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Participation in Shared Mobility Co-design: A Case Study of an Automated Ferry in Fredrikstad

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Abstract. As cities strive toward climate neutrality and digital transformation, shared and automated mobility solutions are emerging as key enablers of sustainable transport. Implementing such systems remains challenging, as public, private, and citizen interests must be aligned. This paper reflects on a co-design case in Fredrikstad, Norway, where citizens, city planners, service providers, ferry operators and project partners participated in a three-stage process exploring how a new automated ferry could be integrated into the city’s public transport ecosystem.

The case shows that when used as a sustained and strategic process, co-design can support participatory planning and foster learning and a sense of ownership among participants. Ownership, however, was difficult to sustain when actors responsible for long-term planning and implementation were not involved early, revealing tensions between collective problem framing and institutional decision-making. The study highlights how participation in shared mobility co-design unfolds through shifting roles and competing logics, and identifies key lessons for cities seeking to pursue inclusive, bottom-up mobility transitions.

Keywords: Shared Mobility, Co-design, Local Development, Stakeholder Participation, Reflexivity

1 Introduction

Cities across Europe are increasingly exploring shared mobility as part of broader strategies to address climate change, reduce transport emissions, and move away from car-dependent development. Shared mobility is commonly understood as access-based transportation [1], enabled through digital platforms that connect users and providers [2, 3], hence supports more flexible and sustainable everyday travel practices. The development of shared mobility involves a wide range of actors, including citizens, commercial operators [4], and public authorities spanning multiple levels [5]. Thus, participation from these actors in urban mobility planning is widely considered important.

Co-design, understood as collaborative design processes involving “everyday people” alongside professionals [6], has become a popular approach within shared mobility projects to engage diverse stakeholder groups [7–10]. Co-design is often framed as an empowering approach to participation, as it seeks to give voice to actors who have not traditionally been involved in design processes [11].

However, achieving meaningful participation in co-design is challenging in practice. Common difficulties include recruiting relevant participants, aligning spaces of interest, and ensuring fair participation and influence within the process [12–14]. These challenges echo broader critiques of participatory planning, which highlight persistent gaps between participation and actual influence over decisions [15, 16].

Learning from prior shared mobility co-design cases is further complicated by their situated nature, shaped by local contexts, transdisciplinary dynamics, and the iterative character of co-design processes. Moreover, participation is often documented in limited ways, focusing on attendance or activities rather than how participation unfolds and shapes outcomes. Therefore, this paper hopes to inform future shared mobility co-design by exploring how participation is shaped by the co-design process, and how these participatory dynamics, in turn, influence co-design outcomes.

2 Method

This study investigates how participation interacts with co-design processes and shapes their outcomes in shared mobility through an in-depth case study of a co-design project in Fredrikstad, Norway. Responding to a broader challenge in co-design research—where project documentation often foregrounds activities and outputs while leaving participation dynamics underexamined—the study adopts reflexivity as an analytical lens to examine participation beyond who takes part and what is produced. Here, reflexivity is used to examine how participation was enabled and constrained within a multi-actor planning context and co-design outcomes understood not as direct expressions of participants’ needs, but as shaped by relationships, institutional settings, and taken-for-granted assumptions about mobility, participation, and feasibility. We believe this perspective to be pertinent in shared mobility co-design, where participation is influenced by expertise, organizational mandates, and context-specific constraints. Reflexive analysis complements descriptive case findings by presenting how roles, boundaries, and assumptions are continuously negotiated in a real-world collaborative practice, and how these negotiations shape project progress and outcomes.

2.1 Case: Co-designing Shared Mobility in Fredrikstad

Fredrikstad, Norway, is one of fifteen European cities participating in the EU-funded Seamless Shared Urban Mobility (SUM) project [17]. As part of the city’s participation, a new ferry route featuring an electric automated ferry was piloted from April 2024 with a 12-month trial period. Ferries have long been a vital and free-to-use mode of river crossing in Fredrikstad and are deeply embedded in the city’s urban identity [18]. The new route provides a shortcut through residential areas to an industrial zone employing approximately 2,500 people, offering a shared mobility alternative to car travel.

Given the novelty of both the route and the automated ferry, a three-stage co-design process was conducted to explore how the ferry line could be integrated into the local public transport system and function as a competitive alternative to car travel (Fig. 1).

Co-design, which is particularly well suited to imagining and planning for not-yet-existing practices [11], was therefore appropriate for this case. Aligning with the fourth direction of co-design [11], the process engaged not only users but also a broad constellation of stakeholders, including citizens, municipal planners, ferry operators, service providers, and SUM partners.

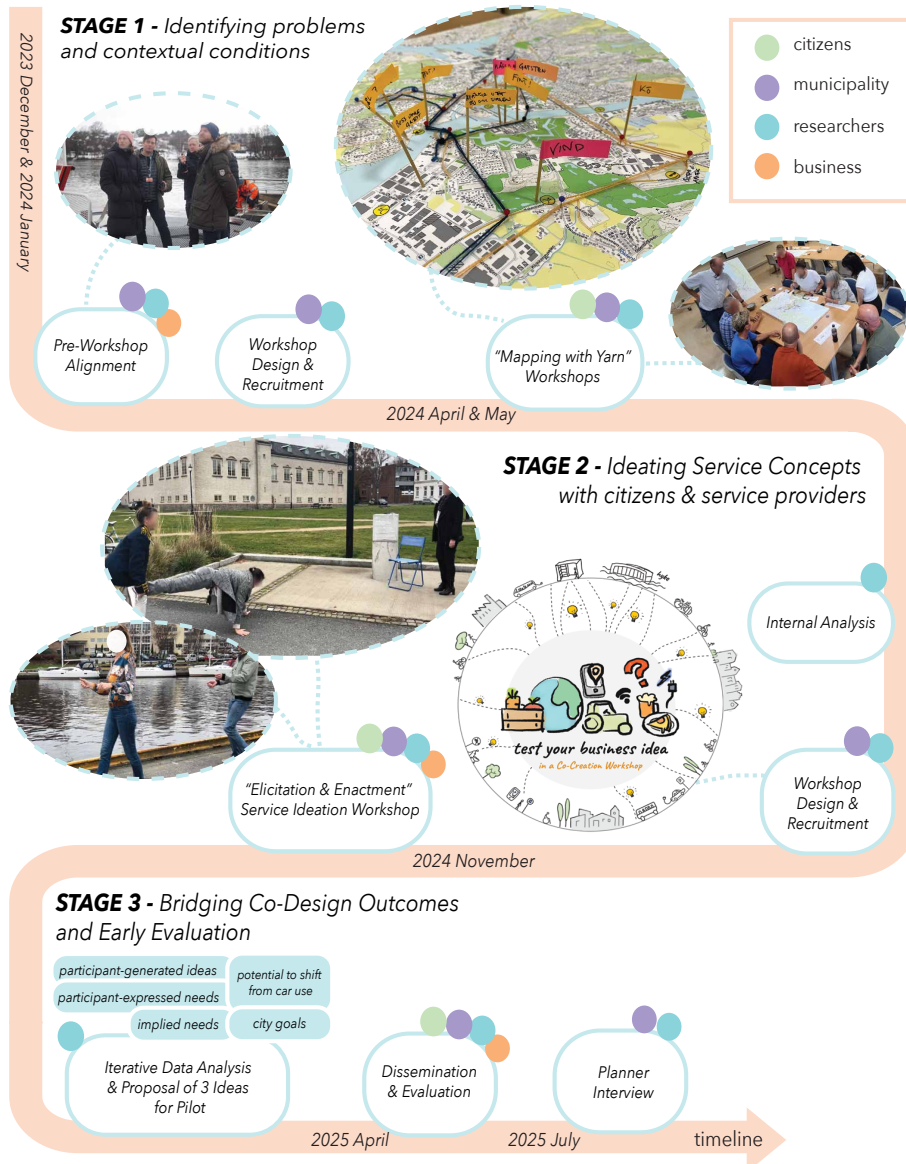


Fig. 1. Co-design Timeline with Three Stages

Participants were recruited by the local Fredrikstad team with support from the research team through a combination of open calls (municipal channels, ferry ads) and targeted email invitations (previous participants, municipal networks). Participation expanded across stages, with each stage building on the previous one. Stage 1 involved local citizens and the core project team (researchers, planners, and ferry operators). Stage 2 retained these participants and expanded to include additional citizens, local service providers, and municipal planners from other divisions. Stage 3 included all previous participants and added SUM partners and senior municipal decision-makers.

Across all stages, participants were positioned as active contributors rather than passive informants, informed by the tell–make–enact framework [19]. To facilitate this, the co-design process included generative sessions that use making as a means of surfacing tacit and latent knowledge [20].

1. Stage 1 took place in Spring 2024, shortly after the new ferry line started operating, and focused on identifying challenges and contextual conditions with participants who had first-hand experience of the route. Two workshops were held where purposefully designed, tactile tools such as yarn and pins were used to visualise travel routines, reveal challenges, and co-create alternative routes, enabling equitable participation and shared sense-making.
2. Stage 2, conducted in autumn 2024, centred on generating service ideas to improve “the ferry ride and beyond,” bridging everyday mobility practices with potential service solutions. A “Service Idea Buffet” manual, developed from Stage 1 insights, introduced abstract prompts such as “doing something while waiting” that encouraged collaborative exploration. During a workshop 34 participants prototyped and enacted service concepts, performing how these might integrate into daily commuting, and produced short films enabling collective reflection and recognition of diverse perspectives.
3. Stage 3 (spring 2025) focused on analysis, proposal development, and early evaluation of ideas for piloting. Dissemination and feedback took place through an online meeting with workshop participants and project partners, using visually rich, minimally text-based slides and Mentimeter to support real-time engagement.

Throughout the process, tool design prioritised playfulness, accessibility, and cultural familiarity as catalysts for participation and creativity, particularly among participants unfamiliar (eg. yarn links Norway’s knitting culture) with one another. Visual instructions and sketches supported communication across language barriers, while light-hearted roleplay was used to introduce enactment activities and encourage engagement.

Group compositions were thoughtfully arranged to balance power dynamics and encourage participation. Factors such as roles, decision-making authority, expertise, personality (when known), gender, and creative potential guided the mixing of participants across small groups.

In the following workshop descriptions, the researchers are referred to as facilitators to reflect their primary role during the workshops.

2.2 Data Collection and Analysis

The co-design process was documented through audio recordings, photographs, field notes, online meeting recordings, workshop artefacts (e.g., maps, notes, videos) and interviews with municipal planners. Audio recordings were transcribed, and all materials were organized to support analysis in two strands: descriptive case analysis and reflexive analysis.

For the descriptive case analysis, data were analysed in 3 steps. First, workshop artefacts, visual materials, and participant contributions were reviewed to trace activities, emerging ideas, and collective decisions. Second, audio transcripts and field notes contextualised these outputs and captured how participants articulated concerns and priorities. Third, findings were synthesised into a structured account of the co-design process and its outcomes.

For the reflexive analysis, the same materials were revisited interpretively in three steps. First, field notes, artefacts, and recorded interactions were analysed to identify moments of tension, negotiation, and alignment. Second, informed by reflexivity as mutual collaboration and discursive deconstruction [21], attention was given to how meanings were co-produced among researchers, citizens, and institutional actors, including the representation of multiple voices. Third, online dissemination materials and interviews were integrated to examine how roles, assumptions, and institutional contexts shaped participation and power.

3 Case Analysis: Co-design Process and Outcomes

The following sections present the outcomes of the three co-design stages, providing a grounded understanding of the process by focusing on the activities, outcomes and how they contributed to solution development in the shared mobility project.

3.1 Stage 1: Identifying Problems and Contextual Conditions

Pre-Workshop Alignment.

Before the co-design workshops began, the research team (based in Gothenburg, Sweden) and the local project team in Fredrikstad (including municipal planners and the ferry operator) held several online coordination meetings. These meetings were crucial for building a collaborative team, clarifying roles, aligning expectations, and establishing shared ambitions for the co-design process. The local team expressed strong motivation to conduct the co-design activities thoroughly and emphasized the importance of researchers' competence in facilitating participatory processes. They also articulated an aspiration for the project outcomes to feel locally grounded and recognisably "Fredrikstad-like."

To further support this collaboration, an on-site visit was conducted, including meetings between the researchers, the local project team, and a representative of a commercial ferry manufacturer, who was largely silent during discussions. The visit also included walkthroughs and ferry journeys along established and proposed routes. This

early alignment established a common interest in reducing private car use and developing shared mobility alternatives between researchers and local team, but also revealed concerns about the new ferry provided by the manufacturer, about its performance and the viability of the test route. Further, communication channels were established, along with clarified roles and expectations, that informed the design of the subsequent co-design activities.

Participation Dynamics.

In the first workshop, attendance was limited and uneven. The session attracted only two citizens—one directly affected by the proposed ferry route—alongside several institutional actors, including two municipal ferry operators, three municipal planners, one ferry manufacturer representative, and members of the research team. The low citizen turnout created a noticeable imbalance, prompting one municipal planner to leave, concerned that the number of officials might overwhelm the citizens, and expressing disappointment at the recruitment outcome.

One citizen, an employee at the industrial area where the new route operates, played a key role in expanding participation. The second workshop was hosted at their workplace, involving five additional employees and one resident living close to the ferry stop. This time, only three researchers, one planner, and one ferry operator were present, substantially broadening the range of everyday travel experiences represented.

Daily Mobility Practices and Barriers.

Citizens worked in small groups of two to three with one to two facilitators, while planners and operators rotated between groups to contribute perspectives and respond to emerging questions. Participants mapped their commuting routes using tactile materials such as foam-based maps, yarn, pins, flags and stickers, enabling them to visualise current travel routines as well as potential ferry-based alternatives using different yarn colors. The activity encouraged simultaneous talking, mapping, and reflecting, allowing participants to articulate not only where they travelled, but also how and why particular choices were made. Routes were annotated using stickers and flags to highlight points of attention along the journey, while participants explored under what conditions the ferry line might be integrated into everyday commuting practices.

Some participants used existing city ferry routes in their everyday travel, others relied almost exclusively on private cars. Reasons stated for commuting by car were in some cases the travel distance or lack of suitable alternatives but also perceived comfort and convenience. One participant raised her voice a few times when trying to justify why she chose car over public ferry during winter seasons, she jokingly repeated: “I’m a comfort girl!” Thus, for many of the participants, the proposed ferry line represented a potential shortcut to avoid traffic jams rather than a complete alternative to driving.

Safety concerns were also raised along industrial roads near the office area, described as “horrible for biking and walking” and dominated by heavy trailers that “don’t stop when you come.” Seasonal discomfort, limited shelter infrastructure, and low awareness of park-and-ride facilities further discouraged shifts from private car use to shared or active transport.

Emerging Context-specific Ideas.

At the same time, participants generated context-specific ideas for improving everyday mobility. Suggestions included integrated bike routes, youth-oriented mobility options, and supporting services such as bus connections to workplaces. Practical considerations shaped modal choices: participants compared travel costs, calculating potential savings related to tolls and congestion charges, and identified perceived “win-wins” such as improved fitness alongside reduced expenses. Everyday errands—shopping, childcare, and gym visits—were discussed as integral parts of route planning, highlighting the need to consider the ferry journey in relation to activities before and after the crossing.

Planners and ferry operators occasionally took a more active role in the discussions when ideas raised questions of feasibility, costs, or system-level implications. For example, proposals for physical infrastructure such as shelters at bus stops were reframed toward digital or system-based solutions, reflecting existing planning priorities and operational constraints. Similarly, when participants suggested extending ferry operating hours or increasing service frequency to accommodate early work schedules, planners and operators explained that running additional services for a small number of users would be costly, and encouraged consideration of alternative solutions.

Emotional and symbolic connections to ferry travel also emerged during the workshop. Several participants referred to ferries as part of local culture and identity, with one noting, “We have the culture for taking the ferries. The culture is there.”

Overall, Stage 1 workshops enabled participants to articulate needs, evaluate trade-offs, and generate ideas grounded in lived experience, while also revealing early interactions between citizen perspectives and institutional considerations.

3.2 Stage 2— Ideating Service Concepts

The second-stage workshop gathered 34 participants from diverse backgrounds, including returning participants from Stage 1 and newcomers such as community representatives, architects, students, consultants, a shoemaker, a tourism professional, a hotel manager, librarians, a car-sharing provider, and municipal planners from departments including tourism, culture, cycling, and town planning.

Participants were divided into six groups, each including two citizens, one service provider, and two municipal representatives from different departments. Service providers were positioned as group leads to encourage ownership and continuity beyond the workshop, while the composition ensured that non-decision-makers outnumbered decision-makers. Recruitment for this stage was challenging: 35 local businesses were invited, but securing participation—particularly from private actors outside the municipal organization—required substantial effort. Registration fluctuated until shortly before the event, and final group compositions were confirmed only the day before.

Group Dynamics.

At the start, some groups—especially those without returning participants or local project team members—were less active. Several service providers were initially uncertain about their role or how it differed from that of citizens. Engagement increased over the

course of the workshop, and participants reported a clearer understanding of roles. After a lunch break with informal chat, everyone appeared much more relaxed, engagement increased across groups, and laughter and social interaction were noticeably higher. The collective joy reached its peak as most groups came back after the film-shooting activity, proudly claiming their group's ideas being the best.

Clear contrasts emerged in how service providers translated their organisational perspectives into potential services. Some actors remained close to their existing business. For example, library staff proposed additional ferry stops near libraries, extending conventional library access rather than imagining new types of services. In contrast, the hotel manager conceptualised the ferry not merely as transport but as part of the visitor experience, proposing a culturally informed application that could provide storytelling and contextual information for tourists. Between these positions, providers such as the car-sharing service and the tourism organisation explored services spanning leisure, social interaction, and multimodal mobility that indirectly related to their own business. On the other hand, the shoemaker, chose to participate primarily as a citizen, explaining that she did not wish to expand her business. Their contributions focused instead on other conveniences in waiting areas rather than services more related to shoemaking, for example, repaired shoe delivery.

Outcomes and Immediate Reflections.

Across groups, participants co-created service concepts ranging from infrastructure improvements to experiential and practical offerings and presented these as short films to the others. The concepts clustered around three main themes:

1. Commuting enhancements, including improved waiting room amenities, real-time traffic updates, and quieter or more exclusive environments;
2. Cultural experiences, such as storytelling, local history, and opportunities for social interaction aboard the ferry;
3. Practical services, including food vending, phone charging, shared bookshelves, repair stations, and multimodal trip support.

The six short films illustrated a wide range of everyday scenarios—from enjoying coffee in a sheltered waiting area as an employee, to exploring the city with the ferry trip as a tourist, from combining ferry travel with shopping a blue chair or errands such as running to “grandma’s death bed”, to waiting rooms offering real-time information and complementary services. Some concepts explored more integrated service exchanges, while others proposed digital or experiential additions, such as a sightseeing application incorporating AI-supported storytelling.

Following the screenings, a brief vote was held to find which concept was most appreciated. It turned out that votes were mainly cast based on narrative qualities of the film, rather than concept. Participant feedback of the workshop overall emphasized enjoyment and learning, one remarking: “it’s so fun, today’s activities!” While the films and votes offered lively and immediate insights, they were not treated as definitive outcomes. Given the spontaneous and time-limited nature of the workshop, the outputs

were understood as indicative rather than final. Together, the workshop artefacts, recordings, and participant reflections highlighted the need for a subsequent stage focused on consolidating and translating the ideas into concepts.

3.3 Stage 3— Bridging Co-Design Outcomes and Early Evaluation

Following on from stage 2, the third stage focused on consolidating and translating diverse co-design outcomes into a small number of service concepts and evaluating their feasibility, relevance, and goal alignment to see which were suitable for potential piloting.

Iterative Concept Refinement.

In the translation process into pilot-ready concepts, researchers worked iteratively with multiple types of data. The co-design process itself had generated several types of insights, including participant-generated ideas (from short films and 100+ additional noted ideas), participant-expressed needs (from votes, discussions and other documented outcomes), and implied needs (interpreted by researchers from expressed concerns or discussions). These insights needed to be balanced with broader considerations including city planning goals, operational constraints, and shared mobility relevance, understood as the potential to encourage shifts from private car use by offering experiential, social, or functional value.

The translation process involved meetings primarily among the researchers, during which feasibility, alignment with city planning goals, and the “fun” quality of interactions to maintain participant engagement were discussed. Researchers weighed these inputs to assess whether proposed concepts offered value beyond private car use, could coexist with car-based practices, or were unlikely to influence car-dependent behaviours, as illustrated in Fig. 1. Promising concepts were then consolidated and refined for potential piloting.

Through this iterative balancing process, three refined service concepts were developed for potential testing and further discussion:

1. an on-demand ferry service designed to feel fun, seamless, and reliable;
2. added services at ferry stops that utilise waiting time to support multitasking trips;
3. a waiting experience emphasising comfort and local identity.

Dissemination and Feedback.

These concepts were first communicated with the local team, who affirmed the feasibility and showed interest but suggest involving more decision-making power to decide, and subsequently disseminated through an online event organized by the local project team in April 2025. The event invited all previous workshop participants, a few more municipal planners (including senior decision-makers), SUM project partners, and a ferry manufacturer representative. The dissemination served as an early evaluation moment, allowing previous participants and stakeholders to collectively assess the relevance, consistency, feasibility, and future potential of the proposed concepts.

Attendance at the dissemination event was notably high, with most of the previous participants joining despite limited outreach and the meeting being held during working hours. The presentation was well received by municipal planners and the ferry manufacturer representative, who appreciated both the clarity of the proposed concepts and the transparency of the decision-making process, and discussed opportunities to combine the proposals with other city activities. To invite reflections from previous workshop participants, the researchers prepared discussion with questions such as “Do you recognize these ideas?” and “Is there anything you would like to add or change?”, but there were very few voices, hence the discussion session concluded earlier than anticipated. A digital tool (Menti) was used for all participants to provide anonymous input, which was later discussed collectively. While feedback was received through the digital tool, participants who had been particularly active during earlier workshops were more much reserved in voicing comments during the live discussion. All participants remained present until the end of the meeting.

Implementation Challenges and Stakeholder Insights.

Following the dissemination, researchers continued discussions with local planners regarding pilot implementation. Due to the absence of remaining project budget, no further piloting was conducted. Instead, semi-structured interviews were conducted with municipal planners involved throughout the co-design process. In reflecting on the process, one interviewee emphasized that the co-design activities generated substantial learning and were perceived as qualitatively different from conventional planning practices: “we’re not presenting problems to stakeholders but figuring out (together) this is the problem and what solution it could be”.

However, the interviewee described how the municipality’s organizational structure and division of responsibilities posed challenges for implementation. While the project activities enabled rapid ideation and experimentation, implementation required alignment with existing planning processes and responsible divisions: “in the municipality everything is very structured and planned... we cannot just [say that] we want this solution and next week the solution will be present”. The interviewee further noted that actors responsible for implementation, such as the technical division leader, had not been directly involved in the co-design process. The main learning was that next time those who are implementation-tasked should be involved to the table earlier.

Compared to earlier stages, this stage involved fewer citizens and relied more on interactions between researchers and planning stakeholders. The third stage had originally been designed to include on-site pilot testing that would again involve citizens, service providers, planners, and researchers, mirroring the multi-actor configuration of the second-stage workshop. However, as no pilot testing was launched, diversity in participation was limited. The reasons for and implications of the absence of subsequent piloting are further examined in later sections.

4 Reflexive Analysis: Roles and Power in Participation

Building on the descriptive account above, the following sections examine how participation unfolded across the co-design stages. Rather than treating participation as a fixed or evaluative outcome, this section approaches it as dynamic and relational, tracing how roles, influence, and engagement shifted over time and how this, in turn, shaped the process and its outcomes.

4.1 Stage 1: Exploratory Participation and Emerging Agenda-setting Power

The pre-workshop activities revealed the comparatively less active position of the commercial ferry manufacturer and positioned the municipality as the main coordinating actor, with researchers shaping the early framing of participation through their facilitation role.

Early workshops focused on problem framing and were characterised by relatively open and exploratory participation. Citizens' lived mobility experiences strongly informed discussions, and hands-on mapping activities supported mutual understanding by making individual travel practices visible and comparable. Some car-users appeared less comfortable in exploratory discussions, sometimes defending existing travel habits or questioning the feasibility of alternatives, highlighting how everyday challenges shape their engagement. This stage enabled participants to articulate not only where they travelled, but how and why particular choices were made, bringing practical, emotional, and cultural dimensions of mobility into view.

Although participation initially appeared balanced, differences in roles and agendas became more apparent as discussions at the end moved toward questions of feasibility and implementation. When planners and ferry operators joined these discussions, citizen proposals—often grounded in everyday travel needs and routines—were interpreted and discussed in relation to costs, operational constraints, and system-level implications. Rather than overt domination, agenda-setting power emerged through processes of explanation, validation, and reframing, shaping which ideas could be carried forward as viable within institutional logics.

The facilitators occupied a mediating position between citizen concerns and institutional reasoning. While this role enabled dialogue across perspectives, it was also constrained by project goals, partner expectations and facilitators' own designer-researcher background.

An interesting tension emerged around notions of local identity. A citizen's statement that "we have the culture for going with the ferries" echoed planners' earlier aspirations for a "Fredrikstad-like" project. While this suggests alignment, the perspectives differed in important ways: citizens articulated ferry culture from lived, first-person experience, whereas planners mobilised it as a strategic narrative oriented toward the city as a whole. This illustrates how shared concepts can function differently across positions, aligning rhetorically while diverging in scale and intent.

4.2 Stage 2: Intensified Participation and Obscured Roles

The second stage expanded participation in both scale and diversity, bringing together citizens, planners, researchers, and a wide range of service providers. Participatory intensity peaked during this stage, particularly through ideation and enactment activities such as scenario-building and film prototyping. These activities fostered visible engagement, enjoyment, and a sense of collective ownership.

However, role ambiguity was a recurring issue. Many participants appeared more comfortable adopting an abstract “citizen” role rather than representing their institutional or professional backgrounds—possibly as a way to manage disagreement and support co-designed ideas. At the same time, some service providers struggled to relate their business to mobility service development. Participants often occupied multiple roles simultaneously, complicating both accountability and influence.

Furthermore, performative dynamics shaped which ideas were recognized and valued. Groups that presented confidently or creatively tended to gain more attention, regardless of the feasibility or relevance of their proposals. This stage thus revealed a key tension in participatory design: while expanding participation can increase creativity and engagement, it can also amplify inequalities when differences in confidence, and familiarity with co-design methods go unacknowledged.

4.3 Stage 3. Participation’s Retreat and the Professionals’ Re-entering

The final stage involved limited participation. At this stage, the process became increasingly researcher-led, as the analysis and synthesis of detailed workshop materials required forms of engagement that were difficult for participants and local partners to maintain. While earlier stages emphasised collective making and discussion, this stage involved abstraction, comparison, and interpretation, which shifted influence back to the research team. This transition illustrates how participation in co-design often narrows during analytical stages, even when earlier stages are highly collaborative.

The high attendance at the dissemination meeting, even with limited outreach and a five-month interval since the last on-site workshop, demonstrates a high level of participant buy-in. On the other hand, participation shifted markedly. Although attendance was high, previously active participants became largely silent, engaging mainly through Menti and platform interaction tools, suggesting a retreat of participation from partnership toward consultation [15].

This shift can be interpreted as a reconfiguration of roles: from co-creators to consultees, and from shared exploration to institutional evaluation. Municipal actors and the manufacturer representative actively discussed how ideas might inform internal planning and the potentials in combining ideas with other planned activities, while follow-up interviews confirmed that no immediate pilots would be implemented due to budgetary constraints. From this point onward, the municipality appeared to step back from its role as a co-design partner and reassert its position as a project owner and municipal decision-maker constrained by budgetary and organisational realities.

In a retrospective account, one municipal project manager made shifts in authority and responsibility visible through his use of pronouns. In the interview, the project

manager used “we” for those involved in the co-design process and “they” for city planners responsible for long-term planning and implementation, describing the latter as having a “professional view” of how the city should be shaped. Hence, collaboratively developed ideas had to be re-evaluated with a “bird perspective”, through whole-city, long-term and system-wide criteria, which complicated implementation.

“Ownership” was emphasized in the interview as a key condition for implementation—those responsible for technical implementation needed to be involved in problem definition and solution development for proposals to be taken up. Without early inclusion, solutions are easy to dismiss as “yeah nice, but not ours”, whereas participation in co-creation helps to “create a ‘we’” around both problem and solution. This suggests that participation is not only about generating ideas but about distributing responsibility and legitimacy for later decisions.

The interviewee also reflected on what co-design demanded from the municipal side: being transparent about the method, proceeding “step-by-step”, relating activities to people’s daily lives so participation feels “natural”, and committing fully to the process rather than using “bits and pieces”.

Across stages, the Fredrikstad case demonstrates that participation in shared mobility co-design is neither linear nor cumulative. Citizens’ lived experiences strongly informed early problem framing and ideation, but institutional criteria, budget constraints and professional planning logics re-entered, narrowed the space of possible outcomes and relocated decision-making authority away from the co-design collective.

5 Discussion

5.1 Car-user Participation in Shared Mobility Co-design Projects: A Practical Challenge

Participation and inclusivity are widely promoted as core principles in shared mobility co-design, particularly in green and just urban transitions. Participatory approaches are framed as mechanisms to ensure mobility services respond to citizens’ needs while fostering social inclusion and public acceptance. However, the Fredrikstad case illustrates that inclusivity is not only a normative aspiration but also a practical challenge—especially when the primary target group is private car users.

Shared mobility initiatives aim to reduce car use, framing certain mobility practices as problems to be addressed. While this aligns with sustainability goals, it creates tensions in participatory settings: car-dependent citizens are simultaneously key stakeholders and part of the “problem” the intervention seeks to solve. Unlike traditionally marginalised groups, car users are beneficiaries of a car-dominant system and do not require empowerment in the usual sense. Yet their participation is critical for understanding everyday mobility practices and the conditions under which shifts might occur. In Fredrikstad, where most journeys are by car, these users are not a minority, but they are not always motivated or comfortable participants in sustainability-oriented co-design.

These tensions were evident throughout the project. Recruitment proved challenging, reflecting both practical constraints and uncertainties about relevance. Open calls attracted few participants, while later recruitment relied on municipal networks, local

employers, and previous participants. Motivation varied: some expressed enthusiasm for shared and active transport, while others articulated self-justifying or ambivalent positions shaped by convenience, safety concerns, family responsibilities, and seasonal conditions.

Co-design spaces can thus become implicitly normative, privileging sustainability-oriented narratives and potentially discouraging car-dependent participants from voicing their needs. Car users may be discursively marginalised—not excluded from the mobility system, but positioned as problematic within dominant transition narratives. At the same time, shared mobility systems are not yet able to support everyone with the shared lifestyle transition, regardless of motivation. This raises a central question: how can co-design better engage mobility users, especially when capacities to participate in shared mobility transitions are uneven?

The findings point to two practical implications for engaging car-dependent participants more effectively. First, the framing during recruitment matters. Positioning co-design around improving everyday mobility—rather than promoting mode shift as a moral or lifestyle choice—can reduce defensiveness and increase relevance. In Fredrikstad, discussions grounded in concrete routines (commuting time, safety, errands, weather) were more engaging than abstract sustainability goals.

Second, participation benefits from transparency and gradual commitment. Interview reflections highlighted the importance of clearly communicating the scope and limits of engagement, designing activities relevant to people’s daily lives, and approaching co-design as a step-by-step process. Incremental invitations can therefore be considered a deliberate strategy rather than a challenge to overcome.

5.2 Tensions that Shape Shared Mobility Co-design

The findings reveal a set of interrelated tensions between the open-ended, collective problem framing enabled by co-design and the institutional structures governing responsibility, authority, and long-term planning in municipalities.

In Fredrikstad, co-design shifted planning away from predefined agendas toward shared problem formulation grounded in everyday mobility experiences. Planners described this as qualitatively different from conventional planning, emphasizing the joint construction of “our problem” rather than the presentation of pre-defined problems. Within the workshops, professional roles were partially suspended: municipal planners participated more as “citizens,” contributing experiential rather than authority perspectives. This role fluidity supported exploration and broadened the range of ideas.

However, this temporary suspension of roles did not extend beyond the co-design setting. Outside the workshops, professionals re-adopted their institutional positions, and the ownership of mobility problems reverted to municipal structures. Collective problem framing did not automatically translate into institutional ownership or implementation. While co-design generated locally grounded ideas and learning, these outcomes largely remained within the project sphere. The late involvement of actors responsible for city-level implementation limited the pathways from exploration to action. Ownership thus emerged not from participation alone, but from sustained involvement across problem definition, ideation, and implementation.

This reveals a tension between everyday, local, and collective ways of knowing mobility and the “bird’s-eye” perspective required for system-level planning. Co-design enabled planners to temporarily step out of their professional roles, but implementation required them to reintegrate ideas into existing plans, budgets, and regulatory frameworks. Ideas valued locally were required to demonstrate city-wide relevance before being considered, reshaping or filtering them in the process.

A related tension concerns the purpose of co-design itself. If co-design is primarily used as a space for exploration and learning, expectations for implementation need to be clearly managed. If implementation is an explicit goal, relevant decision-making actors must be involved from the outset, even if this narrows the solution space earlier. The Fredrikstad case suggests there is no simple answer to whether institutional voices should enter earlier or later; rather, this is a strategic choice with consequences for both participation and outcomes.

Within this dynamic, the role of researchers is also implicated. By encouraging openness and balancing decision-making power prior to workshops, researchers supported exploration but also delayed the involvement of actors responsible for implementation. When implementation did not follow, transparency during dissemination became essential—not as a solution, but as a way to account for the limits of co-design and manage expectations around decisions beyond participants’ control.

6 Conclusion

Overall, the findings show that participation in shared mobility co-design unfolds through shifting roles and ongoing movements between alignment and misalignment among municipal goals, research objectives, and citizens’ everyday mobility practices. In this context, recruitment, participant composition, and framing are not merely logistical or methodological concerns, but reflect institutional priorities and normative assumptions about desirable mobility futures. Rather than assuming that broader inclusion will resolve systemic challenges, the case points to the importance of recognising conflicting expectations and uneven capacities for change as inherent conditions of participatory work. Taken together, the case highlights four interconnected tensions that shape—and may limit—the potential of shared mobility co-design:

1. everyday, local problem framing versus system-level planning logics;
2. a collective “we” inside co-design versus an institutional “they” outside it;
3. exploration versus implementation as competing goals; and
4. role fluidity within workshops versus role reassertion beyond them.

Recognizing and actively navigating these tensions is essential if co-design is to function not only as a space for engagement and mutual learning, but also as a means for a change.

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