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LARGE-SCALE
DEMONSTRATION
PROJECT**

Deliverable D2.1

First Report on Societal Readiness

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Executive summary

Pre-Large-Scale Demonstration (Pre-LSDemo) prepares the groundwork for future Large-Scale Demonstrations (LSDemo) of Connected, Cooperative and Automated Mobility (CCAM) in Europe across three mobility domains: individual mobility, public and shared transport, and freight and logistics. A central ambition is to make **Societal Readiness an integral part of planning and implementing these demonstrations**, ensuring that societal needs, concerns, benefits and burdens are considered alongside technological and operational development.

This deliverable presents the first version of a **modular and adaptable Societal Readiness Framework (SRF)**, developed during the first six months of Pre-LSDemo. Building on Responsible Research and Innovation (RRI), Societal Readiness is understood as the degree to which an innovation is prepared to be integrated into society in a way that creates societal value. The SRF comprises five interconnected components: **SRF1_Map** (stakeholder ecosystem mapping), **SRF2_Need** (societal needs and expectations), **SRF3_Impact** (benefits and burden reflection), **SRF4_Response** (concerns and objection response) and **SRF5_Assessment** (Societal Readiness assessment). Together, they form an iterative process incorporating the RRI dimensions of anticipation, reflexivity, inclusion and responsiveness.

The framework was developed through conceptual work and practical testing, including two workshops, stakeholder interviews and a first use-case assessment. The first workshop showed that CCAM stakeholder ecosystems are highly use-case specific and that considering **value gainers and value losers** helps identify affected groups that might otherwise receive limited attention. Societal and user perspectives were less represented than technological ones, partly reflecting the predominantly technical background of participants. Interviews with representatives of public transport, vehicle manufacturers, user organisations and research organisations showed that participatory methods are widely used, but **Societal Readiness is rarely addressed systematically and stakeholder input does not consistently translate into documented decisions or follow-up**. Four families of participatory methods were identified: consultation and understanding; co-creation and co-design; evaluation, learning and monitoring; and governance and decision-making.

SRF5_Assessment assesses the quality of the Societal Readiness process of a specific use case rather than general public acceptance or realised societal impact. A first application, based on questionnaire responses from use-case owners for **117 CCAM use cases collected in Pre-LSDemo**, showed a gap between identifying relevant actors and systematically considering and responding to their needs. The share rated “Done” or “Partial” - meaning that the respective activity had been fully or partly addressed - decreased from 80% for Actors to 62% for Needs and Impacts and 49% for Response. The application also identified areas for refining the assessment questionnaire.

For future LSDemo, two pathways are proposed: **fully integrated Societal Readiness support**, with a dedicated team throughout the project, and **targeted support** at key decision points and

milestones. The SRF is linked to four use-case lifecycle phases - preparation, design and set-up, testing and learning, and evaluation and next steps - and should be adapted to the characteristics, stakeholder ecosystem and needs of each use case.

The SRF components are at different stages of development: **SRF1_Map and SRF2_Need have progressed substantially, while SRF3_Impact, SRF4_Response and SRF5_Assessment require further development.** Next steps will focus on strengthening the link between stakeholder input and technical, operational and governance decisions, refining the assessment, and translating the framework into a **Societal Readiness Toolkit for future CCAM Large-Scale Demonstrations.**

1 Introduction

Europe is entering a decisive phase in the development of Connected, Cooperative and Automated Mobility (CCAM). While numerous pilots of CCAM exist, large-scale deployment requires a unified approach that integrates technical, societal, regulatory, infrastructural, and operational dimensions. The Pre-Large-Scale Demonstration (Pre-LSDemo) project prepares the essential groundwork for Europe's future Large-Scale CCAM demonstrations. The project gathers the most promising and mature CCAM use cases across individual mobility, shared/public transport and logistics, creating a coordinated and cross-domain foundation for real-world demonstration projects planned for 2027-2031 and beyond. Through stakeholder engagement, it also explores the readiness of key enabling technologies, including sensors, V2X communication, digital services, human-machine interaction, and artificial intelligence, which is becoming a pervasive element of CCAM solutions. As a preparatory action for these future Large-Scale Demonstrations (LSDemo), the objectives of Pre-LSDemo include:

- Developing a harmonised, integrated demonstration plan for CCAM across Europe.
- Embedding Societal Readiness as a core pillar of future demonstration activities.
- Consolidating evaluation methodologies, test procedures, enabling technologies, and readiness criteria.
- Establishing a multi-stakeholder forum to ensure co-creation across industry, authorities, research, operators, and civil society.

To achieve the second objective, Pre-LSDemo develops a Societal Readiness Framework (SRF) that supports the use cases of future CCAM LSDemo in enhancing Societal Readiness of CCAM. It provides a structured approach for integrating societal needs, concerns and perspectives into the planning, implementation and evaluation of CCAM use cases. Pre-LSDemo itself is a Coordination and Support Action (CSA) with a preparatory role, rather than a demonstration project. The SRF developed within the project is intended to guide future LSDemo in addressing Societal Readiness systematically as CCAM use cases are implemented.

1.1 Project aim and scope of this deliverable

Building on this preparatory role, this deliverable focuses specifically on the Societal Readiness Framework (SRF) and its application in future CCAM LSDemo. The framework provides guidance for systematically integrating societal considerations and stakeholder perspectives into CCAM use cases.

In these demonstrations, Societal Readiness should be considered throughout the planning, implementation and evaluation of CCAM use cases, with relevant stakeholders meaningfully involved through forms of participation and co-creation appropriate to their roles, needs and the decisions at stake. The objective is not for every stakeholder to act as a co-designer, but to ensure

that relevant perspectives can inform and, where appropriate, influence the development and implementation of the use case.

To support this, Pre-LSDemo develops the SRF, defining its structure and operational elements and identifying participatory and co-creation methods through which stakeholder needs, expectations and concerns can be captured and addressed.

The framework builds on Responsible Research and Innovation (RRI) principles (Stilgoe et al., 2013; von Schomberg, 2013) and is closely linked to other Pre-LSDemo work packages, in particular stakeholder engagement and evaluation methodologies.

This deliverable is the first result of this work. As the First Report on Societal Readiness, it documents the initial development of the SRF as well as the Societal Readiness activities, findings and lessons from the first six months of Pre-LSDemo.

The development of SRF also draws on experience from the related RemoteReadyMove project. Like Pre-LSDemo, RemoteReadyMove is funded as one of the first Societal Readiness pilots, which the European Commission introduced in the Horizon Europe Cluster 5 Work Programme 2025 to strengthen the integration of societal needs and concerns into research and innovation (European Commission, 2025). As members of the Pre-LSDemo author team are involved in both projects, this enables methodological exchange and joint learning on how Societal Readiness can be operationalised in CCAM.

1.2 Objectives of the work

The work under the first project objective aims to establish the basis for integrating Societal Readiness into the use cases of future LSDemo. This includes defining Societal Readiness principles and integration guidelines, clarifying the roles and responsibilities of Social Sciences and Humanities (SSH) experts, developing assessment criteria, plus qualitative and quantitative indicators (KPIs) for assessing Societal Readiness and its development over time, and providing practical tools for stakeholder mapping, needs elicitation, reflection on benefits and burdens, and the integration of stakeholder feedback into demonstration processes. Together, these elements will form a modular and scalable SRF, which will ultimately be translated into a practical **Societal Readiness Toolkit with supporting methods, templates and checklists**.

Within this work, this deliverable pursues three objectives:

1. To lay the conceptual and methodological foundation of the SRF, including its design principles and five core components,
2. To present initial approaches for stakeholder mapping, stakeholder engagement and SR assessment together with their first application; and
3. To outline how the SRF can be integrated into future LSDemo and connected to other Pre-LSDemo activities.

Pre-LSDemo

At this stage, the SRF is an initial framework that will be further developed, applied and refined throughout Pre-LSDemo. The roles and responsibilities of SSH experts and the further specification of indicators and KPIs will be elaborated in the final report on Societal Readiness. This further development will also consider the work of the Societal Readiness CSA and its evaluation framework, with the aim of ensuring coherence between the Pre-LSDemo approach and the broader Societal Readiness activities at European level.

2 Societal Readiness

The implementation of CCAM is commonly discussed in terms of technological maturity, safety and operational performance. However, technological readiness alone does not ensure successful deployment of these new mobility solutions. **CCAM take place in complex societal environments** in which citizens, users, public authorities, operators, employees, industry and other actors may have different needs, expectations and concerns regarding a CCAM solution and the way it is introduced. These perspectives influence whether and under which conditions a solution is used, supported, permitted, operated and integrated into existing transport systems and public spaces, and whether it creates value for those affected. Concerns that are not adequately addressed, or conflicting interests, can therefore delay or limit the uptake of CCAM solutions just as much as technical shortcomings.

Pre-LSDemo addresses this challenge through the development of a Societal Readiness Framework (SRF). At the European level, Societal Readiness has gained increasing importance across research and innovation: with its Work Programme 2025, Horizon Europe introduced an SR pilot requiring selected research and innovation projects, including Pre-LSDemo, to systematically account for societal needs and concerns throughout their work (European Commission, 2025). The SRF provides a structured way of considering societal needs, values, concerns and impacts alongside technological development and demonstration planning. Rather than treating *societal acceptance* as an issue to be addressed only shortly before or after deployment, **Pre-LSDemo integrates societal considerations from the outset and develops an approach that allows future LSDemo to embed SR throughout the planning, implementation and evaluation of their use cases.**

In Pre-LSDemo, SR is approached as a basis for preparing future LSDemo to systematically consider societal needs, concerns and impacts alongside technological and operational development. The conceptualisation presented in this chapter provides the foundation for the SRF.

2.1 Responsible Research and Innovation as a foundation

The Pre-LSDemo approach to SR is conceptually grounded in Responsible Research and Innovation (RRI) (Bernstein et al., 2022; Milakis, under review). RRI was established as a cross-cutting principle of European research and innovation policy under Horizon 2020 (Lindner et al., 2016), and the SR pilot introduced in Horizon Europe builds on this foundation (European Commission, 2025). RRI reflects a shift from assessing the societal and ethical implications of innovation only after technologies have been developed towards shaping research and innovation processes in ways that contribute to societally desirable outcomes. A central element is shared responsibility among the actors involved in and affected by research and innovation, including researchers and innovators, policymakers, industry and civil society (von Schomberg, 2013; von Schomberg & Blok, 2023).

RRI places particular emphasis on the **process through which innovation is developed**. Rather than focusing only on preventing undesirable consequences, it also asks which outcomes should actively be pursued and how societal needs and aspirations can inform innovation. This requires the inclusion and commitment of relevant stakeholders throughout the innovation process (von Schomberg, 2013).

In the RRI literature, this approach is commonly structured around four interrelated dimensions (Stilgoe et al., 2013), which also underpin existing SR approaches (Bernstein et al., 2022; Braun et al., 2025). In Pre-LSDemo, they are translated into practical requirements. **Anticipation** concerns the intended and unintended implications of innovation and requires a consideration of potential societal opportunities, impacts, risks and unintended consequences at an early stage. **Reflexivity** involves examining the assumptions, motivations, values and interests underlying innovation activities, including potential trade-offs. **Inclusion** concerns the early involvement of relevant societal actors and perspectives, including groups at risk of being overlooked or excluded. **Responsiveness** refers to the capacity to adapt innovation processes to emerging knowledge, perspectives and concerns, so that stakeholder input can lead to adaptations in the planning and implementation of use cases.

Rather than being treated as a separate activity, RRI is embedded throughout the SRF and provides the basis for translating societal considerations into concrete and actionable elements of future CCAM LSDemo. How the four dimensions are operationalised in the individual SRF components is described in Chapter 4.4.

2.2 Understanding Societal Readiness

Societal Readiness (SR) is a concept that can be used to describe how well an innovation and its deployment are aligned with the society in which they are introduced. **It is distinct from concepts such as acceptance or willingness to use.** Acceptance research examines how individuals perceive and respond to a technology or service and which factors, such as perceived usefulness, trust or social norms, influence their willingness to use it. In doing so, it largely takes the innovation *as given*. SR, in contrast, considers the broader conditions under which an innovation is developed and introduced: whether societal needs, values, concerns and potential impacts are taken into account throughout the innovation process and whether the innovation can respond to them. Individual perceptions remain an important input, but SR ultimately reflects how different societal perspectives are negotiated and integrated into an innovation and its deployment.

In this context, “societal” extends beyond end users and citizens and includes the wider set of actors affected by or involved in the implementation of CCAM, including authorities, operators, employees, businesses and civil society organisations. This understanding is consistent with the European Commission’s framing of SR, which emphasises that research and innovation results should account for different societal needs and concerns, thereby increasing their potential for societal uptake and adaptation (European Commission, 2025).

For Pre-LSDemo, SR is understood as **the degree to which an innovation is prepared to be integrated into society in a way that creates societal value**. Societal value is not assumed to be the same for all actors. Different stakeholder groups may have different needs, expectations and concerns and may experience the benefits and burdens of CCAM differently. These perspectives may also conflict, and societal alignment therefore does not imply that all stakeholder needs can be satisfied simultaneously. Societal Readiness should instead help to make such differences and trade-offs visible and provide a structured basis for considering them in CCAM development and implementation decisions.



Figure 2.1: Conceptual visualisation of Societal Readiness processes accompanying technological development, resulting in societally valuable innovation. Source: DLR.

Existing readiness approaches assess different aspects of innovation maturity. Technology Readiness Levels (TRLs) focus on technical maturity, Societal Readiness Levels (SRLs) on stakeholder involvement and societal integration, and Market Readiness Levels (MRLs) on market and commercial readiness. However, these approaches are primarily diagnostic and provide only limited guidance on how these dimensions should develop throughout the innovation lifecycle (Milakis, under review). They are also often considered separately, with limited attention to their interdependencies, while different readiness dimensions may progress at different speeds and few frameworks provide explicit mechanisms for aligning or balancing these pathways over time.

These limitations point to the need for a broader approach in Pre-LSDemo: one that goes beyond assessing SR at a given point in time, but also supports its integration throughout the planning, implementation and evaluation of CCAM LSDemo. **In Pre-LSDemo, Societal Readiness is understood as a state that can be assessed at a given point in time, while dedicated Societal Readiness activities provide the process through which this state can be developed.** The state of Societal Readiness provides an indication of societal alignment and can be assessed through relevant indicators. Societal Readiness activities involve the continuous identification and involvement of relevant stakeholders, reflection on societal impacts, and adaptation to emerging concerns. This distinction between assessment and process-oriented activities provides the basis for the SRF and its application to future LSDemo.

2.3 Why Societal Readiness matters for Pre-LSDemo

Pre-LSDemo prepares the transition from the numerous, mostly local CCAM pilots conducted to date, to LSDemo. This step raises the stakes for SR. Future LSDemo will involve more mature CCAM systems, run for longer periods, cover more diverse local contexts and, in some cases, several countries, and they will affect considerably more people, including those who do not use the services themselves. **Experience from earlier pilots can therefore not simply be transferred, and societal perspectives may change over the lifecycle of an LSDemo, from planning and implementation to evaluation and potential longer-term deployment.**

CCAM may affect different groups in very different ways. The first Pre-LSDemo SR workshop, conducted with consortium partners in May 2026, included a stakeholder-mapping exercise across the three mobility domains to identify actors who may enable, benefit from, or be burdened by CCAM use cases. In this exercise, for example, older people and rural residents were mainly associated by workshop participants with potential gains in accessibility, while bus and taxi drivers were associated with potential job losses (see Chapter 5.1.3 and Table 5.2). **The SRF pays particular attention to representation, vulnerability and exclusion risks and aims to involve diverse citizen groups, including underserved and underrepresented communities whose perspectives might otherwise be overlooked.** The workshop findings illustrate the importance of considering how potential benefits and burdens may differ across stakeholder groups. Previous research on automated and connected driving similarly highlights the importance of engaging relevant stakeholders throughout technology development and testing (Kolarova et al., 2020).

CCAM can create both benefits and burdens. Potential benefits include improved safety, accessibility, sustainability and transport efficiency, while potential burdens include infrastructure costs, employment transitions and concerns about privacy and data governance. **Identifying these perspectives early and transparently allows those planning and implementing CCAM use cases to respond to concerns, adapt where necessary and identify conditions that may affect subsequent deployment.**

For Pre-LSDemo, **the development of the SRF thus aims to ensure that future LSDemo consider who is represented, who may benefit or be burdened, and how societal concerns can be addressed.** This provides the basis for CCAM use cases that are responsive to societal needs, aligned with the contexts in which they operate and more likely to be taken up.

3 The Pre-LSDemo Societal Readiness Framework: Development

3.1 Objectives of the Societal Readiness Framework

The Pre-LSDemo SRF translates the conceptual understanding of SR into a practical approach for future LSDemo. Its main purpose is to ensure that societal considerations are systematically integrated into **demonstration planning, implementation and evaluation**, alongside technological and operational considerations. This reflects the project objective of embedding SR throughout the full lifecycle of future CCAM LSDemo.

The SRF should enable demonstration teams to **identify relevant stakeholders, understand their needs, expectations and concerns, reflect on potential benefits and burdens, respond to societal input, and assess SR over time**. In this way, societal perspectives can become actionable inputs to demonstration planning, rather than being considered only at the point of deployment.

The framework aims to provide demonstration planners with a **structured process, appropriate methods and practical tools** for integrating and assessing SR. Its five core components: (1) stakeholder mapping, (2) needs analysis, (3) impact reflection, (4) responsiveness and (5) assessment, provide the basis for this process and are further developed in the following chapters.

3.2 Normative basis and requirements

To achieve its objectives, the Pre-LSDemo SRF builds on a normative basis and a set of requirements that support its application across different future CCAM LSDemo.

The normative basis is provided by RRI. In line with Chapter 2.1, the four RRI dimensions of anticipation, reflexivity, inclusion and responsiveness guide the development of the framework. This includes explicit consideration of representation, vulnerability and exclusion risks (see Chapter 2.3).

A first requirement is **modularity and transferability**. The framework should provide a common methodological basis applicable across all three mobility domains (individual mobility, public/shared transport and logistics/freight) while remaining adaptable to different local contexts, use cases and levels of maturity. This allows individual methods and tools to be selected and adapted while maintaining consistency across LSDemo.

A second requirement is **the integration of SSH and Science, Technology, Engineering and Mathematics (STEM) perspectives**. This is essential to ensure that societal insights are connected with technological and operational activities and decisions.

A third requirement is that **SR is measurable and actionable**. Qualitative and quantitative SR indicators should enable the assessment of SR and its development over time.

Finally, the development of the SRF must be closely linked to other Pre-LSDemo outcomes to ensure consistency across the preparatory work and enable societal insights to inform stakeholder engagement, evaluation methodologies, demonstration planning and outreach activities in future LSDemo.

3.3 Framework development methodology

The SRF is developed iteratively, combining conceptual work, a scoping literature review, stakeholder interviews, practical testing in workshops and subsequent refinement of the framework components. The development of the SRF combines three closely related strands of work: defining the overall structure and operational elements of the framework and its five core components; identifying participatory and co-creation methods through which stakeholder needs, impacts and concerns can be captured and addressed; and developing the SR assessment approach and indicators (SRF5_Assessment).

Two SR workshops with consortium partners played a central role in this process, serving to test initial approaches and to draw on existing experience across the consortium. Workshop 1 took place at the project kick-off in Berlin (May 2026) and served as a first practical application of the stakeholder mapping approach (SRF1_Map). It explored both stakeholder identification and previous experience with stakeholder engagement. Details of the workshop are provided in Table 3.1.

Table 3.1: Details of the first SR Workshop - overview

First SR Workshop				
Time and Date	Format	Groups	Participants	Facilitation
5 May 2026, project kick-off meeting, Berlin	Two 90-minute sessions with a 30-minute break in between	6 parallel groups, 2 each covering <i>freight and logistics, public and shared mobility, and individual mobility</i>	Approx. 10-15 consortium members per group	One moderator and one note-taker per group
Rationale	This first workshop served as a first practical application of the stakeholder mapping approach. Participants were assigned to groups based on their expertise and experience but were free to switch groups according to their interests.			
Part 1 – Stakeholder mapping		Part 2 – Stakeholder engagement		
The mapping aimed to identify a broad range of actors that need to be considered in the subsequent Societal Readiness activities. The exercise asked three use-case-related questions: 1) Who is needed to enable the CCAM use case? 2) Who may gain value from it? 3) Who may lose value or carry additional burdens? This was chosen to capture not only actors with a formal role or strong influence, but also groups that may be affected by a use case without having decision-making power. An actor could appear in more than one category. The mapping is the starting point for work on stakeholder needs, expectations, concerns and impacts.		To support broad coverage, actors were structured into six categories: 1) societal actors 2) public authorities 3) technological actors 4) infrastructure actors 5) market and transport system actors 6) other actors, including research. The categories served as prompts to reduce the risk of overlooking less obvious stakeholder groups.		
Analysis and Outcome	Following the workshop, all Miro board entries and facilitator notes from the six groups were reviewed and consolidated. Inputs were compared across groups to identify recurring themes, differences between domains, and key points for the further development of the SRF.			

The aim of the first workshop was not to create an exhaustive stakeholder map, but to explore how relevant stakeholders can be systematically identified across different CCAM use cases. The resulting insights were used to refine the stakeholder mapping methodology and identify complementary methods needed for further SRF development.

Workshop 2 in Brussels (September 2026) focused on participatory and co-creation methods for future CCAM LSDemo. Using hypothetical use cases, participants considered when different families of participatory methods should be applied across a LSDemo timeline, which stakeholders should be involved, what the methods should achieve, and their strengths, weaknesses and practical requirements. The results provide input to the selection and further development of participatory methods for the SRF and the Societal Readiness Toolkit.

Table 3.2: Details of the second SR Workshop - setting

Second SR Workshop				
Time and Date	Format	Groups	Participants	Facilitation
1 Sept. 2026, General Assembly, Brussels	One 90-minute session	9 parallel groups, 2 covering <i>freight and logistics</i> , 3 covering <i>public and shared mobility</i> , and 4 covering <i>individual mobility</i>	Approx. 17-20 consortium members per group	Two moderators per group
Rationale	This second workshop served as an opportunity to interactively workshop how different types of participatory and co-creation methods can be used in future LSDemo use cases, why and when. Participants had been asked to indicate which mobility domain they would prefer to be assigned to in their registration for the general assembly.			
Description of the workshop				
After a brief introduction round the participants were divided into two sub-groups. Moderators then presented the task and use case. Each group was asked to discuss the families of participatory methods in relation to a fictional/hypothetical use case tailored to the specific mobility domains (individual mobility, public and shared transport, and freight transport). Using a pre-prepared timeline and color coded post-it notes, participants were then asked to place post-it notes onto the timeline, to reflect where/when each method could be used. The participatory methods had been grouped into four key families, methods to guide: co-creation and co-design; consultation and understanding; evaluation, learning & monitoring; and governance and decision-making. And participants were provided with a one-page overview of the four method families covering purpose, examples of specific methods within the family, and example of use in CCAM projects. Participants were also encouraged to consider in-person or digital formats. Moderators then guided a discussion based on the suggested post-its covering e.g. reasons for clusters of certain methods, what can be achieved through a specific approach, who or which stakeholders should be included, strengths and weaknesses, and challenges and opportunities. Moderators were also encouraged to ask questions about the resources and actors needed to lead or administer the different participatory methods.				
Analysis and Outcome	Following the workshop, each timeline from the 9 parallel groups was documented and summarised digitally. Results were analysed for input on which methods were most commonly suggested, as well as when different methods should be operationalised during an LSDemo. The analysis also considered the intended purpose of the methods, which stakeholder groups should be involved, perceived strengths and limitations, and practical requirements for implementation.			

In parallel with the workshops, the approach for the Societal Readiness assessment (SRF5_Assessment) was developed. The initial assessment concept focused largely on stakeholder perceptions, for example whether groups feel adequately represented, and envisaged establishing a baseline for societal alignment, inclusion and trust. Before this concept could be operationalised, two conceptual questions had to be settled: **what kind of object SR is**, and **what an assessment of it can and cannot establish**. The answers, presented in Chapter 4.2, led to a refinement of the original indicator concept: the assessment focuses on the Societal Readiness of a specific use case by examining whether the conditions for its societally aligned development and deployment are in place. Stakeholder perceptions are retained, but serve as an important source of evidence rather than as the unit of assessment. The refinement drew on existing societal readiness works, in particular “The Little Book of Societal Readiness” (Büscher

& Cronshaw, 2022) and on approaches for specifying values into norms and design requirements (van de Poel, 2013).

The assessment approach was then tested in a first application with a set of CCAM use cases collected by Pre-LSDemo. The SR questions were administered together with other dimensions relevant for defining the CCAM use cases (e.g., regulatory properties). The responses were rated against the guiding assessment questions on the ordinal scale described in Chapter 5.5. Details are provided in Table 3.3.

Table 3.3: Details of the first application of the SR assessment

First application of the SR assessment			
Time and Date	Format	Use cases	Respondents
June–August 2026	Written questionnaire, combined with other use-case dimensions (e.g., regulatory properties)	117 distinct use cases (122 entries) covering public and shared transport (54), freight and logistics (40), individual mobility (34) and infrastructure/system (17); 25 use cases cover more than one domain	Use case owners
Rationale	The test served as a first practical application of SRF5_Assessment. It examined whether the guiding assessment questions and the rating scale can be applied to information provided by future use case owners, and it produced a first picture of SR across the Pre-LSDemo use cases.		
Description of the questionnaire			
The SR section of the use-case template comprised eleven questions, assigned to the four assessment dimensions as follows (wording as in the template):			
Value: Q10 “What societal value does the use case provide?”, with Q9 “What problem does the use case address?” as context.			
Actors: Q13a “Have you identified who is affected by your CCAM Demo beyond main individuals and end-users?”; Q13b “Have you reflected on how different groups might be affected?”, with Q11 “Who will be the main individuals involved into this use case?” and Q12 “Who are the end-users of the use-case?” as context.			
Needs: Q13c “Are you actively engaging any of the affected groups?”; Q13d “Have you assessed the needs and expectations of affected groups?”			
Response: Q13e “Are there concerns or needs your Demo cannot address?”; Q13f “Have affected groups or stakeholders had a formal or informal opportunity to raise concerns about the project?”; Q13g “Have you evaluated how well your Demo aligns with the needs of affected groups?”			
Q9 and Q10 were answered in free text, Q11 and Q12 as checklists, and Q13a–g as tick boxes (e.g. yes / in progress / planned / no) with free-text fields for groups, examples and methods.			
Distribution: The SR questions were part of the Pre-LSDemo use-case template, which the use-case owners completed together with the other use-case dimensions.			
Response rate: 122 use-case entries were registered. After removing one blank template, three use cases submitted twice by different partners and one earlier version that was later resubmitted, 117 use-case entries remained. Four submissions contained no questionnaire answers and nine used an earlier version of the SR questions (SRF1–5 checklist). Of the remaining entries, 112 could be rated on Value and 99–102 on the three process dimensions.			

4 The Pre-LSDemo Societal Readiness Framework (SRF): Structure

4.1 Overview of the Societal Readiness Framework

The Pre-LSDemo SRF provides a structured process for integrating societal considerations into the preparation and implementation of CCAM LSDemo. It combines **five interconnected components**: stakeholder ecosystem mapping (SRF1_Map), societal needs and expectations analysis (SRF2_Need), benefits and burden reflection (SRF3_Impact), concerns and objection response (SRF4_Response), and Societal Readiness assessment (SRF5_Assessment). Together, these components guide demonstration teams from understanding the stakeholder ecosystem to assessing SR and adapting activities where necessary (see Figure 4.1).

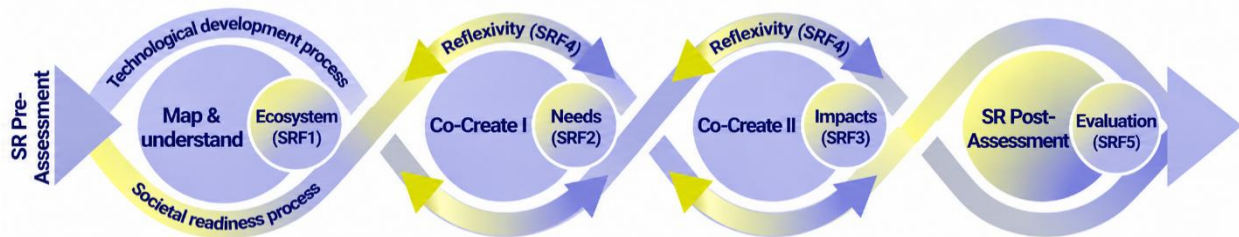


Figure 4.1: The Pre-LSDemo SRF.

The five components are:

1. **SRF1_Map – Stakeholder ecosystem mapping:** identifying and mapping relevant stakeholders, including their roles, influence, vulnerability and potential exclusion risks.
2. **SRF2_Need – Societal needs and expectations:** understanding stakeholders' needs, expectations, concerns and conditions for support.
3. **SRF3_Impact – Benefits and burden reflection:** identifying and reflecting on potential positive and negative societal impacts and how these may differ between stakeholder groups.
4. **SRF4_Response – Concerns and objection response:** enabling stakeholders to raise concerns and supporting co-creation, feedback and adaptation in response.
5. **SRF5_Assessment – Societal Readiness assessment:** using qualitative and quantitative indicators to assess Societal Readiness and its development over time.

The SR activities are not intended as a process running in parallel to technological development or demonstration implementation. Rather, SR activities should be integrated into these processes so that societal considerations can inform decisions as the demonstration develops. How the SRF can be embedded throughout the lifecycle of future CCAM LSDemo further described in Chapter 6.

4.2 The Societal Readiness Pre-& Post-Assessment

The SRF assesses Societal Readiness at two points in time. A **pre-assessment** establishes a baseline early in the engagement cycle, before SRF1_Map to SRF4_Response activities are carried out. A **post-assessment** repeats the same assessment after these components have been carried out. Comparing the two creates a before/after perspective that makes learning and adaptation visible:

**Pre-assessment [baseline] → SR process and co-creation (SRF1–SRF4) → Post-assessment
→ comparison → lessons learned and adaptation**

What is assessed: Readiness is commonly expressed on a scale borrowed from technology readiness. Innovation Fund Denmark, for example, formalised Societal Readiness Levels (SRLs) as a nine-level scale mirroring the TRL scale, focusing on societal adaptation instead of technical performance (Innovation Fund Denmark, 2019). Such scales carry an implicit expectation that SR can be expressed as a single value that rises as a use case matures. This expectation does not hold for SR as understood in the SRF. A TRL describes a property of a technology, established by testing against a common standard. SR is not a property of the technology alone: it concerns how an innovation is developed and integrated in relation to societal actors, their needs and concerns, and potential benefits and burdens. What can be assessed is therefore **the quality of the SR process**, i.e. whether

- affected actors were identified and involved,
- their needs and expectations were elicited and potential benefits and burdens were considered,
- the reasoning behind decisions was made transparent, and
- their input was considered and, where appropriate, informed changes to the use case.

The quality of this process is a necessary condition for creating societal value, although it does not in itself demonstrate that societal value has eventually been realised. Importantly, this includes not only whether stakeholders are involved and heard, but also whether the potential positive and negative impacts of the use case, including their distribution across stakeholder groups, are explicitly reflected upon. This does not abandon the understanding of SR as a state (Chapter 2.2): process quality can be rated at a given point in time and compared between two points in time, which makes changes in SR visible. Maturing SR, as understood in the SRF, therefore does not mean moving up a predefined scale, but strengthening the quality of this process, for example by involving previously overlooked groups, eliciting their needs more thoroughly or responding to them more transparently.

Four assessment dimensions: The assessment follows the sequence of the SR process, from the societal value a use case intends to create, through the actors and their needs and potential impacts, to the response given to them. The four dimensions are therefore *Value, Actors, Needs*

and Impacts, and Response. They are described in Chapter 5.5.1, together with their guiding questions and the rating scale.

Scope of the assessment: The assessment focuses on a specific use case or demonstration, not on CCAM in general. Statements that cannot be attributed to the use case under assessment, such as general attitudes towards automated driving or generic benefits attributed to CCAM, cannot demonstrate its SR. Furthermore, it captures the state of the SR process, not realised societal impact. Whether a use case actually creates societal value normally becomes visible only beyond the duration and scale of a demonstration. What the assessment can establish is whether the conditions for creating that value are in place.

Role within the SRF: The pre-assessment shows where a use case stands and where SR work is most needed, and thus helps to focus SRF1–SRF4. The post-assessment shows where process quality has improved, stagnated or declined. Its results feedback into the iterative SR process (Chapter 4.3), for example when gaps in the involvement of affected groups trigger a return to SRF1_Map. Both assessments use the same instrument, which is described in Chapter 5.5.

4.3 The Societal Readiness Process

The five SRF components are designed as an **interconnected and iterative process** rather than as independent or strictly sequential activities. Together, they support a continuous cycle of understanding the societal context, engaging with stakeholders, responding to identified issues and assessing progress in SR. Rather than forming a strictly sequential process, these five components are interconnected and can be revisited as new stakeholder input, impacts or concerns emerge.

The process is **iterative**: assessment or new stakeholder input may reveal additional actors, needs, impacts or concerns and therefore trigger a return to earlier components. This allows the SRF to evolve together with the demonstration and ensures that societal considerations can continuously inform planning and implementation rather than being assessed only as a separate or subsequent activity. This is consistent with previous work on societal dialogue in automated and connected driving, which emphasises linking dialogue processes to technology development and implementation (Kolarova et al., 2020).

4.4 Integration of RRI principles across the framework

While the four RRI dimensions introduced in Chapter 2.1 cut across the entire SRF, individual components provide more direct mechanisms for operationalizing them. **Inclusion** is particularly prominent in SRF1_Map, where relevant and potentially underrepresented groups are identified, but continues through their meaningful involvement in subsequent components. **Reflexivity** is supported across SRF2_Need to SRF4_Response by examining stakeholder perspectives, underlying assumptions, tensions and the reasoning behind decisions. **Anticipation** is particularly important in SRF3_Impact, where potential benefits, burdens and unintended consequences are considered before and during implementation. **Responsiveness** is most

directly operationalised in SRF4_Response through feedback loops that enable stakeholder input and identified concerns to inform adaptations. SRF5_Assessment cuts across all four dimensions by assessing whether relevant actors have been included, their needs and potential impacts considered, and stakeholder input meaningfully responded to.

In this way, the first four components also correspond to the guiding questions of the Horizon Europe Societal Readiness pilot, which address societal actors, R&I goals and societal needs, benefits and burdens, and objections and concerns (European Commission, 2025).

5 The Pre-LSDemo Societal Readiness Framework (SRF): Application

This chapter describes the practical application of the five SRF components, which are applied iteratively as described in Chapter 4.3. It presents the methods and tools developed for each component and, where available, their initial application within Pre-LSDemo. As the SRF is still under development, the chapter distinguishes between elements already applied or tested and those proposed for application in future CCAM LSDemo. The SRF will be further developed and tested during the remaining six months of Pre-LSDemo, with the final SRF presented in the final report on Societal Readiness.

5.1 Stakeholder ecosystem mapping (SRF1_Map)

SRF1_Map provides a structured approach for identifying and mapping the stakeholders relevant to a specific CCAM use case. The mapping considers characteristics such as role, influence, interest, vulnerability and exclusion risk and provides the basis for deciding whose perspectives should be included in subsequent SRF activities. Stakeholder mapping is understood as an iterative process that combines stakeholder identification, categorisation and consideration of relationships within the wider stakeholder ecosystem. It comprises four steps: defining, identifying, mapping and prioritising relevant stakeholders (Figure 5.1), following established approaches to stakeholder analysis (Reed et al., 2009). It combines collaborative stakeholder mapping with desk research and a gap analysis to identify missing or underrepresented actors. The following sections describe these steps and illustrate them with results from the first SR workshop.

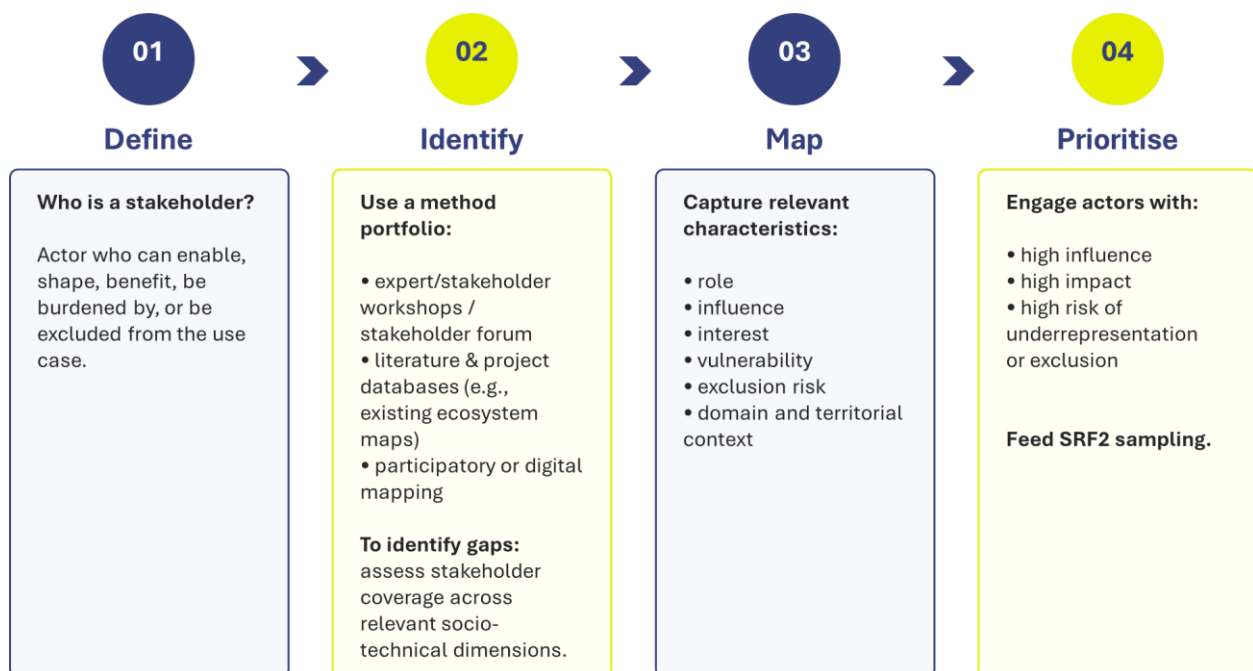


Figure 5.1: SRF1_Map process for stakeholder identification, mapping and prioritisation.

5.1.1 Stakeholder definition

How can stakeholders be defined?

In Pre-LSDemo, a stakeholder was defined as **an actor who can enable, shape, benefit from, be burdened by, or be excluded from a CCAM use case**. This builds on the widely used understanding of stakeholders as those who affect or are affected by a decision or action (Freeman, 1984; Reed et al., 2009), but deliberately extends it to groups that might otherwise be marginalised or overlooked. Stakeholders therefore include not only actors directly involved in implementing a use case, such as operators, authorities or technology providers, but also citizens, non-users and other groups affected by its outcomes. The definition also provides the basis for the three perspectives used to identify stakeholders in Pre-LSDemo: actors who enable a use case, actors who may gain value from it, and actors who may lose value or carry additional burdens (Chapter 5.1.2).

5.1.2 Stakeholder and ecosystem identification

How to identify relevant stakeholders and ecosystems?

Relevant stakeholders should be identified using a combination of complementary methods, as no single source is likely to capture the full stakeholder ecosystem. These include desk research on literature, existing project databases and ecosystem maps, analysis of the relevant (future) socio-technical system, and collaborative stakeholder mapping, in which experts and stakeholders jointly identify relevant actors in a workshop setting. The combination should be adapted to the specific use case and context.

Within Pre-LSDemo, workshop 1 in Berlin applied collaborative stakeholder mapping to six use cases, two per mobility domain. Participants identified stakeholders from three perspectives: who is needed to enable the use case, who may gain value from it, and who may lose value or carry additional burdens. In total, 757 statements were collected (367 enabler, 253 value-gainer and 137 value-loser statements), naming more than 100 different actor groups.

The results showed that relevant stakeholders extend well beyond actors directly involved in CCAM development and operation and that stakeholder ecosystems are use-case specific. In individual mobility, enabler statements were dominated by technological actors (39%), followed by public authorities (20%). In public transport and shared mobility, public authorities were named most often (21%), and in freight, market and transport-system actors such as logistics providers, shippers and terminal operators (20%). In both domains, however, enablers were spread fairly evenly across all six actor categories, reflecting the greater importance of system integration and coordination (Table 5.1).

The workshop also provided methodological insights. Participants often described enabling conditions rather than actors (e.g. "compliance verification is needed"). Translating such conditions into roles ("Who is responsible for compliance verification?") revealed roles that are not yet clearly assigned to existing actors, such as ecosystem orchestrators or coordinators of

information exchange. At the same time, technological enablers were described in more detail than societal and user-related ones, reflecting the predominantly technical backgrounds of the workshop participants and underlining the need to complement workshop-based identification with other sources and a gap analysis (Chapter 5.1.3).

Table 5.1: Example results: stakeholder ecosystems across mobility domains

Excerpt of results for SRF1_Map

Source

First SR Workshop, Berlin (see Chapter 3.3 for methodology)

Description of example result from WS

These results illustrate the **enablers (actors) mentioned during the workshop** for one example use case in each of the three mobility domains. They indicate that the relevant **ecosystems differ across individual mobility, public transport, and freight transport**. While individual mobility has a strong focus on **technological actors** - which are also relevant across the other domains—the integration of public transport and logistics increasingly depends on **system-level actors and coordination**. In freight transport, the ecosystem additionally highlights the importance of actors such as the **workforce, service providers, shippers, and infrastructure and terminal operators**, reflecting the broader range of stakeholders involved in implementation.

L3 urban driving

Individual Mobility • n = 53 enabler mentions • 100% stacked by category share

Public authorities 14 (26%)	Technological 13 (25%)	Infrastructure 11 (21%)	Societal 6 (11%)	Other 5 (9%)	Market & Transport System 4 (8%)
Public authorities; Policy makers & legislators; Type-approval & certification authorities; Emergency responders; Technical Services	Data & digital service providers; OEMs; Suppliers; Technology providers	Charging & parking operators; Road operators / infrastructure managers; City and regional authorities; Telecom providers; Traffic management; Road operators	Other road users; International Federation of Pedestrian; (Potential) users	Accident experts; Driver Training bodies; Insurance; Research institutes	Local business; Public transport & mobility services; (Potential) users

On-demand automated public transport (L4)

Public Transport & Shared Mobility • n = 60 enabler mentions • 100% stacked by category share

Public authorities 13 (22%)	Market & Transport System 12 (20%)	Societal 10 (17%)	Technological 10 (17%)	Infrastructure 9 (15%)	Other 6 (10%)
Public authorities; Policy makers & legislators; Emergency responders; Standardization bodies; Technical Services; Type-approval & certification authorities	Depot operators; Data & digital service providers; Fleet owners & management ; Insurance; Investors; Local business; Public transport & mobility services; Traffic management	Airport operators; Industrial site owners; Media & communicators; Scientific communicators; Public transport authorities; (Potential) users; Civil society	Data & digital service providers; Technology providers; OEMs; Suppliers	Airport operators; Charging & parking operators; Public transport & mobility services; Road operators / infrastructure managers; Technology providers; Telecom providers	Ecosystem associations; Emergency responders; Civil society; Media & communicators; Policy makers & legislators; Research institutes

Cross border freight transport

Freight Transport • n = 66 enabler mentions • 100% stacked by category share

Societal 16 (24%)	Public authorities 14 (21%)	Market & Transport System 13 (20%)	Infrastructure 11 (17%)	Technological 9 (14%)	Other 3 (5%)
(Potential) users; Civil society; Customs; Emergency responders; Ambulance; Labor unions; OEMs; Other road users; Data & digital service providers; Shippers; Transport workers	Customs; Port authorities / operators / owners; Public authorities; EU; Road operators / infrastructure managers; Road service providers; C-ITS / roadside service providers; Type- approval & certification authorities	Logistics & freight operators; Fleet owners & management; Port authorities / operators / owners; Terminal owners; hubs owners; Hauliers; 3 PLs; Shippers; Cargo owners; Terminals, hubs	Road operators / infrastructure managers; Terminal operators; Toll operators; Traffic management; Port authorities / operators / owners; Charging & parking operators; Hydrogen refueling infrastructure operators; Rail operators; Ferry operators	Technology providers; Data & digital service providers; Fleet owners & management; Localization providers; OEMs; Suppliers	Res. Institut es; Stand. bodies

5.1.3 Stakeholder categorisation and prioritization

How to categorize and prioritize stakeholders?

Once identified, stakeholders can be categorized according to characteristics relevant for SR, including their **role, influence, interest, vulnerability and exclusion risk, domain and territorial context**. This helps structure the stakeholder landscape and makes differences in power, involvement and potential impacts visible. These categories are not mutually exclusive, as the same actor may occupy different positions depending on the specific impact or aspect of the use case. Stakeholders also do not act in isolation: their claims may compete with, complement or reinforce each other (Neville and Menguc, 2006).

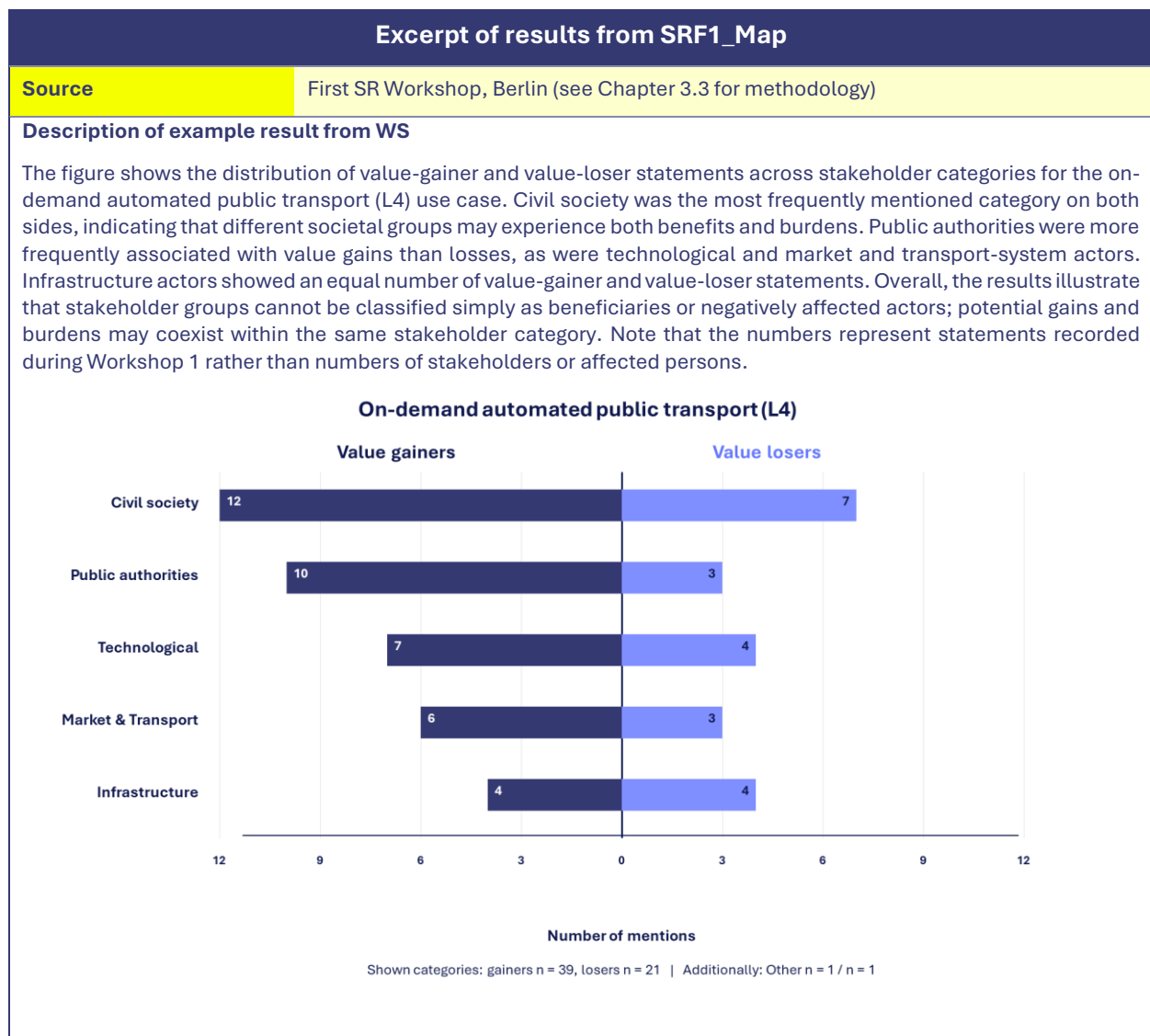
Established approaches typically prioritise stakeholders according to their influence and interest or their salience, defined by power, legitimacy and urgency (Mitchell et al., 1997; Reed et al., 2009). Such approaches, however, risk marginalising groups with little formal power (Reed et al., 2009). **In the SRF, prioritisation therefore also considers stakeholders who are strongly affected, vulnerable, or at risk of being underrepresented or excluded, as well as their potential exposure to both benefits and burdens.** Prioritisation serves to identify whose perspectives require particular attention in subsequent SRF activities, rather than to determine which stakeholders are more important overall. The resulting prioritisation provides the basis for selecting stakeholders for subsequent needs assessment and engagement activities in SRF2_Need.

The results of Workshop 1 illustrate the relevance of this approach. Value was understood broadly, including social, economic, operational, environmental and market benefits and burdens. The value-gainer and value-loser perspectives made societal actors considerably more visible: they accounted for only 18% of enabler statements, but for 30% of value-gainer and 33% of value-loser statements. Some groups, such as professional, taxi and truck drivers, other transport workers or less technology-savvy users, appeared only as value losers and not among the enablers. Several actors, including public authorities, users and other road users, were associated with both gains and losses. Anticipated losses were predominantly business- and

work-related, such as lost revenue, additional administrative burdens and job losses. Participants generally found it easier to name who may lose value than to specify what exactly would be lost.

The on-demand automated public transport (L4) use case shows these patterns in detail (Table 5.2). Potential gains were identified for civil-society groups such as older people, children, young people and rural residents, particularly in relation to accessibility, safety and environmental benefits. At the same time, potential losses or burdens were identified for bus and taxi drivers, depot personnel and public transport operators, including job and business losses as well as coordination and liability burdens.

Table 5.2: Example of stakeholder categorisation according to potential value gains and losses for on-demand automated public transport (L4).



The next example illustrates the specific actors and types of value gains and losses identified for on-demand automated public transport (L4). Potential gains include improved accessibility, safety, public transport provision, technological development and new market opportunities, while potential losses or burdens include job and business losses, usage barriers, investment and standardisation burdens, and coordination and liability challenges. The results also show that the same stakeholder categories may experience both gains and losses.

On-demand automated public transport (L4)

Value gainers (n=40)		Value losers (n=22)	
Civil society (n=12)		Civil society (n=7)	
Specific actors Elderly, children, young people, rural residents First & last mile users, all citizens	Value gained Accessibility · Environment Availability & safety	Specific actors Bus depot personnel, bus & taxi drivers Tech-illiterate people, other workers	Value lost Job losses · Usage barriers Poorer public health
Public authorities (n=10)		Technological (n=4)	
Specific actors Public authorities, municipalities Vehicle, industrial & airport authorities	Value gained Policy impact · Reduced congestion Better public transport · City image	Specific actors OEMs, European industry MicroMobility & tech companies	Value lost Fewer vehicles needed Business losses · Competitive pressure
Technological (n=7)		Infrastructure (n=4)	
Specific actors Tier, suppliers, shuttle OEMs System providers, fleet managers Remote operators centers	Value gained New / improved technologies; new services, data & expansion	Specific actors Infrastructure operators (general)	Value lost Increased complexity · Investments Standardization burden, legacy systems
Market & Transport (n=6)		Public authorities (n=3)	
Specific actors Logistic companies, investors PT operators, maintenance companies	Value gained Reliability & productivity Profits / ROI · Scalable models	Specific actors Public authorities	Value lost Coordination & liability burdens False expectations
Infrastructure (n=4)		Market & Transport (n=3)	
Specific actors Infrastructure owners, city planners Digital infrastructure providers	Value gained Data acquisition · More revenue Optimized pricing system	Specific actors Taxi drivers, PT operators (PTOs) Conventional mobility providers / OEMs	Value lost Job losses · Business losses Losing revenue & ROI

Note: Category totals shown above sum to n=39 gainers and n=21 losers; "Other" adds n=1 / n=1, respectively.

Workshop-based identification may nevertheless leave gaps, particularly where particular perspectives are less strongly represented. A **gap analysis** can therefore be used to assess whether relevant parts of the stakeholder ecosystem are sufficiently represented in the workshop results and to identify actors or groups that may have been overlooked. For this purpose, the initial Pre-LSDemo analysis draws on a set of socio-technical coverage dimensions developed in the related RemoteReadyMove project: operational and technological, user engagement, innovation and market integration, organisational, regulatory, ethics and accountability, and sustainability. These dimensions are used here as a complementary filter for checking stakeholder coverage and do not represent additional SRF components. They provide a reference structure against which the stakeholder coverage emerging from the value-gainer and value-loser mapping can be systematically checked.

Applying this gap analysis to the value-gainer and value-loser results for on-demand automated public transport (L4) showed that the operational and technological and innovation and market-integration dimensions were covered. User engagement, organisational and regulatory dimensions were partially covered, while gaps in stakeholder coverage were identified for ethics and accountability and sustainability (see Figure 5.2).

Readiness dimension	Stakeholder Coverage
 Operational & technological	Covered
 User engagement	Partially covered
 Innovation & market integration	Covered
 Organisational	Partially covered
 Regulatory	Partially covered
 Ethics and accountability	Gap
 Sustainability	Gap

Figure 5.2: Gap analysis of stakeholder coverage across Societal Readiness dimensions based on value-gainer and value-loser mapping: on-demand automated public transport (L4).

These gaps refer to stakeholder coverage within the workshop analysis and do not imply that the use case itself lacks ethical, accountability or sustainability considerations. Rather, they indicate areas in which additional stakeholder perspectives should be considered in subsequent SRF activities.

5.2 Societal needs and expectations analysis (SRF2_Need)

Following the identification and mapping of relevant stakeholders in SRF1_Map, **SRF2_Need focuses on understanding their needs, expectations and concerns**. The purpose is not only to collect stakeholder perspectives, but to consider how these perspectives can inform the design and implementation of the CCAM use case and related demonstration activities. Participation is therefore treated as a means to improve understanding and decision-making rather than as an end in itself. Different methods can be used to capture these perspectives, depending on the stakeholder groups involved, the type and maturity of the use case, the questions to be addressed and the stage of the demonstration. These methods form part of the broader process of citizen and stakeholder participation.

Citizen and stakeholder participation includes “all the ways in which stakeholders (including citizens) can be involved in the policy cycle and in service design and delivery” (OECD, 2022). Co-creation and participatory methods are important for gathering, understanding and incorporating societal needs and expectations in CCAM developments. They are specifically important for a number of reasons. Participation can shed light on different viewpoints and perspectives, and give a voice to those who are often unheard. Through participation, decision-makers and planners become informed of the needs and wants, and impacts decisions may have. Participation creates an opportunity to take different groups into consideration and reduce unjust outcomes. In return, the various stakeholders involved or affected also become informed and can better understand the purpose and goals of a policy or a plan. Inclusion can bring legitimacy to ongoing CCAM developments (OECD, 2022). In this chapter we present results from semi-structured interviews with CCAM stakeholders on existing methods for participation, as well as results from the literature review on participatory methods, CCAM and societal readiness.

Understanding needs and expectations through participation is influenced by various factors such as the degree of influence participants have over decision-making, as well as the form participation takes. Research on participatory methods has classified participation in various ways. For citizen participation, for instance, one of the best-known classifications is Sherry Arnstein’s ladder of citizen participation, which distinguishes forms of participation according to how much power citizens hold in decision-making processes (Arnstein, 1969). Other more recent classifications have expanded this to include more dimensions of participation (Chilvers et al., 2021), such as who is orchestrating the participatory process (e.g., is the initiative institution-led or citizen-led?), as well as what it is that stakeholders and citizens are being asked to participate in (e.g., are participants being invited to discuss an issue on a general level through a public dialogue process or consultation, or are they invited to participate in a test that involves active involvement, such as a living laboratory or co-design workshop?)

5.2.1 Collection of stakeholder needs, expectations and concern

How to collect stakeholder needs, expectations, concerns?

Stakeholder needs, expectations and concerns can be captured through different participatory methods. No single method is suitable for all stakeholders, questions or stages of a demonstration. Method selection should therefore consider what type of input is needed, which stakeholders should be involved, the maturity of the use case, when the input is required, and how the results are expected to inform subsequent activities or decisions. Methods may also be combined or applied repeatedly as the use case develops. The application of methods across different stages of a CCAM demonstration lifecycle is described in Chapter 6.2.

Interviews on existing participatory practice

To understand how insights into stakeholders’ needs, expectations and concerns can be gained in practice, a series of semi-structured interviews was undertaken. The idea was to learn from organisations with some experience in or exposure to one or more participatory methods. Twelve

interviewees were identified, representing four types of organisations: public transport authorities and operators (PTAs/PTOs; 4 interviewees), vehicle manufacturers (OEMs; 3), customer and user representative organisations (3) and research organisations (2). An interview guide with 25 questions was developed and used during the recorded online interviews. Transcriptions were mapped to the applicable questions using AI and then checked by the project team for relevance. Replies were clustered under seven headlines for each of the four groups: (1) background and rationale for the participatory activity, (2) choice of the participatory method, (3) stakeholder selection, (4) planning, facilitation and recruitment, (5) SR aspects addressed, (6) outcomes and use of results, and (7) lessons learned and recommendations.

Based on this, the replies were further synthesised to draw conclusions on the organisations' existing practices regarding participatory methods in general and SR in particular, as well as on whether participatory methods had influenced decisions and whether SR is reflected in governance.

The findings can be summarised as follows:

Participatory methods in general: OEMs use participation to validate specific products. PTAs combine light continuous feedback with more in-depth methods. User organisations train, test or represent the public and research organisations contribute a broad methods toolbox and subject-matter expertise aimed at the quality of the process itself.

All four groups prefer observing real behaviour and using demonstrations over hypothetical methods, and all face limits in resources or representativeness. They differ, however, in their role: OEMs use participation to improve their own vehicles and PTAs to improve the service they run, while user organisations and research organisations act as independent bodies representing, verifying or studying CCAM on behalf of the public rather than developing a product or service themselves.

Participatory methods to address SR: None of the four groups uses a predefined Societal Readiness framework, which is not surprising given that the concept has only recently emerged in research and innovation policy. Relevant SR insights have instead been gained through safety, product, service, advocacy or research activities. The four groups play different but complementary roles: OEMs focus on product adoption, PTAs on service experience, user organisations on independent representation and accountability, and research organisations on methods and evidence. Across all groups, however, there is a common gap: SR is not yet addressed through a systematic and repeatable process.

Decision influence and governance: Concrete decision influence is rare, but some examples exist: one user organisation's testing led to a manufacturer recall, one OEM's ethics framework supported formal Level 3 approval, and a PTA's failed bus retrofit reversed its technical strategy. Formal processes for integrating Societal Readiness into decisions are still limited. Most organisations rely on voluntary guidelines, internal rules and safeguards for future deployments.

Several respondents would like regulators to be involved earlier, at the requirement-setting stage, rather than only as a late approval gate.

Implications for the SRF: The interviews confirm the need for a structured approach: while participatory methods are widely used, Societal Readiness is not addressed systematically, and stakeholder input rarely leads to clearly documented follow-up or decisions. For the SRF, this underlines the value of methods based on real experience and demonstration, the importance of combining the complementary perspectives of different organisations, and the need for explicit mechanisms that connect stakeholder input with technical, operational or governance decisions (SRF4_Response, Chapter 5.4) and monitor how SR develops over time (SRF5_Assessment, Chapter 5.5). The following overview of participatory method families builds on these insights.

Literature review

Complementing the interviews, a **scoping literature review** was used to group participatory and co-creation methods into **four main families according to their main purpose: 1) consultation and understanding, 2) co-creation and co-design, 3) evaluation learning and monitoring, and 4) governance and decision-making**. Methods from different families can be combined, and some, such as co-design, may serve several purposes. Across the four families of methods, the format of participation should also be considered. This involves assessing whether in-person (e.g. face-to-face workshops, meetings, interviews or field activities), or digital formats (e.g. online workshops/interviews, surveys, collaboration through digital platforms, digital participatory mapping, VR) are most suitable.

First, methods for **consultation and understanding** can be summarised as participatory tools used to gather information, encourage deliberation, share perspectives, experiences and preferences from stakeholders. They help project teams understand needs, identify challenges and inform decision-making. Generally, the main purpose of methods for consultation and understanding are to understand and learn what stakeholders need, think, experience or prefer. In table 5.3, we summarise some of the key strengths and weaknesses of methods for consultation and understanding.

Table 5.3: Methods for consultation and understanding – strengths and weaknesses

Strengths	Weaknesses
• Create forums to gather valuable insights into stakeholder needs and expectations • Contribute with knowledge to make a demonstration relevant and responsive to real-world challenges and needs • Help capture diverse perspectives; help with the early identification of crucial issues if used at the right time	• Consultation does not necessarily give stakeholders influence over decisions • Risk of superficial participation; findings may not represent all stakeholders • Issues with recruiting representative groups of participants; limited

• Support evidence-based decision-making • Can contribute to legitimacy if knowledge is meaningfully considered and included in decision-making.	- opportunities for collaboration and shared learning • Can be of limited value if consultation is used as a one-time activity.
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Public consultations are one example of a specific method for consultation and understanding. In public consultations, citizens are invited to provide feedback, usually, to a public institution. The organizers define the issues for consultation, questions, and process, while the citizens contribute with their views and opinions. Public consultations can involve both citizens and/or stakeholders such as NGOs. In a study on public dialogue processes on self-driving vehicles in the UK, Stilgoe and Cohen (2021) describe two examples: a national public dialogue with groups of citizens in several locations across the UK, and the ‘Citizens’ Conversation’ in Manchester, organised in collaboration with Transport for Greater Manchester. In both cases, participants were recruited to reflect the diversity of the local population.

Second, methods for **co-creation and co-design** can be summarised as participatory methods used to actively involve stakeholders in developing, designing or shaping CCAM visions, solutions, services, or innovations. They emphasise collaboration and can support shared ownership of outcomes. The main purpose of these types of methods is to develop CCAM solutions or concepts through active stakeholder involvement. They are best suited for use when the solution is still open enough for stakeholders to influence its design. **Typical methods include co-design workshops, living labs, scenario workshops, future visioning exercises and design sprints.**

Table 5.4: Methods for co-creation and co-design – strengths and weaknesses

Strengths	Weaknesses
• Generate knowledge on diverse experiences and perspectives • Help ensure solutions/technologies/service under development reflects user and stakeholder needs • Generate concrete ideas or solutions; can help build collaboration and shared ownership amongst participants • Can help to identify issues and opportunities for development early in the process	• Can have a limited impact if time and resources are limited • Outcomes can be affected if skilled facilitation and expert knowledge of methods is lacking • Overall results can lack legitimacy if input from co-creation is overlooked in decision-making processes • Pre-decided goals and solutions limit success if outcomes have already been fixed

Co-design methods allow residents, passengers, transport operators, local authorities, and other stakeholders to shape vehicle services, operational concepts, route planning, safety requirements, and user interfaces before and during AV deployment, as well as in assessing

results and possible paths for development. Examples from autonomous mobility include a community design workshop in the Singapore neighbourhood of Punggol, in which residents designed their ideal autonomous mobility system, providing insights into community-level priorities and values (Kurniawan et al., 2024). Severs et al. (2022) used participatory workshops with transport-excluded groups, including older people, women, disabled and neurodivergent people and people with mental health conditions, to explore how the design of shared autonomous vehicles could create more inclusive journey experiences.

It is important to note that co-design methods can be used to frame participatory test forums, such as living labs. Co-design methods should be used strategically as structured participatory approaches that actively involve end users and other stakeholders in the design, development, testing, and evaluation of technologies and services. Rather than treating users as passive subjects, co-design treats them as partners who contribute knowledge, experiences, needs, and preferences throughout the innovation process. Co-design can therefore straddle a number of the families of methods mentioned here, including approaches to evaluation and learning.

Third, methods for **evaluation, learning and monitoring** are used to assess processes, outcomes and impacts. They support learning by identifying strengths, weaknesses, lessons learned and opportunities for improvement. Their key purpose in a CCAM context is to generate feedback and assess outcomes throughout a demo and after the demo, and generate insights on what should improve. **Typical methods include user diaries, reflection workshops, hands-on experience and real-time interactions, citizen panels, deliberative mini-publics and impact-assessment workshops.**

Table 5.5: Methods for evaluation, learning and monitoring – strengths and weaknesses

Strengths	Weaknesses
• Can provide concrete evidence of impact and outcomes • Support continuous learning and improvement • Document stakeholder experiences and perspectives • Creates new understanding and insights (e.g. how different groups are affected) • Documents lessons learned and thereby contributes to transparency and accountability in reporting of results • Generates knowledge for future projects • Qualitative and quantitative methods can be combined to provide comprehensive results	• May be unsuccessful if the right expertise and resources are not allocated • Some impacts are difficult to measure due to delays in visibility of long-term outcomes • Some impacts may only become visible after the project end • Participants may experience participation fatigue • Project teams and participants may struggle with the administrative burden of data collection and analysis

One specific example of an established monitoring, learning and evaluation method that could be applied in a CCAM demonstration concept is a Deliberative Mini Public. Deliberative mini publics (DMP) is an umbrella term for participatory spaces that invite citizens to discuss and debate topical issues for decision-making, to hear experts and to provide policy recommendations (see Saarikoski, et al., 2023). DMPs such as citizen juries, assemblies and panels constitute a developing field within public participation and have garnered attention because of its potential to create legitimacy and social acceptance for policy measures in climate politics and sustainability transformation and give decision makers a better sense of their public mandate. A DMP will normally have 20 – 40 participants that are representative of the larger society in the sense that the composition of participants will mirror the nation, region or locality (depending on the scope) in terms of socio-demographic and socio-economic factors and political leanings. A DMP will typically last over several weekends or days, the participants are expected to be present throughout all the DMPs activities. The setting of a DMP must encourage deliberation based on inclusion and equality. All voices are heard, and the participants are allowed to influence the agenda, propose solutions, and give reasons for support or criticism of proposals through give-and-take arguments. The participants have the opportunity to hear and cross-examine experts and call for additional information, and they can discuss and debate the issues with each other. In practice, DMPs will consist of a mixture of lectures/presentations and active workshops, like climate fresco, persona discussions or co-creating future scenarios. In a CCAM demonstration this could include members of the public participating in the test of a service in public transport, as well as other groups potentially affected by changes brought by CCAM integration in public transport.

Fourth, participatory methods can be used to specifically tackle the complex needs of stakeholders involved in **governance and decision-making processes**. These kinds of methods are used as tools and mechanisms for coordinating stakeholders, facilitating decision-making, and ensuring that different interests are involved and represented throughout a project or demonstration. The purpose of these methods is to engage and co-ordinate stakeholders and to connect CCAM demonstrations and results to key decision-making processes. It is valuable to use these kinds of methods when multiple actors need to align goals, discuss trade-offs or make/prepare decisions together. **Typical methods include stakeholder forums, policy roundtables, policy labs, expert panels and future scenario exercises.**

Table 5.6: Methods for governance and decision-making – strengths and weaknesses

Strengths	Weaknesses
• Can help align goals, expectations, and activities across diverse stakeholders • Support transparent and accountable decision making • Ensure broad representation; helps build legitimacy and trust in project outcomes and decision-making • Can strengthen commitment and ownership amongst key actors • Can help identify conflict and competing priorities • Contribute to project learning and connecting evidence to policy and decision-making arenas	• Roles and responsibilities may become unclear if left undefined or vague • Time and resource intensive • Require sustained engagement from stakeholders • Stakeholders may feel their participation is symbolic if they do not have a genuine role/influence in decision making • Conflict or competing priorities can slow down the project

Future scenario exercises, for example, can bring together a range of stakeholders to discuss key governance and decision-making issues. Conventional transport planning uses forecasting methods to estimate the future demand for transports, an approach often called “predict and provide”. This approach is criticized for being unable to deal with uncertainties that come with technology adoption, human behavior and system disruption. Forecasting causes path-dependencies that become obsolete over time and is difficult to adapt to disruptions. More recently, there has been a development of vision-led planning approaches. This approach, sometimes called “decide and provide”, is centred on first deciding on a desirable future and then assessing what measures are needed to achieve that desired outcome.

Backcasting is one such method in the decide and provide paradigm. It starts with an assessment of the current situation and identifies context, gaps and needs. Instead of attempting to predict what will happen, participants discuss what they want or prefer to happen. Then follows a backward reasoning during which the participants identify necessary steps, pathways and strategies with the goal in mind. Generally, the backcasting method will follow five stages: 1) Strategic problem orientation and framework definition; 2) Images of the future; 3) Pathways definition and analysis; 4) Formulation of the strategic vision; 5) Operational planning. There are a variety of future scenario methods other than the backcasting method, some of which can be more or less useful for public participation and co-creation also depending on the target group.

Some other future scenario methods include:

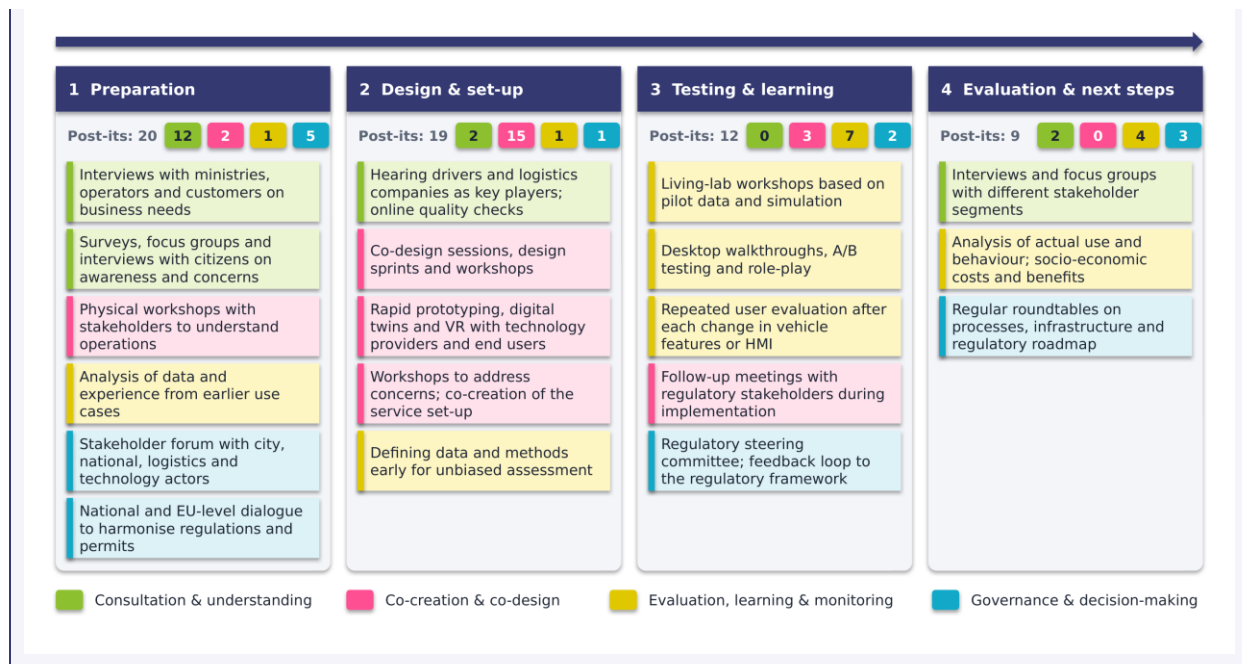
- **Future wheel method:** Participants start with a “signal” or topic of future development and discusses the impacts (“future triggers”) in several steps. The signal is placed in the centre of the wheel, the participants then map out the direct impacts closest to the centre and then the indirect impacts further out in the wheel. Several wheels can be created during a workshop. (see Bengston, 2016)

- **X-curve:** Participants explore the questions: 1) Where do we want to go (top right corner); 2) What do we expand/develop (bottom left corner); 3) What do we leave behind (upper left corner); 4) What remains in the future (bottom right corner). An x-curve diagram is created by drawing two lines between the questions.

The four method families were applied in the second SR workshop to hypothetical LSDemo use cases in each mobility domain (see Chapter 3.3). Table 5.7 shows an example from the cross-border freight transport group, focusing on the methods and formats participants proposed for capturing stakeholder needs. How the method families can be applied across the phases of an LSDemo is described in more detail for all three domains in Chapter 6.3.

Table 5.7: Example from Pre-LSDemo – participatory methods proposed for a cross-border freight use case

Excerpt of results for SRF2_Need	
Source	Second SR Workshop, Brussels (see Chapter 3.3 for methodology)
Description of example result from WS on participatory methods Participatory methods for a Cross-border freight use-case: Participants proposed a mix of methods and formats that changed across the phases of the use case. In the preparation phase, they emphasized physical or hybrid formats, such as roundtables and workshops, to align key actors (terminal operators, regulatory bodies, OEMs and logistics service providers) on what to include in the set-up and why. Interviews with ministries, operators and customers were proposed to understand business and regulatory requirements, while online surveys and interviews with citizens were suggested to capture societal concerns and the potential societal costs of the deployment. Participants noted that end users are difficult to involve and should be brought in actively from the beginning. In the design and set-up phase, co-design sessions, design sprints and rapid prototyping were proposed, bringing technology providers together with end users and other stakeholders. For testing and learning, participants suggested living-lab workshops based on pilot data, desktop walkthroughs, role-play and A/B testing, as well as regular follow-up meetings with regulatory stakeholders. For evaluation, interviews and focus groups with different stakeholder segments were proposed. Most stakeholder inputs were complementary, but some needs pointed to potential conflict lines, for example whether terminals should adapt to automated vehicles or vehicles to existing terminal processes, and when the solution will become affordable.	



5.2.2 Analysis and structuring of stakeholder needs, expectations and concern

How to analyse and structure stakeholder needs, expectations, concerns?

Once stakeholder input has been collected, it needs to be systematically analysed and structured so that it can inform subsequent SRF activities and decisions concerning the use case. Depending on the method used, the input may consist of interview material, survey responses, workshop contributions or other qualitative and quantitative data.

Qualitative input can be reviewed, coded and consolidated into recurring themes while retaining information on which stakeholder groups expressed particular needs, expectations or concerns. Comparing the resulting themes across stakeholder groups, use cases or mobility domains can help identify commonalities as well as differences that require further attention. In Pre-LSDemo, the statements from the first SR workshop were analysed using qualitative content analysis (Mayring, 2014). An inductive-deductive coding scheme captured the actor, its role or the value gained or lost, the underlying argument, a thematic category and, for enablers, the enabling condition. The arguments explaining why an actor enables a use case or gains or loses value provide indications of underlying stakeholder needs, expectations, concerns or requirements, which can subsequently be explored directly with the respective stakeholder groups. Separating actors from the values at stake proved important, as participants often named an actor without specifying what it would gain or lose. Making this explicit allows stakeholder interests to be compared systematically.

The analysis should provide a transparent link between the original stakeholder input and the resulting themes or categories. In the workshop analysis, this was ensured by manual coding, discussions within the research team, sample reviews and iterative refinement of the categories.

AI-supported tools were used to cross-check coding consistency and, for the interviews, to map transcripts to the interview questions, with results checked by the project team. The Pre-LSDemo experience thus highlights the importance of human-led coding and interpretation: digital or AI-supported approaches may assist the analysis but should not replace it.

It should be noted that where needs, expectations or concerns are inferred from expert workshops, literature or previous projects rather than expressed directly by the affected stakeholder groups, they should be treated as preliminary hypotheses. These should, where feasible, be validated or refined through subsequent engagement with the respective stakeholders. This distinction is particularly important for groups that are underrepresented in the consortium or have limited formal influence.

5.2.3 Identification of potential conflict lines

How to identify potential conflicts and conflict lines?

Stakeholder needs and expectations may be complementary, but they may also differ or conflict; claims of different stakeholders can compete with, complement or reinforce each other (Neville and Menguc, 2006). Identifying such conflict lines is therefore an important part of the needs analysis. **Conflict lines can become visible by comparing the needs, expectations and concerns identified for different stakeholder groups and examining where these cannot easily be accommodated simultaneously.** The analysis should make explicit which needs, values or interests are in tension, which stakeholder groups are affected, and under what conditions the conflict emerges. They may concern, for example, different objectives, responsibilities, costs, use of infrastructure or public space, data and privacy, or the distribution of benefits and burdens. Earlier research on automated and connected driving identified, for instance, tensions between individual benefits and system-level effects such as additional traffic and emissions, between innovation and job losses in professional driving, and between data-based services and privacy (Kolarova et al., 2020).

The Pre-LSDemo workshops illustrate this. In the second SR workshop, most inputs of the freight group were complementary, but participants disagreed on whether terminals should adapt to automated vehicles or vehicles to existing terminal processes (Table 5.7). In the first workshop, anticipated losses were often expressed as conditional statements, for example that traffic flow may decrease if legislation requires larger safety gaps than those kept by human drivers. Such statements are useful for conflict analysis, as they point to the conditions under which a conflict would arise and thus to possible ways of avoiding it.

The aim is not necessarily to resolve all differences or to achieve consensus. Rather, **conflicting and compatible interests should be made explicit and transparent so that they can be discussed through structured stakeholder engagement and considered in subsequent decisions.** Experience from the DiVA project similarly showed that dialogue may not remove differences and contradictions, but can help make conflicts and commonalities visible, identify priorities and possible concessions, and support the development of potential courses of action

(Kolarova et al., 2020). Research on participatory design likewise shows that value conflicts can make consensus difficult even in participatory processes and that explaining why a decision was made, rather than only how, can help to address such conflicts (Park et al., 2022). Identified conflict lines therefore provide direct input to SRF3_Impact and SRF4_Response (Chapters 5.3 and 5.4).

5.3 Benefits and burden reflection (SRF3_Impact)

CCAM solutions tested in future LSDemo may, if subsequently deployed at scale, generate both societal benefits and burdens that are experienced differently across stakeholder groups. Potential benefits include safer mobility, enhanced accessibility, environmental sustainability and reduced emissions, efficiency gains in logistics and public transport, and new economic opportunities. Potential burdens may include employment and job transitions, infrastructure costs, and concerns related to privacy, data governance, and surveillance. The value gains and losses identified in Workshop 1 (see Chapter 5.1.3) provide an initial example of such anticipated benefits and burdens and illustrate how they may differ across stakeholder groups.

Building on the stakeholder ecosystem identified in SRF1_Map and the needs, expectations and concerns explored in SRF2_Need, SRF3_Impact considers how potential impacts may be distributed and perceived across stakeholder groups. SRF3_Impact does not constitute an impact assessment. Instead, **it focuses on anticipating potential societal benefits and burdens and reflecting on them with relevant stakeholders to identify different perceptions, potential imbalances and trade-offs.**

5.3.1 Identification of positive and negative impacts

How to identify relevant positive and negative impacts and the stakeholder groups affected by them?

The first step is to **identify potential positive and negative impacts of the planned CCAM applications and the stakeholder groups that may experience them.** This can build on existing CCAM evidence and impact frameworks and be complemented through foresight, stakeholder mapping and participatory approaches. The stakeholder mapping conducted under SRF1 provides a starting point for considering how impacts may differ across groups. Impacts are considered broadly and may concern, e.g., accessibility and user experience, employment and organisational change, sustainability, economic effects, privacy and ethics, governance, or regulatory conditions.

Relevant stakeholders should then be informed about the potential impacts identified, so that they can express how these impacts are perceived, raise concerns, highlight overlooked consequences, and identify which benefits or burdens matter most from their perspective. Particular attention should be paid not only to the direction of an impact, but also to its distribution: who is expected to benefit, who may carry costs or risks, and whether groups with limited influence may be disproportionately affected. These stakeholder perspectives should

subsequently feed back into the technical and operational development process, where feasible, so that potential negative effects can be avoided or mitigated and relevant societal benefits can be strengthened.

At this stage, the purpose is not to assess or quantify impacts, but to anticipate potential benefits and burdens with relevant stakeholders. This provides a basis for subsequently exploring how these anticipated impacts are perceived and where potential imbalances and trade-offs may emerge.

In future LSDemo, SR impact assessment can be carried out as part of the evaluation. SRF3_Impact and impact assessment are distinct but closely linked activities: **while impact assessment measures the actual effects of a use case, SRF3_Impact anticipates potential benefits and burdens and reflects on how different stakeholder groups perceive them.** The societal impacts and affected stakeholder groups identified through the SRF can therefore help determine which impact areas and groups require assessment, while the results of the impact assessment can in turn inform the reflection in SRF3_Impact and subsequent SR activities. Within Pre-LSDemo, this link is established through WP4, which identifies priority impact areas and challenges requiring further evaluation and links them to appropriate impact assessment methodologies.

5.3.2 Assessment of societal perceptions of impacts

How to assess how different societal groups perceive these impacts?

Once relevant impacts have been identified, SRF3_Impact focuses on understanding how benefits and burdens may affect different stakeholder groups and how these groups perceive their distribution. The same development may generate benefits for some groups while creating burdens for others. The purpose is therefore to explore **how stakeholders perceive anticipated benefits and burdens**, including whether their distribution is considered acceptable or problematic and **why perceptions may differ across stakeholder groups**. These perceptions can be explored through co-design workshops, focus groups, participatory mapping and digital deliberation tools, allowing stakeholders to express concerns, expectations and priorities.

5.3.3 Identification of perceived imbalances and trade-offs

How to identify and make visible perceived imbalances and trade-offs across stakeholder groups?

Identifying and discussing impacts should help reveal **perceived burdens, imbalances and trade-offs across stakeholder groups**. A development may, for example, improve efficiency or accessibility while creating additional costs, responsibilities or disadvantages elsewhere. Stakeholder groups may also differ in whether they regard a particular outcome as a benefit or a burden, reflecting different values, interests and contextual conditions. These perceptions should therefore be discussed with the relevant stakeholders and translated into concrete issues that can be considered in the technical, operational or governance process.

Where stakeholder groups experience impacts differently or conflicting interests emerge, participatory reflection and dialogue can help make these differences and trade-offs explicit and provide a basis for discussing how they might be addressed. This may include scenario-based deliberation in which alternative deployment choices and their potential consequences are explored collectively with relevant stakeholders. The objective is **to make different stakeholder perspectives and potential trade-offs explicit and to reflect on them through an iterative dialogue with relevant stakeholders**, including whether anticipated negative effects or burdens could be avoided or minimised and whether potential benefits could be strengthened or more fairly distributed. As perceptions and potential trade-offs may change as a use case develops and is experienced in practice, this reflection may need to be revisited throughout the demonstration process. Identified burdens, imbalances and conflicts provide direct input to SRF4_Response, where possible responses and mitigation strategies are developed and fed back into demonstration planning.

Table 5.8: Example from Pre-LSDemo – Insights from the Second SR Workshop

Excerpt of results for SRF3_Impacts	
Source	Second SR Workshop, Brussels (see Chapter 3.3 for methodology)
Description of example result from WS on participatory methods	
The discussion on on-demand automated public transport (L4) highlighted that stakeholder reflection should continue throughout development and demonstration rather than take place only once. Participants noted that some relevant insights, particularly concerning human factors, may only emerge during actual service use. Consultation and engagement may therefore need to be repeated as the service develops or new features are introduced.	

5.4 Concerns and objection response mechanism (SRF4_Response)

5.4.1 Structured formats for raising concerns and objections

How to establish structured formats for stakeholders to raise concerns and objections?

The participatory method families presented in Chapter 5.2.1 can also serve as structured formats through which stakeholders raise concerns and objections and provide suggestions on how identified needs, impacts or trade-offs could be addressed. As concerns may emerge at any stage, such formats should be implemented longitudinally throughout an LSDemo, with feedback opportunities built into each phase. **Consultation methods** applied early help to flag concerns and identify priorities for adaptation before key decisions are fixed. **Co-creation and co-design methods** allow users and non-users, including vulnerable groups, to experience prototypes and comment on them at an early stage. During testing and evaluation, **open and continuous channels**, such as digital participation platforms, enable stakeholders to raise concerns and objections and improvement suggestions easily and over time. The purpose is not only to collect feedback, but to create a structured route through which relevant stakeholder input can reach the actors responsible for technical and operational decisions.

5.4.2 Involving stakeholders in co-creating solutions

How to involve stakeholders in co-creating responses and solutions?

Depending on the issue, responses may be developed through co-design and co-creation, consultation, technical analysis, governance processes or combinations of these approaches. **Co-design and co-creation methods** (Chapter 5.2.1) are the main way of involving stakeholders in developing responses and solutions. As these methods emphasise repeated cycles of testing and iteration, key milestones for feedback and adjustment should be planned into the demonstration from the outset. **Governance and decision-making methods** help to involve actors with key roles in the demonstration and to clarify roles and responsibilities early, reducing misunderstandings about who decides on which issues. **Learning, monitoring and evaluation processes** established at an early stage ensure that stakeholders receive new knowledge on issues of concern and can see that these issues are being monitored. The key requirement is that the chosen response mechanism is appropriate to the issue and provides a realistic possibility for stakeholder input to influence the development process where feasible.

5.4.3 Feedback loops between stakeholder input and implementation

How to establish feedback loops between stakeholder input and LSDemo planning and implementation?

Stakeholder input only contributes to SR if it demonstrably reaches the decisions taken in planning and implementing an LSDemo. SRF4_Response therefore establishes a defined feedback loop between the SR activities and the technical and operational development of the demonstration. The approach builds on experience from the RemoteReadyMove project and is adapted to the structure of the SRF:

- **Screening and ownership:** Findings from SRF1_Map to SRF3_Impact, including identified needs, concerns, anticipated burdens and conflict lines, are screened for issues that require a response or further stakeholder input. Each issue is linked to a concrete development question or decision of the demonstration and assigned to the partner, technical team or decision-making body responsible for considering and responding to it.
- **Selecting method and timing:** The SR team and the responsible technical partner select a suitable engagement method (e.g. interviews, workshops, storyboards or prototypes; see Chapter 5.2.1) and schedule it before the respective decision becomes fixed.
- **Joint review and translation:** The resulting input is reviewed jointly by the SR team and the technical team and interpreted against the underlying stakeholder need, technical feasibility and other requirements. Where relevant, stakeholder input is translated into concrete design, operational, governance or mitigation options.
- **Documented response:** For each issue, the responsible actor and resulting decision is documented as one of the following: (a) requirement or design choice adapted; (b) existing choice retained, with rationale; (c) further stakeholder input or technical

investigation required; (d) issue cannot currently be resolved and is transferred to mitigation or subsequent assessment.

- **Closing the loop:** Stakeholders are informed how their input was used and, where it could not be taken into account, why. This transparency is a precondition for trust and for continued engagement.

Where stakeholder needs conflict with each other or with technical constraints, the competing needs, relevant constraints, alternatives and expected consequences are documented and, where appropriate, discussed with affected stakeholders. The objective is not necessarily to eliminate all conflicts, but to make the reasoning behind the chosen response transparent and to identify whether negative effects can be mitigated or alternative solutions considered. Issues that cannot be resolved within regular development can be escalated to an interdisciplinary group of technical, SR and stakeholder representatives, which develops mitigation options and records the remaining trade-offs.

The documentation of issues and responses (e.g. in a decision log) provides the evidence base for the Response dimension of SRF5_Assessment (Chapter 5.5) and makes the feedback loop traceable over time. How this process is embedded in the governance and development routines of an LSDemo, and who is responsible for it, will be specified further in the final report on Societal Readiness.

5.5 SR assessment and indicators (SRF5_Assessment)

SRF5_Assessment makes the work carried out in SRF1_Map to SRF4_Response visible, comparable and open to scrutiny. Following the understanding set out in Chapter 2.2, it treats SR as the degree to which a deployment is prepared to be integrated into society in a way that creates societal value. The assessment therefore does not measure approval, acceptance, willingness to adopt, or public opinion on CCAM, but asks whether a deployment has defined the societal value it intends to create, which actors may benefit or bear burdens, whether their needs and expectations are understood, whether potential impacts and trade-offs have been considered, and whether this knowledge has influenced technical, operational or governance development. It therefore assesses the state and development of the SR process rather than providing a verdict on whether a deployment itself is societally ready.

5.5.1 From guiding questions to indicators

Because SR is addressed in a process that shapes the technical development of a CCAM use case into an innovation for society, SR indicators cannot be derived from measuring a technical property. Instead, the assessment can identify:

- whether certain work has been done,
- who was involved in the development process,

- whether stakeholder needs, potential benefits and burdens, and relevant trade-offs were considered,
- which methods were applied to reach decisions, and
- whether stakeholder insights were translated into responses, adaptations or documented decisions.

The indicators are therefore specified as **guiding assessment questions**, grouped into four dimensions. The dimensions follow the sequence of the SR process, from the value claim, through the actors and their needs and impacts, to the response given to them. Table 5.9 shows the dimensions.

Table 5.9: SR assessment dimensions and their relation to the SRF components

Dimension	Guiding question (focus of assessment)
1. Value	Is societal value proposed, and specified in outcome terms?
2. Actors	Is there a clear view of the relevant actors, including those who may lose or be left out?
3. Needs and Impacts	Have the needs and expectations of affected groups been assessed, and have potential benefits, burdens and differences in impacts across stakeholder groups been considered?
4. Response	Have stakeholder needs, concerns and identified impacts been considered in development decisions, has anything changed as a result where appropriate, and are remaining gaps or unresolved trade-offs acknowledged and documented?

The Value dimension builds on the idea that abstract values need to be specified into more concrete norms and, eventually, design requirements before they can guide development (van de Poel, 2013). A use case that states, for example, that it improves accessibility is rated higher when it specifies for which groups, in which situations and through which design features this is to be achieved. This rating concerns the specification and operationalisation of intended societal value, not evidence that this value has already been realised. Note that realised effects are addressed through impact assessment and subsequent evaluation.

Each guiding question is rated on an **ordinal scale** that expresses how far the corresponding work has progressed and how well it is evidenced (Table 5.10).

Table 5.10: Assessment coding scale

Colour	Meaning for the question
Done	Done for this deployment, specific to named groups, with a method or artefact that can be pointed to.
Partial	Groups or methods named but not fully attributable; or outcome value with generic beneficiaries
Planned / borrowed	Planned only; borrowed from another deployment; or claimed without content or method
Not started	Not considered, or no societal value stated.
Not assessable	Data missing or wrong questionnaire.

Each rating is accompanied by a short qualitative justification and a reference to the underlying evidence, such as stakeholder maps, workshop documentation, requirement lists or decision logs.

5.5.2 Conducting the pre-assessment

The pre-assessment is established **early in the engagement cycle**, ideally once the use case and its objectives have been defined but before key development decisions are fixed. It documents where the use case stands in the four dimensions before the SR process has been carried out and provides the reference point against which later changes are assessed. Establishing the baseline involves the following steps:

- **Collecting information.** Use case owners answer the guiding assessment questions, for example through a structured questionnaire. Where possible, answers are supported by existing documents such as use case descriptions, requirement lists or earlier stakeholder analyses. Short follow-up interviews can clarify incomplete or ambiguous answers.
- **Rating.** The answers are rated against each guiding question on the ordinal scale. To increase reliability in future applications, ratings should be carried out independently by two raters, with discrepancies subsequently discussed and resolved.
- **Documenting gaps.** Questions rated 'Planned / borrowed', 'Not started' or 'Not assessable' are recorded as gaps. They indicate where the SR process should focus, for example which affected groups are still missing in SRF1_Map or where needs have not yet been elicited in SRF2_Need.
- **Feeding back.** The baseline results are shared with the use case owners and the SR team so that they can inform the planning of SRF1–SRF4.

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Early in the engagement cycle, ratings of 'Planned / borrowed' or 'Not started' are to be expected. They should not be read as a negative result, as they make visible where SR work is needed.

The approach was first applied to questionnaire data from Pre-LSDemo use cases (see Chapter 3.3). Selected findings from this first application are summarised in the following table.

Table 5.11: Selected findings from the first application of SRF5_Assessment

Excerpt of results for SRF5_Assessment

Source

First application with Pre-LSDemo use cases (see Chapter 3.3 for methodology)

Description of findings from the test application

The first step in testing and validating the SR assessment approach was to analyse Q10 of the questionnaire ("What societal value does the use case provide?"). A coding scheme was built from the answers themselves. Each answer was first stripped of statements that do not describe a societal value: operator interests (e.g. cost efficiency, scalability), project activities (e.g. testing, generating evidence) and acceptance clauses. What remained was assigned to one or more value categories. The initial scanning and set up of the coding scheme were carried out through a researcher, who then validated and extended the coding using AI. Across the 112 distinct use cases that answered Q10, the following values for society were named (a use case can name several):

Climate / CO₂ / emissions

47 (42%)

Road safety (general)

42 (38%)

Physical accessibility (reduced mobility, boarding)

23 (21%)

Inclusion / equity / mobility poverty

20 (18%)

Trust / acceptance

15 (13%)

Service availability / reliability

13 (12%)

Working conditions / re-skilling

10 (9%)

Safety of vulnerable road users

9 (8%)

Local environment (air, noise, light, space)

8 (7%)

Occupational safety

8 (7%)

Access to jobs, education, health

7 (6%)

Modal shift from private car

7 (6%)

Congestion / peak load

6 (5%)

Child safety

4 (4%)

No societal value stated

15 (13%)

Number and share of the 112 distinct use cases with an answer to Q10. A use case can name several values (219 mentions, 2.0 per use case), so shares do not add up to 100%. Grey: trust/acceptance is not a societal value in the SRF sense; "no societal value stated" = nothing left after removing operator interests and project activities. Coding: single coder, first pass.

The next step was to hold these values against the answers to Q13, rating all use cases on the four assessment dimensions (Value, Actors, Needs, Response). This showed that the use-case owners who filled out the templates gave the most complete answers in the Actors dimension, but that knowing the actors rarely went as far as engaging them or responding to their needs. 40% of the use cases named affected groups beyond the directly involved actors, including groups that may lose out or be left out. The share rated "Done" or "Partial" fell from 80% for Actors to 62% for Needs and 49% for Response, and no use case reached "Done" on Needs. Only 10% of the use cases showed a concrete societal concern being handled, together with a channel for raising concerns or a check against needs. Where concerns were named, about half were technical or regulatory gaps rather than needs of affected groups. However, these numbers should be read with caution. They reflect the early state of the questionnaire as well as the use cases: engagement is asked about once per use case rather than per group, so needs cannot be traced back to the groups that were named. The ratings are also a first pass by a single rater; a second, independent rating is still pending. The findings show where the questionnaire needs to be sharpened: engagement and needs should be asked per affected group, the question on unaddressed concerns should refer explicitly to the needs of affected groups, and the "no known gaps" option should only apply once needs have been assessed. A refined and validated version of the questionnaire will be provided in the final report on societal readiness.

6 Using the SRF in CCAM Large-Scale Demonstrations

The SRF is structured as a flexible and modular framework for integration into future CCAM LSDemo. While the five SRF components provide a common structure, their practical application needs to be adapted to the objectives, use cases, stakeholder ecosystems and development stages of individual demonstrations.

Building on the framework components and methods presented in Chapter 5, this chapter describes how the SRF can be integrated into an LSDemo, how its activities can be embedded across the project lifecycle, and how the framework can be adapted to the specific context of individual demonstrations.

6.1 SRF integration options

What are the different options for integrating the SRF into a project?

Depending on the project context, the application and integration level may vary. Consequently, two primary integration pathways are proposed. These pathways offer varying levels of engagement by SR experts, while consistently aiming to assist projects in integrating and strengthening Societal Readiness processes throughout the project lifecycle.



Figure 6.1: Two pathways of SRF integration in LSDemo.

From the perspective of an LSDemo leader, engagement with the SRF may begin with an initial dialogue with SRF experts to review the use case, identify relevant stakeholders and determine the appropriate level of SRF support. Depending on project needs, this may involve either fully integrated support (Option 1) or targeted support (Option 2).

Option 1: Fully integrated support: In this model, a dedicated SR team collaborates with the use-case implementation team throughout the project's entire lifecycle. The SRF team functions as a strategic partner, supporting the design, implementation, monitoring, and evaluation of SR

activities from the project's inception to its final assessment, and is closely integrated into the project team.

The role of the SRF team includes:

- conducting stakeholder ecosystem mapping;
- designing and facilitating participatory and co-creation activities;
- identifying societal needs, expectations and concerns;
- supporting reflection on societal benefits and burdens;
- supporting the establishment of mechanisms for responding to concerns and objections;
- conducting baseline and follow-up SR assessments;
- advising project partners on integrating societal insights into technical and operational decision-making;
- monitoring progress and supporting continuous improvement.

In this model, activities related to SR are incorporated into the governance structures of projects, thereby becoming essential components of project planning, implementation, and evaluation. The SR team functions as an independent facilitator and critical advisor, assisting project partners in anticipating societal challenges, making competing stakeholder interests visible, and supporting societal learning and adaptation over time.

This approach can be particularly suitable for:

- complex multi-stakeholder projects;
- projects with high public visibility;
- projects involving significant societal impacts, risks or uncertainties;
- projects seeking to establish best-practice approaches to societal engagement and co-creation.

The outcome is not only a structured assessment of the SR process, but also an ongoing process of societal learning, reflection and adaptation throughout the project lifecycle.

Option 2: Targeted Societal Readiness Support

In this model, responsibility for SR activities is shared across the demonstration team, with SR experts providing targeted support at specific stages of the project.

The role of SRF experts may include:

- conducting a baseline SR assessment;
- facilitating workshops;
- advising on suitable participatory methods;

- reviewing stakeholder engagement strategies;
- supporting impact reflection exercises;
- conducting follow-up SR assessments;
- providing recommendations for improvement.

In this way, rather than being continuously embedded within the project, SRF experts are engaged at key decision points or project milestones. Their role is to provide guidance, identify gaps and support project teams in strengthening societal readiness activities where required. This approach can be particularly suitable for projects:

- with less complex societal challenges;
- with sufficient internal capacity to carry out most SR activities;
- with limited resources for continuous SR support.

Regardless of the integration pathway selected, the primary objective remains the same: supporting individual applications strengthening their SR processes over time. The SRF therefore treats SR as a continuous process of learning, reflection and adaptation. Through stakeholder engagement, participatory methods, impact reflection and structured assessment, project teams gain a progressively richer understanding of:

- who is affected by the innovation;
- who benefits and who may bear burdens;
- which societal values are relevant;
- what concerns need to be addressed;
- how stakeholder input can improve project outcomes.

The role of SRF experts is not just to support assessment, but also to facilitate the SR process. By providing appropriate methods, facilitating dialogue, and supporting reflection and responsiveness, SRF experts can help project teams integrate societal considerations into the development and implementation of their use cases.

6.2 Integration across the project lifecycle

How can the SRF be embedded across the project lifecycle?

Either through Option 1 or Option 2, the SRF is designed to be integrated throughout the lifecycle of a use case, rather than being applied as a one-time assessment exercise. SR develops over time as stakeholders are identified, engaged, listened to, and involved in shaping decisions and evaluating outcomes. Consequently, the SRF supports a continuous process of learning, adaptation, and improvement that accompanies the development of a use case from its earliest stages through to evaluation and future deployment. This approach reflects the understanding of

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Societal Readiness as a dynamic capability that can be strengthened through systematic engagement and reflection.

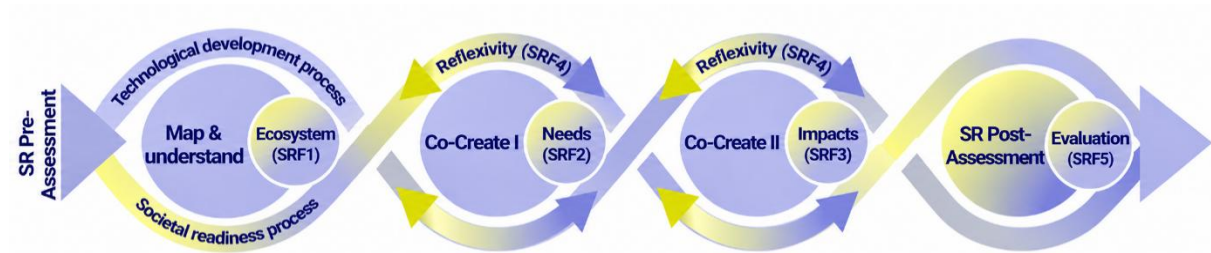


Figure 6.2: The Pre-LSDemo SRF.

To support this process, the SRF lifecycle (Figure 6.2) can be integrated across four key stages of the use-case lifecycle: (1) Preparation, (2) Design and Set-up, (3) Testing and Learning, (4) Evaluation and Next Steps.

Across all four stages, the SRF can draw upon four families of participatory methods presented in Chapter 5.2.1 and applied in the Second SR Workshop (see Chapter 3.3). These method families can support different objectives and can be applied individually or in combination, depending on the needs and context of the use case

- **Consultation and Understanding:** methods used to understand stakeholder needs, experiences, expectations, and concerns.
- **Co-creation and Co-design:** methods used to collaboratively develop solutions, services, and implementation approaches with stakeholders.
- **Evaluation, Learning and Monitoring:** methods used to assess experiences, outcomes, impacts, and lessons learned.
- **Governance and Decision-making:** methods used to align stakeholders, discuss trade-offs, and support collective decision-making processes.

The choice of methods should be guided by the purpose of stakeholder participation at each stage rather than by a predefined methodological prescription. Different stages of the project lifecycle require different forms of participation and therefore different combinations of methods.

Phase 1: Preparation: The preparation stage focuses on understanding the societal context of the use case and establishing an initial SR baseline. During this stage, project teams can aim to identify relevant stakeholder groups, understand potential beneficiaries and affected parties, clarify the intended societal value, and explore potential concerns, risks, and opportunities. The most relevant SRF components are SRF1_Map, SRF2_Need, and SRF5_Assessment. A pre-assessment should be conducted at this stage to establish the initial state of the SR process and identify where further attention is needed. This provides a baseline against which progress can later be assessed.

Methods from the **Consultation and Understanding** family are particularly valuable during this stage. Examples include stakeholder interviews, surveys, focus groups, public dialogue activities, and participatory mapping exercises. These methods can help establish an initial understanding of stakeholder perspectives and provide the evidence base for subsequent activities. Governance-oriented methods may also be used to establish project structures, identify key actors, and define responsibilities for societal readiness activities.

Phase 2: Design and Set-up: As the use case progresses from concept to implementation planning, societal insights should increasingly inform design and operational decisions. During this stage, the focus shifts from understanding stakeholder perspectives towards incorporating these perspectives into the design of the use case. The most relevant SRF components are SRF2_Need, SRF3_Impact, and SRF4_Response.

Methods from the **Co-creation and Co-design** family become particularly important. Examples include co-design workshops, living labs, scenario workshops, future visioning exercises, and design sprints. These approaches can enable stakeholders to actively shape system features, service concepts, operational procedures, and implementation strategies.

Phase 3: Testing and Learning: During testing and demonstration activities, the objective is to understand how the use case performs in practice and how stakeholders experience and respond to it. This stage provides an opportunity to identify unintended consequences, emerging concerns, and opportunities for improvement. The most relevant SRF components are SRF3_Impact, SRF4_Response, and SRF5_Assessment.

Methods from the **Evaluation, Learning and Monitoring** family are particularly relevant during this stage. Examples include user diaries, reflection workshops, hands-on experience sessions, citizen panels, and impact assessment workshops. Findings obtained during testing can be used to revisit earlier SRF components, enabling continuous adaptation and improvement based on emerging societal insights.

Phase 4: Evaluation and Next Steps: The final phase focuses on assessing progress in societal readiness, reflecting on lessons learned, and identifying future actions. The aim is not only to evaluate project outcomes but also to understand how societal considerations have influenced decision-making and how societal readiness has evolved throughout the project. The most relevant SRF component is SRF5_Assessment. A post-assessment should be conducted at this stage using the same assessment framework as the pre-assessment. Comparing the two assessments helps identify where the SR process has strengthened, where gaps remain, and which issues require further attention in future development or deployment.

This phase may draw upon all four method families, although **Evaluation, Learning and Monitoring** and **Governance and Decision-making** methods are particularly relevant. Activities can help evaluate achievements, discuss remaining challenges, and identify priorities for future development or deployment. The comparison between pre- and post-assessment provides a structured basis for reflecting on how SR has developed over time and for identifying priorities for further improvement.

Across all four lifecycle phases, participatory methods can serve a dual function. First, they generate knowledge about stakeholder perspectives, societal impacts, and implementation requirements. Second, they actively contribute to strengthening the SR maturity of the use case itself. More broadly, SRF activities should not be understood only as opportunities for stakeholder participation. They should create a continuous link between stakeholder perspectives and the development process: relevant actors are informed and engaged, their needs and perceptions of potential impacts are captured, and these insights are translated into technical, operational or governance responses where feasible. Decisions and remaining trade-offs should be documented and communicated back to stakeholders. In this way, the lifecycle operationalises inclusion, anticipation, reflexivity and responsiveness together.

6.3 Adaptation to individual Large-Scale-Demonstrations

How can the SRF be tailored to individual LSDemo?

While the SRF provides a common structure for integrating societal considerations into CCAM demonstrations, its implementation should always be tailored to the specific characteristics of the LSDemo. Use cases may differ in terms of their objectives, technological maturity, stakeholder landscape, geographical context, regulatory environment, societal impacts, and available resources. Consequently, as mentioned earlier, the SRF is not intended to prescribe a single implementation model but rather to provide a flexible framework that can be adapted to local circumstances and project needs.

A key principle of the SRF is therefore **proportionality**. The scale and intensity of SR activities should be aligned with the societal relevance, complexity and risk profile of the use case, rather than demonstration size alone. For example, a relatively small pilot involving few users may still require intensive SR activities if it affects vulnerable groups or raises significant ethical, safety, employment or privacy concerns, whereas a larger but well-established application may require a more targeted approach. Factors such as stakeholder diversity, potential benefits and burdens, uncertainty, reversibility of decisions, public visibility and the potential severity of unintended consequences should therefore guide the intensity of SR activities.

The adaptation of the SRF should begin with an assessment of the use case's SR needs. Factors that may influence the design of SRF activities include:

- the number and diversity of stakeholder groups affected;
- the anticipated societal benefits and burdens;
- the level of public visibility and societal sensitivity;
- the degree of technological novelty and uncertainty;
- regulatory and policy considerations;
- resource availability and project timelines.

Once these factors have been considered, the project team, supported where appropriate by SRF experts, can select the most appropriate combination of participatory methods and engagement

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activities. Rather than prescribing specific methods for each LSDemo, the SRF encourages demonstration teams to select and combine methods according to their objectives. In practice, an individual LSDemo may employ multiple method families simultaneously and revisit them throughout the project lifecycle (see Figure 6.2 for continuous reflexivity element of SRF). That is why different method families can be complementary and often provide the most value when used together rather than in isolation. In the following sections, we will provide example use-cases from the second workshop and some high-level application examples.

Individual Mobility LSDemo (Level 3 Automated Driving)

The following example illustrates how the SRF could be adapted and applied to a hypothetical Individual Mobility LSDemo focused on Level 3 automated driving.

The use case explores how Level 3 automation can improve safety, comfort, traffic flow, and accessibility in increasingly complex settings. The demo aims to explore important questions regarding user behaviour, driver responsibility, human-machine interaction, regulatory frameworks, infrastructure readiness, data management, and public response to automation. The demonstration provides an opportunity to assess both the benefits and limitations of conditional automation as a transitional step towards higher levels of vehicle automation. The demo aims to demonstrate the safe and effective deployment of Level 3 automated driving, generating insights into user experiences, operational performance, regulatory needs, and societal impacts.

At the **Preparation** stage, the SRF team would focus on understanding the societal context surrounding the demonstration of L3 vehicles. Activities may include stakeholder mapping exercises to identify the needs of drivers, passengers, non-users, pedestrians, cyclists, road authorities, municipalities, insurers, and policymakers. Consultation and Understanding methods such as interviews, focus groups, and surveys would be used to explore expectations, concerns, perceived benefits, and perceived risks associated with automated driving. A pre-assessment would also be conducted at this stage to establish the initial state of the SR process and identify areas where further attention is needed during the demonstration.

During the **Design and Set-up** phase, Co-creation and Co-design methods could be used to translate stakeholder insights into design requirements and implementation strategies. Workshops involving users, manufacturers, authorities, and mobility experts could be organised to develop user personas, identify critical driving scenarios, and explore communication strategies for how the system should communicate its capabilities and limitations.

The **Testing and Learning** phase would primarily employ Evaluation, Learning and Monitoring methods. User experience studies, reflection workshops, hands-on demonstrations, and monitoring activities would be conducted to understand how participants interact with the technology under real-world conditions.

Finally, during **Evaluation and Next Steps**, Governance and Decision-making methods would support discussions between manufacturers, authorities, user representatives, and other

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stakeholders regarding lessons learned, deployment requirements, regulatory implications, and future scaling opportunities. A post-assessment would then be conducted using the same assessment framework as the pre-assessment. Comparing the two would help identify how the SR process has developed, where progress has been made, and which gaps or unresolved issues require further attention before future deployment or scaling.

Public Transport and Shared Mobility LSDemo (On-Demand Automated Public Transport)

The following example illustrates how the SRF could be applied to a hypothetical Public Transport and Shared Mobility LSDemo involving an SAE Level 4 on-demand automated public transport service operating within a defined operational area.

A demonstration of an SAE Level 4 automated public transport service operating on-demand within a defined operational area. The service uses fully automated vehicles that can perform all driving tasks without human intervention under specified conditions. Passengers request rides through a digital platform, enabling flexible routing and service delivery based on real-time demand. The demo aims to explore how automated mobility can improve accessibility, efficiency, sustainability, and user experience in public transport systems, while highlighting the technical, regulatory, operational, and societal considerations for large-scale deployment.

At the **Preparation** stage, the primary objective can be to understand the mobility needs of the communities that the service intends to support. Activities could therefore include stakeholder mapping, interviews, surveys, focus groups, and community engagement with passengers, non-users, public transport authorities, municipalities, community organisations, schools, major employers, and vulnerable population groups. Particular attention may be given to identifying transport poverty, accessibility barriers, service gaps, and unmet mobility needs. A pre-assessment would also be conducted at this stage to establish the initial state of the SR process and identify areas requiring particular attention during the demonstration.

During the **Design and Set-up phase**, Co-creation and Co-design methods could be used to refine aspects of the service concept that can realistically be adapted within the LSDemo and to identify stakeholder requirements for potential future deployment. Workshops, living labs, and scenario-based discussions may inform aspects such as service routing, booking systems, accessibility features, vehicle design, passenger information systems, and integration with existing transport services, even where these cannot be fully addressed within the timeframe of the LSDemo.

The **Testing and Learning** phase would focus on understanding how users and other stakeholders experience the automated service in practice. Evaluation, Learning and Monitoring methods such as user feedback surveys, reflection workshops, citizen panels, and real-time feedback tools could be employed. These activities can also help identify emerging concerns, unintended effects, and opportunities to adapt the service as experience with the demonstration grows.

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Finally, during the **Evaluation and Next Steps** phase, Governance and Decision-making methods would support discussions regarding future deployment, long-term service integration, regulatory requirements, and policy implications. A post-assessment would then be conducted using the same assessment framework as the pre-assessment. Comparing the two would help identify how the SR process has developed, where progress has been made, and which gaps or unresolved issues should be addressed before wider deployment or long-term service integration.

Cross Border Freight LSDemo (Cross-Border Autonomous Freight Transport)

The following example illustrates how the SRF could be applied to a hypothetical cross-border freight LSDemo involving SAE Level 4 automated freight vehicles operating along an international logistics corridor connecting terminals, ports, logistics hubs, and distribution centres across multiple countries. The hypothetical demonstration involves automated freight operations across national borders and interactions with logistics operators, infrastructure providers, authorities, professional drivers and other affected stakeholders.

At the **Preparation** stage, the focus would be on establishing a shared understanding among the diverse actors required to enable cross-border operations. Stakeholder ecosystem mapping would identify logistics service providers, freight customers, vehicle manufacturers, terminal operators, infrastructure providers, regulators, type-approval authorities, customs authorities, local communities, and road authorities. A pre-assessment would also be conducted at this stage to establish the initial state of the SR process and identify areas requiring particular attention during the demonstration.

During the **Design and Set-up** phase, Co-creation and Co-design activities would enable stakeholders to jointly shape the deployment concept. Discussions would extend beyond the automated vehicle itself and consider the broader logistics ecosystem, including terminal operations, fleet management, charging infrastructure, automation-electrification interactions, and regulatory requirements.

The **Testing and Learning** phase would focus on evaluating system performance, operational feasibility, stakeholder experiences, and regulatory readiness under real-world conditions. Evaluation, Learning and Monitoring methods would support continuous learning through simulation exercises, phased Operational Design Domain expansion, demonstration trials, and stakeholder review meetings. These activities can also help identify emerging concerns, unintended effects, and operational or regulatory issues that may require adaptation during the demonstration.

Finally, during the **Evaluation and Next Steps** phase, Governance and Decision-making methods would support reflection on lessons learned and future deployment strategies. Stakeholder roundtables, policy discussions, and expert panels could be convened to review operational performance, regulatory obstacles, societal impacts, and business case viability. A post-assessment would then be conducted using the same assessment framework as the pre-assessment. Comparing the two would help identify how the SR process has developed, where

progress has been made, and which gaps or unresolved issues should be addressed before wider cross-border deployment or scaling.

As illustrated by the three example LSDemo, the SRF can be adapted to a wide variety of CCAM application domains while maintaining a common methodological structure. Whether applied to individual mobility, public transport and shared mobility, or cross-border freight transport, the SRF provides a systematic approach for identifying, understanding, engaging, and responding to the needs of a broad stakeholder ecosystem, including both direct actors involved in the demonstration and indirect actors who may experience its wider societal impacts. Across the four phases of the use-case lifecycle, different families of participatory methods can be employed for different purposes. The particular combination of methods can vary depending on the characteristics, objectives, and maturity of the LSDemo.

Regardless of the specific application domain or methodological choices, all SRF activities contribute towards the same overarching objective: strengthening the SR maturity of the use case. Through SRF1_Map, projects can develop a systematic understanding of the stakeholder ecosystem and identify actors who may influence, benefit from, or be affected by the innovation. SRF2_Need will support the identification of stakeholder needs, expectations, concerns, and conditions for support. SRF3_Impact will enable reflection on potential societal benefits and burdens, helping project teams anticipate impacts across different stakeholder groups. SRF4_Response can provide mechanisms for addressing concerns, resolving conflicts, and incorporating stakeholder feedback into project planning and implementation. Finally, SRF5_Assessment will provide mechanisms to monitor, evaluate, and demonstrate progress in Societal Readiness over time. Together, these components support a continuous process of engagement, reflection, learning, and adaptation, allowing LSDemo to progressively improve their SR maturity. **In this way, the SRF serves not only as an assessment framework but also as a practical pathway for strengthening the societal foundations of CCAM innovations and supporting more inclusive, responsive, trusted, and ultimately more successful deployments.**

7 Conclusions and outlook

This first report on SR documents the development of the Pre-LSDemo SRF during the first six months of the project. The work conducted so far has established the overall structure of the framework and its five interrelated components: SRF1_Map, SRF2_Need, SRF3_Impact, SRF4_Response and SRF5_Assessment. Together, these components provide a structured approach for integrating societal considerations into the preparation and implementation of future CCAM Large-Scale Demonstrations.

The individual components are currently at different stages of development. In particular, SRF1_Map and SRF2_Need have progressed substantially. The work has established an approach for identifying, mapping and prioritising relevant stakeholder ecosystems and has developed a structured approach for identifying and analysing stakeholder needs, expectations and concerns. The participatory method families explored in the second SR workshop provide an initial methodological basis for supporting these activities in different CCAM contexts. SRF3_Impact, SRF4_Response and SRF5_Assessment are under further development and will be progressively refined through continued application and reflection during the project.

At the same time, the work presented in this report provides an initial concept for integrating the SRF into future LSDemo. Two possible levels of SRF support have been identified, ranging from fully integrated support to targeted support, and the framework has been related to different phases of the project lifecycle. The examples developed so far also illustrate that the SRF is not intended as a fixed procedure, but needs to be adapted to the characteristics, stakeholder ecosystems and needs of individual demonstrations.

The next phase of work will therefore focus both on further developing the individual SRF components and on making their practical application increasingly concrete. This includes further work on the SR assessment, the relationships between the five SRF components, and the selection and application of suitable participatory methods. The framework will continue to be applied and refined throughout Pre-LSDemo rather than being treated as a completed or validated framework at this stage. By April 2027, this work will result in concrete guidance and supporting materials in the form of an SR Toolkit for applying the SRF in future CCAM LSDemo.

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