents would be able to log into their profile to track their contributions and have the option to engage in active feedback requests, post or react to interesting innovation ideas on the discussion forum and suggest ideas and discussion about TGV community. This platform would also have other features for residents to personalise their innovation contribution plan and activity schedule.

### Interactive wall to engage and act as a communal space for the residents of TGV

Interactive touch screen wall that senses gestures and movements, recognizes and lights up based on the number of interactions one has had with it. Say for instance, If it's dull, you'll need to "give it life" by interacting with it. It would also allow residents to access all information related to TGV, provide with options to give feedback, and include all the features discussed in previous concept. One can choose to view the content on the screen in public or scan a QR code to access it privately on their phone. Beyond just information, knowledge, and support, it will also act as a casual hangout space. Residents could go there to interact with the wall, play digital games, or meet other residents without any particular reason—just to be part of the community.

## Early validation of the concepts

These two ideas were validated with the residents and TGV through tiny explorations which happened in 3 folds.

### 1. Brief in-person exploration with low-fi prototype

I discussed the concepts and validated the features of the digital platform using a low-fidelity paper prototype with two residents and two TGV employees and these interactions lasted 20-30 mins. The participants were asked whether this solution would bring value to them, if it would ease challenges related to information and communication, what their preferred touch points were, and their level of willingness to engage with the platform.

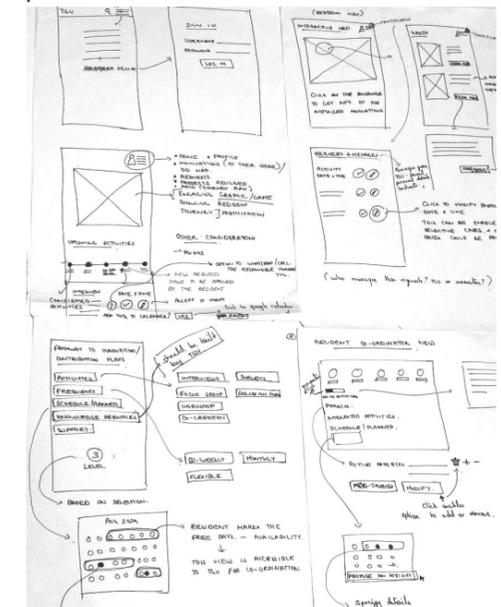


Figure 4.5. Sketches of the platform screen

### 2. Exploration over WhatsApp

I used the TGV resident WhatsApp group to share brief descriptions of the concepts with a few simple follow up questions and polls to understand resident preferences over a period of 2 weeks.

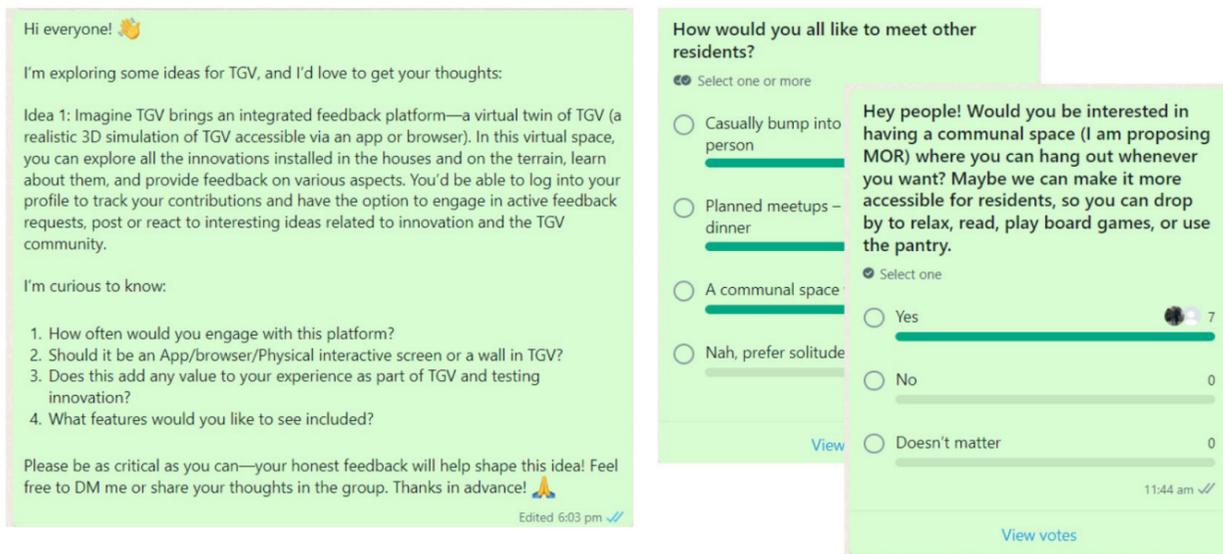


Figure 4.6. Screenshots of messages shared in the resident WhatsApp group

### 3. Community drinks for the Residents

During this exploration phase, a residents-only gathering was coincidentally initiated and organised by the residents of TGV. This gathering took place in the MOR building, which is temporarily used as an office space for TGV and features a kitchen and a nice outdoor patio with seating for 15-20 people. The event had a good turnout, and everyone enjoyed and shared food and drinks. The residents expressed their interest in organising more such gatherings in the future, and the MOR building served perfectly as a communal space. The current limitation is that, since it is used by TGV during the weekdays, it is only accessible to residents after hours and on weekends. This space is also popular among residents for hosting private parties due to its kitchen and outdoor seating area. It was also observed that the residents show more interest in resident only gatherings than the one organised by TGV as it is primarily a social gathering for the employees where they also invite residents.

#### Feedback and insights from early validation

- The digital platform was considered informative by residents and TGV employees, as both the parties struggled to explain the innovation installed in houses and on the terrain to friends, family and visitors. However, they felt the amount of interaction

would depend on how well the idea is executed.

*"I think that both residents and colleagues would value the information very much. When I first started working at The Green Village I myself sometimes had trouble finding good information about the innovations, the terrain, etc. However, the amount of interaction really depends on how well the idea is executed." (TGV employee)*

- Since TGV attracts many outsiders (including visitors, workers, and curious individuals who may enter knowingly or unknowingly), it was suggested that providing resident information on the platform, along with details of the innovations installed in each home, would be beneficial. This would give residents a clearer understanding of who lives where.
- Interaction wall was seen as an interesting touchpoint. Residents were not sure of the value of the interaction wall as an engaging space, however both residents and TGV employees expressed it would be very useful and attractive for visitors.
- Most of them mentioned the app to be a more suitable touchpoint, while interactive wall could be an extended touchpoint for those who struggle to maintain an app due to limited phone storage space.

- Residents prefer a communal space which is more accessible for residents where they can be without any reason, with some games and TV and many voted for MOR building in TGV as a suitable option.

*"I love the idea of having something interactive and to have something that pushes you to give attention. It reminds the residents that there is a need for some feedback." (TGV employee)*

*"An IRL screen sounds really cool, but specifically for feedback I wouldn't get off the couch" (TGV Resident)*

- TGV employee also expressed that the platform would also act as a medium to measure resident engagement

*"Clear info about what the innovations are in easy language. Maybe a timeline about how long they plan to test something, this might be a good motivator to contribute while you can. Feedback requests are also a good idea, I'd check the platform more in that case." (TGV Resident)*

### 4.3 Individual ideas aligned with the concept

Based on insights from the research, inspiration from the co-ideation session, and feedback from early concept explorations, I further ideated to refine and generate additional ideas aimed at addressing various challenges. These ideas may include overlapping functionalities and features, and can be combined, modified, or substituted as needed.

#### Digital platform for residents - Enhancing information, knowledge, and communication

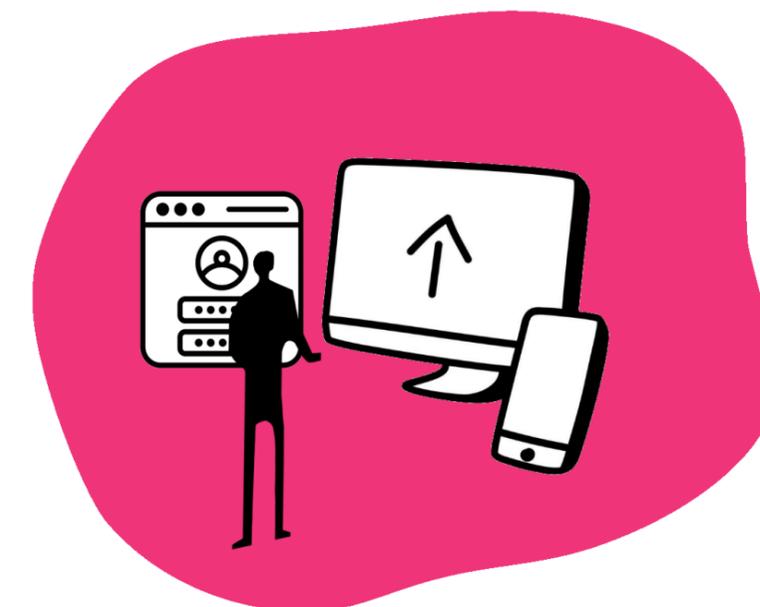
Currently, the TGV website offers a wealth of information about innovations, but it is difficult for users to navigate and engage with, making it challenging for residents to find relevant information about innovations installed in their homes. To address this, the proposed platform includes an interactive 3D map of TGV, featuring detailed information about installed innovations and the residents in each building. The platform will also provide FAQs, updates on innovations from TGV and innovators, temporary fixes, innovation testing status, and contact details. Currently, residents use WhatsApp to report concerns about utility and maintenance, which can lead to delays and multiple follow-ups. Integrating these complaints into the platform will provide a clearer

picture for both TGV and residents, improving issue tracking and resolution. By consolidating user data and feedback, the platform will link with existing data systems, helping TGV demonstrate its impact and refine future strategies.

The idea is to simplify information and provide it in an engaging manner and streamline communication to improve issue tracking and resolution through a digital platform. The plan involves redesigning the existing TGV website to include user login, allowing residents to access tailored information and provide with features that make their innovation testing process and communication more organised and efficient. This simplified version of the earlier virtual TGV concept (early concept 1) focuses on addressing residents' needs and enhancing the value this platform can offer. Additionally, the platform will host resources related to innovations, creating a comprehensive knowledge base that will benefit the field over time. Residents will be able to explore installations in other houses, participate in virtual testing, and provide feedback, increasing their engagement with the innovation process. The platform will track residents' involvement in innovation activities, projects, and feedback, recognizing their contributions.

#### Future Scope:

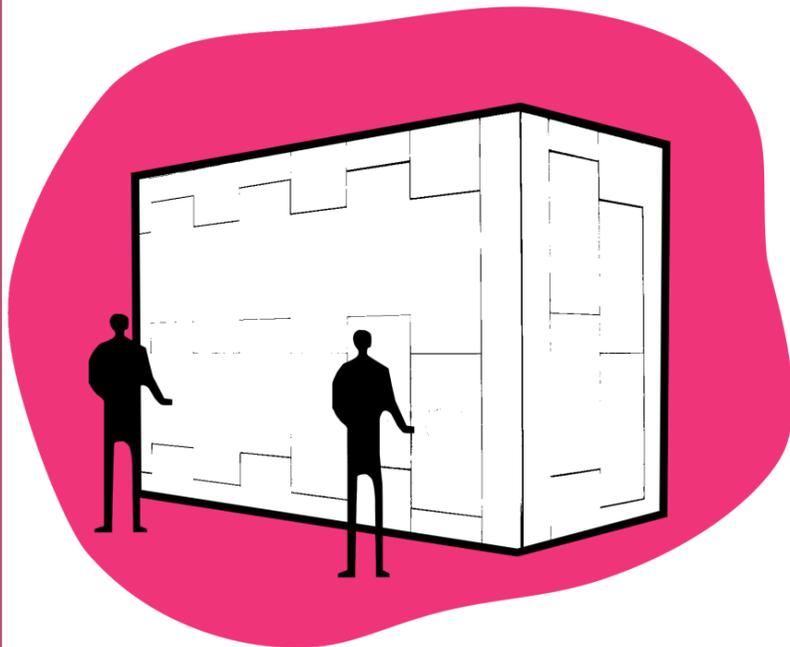
- Open innovation platform (including TU Delft students and researchers)
- Personalization and access for innovators and TGV employees
- Community discussion forum



**Interactive digital screen/wall** - that serves as a vibrant community hub

This idea aims to extend the platform idea discussed before into a physical interactive touchpoint. In addition to providing awareness of what's happening on the terrain, it also addresses the need for residents to have a space for interaction. The screen is accessible to everyone, with content tailored to individual users. Residents who sign in can choose to view updates and announcements either on the screen or privately on their phones via QR codes. It also offers virtual simulations of TGV's innovations, allowing visitors to explore these innovations like never before and provide feedback, helping innovators better demonstrate their work to guests.

The screen is a natural gathering spot where residents can hang out, interact, and take part in spontaneous community activities. It supports virtual meetups, workshops, and social events, and can host live video streams, virtual reality experiences, or augmented reality interactions. For entertainment, the screen offers a variety of digital games and challenges, including quizzes, puzzles, and creative activities, which help encourage community participation and the screen can also be transformed into a community hub for movie nights, interactive storytelling, or live performances. It also keeps residents informed with real-time updates, emergency announcements, and celebratory messages like birthdays and achievements.



**Adaptive Scheduling tool** - for enhanced collaboration and real time inputs

The idea is to involve residents in the planning and scheduling of innovation testing, feedback, and maintenance activities, making the process more collaborative. This approach ensures that residents are better prepared, informed, and have the flexibility to adjust activities to fit their schedules, similar to how one would manage tasks when owning or renting a home. While it may not be entirely possible to replicate this level of control in a living lab environment, involving residents in the planning process can foster a sense of ownership and lead to more positive outcomes.

This tool aims at improving communication and coordination between residents and project coordinators. Currently, project managers (PMs) individually reach out to residents to inform them of upcoming activities, which can often lead to confusion among residents due to the challenges of coordinating with multiple contacts. To address this, I propose the introduction of a new role: the Resident Coordinator. This position would serve as the single point of contact for residents, acting as their advocate and ensuring they are supported in living comfortably while contributing to the innovation process.

Through this tool, residents will receive notifications of all scheduled activities as requests, with the flexibility to reschedule, accept, or reject certain optional activities. A timeline feature will keep residents informed of

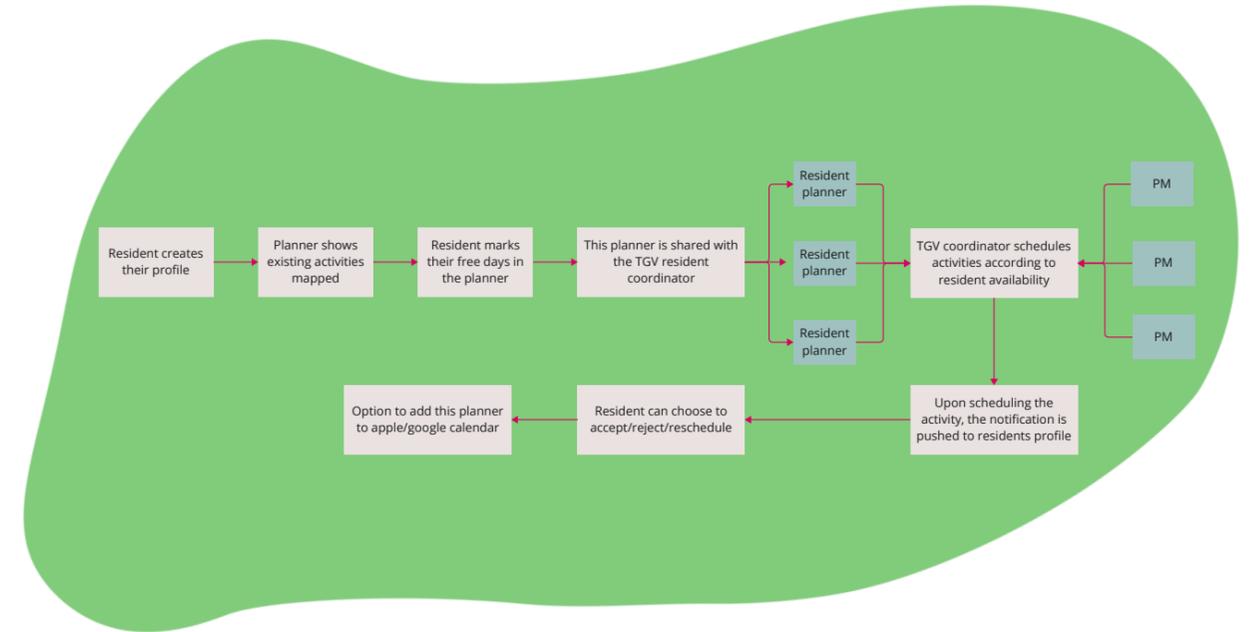


Figure 4.7. How the scheduling tool would work

upcoming activities well in advance, helping them plan accordingly.

Each resident will have a personalised digital profile, featuring a planner where they can mark their available days in advance. This planner will be accessible to the TGV Resident Coordinator, who will use it to schedule activities that fit residents' availability. Furthermore, the planner can be integrated with Apple or Google Calendar, allowing for seamless synchronisation with residents' existing schedules. The tool could be available as an app, part of the platform, or as a community planner in the interactive wall.

**Resident's pathway to innovation**

This concept is to empower residents. While living labs strive for collaborative innovation, they often limit the roles of residents when partnering with companies (Leminen et al., 2015). Leminen et al. (2015) discusses four roles users could play in living labs and asks the living labs to provide space for creative consumers to emerge. The roles are : (1) the informant, (2) the tester, (3) the contributor, and (4) the co-creator. The informant provides user knowledge, insights, and

opinions to the living lab. The informant functions as a "lab rat" in a real-world setting, where their behaviour can be observed and data on needs and desires can be collected. The tester assesses innovations in the users' actual environments, such as hospitals, restaurants, and classrooms. The contributor works collaboratively with others to create new products, services, processes, and technologies. The contributor is actively involved in the development work, which is structured to meet the objectives of companies within the living lab. The co-creator engages in problem-seeking and solving, ideating, and innovating, working alongside the companies' R&D teams and other living lab participants as equals to develop solutions.

The central idea of this concept is to shift the resident's role from a passive participant to an empowered contributor in the innovation ecosystem. By providing the necessary structure, resources, and autonomy, residents can optimise their contributions, leading to more effective and inclusive innovation processes within living labs. This idea is based on the role mechanism concept discussed in the literature. According to Herrmann et al. (2004), role mechanisms determine the development of the role of users. Users can become

creative consumers and proactive user innovators in living labs through two main approaches: role taking and role making. Role taking refers to an actor adopting a predefined role, with tasks and responsibilities outlined by another party, known as the role sender. Role making describes how an actor interprets and modifies the expectations of others into specific actions and behaviours (Turner, 1988). In this process, the actor actively defines and shapes the role according to their own contributions and interpretations.

A central feature of this concept is the creation of a personalised plan for each resident, allowing them to set their own goals, access feedback, and track their progress. Residents will have the freedom to explore a wide range of activities, testing and feedback methods (such as interviews, co-creation sessions, focus groups, etc.), and choose their preferences. They can also specify how frequently they would like to be involved, allowing them to consider their personal commitments and plan accordingly. Additionally, they will have access to knowledge resources and support features that help them gain knowledge in relevant topics, enabling them

to engage with the content more confidently and offer informed feedback.

This approach ensures that residents can see the tangible impact of their contributions, making their involvement more meaningful and aligned with their interests. Residents have the autonomy to choose their level of involvement, with tasks assigned based on their preferences. This flexibility encourages greater participation by respecting residents' time and commitment levels.

By integrating this feature into the resident onboarding process, it ensures that residents understand their roles and expectations from the outset. Quarterly check-ins with the TGV resident coordinator will help align resident interests with ongoing innovation and testing demands, offering TGV an opportunity to support them in navigating this pathway, making it a more collaborative experience. The tool could be part of the platform, session design or a feature available in the interactive wall.

## Communal Space for Residents - Repurpose MOR

This concept addresses the challenge of declining community spirit among residents and builds on the earlier discussion of community engagement as a strategy to better involve residents in the innovation process. While TGV is a thoughtfully designed space with a well-considered blue and green balance, it currently lacks a dedicated area where residents can freely use and enjoy the space without reservations.

The goal is to create a multi-functional communal space for residents—a place where they can relax, socialise, play, and cook at their convenience. This idea emerged from initial feedback from residents who expressed a preference for casual interactions with their neighbours. Currently, the MOR building at TGV, which is temporarily used as an office, includes a kitchen, laundry, bathroom, and an outdoor patio. This facility is accessible to residents only after office hours on weekdays and during weekends.

The proposal is to repurpose the MOR building into a fully accessible communal space for both residents and

employees. By removing work-related activities from this area, it can be transformed into a versatile space that supports various activities, such as recreation, quiet reading, movie viewing, or even alternate workspaces for the residents. Residents should be able to use this space freely, without needing a specific reason, and engage in activities that suit their interests and needs.

## Third spaces

The idea is to transform underused spaces in TGV into vibrant “third spaces” that promote community engagement and social interaction. While TGV already hosts various innovations across its terrain, these installations could be more actively utilized by the community. By introducing curated activities around these innovations, the spaces can evolve from passive locations into active hubs where residents can gather, interact, and build connections. This approach not only strengthens community bonds but also provides researchers with more opportunities to gather feedback on the innovation installations, enhancing both community involvement and the innovation process.

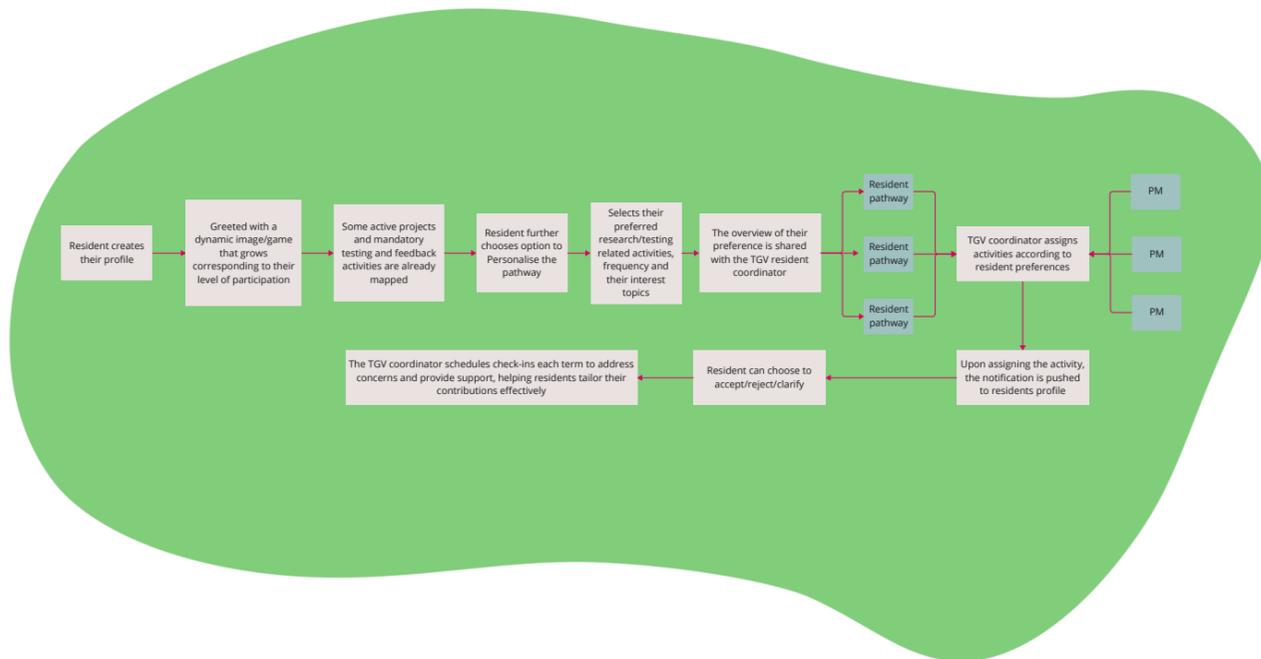
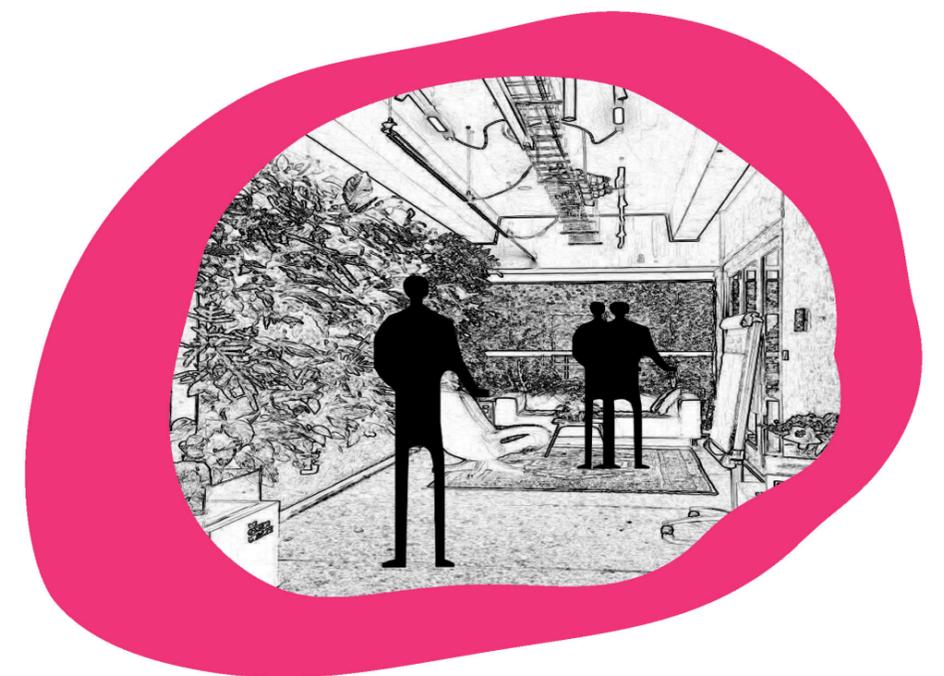


Figure 4.8. How the resident pathway to innovation would work



**TGV ExploreAR**, an AR integrated experience tool that guides residents to experience TGV in new ways

Another challenge intrinsic to the nature of the living lab is its multi-functionality—TGV serves as a living space, a workplace, a venue for tours and events, and a social hub. In juggling these diverse roles, TGV has unintentionally created an invisible barrier that leaves residents uncertain about whether they can freely access and use certain resources. This lack of clear permission makes residents feel hesitant to fully embrace the space as their own. This concept aims to empower residents to explore and experience TGV with confidence through the use of augmented reality (AR). TGV ExploreAR is an AR-integrated experience tool designed to guide residents in discovering TGV in new and engaging ways. The tool allows residents to choose

from pre-set experiences based on their current mood or needs (such as “Camping at TGV,” “I want to get some vitamin D,” or “I am feeling social”). It then generates a digital path overlaid on the map of TGV/TU Delft that residents can follow, updating in real-time as they move and providing prompts about activities and explorations available at each spot.

This tool not only offers clear guidance on where to go and what can be done but also includes features that allow residents to add to existing trails or create new ones. The goal is to help residents experience TGV in fresh, exciting ways, fostering new associations and memories that, over time, will strengthen their sense of connection to TGV.



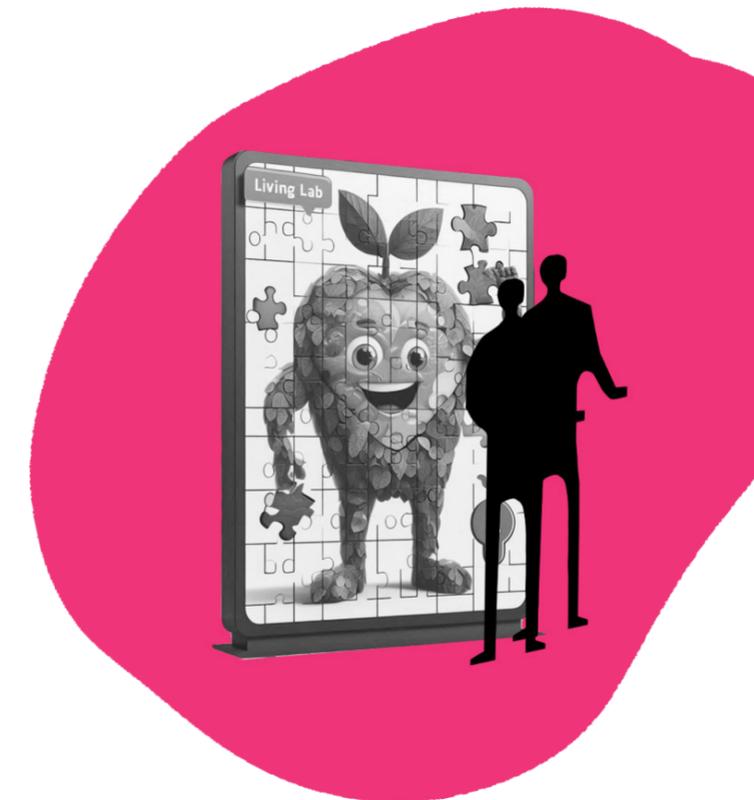
## TGV Mascot

The idea is to humanize TGV by introducing a mascot—an engaging symbol that represents and unites the entire TGV community. A mascot can create a shared identity, build emotional connections, and promote a sense of collective ownership among residents, employees, and the organization. By serving as a relatable and tangible representation of the community, the mascot would reinforce the idea that everyone is part of the same “pack,” encouraging deeper engagement, participation, and a stronger sense of belonging within TGV.

Using a mascot can be a powerful tool to foster emotional connections and social cohesion. According to Schattschneider (2005), mascots hold sentimental value, creating emotional bonds with users. As cultural symbols, they carry social, political, and cultural meanings (Peng, 2012), allowing them to resonate with people on multiple levels. By functioning as place identity markers, bonding tools, and social engagement mechanisms, mascots serve to strengthen connections between people and their environment (Radomskaya & Pearce, 2020).

The concept of anthropomorphism - assigning human characteristics to nonhuman objects plays a significant role in the effectiveness of mascots. As Cayla (2013) explains, mascots tap into a deeply rooted human

tendency to relate to anthropomorphic objects, helping people navigate social and emotional interactions. Chartrand et al. (2008) suggests that anthropomorphized mascots can influence social behaviour, fostering feelings of familiarity, trust, and engagement. These psychological functions make mascots ideal for guiding interactions within communities, creating a sense of unity, loyalty, and comfort (Dolley, 2003).



As Sanders and Stappers (2013) points out, when tackling a problem related to societal value, there is no predetermined outcome, and determining the form that outcome should take is a key part of the challenge. During the ideation phase, it was observed that the ideas discussed in the earlier section address specific challenges and contribute to resident engagement in distinct ways. Reflecting on the interdependence of factors—recognizing that a single challenge may have multiple solutions and that one solution may not address interconnected challenges—it’s clear that interventions may be required at multiple levels, both organizational and individual or group levels. Consequently, this research takes a step back and draws inspiration from the literature to develop a framework that outlines broad strategies for resident engagement, presenting design concepts as examples to inspire TGV. These can then be further developed and validated based on their specific needs in the future.

# 05 | Design Development

This chapter highlights the shift from a specific intervention to a strategic approach, culminating in the presentation of a design intervention. It introduces the project's main outcome—a community-based resident engagement framework—and presents actionable tools designed to help TGV employees empathize with residents and foster meaningful engagement.

## 5.1 Design strategy

### Using community feeling to engage and motivate residents

Examining the factors that influence resident engagement in innovation (see Section 3.2, Figure 3.5), it becomes clear that these factors are interconnected and contribute to a decline in community engagement. This decline, in turn, hinders residents' participation in the innovation process. Therefore, the strategy is to utilize a sense of community as a means to engage residents in the innovation testing process. As mentioned earlier in this report, research suggests that community engagement is an effective approach to fostering resident involvement in innovation initiatives.

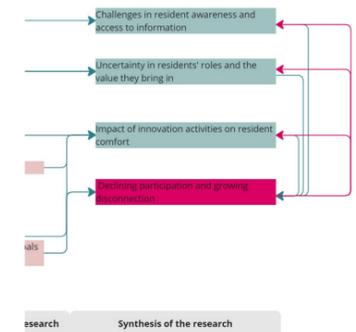


Figure 5.1. Interdependent factors



Figure 5.2. Solution strategy using sense of community as a vehicle to build resident engagement in innovation activities

This prompts the question: *How can we foster a sense of community among residents?*

### Social cohesion

Social cohesion is a feature of society that demonstrates how individuals within that society are interconnected and dependent on each other (Berkman and Kawachi 2000). Jenson et al. (2002) described social cohesion as an ongoing process involving group structures, solidarity, and shared values. He outlined five key dimensions: belonging, inclusion, participation, recognition, and legitimacy. In other words, social cohesion is about feeling like you're part of a group, being included, and having your contributions recognized. Lewin (1946) argued that individual behaviour results from the interaction between personal characteristics and the social environment. This means that a person's actions are influenced by both their own traits and the opportunities or constraints provided by their social context. Fonseca et al. (2018) developed a framework

that shows the connections and interdependencies between the individual, the community and institutions, although this is in the context of resilient cities, the connection holds good for any communities.

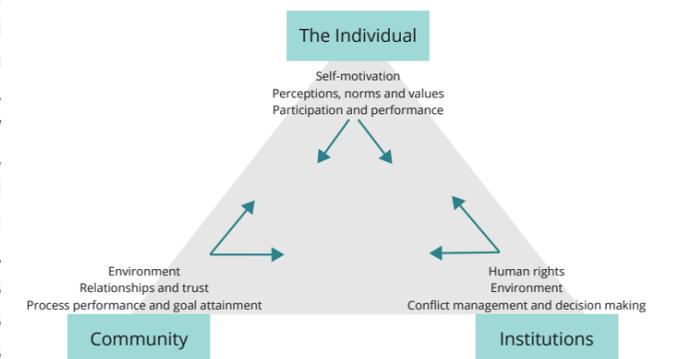


Figure 5.3. Illustration of Fonseca et al.'s (2018) framework to characterize social cohesion

### Community cohesion

The concept of community has been understood in different ways. From a systems perspective, a community is like a living organism made up of various parts that perform specific functions or activities within certain limits to meet its needs. From a social perspective, a community can be described as the social and political networks that connect individuals, organisations, and leaders. There are also virtual communities—social groups or people with shared interests who interact in an organised way online (Clinical and Translational Science Awards Consortium et al., 2011).

A cohesive community is one where (Beecham et al., 2002 & Ratcliffe, 2012):

All members share a common vision and feel a sense of belonging;

- The diversity of people's backgrounds and circumstances is recognized and valued;
- Individuals from different backgrounds have equal life opportunities; and
- Strong, positive relationships are built among people from various backgrounds

Vélez and Ardila (2019) outlines the main aspects that compose the framework for community cohesion: the individual, interaction relationship, and community and further claims, for community cohesion, it's important to understand the individual as a part of a larger system, with unique characteristics that shape their role and position within that environment. Community cohesion involves a process where individuals can distinguish themselves from others, while also recognizing their own strengths and weaknesses. Minker et al. (2004) also explains how Individuals possess their own sense of community membership, which may differ from how community is defined in literature and adds that individuals may feel a sense of belonging to multiple communities, and their sense of membership can shift over time, influencing their participation in community activities.

McMillan and Chavis (1986) define a sense of community as the feeling members have of belonging, the belief that they are important to one another and the group, and a shared confidence that their needs will be fulfilled through their mutual commitment to the community. This definition outlines four key elements of a sense of community:

Membership - The feeling of belonging or personal connection within the group.

Influence - The sense that individuals matter to the

group and that the group is important to its members. Integration and fulfilment of Needs - The belief that members' needs will be met through the resources and support available within the group.

Shared Emotional Connection - The commitment and trust that come from shared experiences, history, and time spent together.

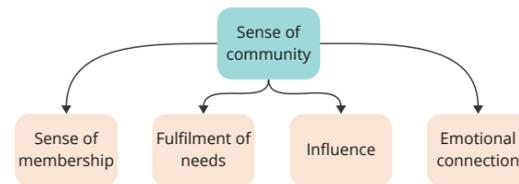


Figure 5.4. Illustration of McMillan and Chavis's (1986) sense of community definition

A study by Tartaglia, S. (2005) suggested two factors related to the affective ties reflecting the emotional connections with different aspects of the local community: the physical aspect (Place Attachment), and the social aspect (Social Bonds), which aligns with the Shared emotional connection dimension in the classic model by McMillan and Chavis (1986). These two factors, relating to emotional ties with the local community, are consistent with the community ties model proposed by Riger and Lavrakas (1981), which distinguishes between attachment to a place (Physical Rootedness) and attachment to people (Social Bonding).

### 5.2 Framework to foster Resident engagement:

The residents of TGV play a dual role: first, as individuals seeking a comfortable living space, and second, as contributors to the innovation process within the community. This framework highlights the factors that influence resident engagement by fostering a sense of community, drawing from literature and insights gathered throughout this project. It builds upon the findings of McMillan and Chavis (1986) and Tartaglia (2005) regarding the sense of community, adapting them to incorporate the factors and dimensions that influence social and community cohesion as discussed in the literature. These groups have then been redefined to include context specific factors identified in this study, forming a context specific framework rooted in literature.

collective representations	rewards	personal investment	task competence	group success	agency of the individual
acknowledge other needs, values and opinions'	length of residency	reward	home ownership	reference	membership
participation	performance	motives to want to belong	coerciveness	emotional safety to expose needs and feelings	social relationships
levels of liking and disliking	conformity	acting towards a common goal	legitimacy	reciprocal loyalty and solidarity	identity
need fulfilment	status in a group	vulnerability and trust to share private materials	reduction of inequalities and exclusion	group integration	expertise
transparency	strength of social relations and shared values	individual attractions to the group	legitimacy	trust	vulnerability and trust to share private materials
establishment	information	rewards	group dynamics	membership	enabling a person to become the person he/she strives to be
satisfaction with the community	member's motivation	amount and strength of reciprocal positive attitudes among individuals in a group	expertise	personal investment	shared emotional commitment and reciprocity
task competence	influence and initiative	reciprocal influence	recognition	information disclosure	safe space
positive resolution of community's task	intimate face-to-face communications	spiritual bond	competence of the group/other group member	unconscious identification of individuals	interactions in shared events
influence and initiative	positive participation in groups activities	connection	reciprocal influence	safe space	information disclosure
information	amount and strength of reciprocal positive attitudes among individuals in a group	shared emotional commitment and reciprocity	belonging	recognition	success
satisfaction with the community	perceptions that individuals have from other members of the group	group dynamics	individual attractions to the group	strength of social relations and shared values	individual's perception of outcomes
individual or social factors	trust	support	enabling a person to become the person he/she strives to be	status in a group	need fulfilment
achievement	levels of liking and disliking	legitimacy	transparency	length of residency	success
establishment	reduction of inequalities and exclusion	positive engagement	reciprocal loyalty and solidarity	group integration	support
conformity	reference	achievement	home ownership	emotional safety to expose needs and feelings	performance
participation	reward	identity	coerciveness	belonging	social relationships
motives to want to belong	connection	collective representations	agency of the individual	acknowledge other needs, values and opinions'	group success
intrinsic collective mentality	member's motivation	positive engagement	acting towards a common goal	individual or social factors	positive participation in groups activities
competence of the group/other group member	positive formal and informal interaction	legitimacy	positive formal and informal interaction	Strong social bonds	

Figure 5.5. Some of the factors and dimensions related to social and community cohesion discussed in literature (Fonseca et al., 2018 & McMillan & Chavis, 1986)

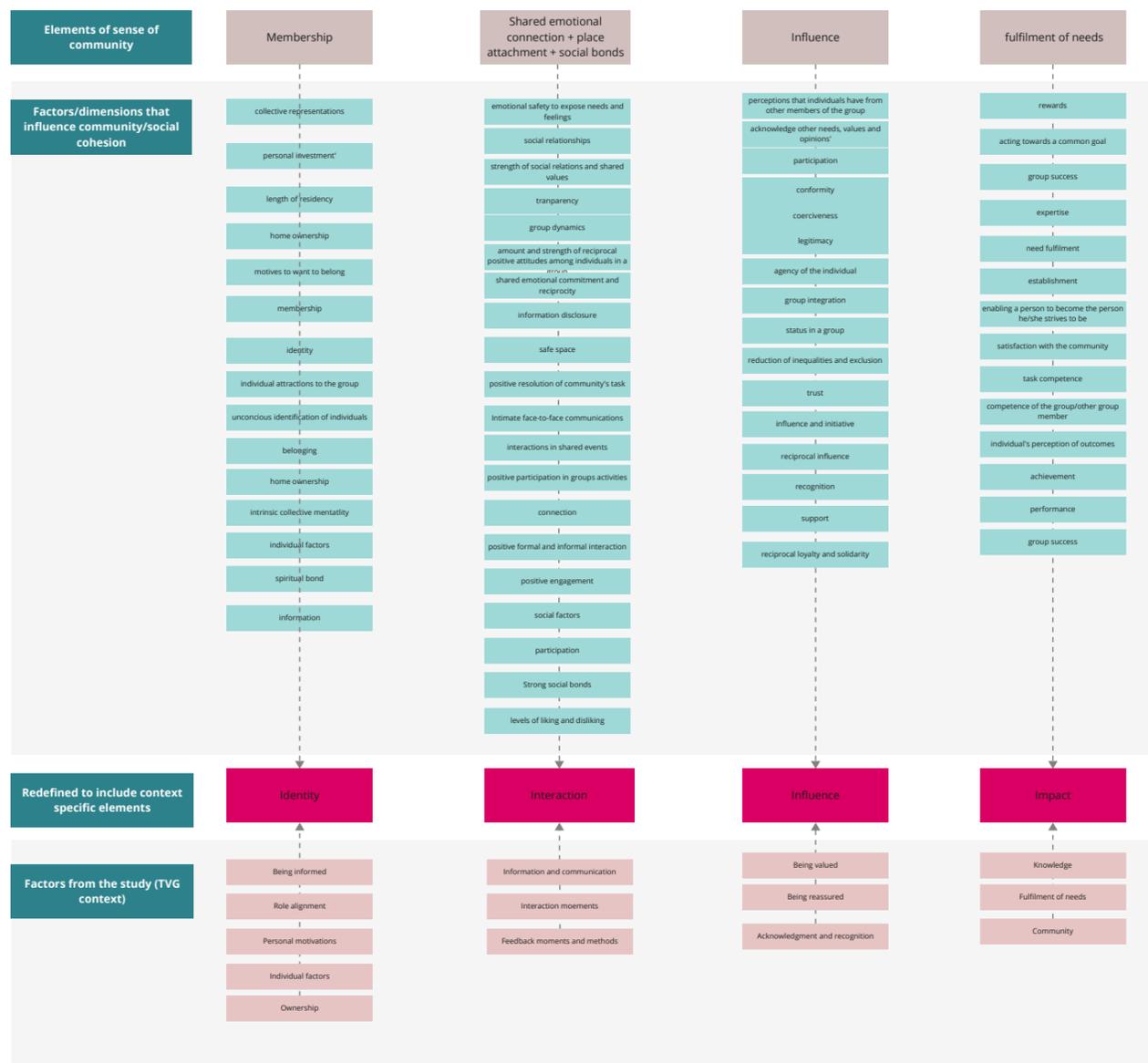


Figure 5.6. Mapping identified factors/dimensions from literature and this study (through interviews/focus group) to redefine the elements to suit TGV context.

## Community-based resident engagement framework (CBRE)

The core premise of the framework is that resident engagement is strongly tied to their sense of connection and belonging within the TGV community. Residents need to feel they are active, valued members of the community, that their contributions are integral to the larger goals of TGV, and that they are recognized for the value they bring. Furthermore, their interactions with the community and the innovation process should be positive, rewarding experiences that fulfil both personal and community needs. When these elements are in place, residents will not only engage more fully but also continue to do so over time, creating a positive cycle of participation.

The framework identifies two categories of elements that influence resident engagement:

1. *Enablers* - factors that initially attract and engage residents, such as creating a sense of belonging, identity, and connection.
2. *Reinforcers* - factors that help sustain and deepen their engagement over time, such as the sense of mattering and fulfilment.

Together, these elements form a continuous loop of engagement, where residents feel more connected, involved, and valued.

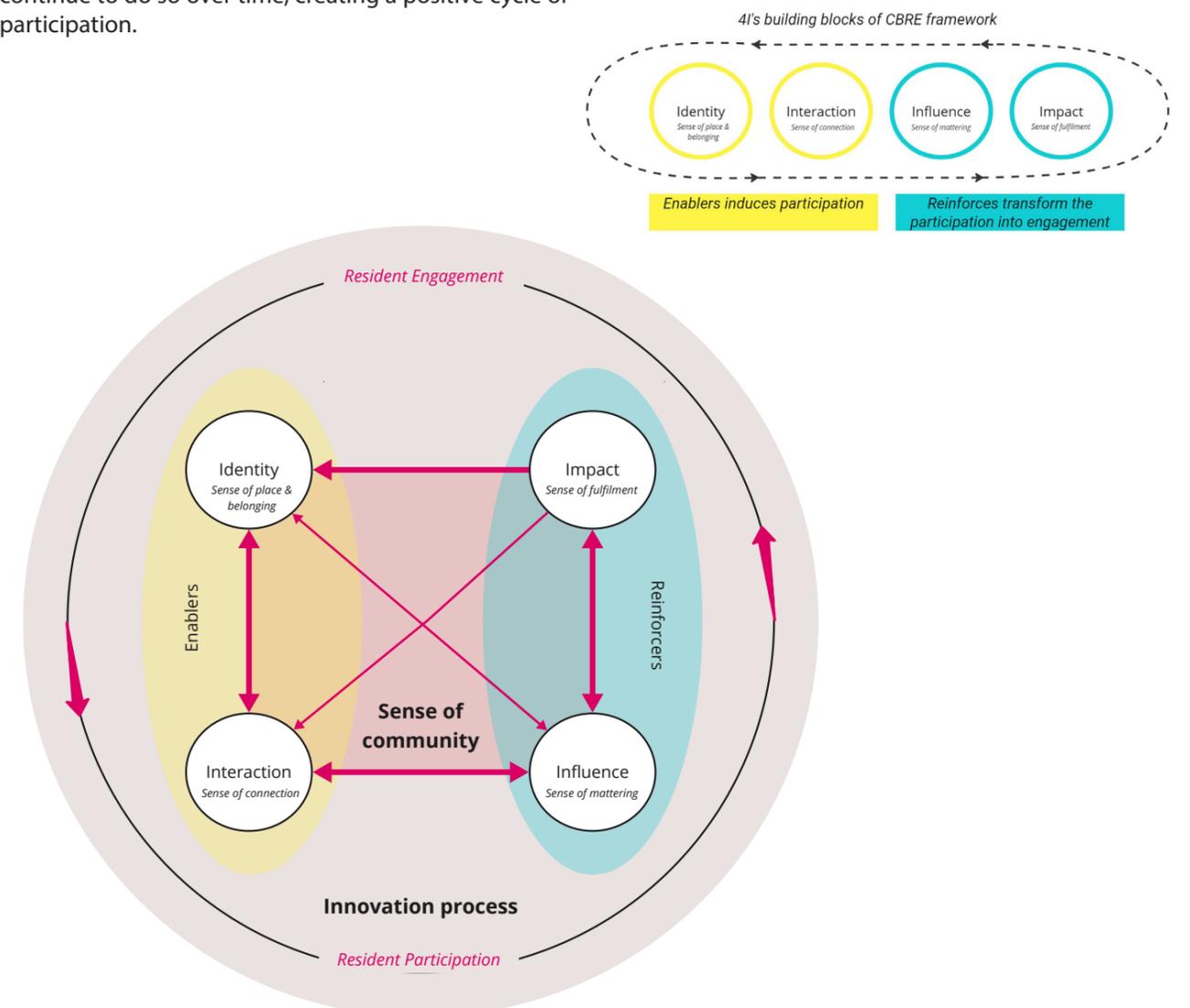


Figure 5.7. Community-based resident engagement framework (CBRE)

The 4 elements (4I's) - building blocks of resident engagement

### 1. Identity: Building a Sense of Belonging

Identity refers to how residents see themselves in relation to the TGV community, its values, and its mission. It is essential for residents to feel they are not just temporary occupants but integral members of a community that shares common goals. However, it is important to recognize that residents' primary needs (e.g., comfort, safety, privacy) differ from TGV's mission of innovation. For residents to align with the broader objectives of TGV, they must feel part of something larger—both emotionally and practically.

In this context, identity encompasses residents' personal motives, their knowledge and awareness of the group, attraction to the group, and their willingness to invest time and energy in the community. A strong sense of ownership—both over the group and the physical space of TGV—fosters deeper connections, while a collective mentality encourages residents to work together toward shared goals. Additionally, it includes a spiritual bond, rooted in a common passion that residents can identify with.

#### Factors

Role perception  
Clear communication  
Ownership  
Collective identity

#### How Identity influences resident engagement in TGV

When residents identify with the TGV community, they are more likely to participate in innovation activities, as they feel a personal stake in the community's success. They are more willing to align their behaviours and decisions with the community's goals. Identity also fosters a sense of belonging, which is critical for developing emotional bonds with the community. This feeling of belonging helps residents engage more actively and feel motivated to contribute their time, feedback, and effort.

#### Strategies for building Identity

- *Clear communication:* Providing clear, consistent information about TGV's innovation activities, goals, and values helps residents understand their role in the broader mission.
- *Alignment of resident's role:* Addressing uncertainties

about residents' roles—both as tenants and contributors to innovation—ensures they feel part of the group and understand their value to TGV.

- *Sense of ownership:* Residents should feel a degree of ownership over their living space and the activities happening around them. Efforts should be made to clarify their influence in the innovation process and their ability to shape outcomes.
- *Community rituals and symbols:* Holding events, festivals, and rituals that resonate with the community can create symbols of belonging and shared purpose, reinforcing the idea that residents are part of a collective identity.

### 2. Interaction: building a sense of connection

Interaction refers to the nature of the social relationships and connections formed among residents and with other stakeholders at TGV. The depth, frequency, and quality of these interactions significantly impact resident engagement. Positive interactions foster a sense of trust, mutual respect, and collaboration, all of which are essential for a thriving community. Interaction includes the emotional and physical investments that residents make when engaging in innovation activities, as well as their expectations for the outcomes of these interactions.

Interactions can take many forms, from casual social gatherings to formal feedback sessions. Strong social connections have been shown to increase residents' investment in the community and their willingness to contribute to its success.

#### Factors

Social relationship  
Transparency  
Trust  
Interaction quality and frequency

#### How Interaction influences resident engagement in TGV

Residents are more likely to engage in the community and the innovation process if their interactions are positive, meaningful, and fulfilling. Trust and openness in communication between residents and TGV staff, as well as among residents themselves, can help create an environment where residents feel comfortable sharing feedback, raising concerns, and collaborating on innovation efforts. On the other hand, poorly organised or unstructured interactions can lead to disengagement and frustration, as residents may feel undervalued or ignored.

#### Strategies for facilitating positive interaction

- *Considerate planning:* Activities that affect residents' daily lives, such as maintenance or testing sessions, should be planned well in advance, with clear communication and consideration for their schedules.
- *Transparency:* Maintaining open communication and sharing relevant updates about innovation activities builds trust and ensures that residents are well-informed.
- *Safe spaces for feedback:* Creating opportunities for residents to share their thoughts, both formally and informally, in an environment where they feel respected and heard is crucial.
- *Shared social events:* Hosting regular social gatherings, such as community drinks or resident networking events, strengthens bonds and helps build a sense of community.

### 3. Influence: building a sense of mattering

Influence refers to the sense of mattering—feeling both valued and able to add value. It reflects the degree to which residents believe they have a voice in the community and can shape its activities and outcomes. People are more likely to engage when they believe their input is important and that they can influence the group's direction. This includes an individual's perception of how they are viewed, the belief that their contributions to innovation are valued, and the recognition that their feedback leads to tangible changes.

Influence is a two-way process—for the community to influence residents and shape their behaviours and engagement levels, the residents need to feel that they can influence the community.

#### Factors

Recognition  
Participation  
Empowerment  
Feedback utilisation

#### How Influence affects resident engagement in TGV

When residents feel valued and empowered and that their opinions are recognized, they are more likely to remain engaged in the community and the innovation process. An empathetic approach where they feel they are heard, their needs and efforts are noticed and a participatory approach, where residents are consulted and their feedback visibly acted upon, strengthens their

sense of agency and investment in the community.

#### Strategies for enhancing Influence

- *Show that they matter; show that they add value*
- *Invite genuine participation:* Acknowledge their expertise and involve residents genuinely in activities.
- *Empower Residents:* Encourage residents to take up decision making in community related aspects (that doesn't affect professional work of TGV) through resident clubs, committees, or other platforms for input.
- *Recognition:* Acknowledge and celebrate the contributions that residents make to the innovation process, reinforcing their sense of influence and importance.
- *Showcase feedback utilisation:* Show residents how their feedback is being used by providing regular updates on changes made as a result of their input.

### 4. Impact: sense of fulfilment

Impact refers to the sense of fulfilment and satisfaction that residents experience from seeing the tangible and intangible rewards of their participation in the community and innovation activities. These rewards can be both tangible, such as access to new skills, opportunities, or incentives, and intangible, like a sense of personal growth, fulfilment, or contributing to a meaningful cause. Impact is not only reflected in the outcomes of innovation projects but also in the overall living experience at TGV.

This factor encompasses various elements that contribute to an individual's feeling of meaningful contribution and satisfaction. It includes rewards that acknowledge personal and collective achievements, fostering a sense of shared purpose and common goals. The success of the group and the expertise within the community further enhance feelings of accomplishment and progress.

#### Factors

Outcome  
Need fulfilment  
Rewards

#### How Impact strengthens engagement

When residents can see the tangible results of their contributions, they are more likely to continue engaging with the community. Success, whether in terms of personal growth or witnessing the achievements of the

innovation process, reinforces their commitment and strengthens the bonds between residents and TGV. It is important for residents to feel that their contribution is impactful and that they witness it.

**Strategies for maximising Impact**

- *Tangible rewards:* Offering rewards such as access to exclusive knowledge, skill-building opportunities, or incentives can motivate residents to stay engaged.
- *Fulfilment of needs:* Ensure that residents' primary and secondary needs are met, from comfort and security to personal development and intellectual growth.
- *Share the success:* Provide residents with opportunities to see the impact of their contributions, whether through project updates or community-wide celebrations of milestones.

With these four elements (4I's) - *Identity, Interaction, Influence, and Impact* - this framework provides

a comprehensive approach to fostering resident engagement within TGV. It encourages TGV to focus on building a strong sense of belonging and community identity, fostering positive and meaningful interactions, empowering residents with a sense of influence, and ensuring that their contributions lead to fulfilling and rewarding outcomes. Together, these factors create a sustainable cycle of engagement that benefits both residents and the broader innovation community.

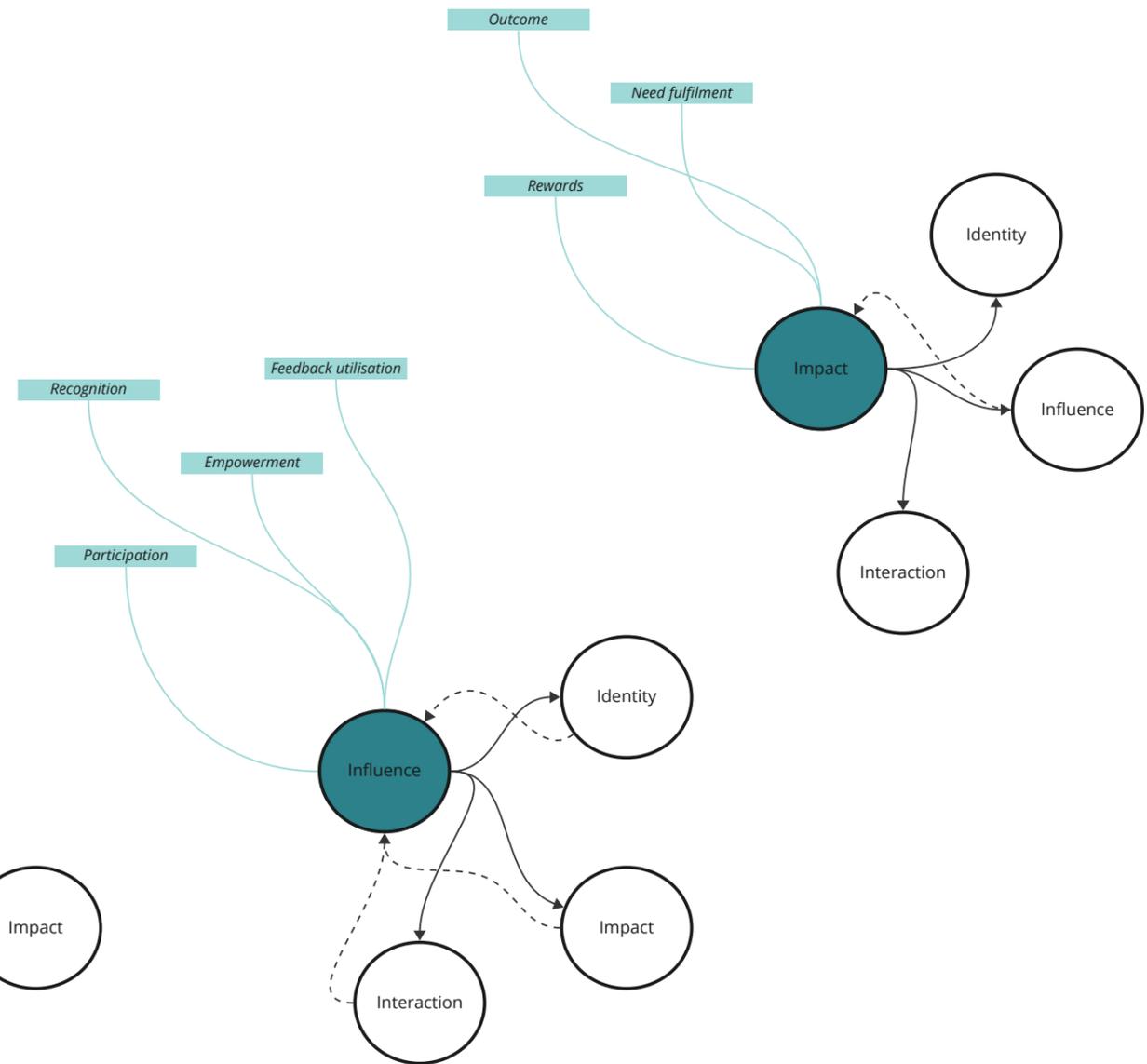
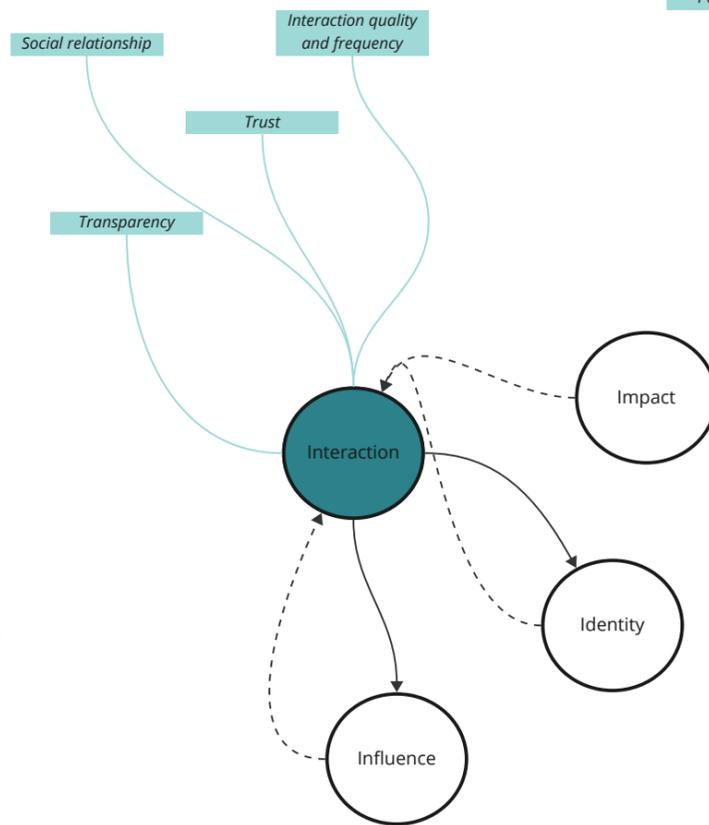
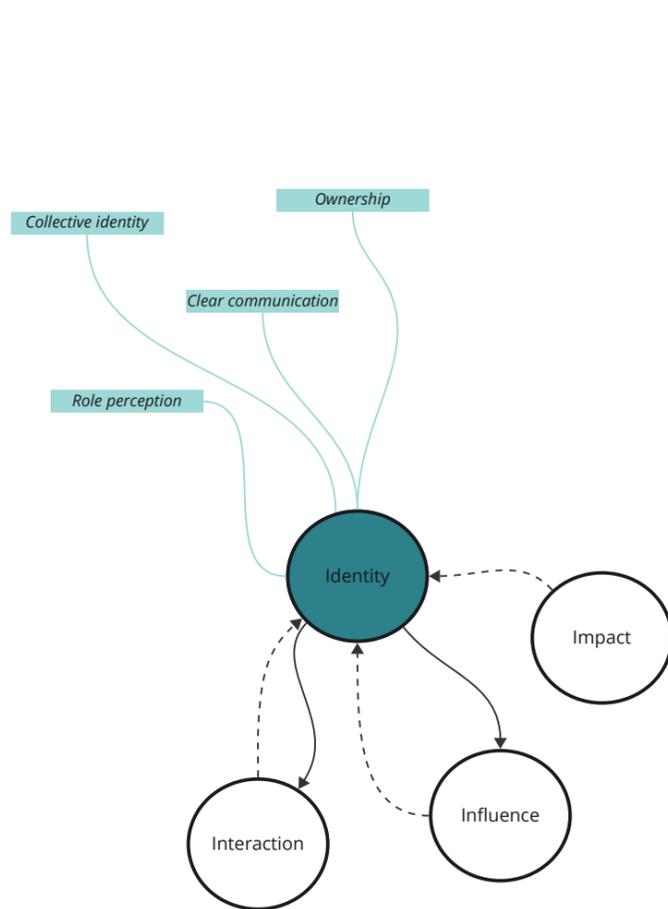


Figure 5.8. Illustration of the elements of the CBRE framework, their factors, and how they influence each other

	Elements	Affect	Factors	Strategies
Fosters participation	Identity	Sense of belonging	Perception of resident's role Clear communication Ownership Collective identity	<p><b>Clear communication:</b> Providing clear, consistent information about TGV's innovation activities, goals, and values helps residents understand their role in the broader mission.</p> <p><b>Alignment on resident's role:</b> Addressing uncertainties about residents' roles—both as tenants and contributors to innovation—ensures they feel part of the group and understand their value to TGV.</p> <p><b>Sense of ownership:</b> Residents should feel a degree of ownership over their living space and the activities happening around them. Efforts should be made to clarify their influence in the innovation process and their ability to shape outcomes.</p> <p><b>Community rituals and symbols:</b> Holding events, festivals, and rituals that resonate with the community can create symbols of belonging and shared purpose, reinforcing the idea that residents are part of a collective identity.</p>
	Interaction	Sense of connection	Social relationship Transparency Trust Interaction quality and frequency	<p><b>Considerate planning :</b> Activities that affect residents' daily lives, such as maintenance or testing sessions, should be planned well in advance, with clear communication and consideration for their schedules.</p> <p><b>Transparency:</b> Maintaining open communication and sharing relevant updates about innovation activities builds trust and ensures that residents are well-informed.</p> <p><b>Safe spaces for feedback:</b> Creating opportunities for residents to share their thoughts, both formally and informally, in an environment where they feel respected and heard is crucial.</p> <p><b>Shared social events :</b> Hosting regular social gatherings, such as community drinks or resident networking events, strengthens bonds and helps build a sense of community.</p>
Fosters engagement	Influence	Sense of mattering	Recognition Participation Empowerment Feedback utilisation	<p>Show that they matter; show that they add value.</p> <p><b>Invite genuine participation:</b> Acknowledge their expertise and involve residents genuinely in activities.</p> <p><b>Empower Residents:</b> Encourage residents to take up decision making in community related aspects (that doesn't affect professional work of TVG) through resident clubs, committees, or other platforms for input.</p> <p><b>Recognition:</b> Acknowledge and celebrate the contributions that residents make to the innovation process, reinforcing their sense of influence and importance.</p> <p><b>Showcase feedback utilisation:</b> Show residents how their feedback is being used by providing regular updates on changes made as a result of their input.</p>
	Impact	Sense of fulfilment	Outcome Need fulfilment Rewards	<p><b>Tangible rewards:</b> Offering rewards such as access to exclusive knowledge, skill-building opportunities, or incentives can motivate residents to stay engaged.</p> <p><b>Fulfilment of needs:</b> Ensure that residents' primary and secondary needs are met, from comfort and security to personal development and intellectual growth.</p> <p><b>Share the success:</b> Provide residents with opportunities to see the impact of their contributions, whether through project updates or community-wide celebrations of milestones.</p>

Figure 5.9. Table showing the CBRE elements, affect, factors, and strategies

## 5.3 Evaluating the framework

The evaluation focused on assessing the framework, along with the Quick Insight and Impact Templates. Booklets (Figure 5.10) containing structured activities were created, presenting a scenario based on the resident's challenge and incorporating the framework and templates. These booklets were distributed to TGV employees, who were asked to complete the activities independently and submit their responses.

The purpose of the evaluation was to determine how effectively the framework and templates helped TGV employees understand the scenario and supported their ideation process. The feedback gathered was essential in evaluating the form and effectiveness of the templates and identifying any adjustments needed to improve clarity, usability, or relevance to the TGV context.

### Key Takeaways:

**Scenario-Based Learning:** Scenarios helped employees understand the resident journey and apply the framework to different perspectives.

**Framework Utility:** The framework structured employees' thinking, helping them consider all factors.

**Different approaches to engagement:** Not all employees naturally engage in resolving resident issues, and some may not need to problem-solve, highlighting diverse needs within the team.

**Group activity potential:** The template would be more effective as a group activity tool.

**Clear instructions needed:** Guidance on how to fill

**Conceptual framework: to guide TGV to build sustainable cycles of resident engagement**

To be used to understand the problem and its impact on resident engagement, as well as to evaluate ideas that could help address the issue.

Arrows indicate their interdependencies

(form not finalised)

**Scenario**

**The Impact of COVID-19**

In recent months, it has become apparent that something may be amiss within our community. The sense of community of our community division remains that brought together TGV residents to solve, share, learn, and discuss existing concerns. This includes distributed attendance at these gatherings has recently declined, and other residents in the community appear to be feeling disconnected from the community. Our residents are also reporting that they are not able to connect with their neighbours, and that they are not able to connect with their neighbours. This has led to a sense of isolation and a lack of connection with the community. This has led to a sense of isolation and a lack of connection with the community. This has led to a sense of isolation and a lack of connection with the community.

**Idea generation and evaluation activity**

Your name(s):

The activity is divided into two parts:

- You will read the provided scenario, empathise with the residents, and brainstorm ideas based on the provided scenario.
- You will take on the role of a TGV representative responsible for addressing the challenge outlined in the scenario, using a conceptual framework and guided activities that you complete in a guided project.

Part 1: Ideas as a member of TGV community

Part 2: Use the framework to understand the problem and evaluate the ideas as a TGV employee responsible to make the change

**Reflection**

Please reflect on the entire activity (both Part 1 and Part 2) and share your thoughts. Your insights are extremely valuable to my production project. (Please answer all questions)

How did the framework enhance your understanding of the problem?

In what ways did the framework help you generate new ideas and structure them more effectively?

What additional elements, probes, or activities would improve the framework to help you develop actionable strategies?

How well does the framework address the key aspects you consider when tackling this challenge, and how easily can it be adapted to your needs?

Can you imagine using this framework in other scenarios or for different use cases? If so, how?

Did the framework help you identify any gaps or areas for improvement in your current approach? If so, what were they?

How easy or difficult was it to comprehend and follow the framework and its associated activities?

What challenges or limitations, if any, did you encounter while using the framework?

In what ways do you think this framework could support collaboration during the process? Any suggestions?

Any other comments?

Figure 5.10. Pages from the booklet distributed for the framework template evaluation (See appendix E1 for full booklet)

Figure 5.11. Participants filled templates and their reflection

and use the template is essential for its effectiveness. Challenges with Theory: Applying theoretical frameworks was difficult, prompting the creation of moments of intervention, an opportunity map, and factor mapping to clarify the resident journey and drive employee action.

**Digital Template:** A digital version of the template would offer flexibility, allowing employees to tailor it to their needs.

*"The template helped a bit. it would be better for me to do this in interaction with colleagues, that boosts my creativity"*

*"using identity, interaction, etc provides focus and structure towards needs of the residents. with more explanation and interactive approach it can be supportive"*

*"A3 form was difficult to fill in, so was not helpful frame in individual approach"*

*"I think it really helps to make sure you don't forget any aspects to consider"*

*"I liked the part where i could make a mind map and let creativity flow. i think a little explanation about an exercise would be really nice"*

*"framework is theoretical and the application is far difficult"*

## 5.4 Actionable tools based on CBRE framework

Based on the insights and feedback from the framework evaluation activity with TGV employees, three actionable tools were developed to translate the framework elements into more practical applications:

### Moments of Intervention

An Opportunity Map created from ethnographic research insights, this map captures the emotional journey of residents, from onboarding to living and testing innovations and offboarding at TGV. It highlights key high and low moments and aligns them with factors from the Community-Based Resident Engagement (CBRE) framework. TGV can use this map to design targeted interventions that improve resident engagement and overall experience.

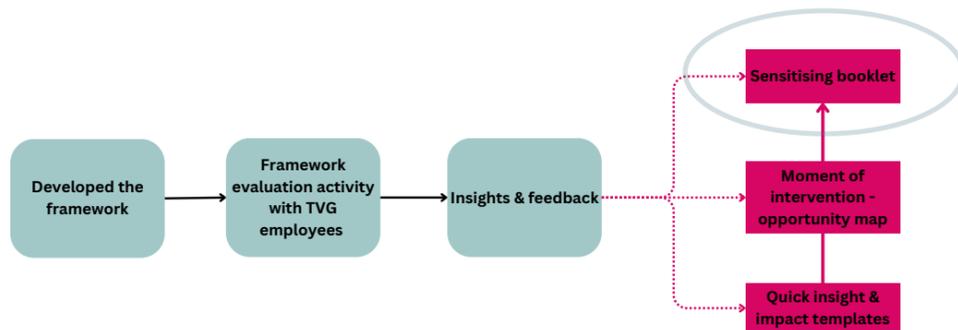


Figure 5.12. Project outcome

### Quick Insight and Impact Assessment Template

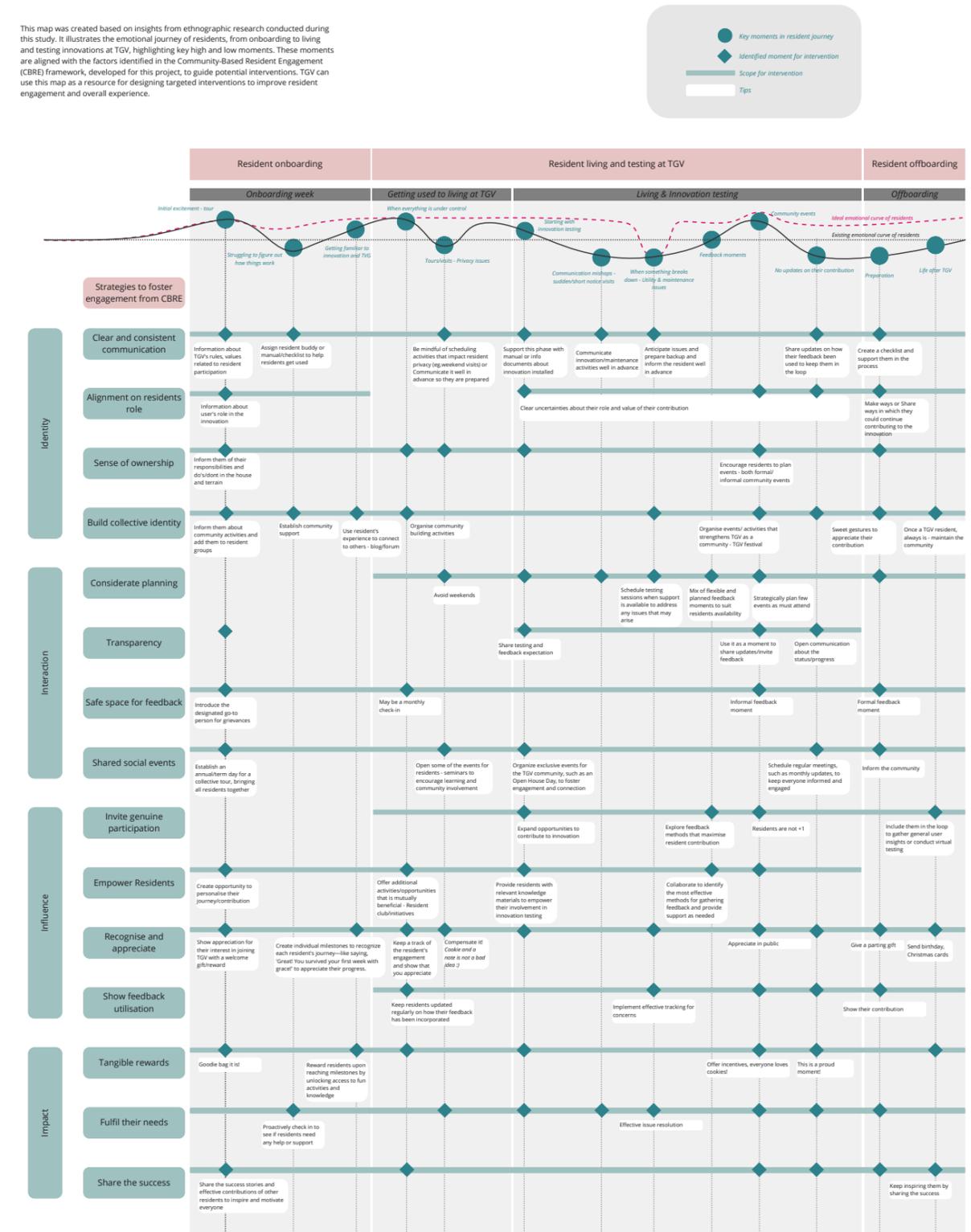
This template includes structured prompts aligned with the CBRE framework, designed to help TGV teams deeply understand resident challenges, brainstorm solutions, and quickly assess the impact of developed ideas.

### Sensitizing Booklet

Recognizing that not all employees engage in problem-solving, this booklet provides a clear understanding of the resident experience and ways to engage them. It also presents the outcomes of the thesis in an accessible format for all employees.

## Moments of Intervention Opportunity map

This map was created based on insights from ethnographic research conducted during this study. It illustrates the emotional journey of residents, from onboarding to living and testing innovations at TGV, highlighting key high and low moments. These moments are aligned with the factors identified in the Community-Based Resident Engagement (CBRE) framework, developed for this project, to guide potential interventions. TGV can use this map as a resource for designing targeted interventions to improve resident engagement and overall experience.



# Quick Insight & Impact Templates

## Understanding the challenge with the help of the framework

**1. Identify the challenge**  
 What is the challenge? Write it down in a line or 2 and use the framework to get to the roots of the problem and how it could affect resident engagement.

**Lots dive deeper!**  
 In the following steps, we will dive deeper to understand the implications of the problem using the Resident engagement elements (the 4 I's: identity, interaction, influence, and impact) and from different perspectives, including those of the residents, stakeholders, and TVG. Afterward, we will reflect on these insights to grasp the significance of the issue and plan the next steps toward resolution.

**Resident engagement elements 4I's** Identity Interaction Influence Impact

**2. Explore the impact on Residents**  
 Which element (identity/interaction/influence/impact) do you believe is most impacted by the problem for residents?  
 Describe how it is affected in the box(es) to the right. You may come up with as many aspects and fill them up in the respective element boxes. Feel free to use post-its if helpful.  
 How does it influence other factors for the residents?  
 Consider the aspects mentioned in the previous step. Use the arrows as guides to explore whether the identified aspect further impacts any of the other elements (identity, interaction, influence, or impact). If so, write it down in the respective box. If you discover new connections, map them accordingly.  
 Tip: Focus on one element at a time, and think from all possible perspectives of the residents.

**3. Resulting impact on stakeholders**  
 How does it affect the other stakeholders?  
 List all the stakeholders you believe will be impacted by the observed resident behavior or the identified challenge. Then, reflect on how the points mentioned in the previous step (identity, interaction, influence, and impact) affect these stakeholders. Each aspect could cause a different impact or a collective impact, but try to dissect and think deep.  
 Stakeholder 1  
 Stakeholder 2  
 Stakeholder 3

**4. Reframing the challenge**  
 How do you (re)define the challenge?  
 Consider the insights gained from previous discussions and analyses. Reflect on the various perspectives of residents and stakeholders, along with the implications identified. Based on this reflection, articulate a clear and specific challenge statement that captures the core issue and its complexities. This statement can represent a single challenge or multiple, more specific challenges. Be careful not to oversimplify the problem; doing so may require you to revisit step 1.  
 How significant is this issue to address?  
 Reflect on the implications mentioned in the previous steps from both the residents' and stakeholders' perspectives. Based on this reflection, determine the significance of addressing the issue and categorize it as low, medium, or high.

**5. Solution direction**  
 What would be a suitable measure to resolve the challenge?  
 Identify the quick logical directions that could address the problem, such as changes in processes, incentives, or workflows.  
 Note: Use these directions as a foundation to ideate further and develop suitable interventions that effectively tackle the identified challenges.  
 Who should be involved in addressing the challenge?  
 Consider the various stakeholders, residents, and team members who can contribute valuable insights, resources, and support. Identify individuals or groups whose participation is essential for ideating and implementing the interventions.  
 Note: Ensure a collaborative approach to problem-solving.  
 Anything else to consider?



## Evaluating the idea(s) with the help of the framework

**1. Idea**  
 What idea would you like to assess? Write down the important aspects/features of this idea and use the framework to evaluate its potential to foster resident engagement.

**Let's Evaluate the Idea!**  
 In the following steps, we will thoroughly evaluate the proposed idea by assessing its features, feasibility, and potential impacts. We will examine how the idea aligns with the needs of residents and stakeholders, as well as its capacity to deliver meaningful value across the four elements of the framework (the 4 I's: identity, interaction, influence, and impact), which are the building blocks of resident engagement. Through collaborative discussions, we aim to ensure that our decisions are well-informed and strategically aligned with the resident engagement framework, laying the groundwork for effective implementation.

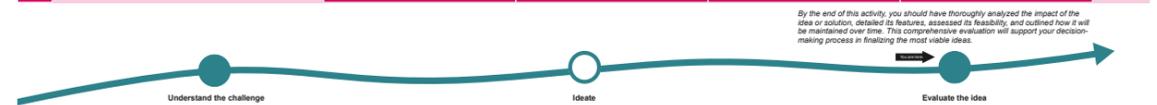
**Resident engagement elements 4I's** Identity Interaction Influence Impact

**2. Explore the impact on Residents**  
 Which element (identity/interaction/influence/impact) do you think this idea focuses on for residents?  
 Describe how it is affected in the box(es) to the right. You may come up with as many aspects and fill them up in the respective element boxes. Feel free to use post-its if helpful.  
 How does it influence other factors for the residents?  
 Consider the aspects mentioned in the previous step. Use the arrows as guides to explore whether the identified aspect further impacts any of the other elements (identity, interaction, influence, or impact). If so, write it down in the respective box. If you discover new connections, map them accordingly.  
 Tip: Focus on one element at a time, and think from all possible perspectives of the residents.

**3. Resulting impact on stakeholders**  
 How does this solution add value to other stakeholders?  
 List all the stakeholders identified during the first activity (understanding the problem), and feel free to add new ones if necessary. Then, reflect on how the proposed solution - either directly or indirectly (through its impact on residents as mentioned in the previous step) - adds value to each stakeholder. Consider the ways in which improving identity, interaction, influence, and impact for residents also benefits each stakeholder.  
 Stakeholder 1  
 Stakeholder 2  
 Stakeholder 3

**4. Assess the feasibility**  
 Which features or elements of the idea would facilitate the value discussed above?  
 Identify the specific features or elements of your proposed solution that will help deliver the value to stakeholders. Consider how these components will enhance identity, interaction, influence, or impact for residents and, in turn, benefit the broader group of stakeholders.  
 Is the feature or element feasible?  
 Evaluate whether the identified feature or element of the solution is realistic and achievable. Consider factors such as resources, time, technology, stakeholder cooperation, and potential challenges. Assess whether it can be effectively implemented to deliver the desired value to residents and stakeholders.  
 What are the potential risks or challenges?  
 Consider any obstacles or issues that might arise during implementation. These could include technical limitations, budget constraints, stakeholder resistance, lack of resources, timeline delays, or unforeseen dependencies. Evaluate how these risks could impact the success of the feature or element and what mitigation strategies could be put in place to address them.  
 How will this feature/element be maintained or sustained over time?  
 Consider the resources, personnel, budget, and processes needed for regular maintenance. Think about whether training, monitoring, updates, or partnerships will be required to keep the feature effective and relevant in the long run.

**5. Evaluate**  
 What is your decision?  
 Based on the discussions and evaluations, determine whether this idea will be pursued moving forward.



## 5.5 Sensitising booklet on resident's experience and engagement

The design goal for this thesis was to : "Design an intervention that promotes resident engagement in the innovation process and within TGV community."

This booklet is an intervention aimed at informing and aligning TGV employees on resident experiences and engagement practices.

By translating the research findings into this booklet, we are taking the first step toward building alignment on role perception. The booklet is designed to foster empathy among TGV employees toward resident experiences while providing a practical framework for resident engagement. It includes actionable components to support employees in developing effective strategies and interventions for resident engagement, both in the innovation process and within the broader TGV community.

### Why TGV employees?

During the research it was found that role perception of the residents is an important factor that influence their identity and their engagement in the innovation process and in TGV community. Role perception of residents comes from how they are being perceived by other members of the community and their own beliefs. This brings us to the point where it is essential to align the other members of the community- TGV employees who mostly come from technical backgrounds, which may cause them to overlook the resident experience. However, it's critical for employees to understand this perspective to drive meaningful engagement.

**TGV is a Community:** TGV is not just a workplace but a community where both residents and TGV employees coexist. Understanding and empathy are vital to improving the relationship between these two groups. Aligning employees leads to creation and realisation of resident engagement strategies in TGV.

**TGV employees are the bridge:** TGV employees play a key role in connecting innovators with residents. Their involvement extends to designing and implementing innovation testing and feedback plans. By aligning employees with the goals of resident engagement, they can influence innovators to consider resident needs and feedback, leading to more successful initiatives.

**TGV employees are the changemakers:** Their interest to understand and engage residents and their ideas have the power to shape initiatives that bring real change to TGV.

### Contents of the Sensitising booklet

- Living lab vision scenario
- Short narratives on resident experience
- Community-based Resident engagement framework (CBRE)
- Moments of intervention - Opportunity map
- Design intervention examples
- Quick Insight & Impact templates

The sensitising booklet is attached separately to the thesis submission

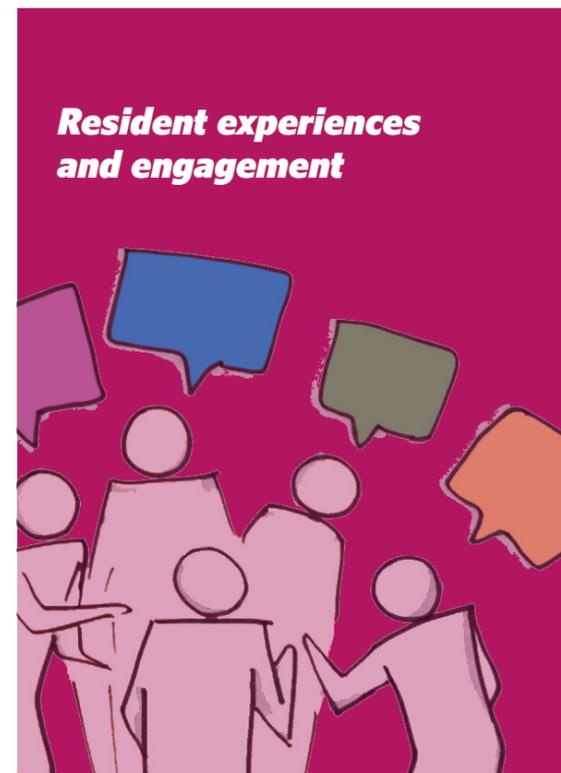


Figure. 5.13. Cover of the sensitising booklet on Resident experiences and engagement

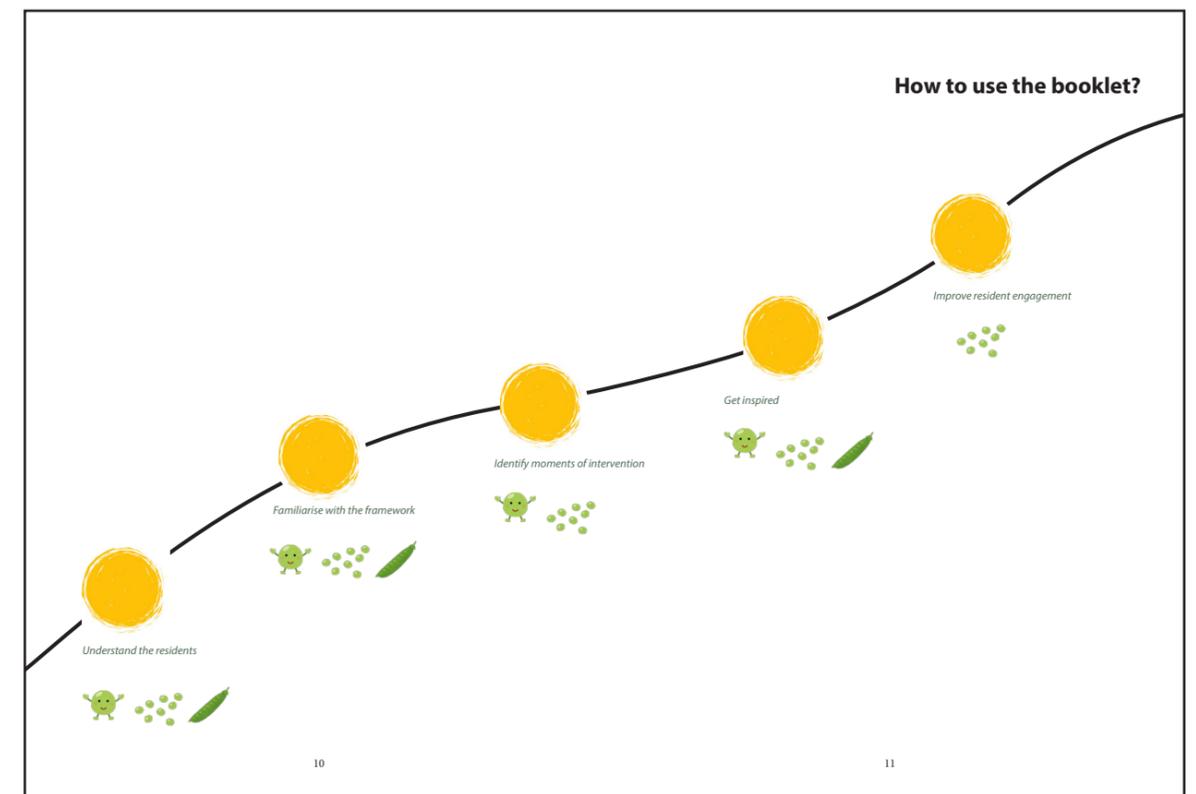
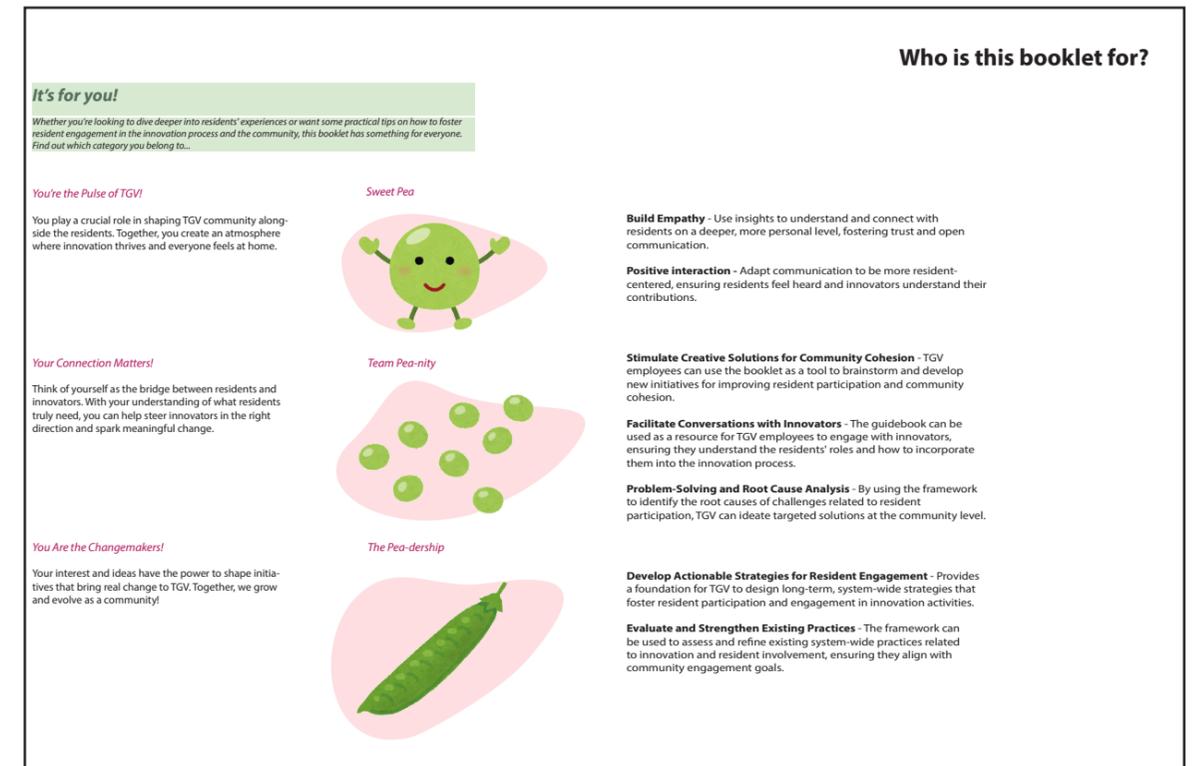


Figure. 5.14. Some pages from the sensitising booklet on Resident experiences and engagement (See the sensitising booklet for more)

## Lets meet the residents



Diligent Dana  
The quiet, introverted



Leadership Leo  
The outgoing resident



Mindful Maya  
The sensitive resident



Jolly Jamie  
The cheerful and playful



Engaged Emma  
The proactive resident



Welcome to the heart of our community!

Here, we want to introduce you to the wonderful people who live in our living lab. Our residents come from all sorts of backgrounds, bringing their unique stories and personalities with them. Some are single, some are couples; some are feeling happy, while others might be going through tough times. This mix makes our community feel real and vibrant, just like any neighbourhood you'd find out there.

But what really brings everyone together is their need for housing—a place to call home. In addition, they all share a passion for sustainability and innovation. They're excited to share their expertise as users and make impactful contributions to the innovation process.

Let's focus on what brings us together instead of what sets us apart! By highlighting our shared interests and goals, we can build a stronger, more supportive community. Together, we can inspire each other and work toward a brighter, more sustainable future for everyone!

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## The mystery of Innovations

Krish, a long-time resident of the TGV Living Lab, was known for his outgoing and cheerful personality. He loved being an active member of the community and frequently shared his experiences with new residents. So, when his family from his home country came to visit, they were excited to see what living in a "living lab" was all about. Their curiosity quickly turned into a barrage of questions—about the innovative technologies, the smart systems, and how life was different at TGV.

To Krish's surprise, he struggled to answer most of them. He stammered through explanations, realizing that over time, he had lost track of the various innovations around him. He couldn't explain how the new heating system worked or why some lights adjusted automatically. The once-exciting tech that he was proud to talk about had slipped from his mind as his priorities shifted.

The real shock came when he tried to show off a new device that had been installed just a week ago—and realized he couldn't remember how to operate it. His family watched as he fumbled with the buttons and features, feeling a mix of embarrassment and frustration. How did I forget this already? he thought, feeling the pressure to impress his guests.

After some back-and-forth texting with a TGV employee and even reaching out to the innovator, Krish finally figured out how to use the device. But the whole experience left him wondering why there wasn't an easier way to stay on top of these things. He dreaded having to rely on memory and emails for every update. Wouldn't it be great, he thought, if there was a simple, non-intrusive way to find answers to my questions or look up how these things work? A guide, or even an app, to help keep track of all the innovations here?

Krish still loved living at TGV, but this experience made him realize how easy it was to fall out of the loop when it came to the very innovations that made the living lab special. He just wished staying informed didn't feel like a puzzle every time.



How would you feel if you were in Krish's shoes?  
Embarrassed? Or would you just laugh it off?

.....

.....

.....

Have you ever found it difficult to say "no" in a situation where you felt obligated? How did that affect you?

.....

.....

.....



## The uncomfortable "yes"

Keith was buzzing with excitement as he got ready to meet his best friend, someone he hadn't seen in two years. He had been counting down to this day for weeks, and the moment had finally arrived. Just as he was about to leave, a knock came at the door.

To his surprise, it was a group of technicians, all prepped to fix a leaking roof—a problem Keith had almost forgotten about. The timing couldn't have been worse. On one hand, he was relieved the issue was being addressed, but on the other, his reunion was slipping through his fingers. Glancing at his watch, Keith debated telling the workers to come back later.

But he hesitated. He didn't want to seem difficult or cause a fuss, and wasn't sure if it was okay to ask them to reschedule. Feeling obligated, he urged the workers to finish quickly, hoping it wouldn't take long. Hours later, though, Keith's plans with his friend were ruined, and frustration gnawed at him. This wasn't the first time his schedule had been hijacked by unscheduled maintenance work.

After some internal debate, Keith reached out to the TGV team to ask if residents could be informed in advance about maintenance schedules. That's when he found out the work wasn't even planned for that day—there had been a miscommunication between the TGV team, the technicians, and, of course, Keith himself.

In that moment, Keith realized how hard it was to say "no" when he felt he couldn't, even if it meant his own plans were disrupted. He couldn't help but think that with better communication—and a little more confidence to speak up—he could have saved himself a lot of stress and a missed reunion.

## Sneak peek into our residents' lives

In this section, we invite you to explore the short narratives of our residents' experiences. These stories highlight their interesting experiences and encounters here, blending real insights with a touch of exaggeration and fiction. Our aim is to give you a deeper understanding of the diverse possibilities that exist within our community. As you read through these narratives, we encourage you to think critically, reflect on the situations presented, and decide for yourself how much of it resonates with reality. Each story offers a unique glimpse into the varied experiences of our residents' lives.

Let's dive in and see what their lives look like!

### A Resident's Onboarding Experience at TVG Living Lab

Meet Sarah, our enthusiastic new resident at the TVG Living Lab, who embarked on her onboarding adventure with a mix of excitement and confusion. As she arrived, she was greeted with bright smiles from the team, who whisked her away on a tour of the terrain, showcasing sustainable innovations big and small. "Welcome to TVG!" they exclaimed, and Sarah felt the energy around her.

As the team explained the innovations in the house and the surrounding area, Sarah struggled to keep track of all the instructions. She thought, "Do I need to remember all these? Where's my cheat sheet?" The impressive technology was fascinating, but it felt like a lot to absorb in one go.

After the tour, she settled into her new space, ready to embrace the innovative lifestyle. Feeling a bit chilly, Sarah decided to turn on the heating through the app. It felt empowering at first until she swiped the button to turn it off, only to discover that the app and the actual heater were having a serious communication breakdown. The app showed the heater was off, but the room was getting warmer and warmer.

Minutes turned into a mini sauna experience, and Sarah's mind raced as she thought, "Is it supposed to feel like a tropical vacation in here?" Panic set in when she remembered it was a weekend—no one from the TVG team was around to save her from this warm disaster. Thankfully, the team was quick to respond via text, reassuring her they'd help.

In a delightful twist, an old resident chimed in with a quick fix, explaining how to reset the heater by figuring out that tricky white plug and replugging it. Relief washed over Sarah as she finally got the room back to a reasonable temperature.

As she settled in, she couldn't help but think how much easier her onboarding would have been if all this information was documented in one place. "A handy guide for dummies," she chuckled to herself, picturing a bright cover with the title "How to Not Roast Yourself in a Smart House."

With a smile on her face, Sarah embraced her new home, excited to learn and grow in this unique living lab—just maybe with a little less sweating next time!

How would you feel if you were in Sarah's shoes?

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.....

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What actions can you take to improve her experience?

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.....

.....

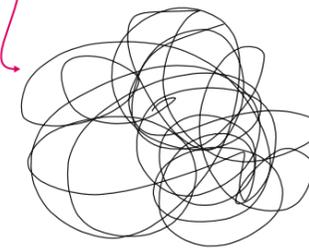


18

19

## Quick Insight & Impact Templates

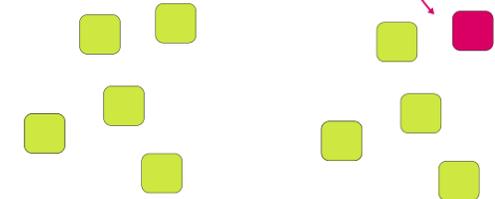
Helps to understand the problem and its impact



Problem identification

TP - 1

Evaluate the idea for maximum impact



Idea generation

Idea evaluation

TP - 2

# 06 | Design Evaluation

This chapter presents the feedback and insights gathered from the evaluation session conducted with TGV employees on the final concept.

## Evaluating the sensitising booklet

The evaluation of the the sensitizing booklet included all its components—scenarios, stories, the framework, and actionable tools such as the Opportunity Map and Quick Insight & Impact template. This evaluation was conducted through individual interviews with four TGV employees. The session was set up for 1 hour, beginning with a brief introduction to the design direction and the booklet, followed by a review of the contents. Employees were then asked questions based on the booklet. The interview guide can be found in the appendix E3.

The primary aim of the validation sessions were to determine whether the booklet effectively helps TGV employees (the target group) understand and

empathize with residents. Specifically, it sought to evaluate if the booklet encourages reflection on their roles and offers ways to improve engagement with residents. Additionally, feedback was solicited regarding the structure, tone, format, and the booklet’s applicability to the employees’ daily work within TGV.

The insights from these sessions are discussed below, and were subsequently used to further refine the final concept - the framework, actionable tools of the framework and the booklet.

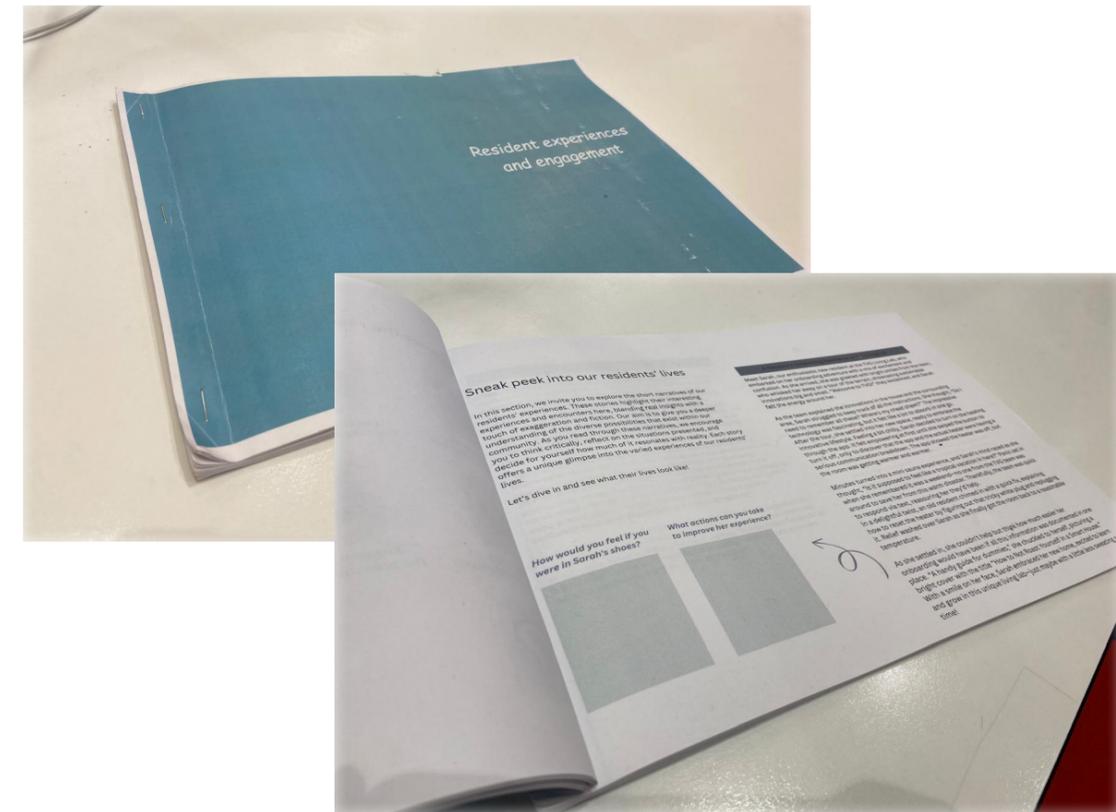


Figure 6.1. Photos of the sensitising booklet draft version (See appendix E2 for the full booklet)

## Key Insights from the validation session

**Vision scenario activity:** Participants found the first activity—comparing vision scenarios for a living lab and reflecting on where TGV currently stands—highly effective. It encouraged them to think critically about TGV's current state and realize that there is more work to be done. The consensus was that TGV is closer to the undesirable scenario, highlighting the need for this intervention and reflecting on the gap between aspirations and reality.

*"I really like that you start with the two vision scenarios. Working here, you might think, 'Oh, we have great feedback, and we work really well with our residents.' But through the scenario activity, you begin to wonder, 'Maybe we have some work to do.'" (Program manager, TGV)*

**Empathy and awareness:** Many participants recognized that while some employees naturally show curiosity and empathy toward residents, this is not widespread across the organization. It was noted that interaction and engagement with residents, along with related values, are not yet ingrained in TGV's culture. Employees who hold key positions felt that they could influence their teams, but emphasized the need for a common understanding of resident experiences to align efforts.

*"I think it gives more like an insight because, like, I just don't know how they experience it. It also gives insights that it could be a negative experience, and that's not the first thing I think about. I think, like, 'Oh, they can live there, and they have a house, and it's nice,' and this makes you realize there are also downside effects of it. So, therefore, I think it's really helpful." (Intern, TGV)*

**Narratives and emotional impact:** The short narratives were particularly appreciated for providing a vivid picture of the residents. Several participants said the narratives and the reflective questions encouraged them to empathize with residents. One participant mentioned that it prompted a sense of shame, making them reflect deeply on their interactions with residents. This emotional response indicates that the booklet successfully achieved its goal of fostering empathy. Another participant admitted that they previously viewed residents as "guinea pigs" but now see them in a more empathetic light. This shift in perception demonstrates the booklet's effectiveness in reframing resident relationships.

*"The booklet definitely helps in the first way that I look at the residents with a different glasses. I should say I saw them as Guinea pigs. Yeah, yeah, yeah, that's how I saw our residents like, they are the nice, cute Guinea pigs living here and we do test together with them." (Project manager, TGV)*

**Inspiration Section:** The examples in the inspiration section prompted participants to think about new aspects of resident engagement, which had not occurred to them before. The framework, in particular, encouraged them to approach issues from the residents' perspective, which was seen as a positive outcome.

*"I like the framework. If you have this case and you want to come up with a solution, then I could do it like in 5 minutes and think, 'Oh, this is the problem.' Or maybe, 'We can do it like this. OK, let's do it.' But with this one, it doesn't work. And I think that's a good one because I think that the problems or the challenges with the residents are more deep, they're more complex, so you actually get help. The framework helps you to kind of extract the problem in different parts, and that makes sure that the solution also tackles the whole problem instead of just the surface level, exactly." (Program manager, TGV)*

## Evaluation

**Effectiveness of the Booklet:** The booklet was highly effective in fostering empathy and encouraging TGV employees to reflect on their roles in relation to residents. Participants particularly appreciated the use of short narratives and the vision scenario activity, which effectively challenged their assumptions about TGV's current engagement with residents. These elements also helped shift perspectives and triggered emotional responses, such as shame, highlighting the booklet's success in building empathy.

However, while the framework encouraged participants to think from the residents' perspective, the tools (like the opportunity map and quick insight & impact templates) required additional explanation. This suggests that the framework and tools might benefit from more detailed instructions or a facilitated session to ensure clarity and effective use.

**Ease of Use:** While the content was deemed useful and thought-provoking, participants found the booklet text-heavy. They suggested including a brief overview or key pointers for those who may not have time to read the entire document. A poster summarizing the booklet's key messages was also recommended as a way to provide a broad overview, making it easier for

employees to engage with the content at a glance. Opinions were divided regarding the format. Some participants preferred a digital version for ease of access and alignment with TGV's ways of working, while others favored a physical booklet for a more engaging reading experience. A notable suggestion was to produce a single master copy, allowing interested employees to access it, rather than distributing copies to everyone.

**Integration and Usability:** Participants noted that the booklet should be integrated into TGV's workflow through clear ownership. Assigning a dedicated team or individual to manage and facilitate resident engagement, as well as conducting workshops, were proposed as ways to ensure the booklet's effective implementation. A suggestion was made to include a link to the booklet in the TGV employee handbook, making it easily accessible to all staff.

Additionally, the tools provided in the framework (opportunity map and Quick Insight & Impact template) needed further explanation, with feedback suggesting that step-by-step instructions should be included. Some participants struggled to understand the tools when working individually but found them clearer after receiving guidance. This indicates that these tools might be more effective when used in a workshop setting or facilitated session, emphasizing the need for structured support.

### Suggestions for Improvement:

1. **Content Overview:** Provide a summarized version or key points at the beginning of the booklet for employees with limited time.
2. **Poster Version:** Create a poster that outlines the purpose and key actions of the booklet, offering a quick reference.

3. **Format:** Offer both digital and physical formats, while also considering the suggestion of a single master copy for shared access.
4. **Tool Instructions:** Include step-by-step instructions for the supporting tools, ensuring clarity on how they should be used.
5. **Facilitated Sessions:** Consider workshops or assigned facilitators to guide employees in using the tools effectively.
6. **Ownership and Integration:** Assign responsibility for resident engagement to a dedicated team or individual, and consider incorporating the booklet into the employee handbook to promote ongoing access and use.
7. **Language Accessibility:** A Dutch translation of the booklet would improve clarity and engagement for all employees.

These insights demonstrate that while the booklet is effective in building empathy and reflecting on role perception, enhancements in usability and integration will ensure its broader impact across TGV.

# 07 | Discussion

This chapter presents the overall conclusions of the project, offering final recommendations while reflecting on the initial assignment and personal insights. It discusses the project's findings and approach, limitations, provides a personal reflection on the process, and identifies potential areas for further research

## 7.1 Research findings and outcome

The project's scope and direction evolved significantly throughout the research process. Initially focused on feedback methods, the project was redefined based on insights from interviews to explore the main research question:

*How can residents feel more valued and engaged in innovation testing within the TGV community?*

To investigate this question, two sub-questions were developed:

1. What challenges do residents currently face in the innovation testing process?
2. What factors contribute to resident engagement within the TGV community?

These questions guided the research and informed the design interventions aimed at enhancing resident engagement in innovation at TGV.

### **Challenges in the innovation testing process**

Through a combination of interviews, focus groups, and observations, I uncovered several challenges residents face in the innovation testing process. While residents were generally curious about the innovations being tested at TGV, they were often not motivated enough to participate actively. A recurring theme was the different perception of the role of the residents in the innovation and the sense that their contributions were not being valued or recognized. This lack of acknowledgment made them less willing to invest their time and effort in engaging with the innovations.

Residents also expressed dissatisfaction with the unstructured and inconsistent feedback process. They were unclear about when and how they would be involved and how their feedback was being used, if at all, and this uncertainty eroded their motivation. Many felt that innovators did not show a genuine interest in involving them, which further discouraged participation. These challenges were exacerbated by a lack of communication about the purpose and significance of their involvement in the innovation process. Residents desired more recognition, reassurance, and support from TGV to feel that their contributions mattered.

### **Factors influencing resident engagement**

Exploring the second sub-question required an in-depth look at the broader context of resident engagement within the TGV community. Drawing from interviews, observations, and my own auto-ethnographic research, I identified a significant difference in how residents and other stakeholders perceived the purpose of the TGV living environment. For the residents, their primary need was housing and comfort, not innovation. Innovation was secondary in their priorities, as they viewed their participation as part of their contractual obligation rather than a voluntary engagement. This tension between their housing needs and their role in the innovation process created a sense of disconnection.

The concept of value exchange was central to understanding resident engagement. Residents contribute to TGV by living in an experimental environment, but in return, they expect a comfortable and supportive living experience. The challenge lies in ensuring that this exchange is balanced and that residents feel that their contributions are meaningful. This research emphasized that residents would engage more fully in innovation testing if their primary housing needs—such as privacy, comfort, and safety—were met. Additionally, when residents feel recognized and their input is considered valuable, their engagement in innovation activities becomes more natural.

A less obvious but significant issue was the tension surrounding ownership. Residents often felt they lacked control over their living spaces, as decisions regarding the houses and the broader TGV environment were primarily made by TGV management. This lack of control negatively impacted their sense of ownership of both the place and the community, leading them to undervalue their roles and diminishing their connection to the shared goals.

### **Addressing the main research question**

By addressing these two sub-questions, I was able to synthesize the research findings to uncover key factors that could be leveraged to improve resident engagement and help them feel more valued. One important discovery was the dual role of community—both a cause and an effect of the challenges uncovered. The research revealed that fostering a sense of community among residents could serve as a

powerful tool for promoting engagement in innovation testing.

This insight informed the design strategy, where the sense of community became a vehicle for connecting residents to TGV and, by extension, to the innovation process. To address the research question, I developed a community-based resident engagement framework specifically for the TGV context. This framework identified four key elements—the 4I's—which are essential for fostering a sense of community:

1. *Identity*: Helping residents form a strong personal and collective identity within the TGV environment.
2. *Interaction*: Facilitating frequent and meaningful interactions among residents, TGV employees, and innovators.
3. *Influence*: Showing residents that they matter, their opinions matter
4. *Impact*: Ensuring that residents can see the tangible results of their contributions and feel that their efforts make a difference.

The first two elements—Identity and Interaction—act as enablers, encouraging initial participation, while the latter two—Influence and Impact—act as reinforcers, sustaining long-term engagement in the innovation process. The framework outlines strategies and factors that can influence these elements, providing TGV employees and designers with practical guidelines to create interventions that promote resident engagement.

In addition, I addressed the challenge of varying perception on residents' roles by creating a sensitizing booklet for TGV employees. This booklet serves as a tool to align the perceptions of residents' roles in the innovation process, aiming to foster a positive and constructive view of residents among the TGV employees who can in turn influence the innovators. The content of the booklet was partially informed by participatory activities with TGV employees, and its goal is to encourage empathy and understanding about resident's needs and experiences.

To make the framework actionable, I also developed a Moments of Intervention - Opportunity Map, which highlights specific moments in Residents journey where TGV employees can intervene to foster engagement. Additionally, a quick insight & impact templates based on the framework was designed to help employees approach problems from both the

residents' and the stakeholders' perspectives, ensuring that future interventions are grounded in a deep understanding of the residents' needs.

## 7.2 Limitations

Despite the insights gained, the project had several limitations:

**Limited sample size:** The research relied on qualitative data from a small, transient population of residents. TGV residents are mostly students or PhD researchers, and their perspectives may differ widely depending on their backgrounds and experiences. As a result, the findings may not be representative of all residents at TGV, and there may be other individual factors influencing resident engagement that were not explored in this research.

**Time constraints:** Due to the limited duration of the graduation project, the proposed community-based intervention strategy has not been fully evaluated in the context of TGV. While the literature supports the effectiveness of community-based approaches, the suitability of this strategy for TGV still needs to be tested and refined over time.

**Focus on Residents' perspectives:** The research primarily focused on residents, given their critical role in the innovation process. However, the perspectives of other stakeholders, such as TGV employees and innovators, were explored less thoroughly. This may have limited the depth of understanding regarding how these stakeholders perceive and engage with the residents.

**Researcher bias:** Living at TGV during the project allowed me to experience the environment first-hand, providing valuable insights. However, this also posed the risk of unconscious bias. While I took steps to avoid including solely personal experiences, my role as both a resident and researcher could have influenced how I interpreted certain data.

**Incomplete evaluation of tools:** The actionable tools, such as the quick insight & impact template and the sensitizing booklet, were developed to aid TGV employees in designing interventions. However, these tools were not tested extensively during the project, and their long-term effectiveness remains uncertain.

## 7.3 Future Research Directions

**Exploration of Placemaking:** Placemaking was considered as a potential intervention to foster a sense of place and belonging among residents. This concept is explained in Appendix D. Although this approach was not fully developed due to time constraints, future research could explore how placemaking could be implemented as a long-term strategy to enhance resident engagement in TGV.

**Employee Perspectives:** Since this research focused primarily on residents, future studies could explore the perspectives of TGV employees and how their roles and attitudes influence the overall community dynamics and innovation testing process in a living lab environment.

**Gender and Empathy:** It was observed that women participants tended to exhibit higher levels of empathy in their interactions, particularly in understanding subtle but significant resident experiences. Future research could delve into how gender differences affect engagement and empathy within the TGV community.

**Long-term Integration:** Further research should focus on integrating the findings and interventions into TGV's existing processes and culture. The long-term success of this project depends on how well these strategies are adopted and embedded within TGV's ways of working.

**Adaptability of the Framework for Other Living Labs:** Although the framework was developed specifically for the TGV context, its underlying factors were heavily influenced by existing literature. Future research could explore the suitability and adaptability of this framework for other living labs, investigating how it can be applied or modified to fit different environments and communities.

## 7.4 Personal Reflection

Throughout this project, I adopted a human-centered design thinking approach, which was exploratory and iterative. This approach allowed for deep engagement with the problem but also led to challenges in scoping the project, as the findings often uncovered new areas requiring attention. The participatory approach proved invaluable in understanding the needs of the various stakeholders, but it also presented logistical challenges,

particularly in coordinating the involvement of residents and other stakeholders whose priorities and availabilities often conflicted.

While I am satisfied with the research findings, I consciously opted for a strategic design approach for the final solution after exploring specific design interventions. Given the multi-stakeholder environment with varying priorities, I believe the solution should be internally developed or created in close collaboration with the internal team. However, due to the structure of the graduation project, which was largely an individual effort, my attempts to involve stakeholders did not yield the completeness I desired. Therefore, I developed a framework and sensitizing booklet designed to foster empathy among TGV employees toward residents and to enable TGV to create its own tailored interventions. I believe that for a project as complex as this, it is essential for the internal team at TGV, in collaboration with all stakeholders, to take ownership of the interventions. As an external designer, it can be challenging to fully grasp all the interdependencies within the system, even when employing participatory approaches.

Evaluating the success of the design was challenging, as many of the issues uncovered—such as role perception and the feeling of being valued—are difficult to measure and require ongoing assessment. However, based on the evaluation session with TGV employees, I am pleased with the reactions to the sensitizing booklet, which facilitated the intended outcome of fostering empathy among TGV employees and encouraging them to consider residents' perspectives in their daily interactions.

In conclusion, I realize that these findings will only be impactful if they continue to be discussed, iterated upon, and integrated into TGV's organizational culture. I hope that the tools and insights I have provided will find a meaningful place within TGV and contribute to the development of a more engaged and connected community.

## 08 | Conclusion

This graduation project aimed to explore how residents at TGV could feel more valued and engaged in the innovation testing process and within the broader TGV community. Using a human-centered design approach, I identified several key challenges and opportunities for improving resident engagement, focusing on the dual roles of community building and active participation in innovation.

The research revealed that residents often feel disconnected from the innovation process, perceiving their contributions as undervalued or purely obligatory. This disconnect is further compounded by a lack of structured feedback processes, insufficient communication about their roles, and the absence of recognition for their efforts. These factors have led to declining engagement and a weakening sense of community at TGV. By addressing these challenges, the project proposed a strategic framework aimed at fostering a stronger sense of belonging and participation among residents.

The core outcome of this project was the development of a community-based resident engagement framework (CBRE) built around four key elements: Identity, Interaction, Influence, and Impact. This framework, along with actionable tools such as the Moments of Intervention-Opportunity Map, the sensitizing booklet, and quick insight and impact templates,

provides TGV employees with awareness of resident experiences and offers concrete strategies to enhance engagement, creating meaningful connections between residents and the innovation process.

Despite its contributions, the project also faced limitations, such as the reliance on a small and transient sample of residents and the need for further evaluation of the proposed interventions. Nonetheless, the insights generated offer a strong foundation for future work, including the potential for broader community and stakeholder involvement, as well as the long-term integration of these findings into TGV's processes. Additionally, the adaptability of the framework in other living lab contexts presents an area for exploration.

In conclusion, this project highlights the importance of aligning the needs of residents with the goals of innovation at TGV. By fostering a sense of community and ensuring that residents feel their contributions are valued, TGV can create a more engaged and supportive environment for testing sustainable innovations. The tools and strategies developed in this project serve as a starting point for continued improvements in resident engagement, with the hope that they will contribute to the long-term success and vitality of TGV.



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## 10 | Appendix

The Appendices of this report can be found as a separate document

### **Appendix A : Project brief**

#### **Appendix B : Stakeholder interview**

B1 Interview questions

#### **Appendix C : Focus group + Ideation session**

C1 Session booklet

C2 Insights

#### **Appendix D: Concept**

D1 Placemaking

D2 Placemaking activity

#### **Appendix E: Final Concept Evaluation**

E1 Framework evaluation

E2 Sensitising booklet (Draft)

E3 Evaluation question

