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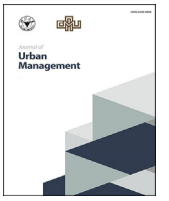

Research Article

Prioritizing values in smart mobility governance: A stakeholder-based analysis.

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ABSTRACT

This research examines how stakeholders prioritize public values within the decision-making process in smart mobility governance. Our insights are based on the OptiRoutS project, which aims to promote sustainable travel behaviors through prosocial routes in car navigation in Belgium. We specifically focus on identifying and embedding societal values into multi-stakeholder decision-making processes applying mixed methods. After identifying the main stakeholders in the Belgian mobility ecosystem, we conducted 18 semi-structured interviews with stakeholders pertaining to all quadrants of the Quadruple Helix (i.e., government, academia, civil society, industry) to identify the most important drivers and values in mobility governance. During the subsequent co-creation session, we employed the Analytic Hierarchy Process (AHP) method, to facilitate collaborative consensus-building and value prioritization. Our results highlight the complexity of decision-making in the mobility context, and the trade-off between the importance of values on the short-, and long-term. This stakeholder-based analysis offers new insights into how public values can be integrated into smart mobility governance frameworks. It provides guidance for policymakers aiming to balance technological advancement with societal goals. The study contributes to the broader discourse on value-based governance, emphasizing the role of multi-stakeholder collaboration in fostering just and sustainable mobility ecosystems.

1. Introduction

The concept of smart mobility stands at the forefront of contemporary urban transportation, representing an innovative approach to addressing the complex challenges of modern city living (Pangbourne et al., 2020). As technology continues to advance at an unprecedented pace, the idea of smart mobility is set to shake up how people get around cities, aiming for ways that are more efficient, sustainable and accessible (Lyons, 2018). Yet, despite the rapid evolution of smart mobility technologies and their increasing integration into urban landscapes (Moscholidou et al., 2023), there remains a notable gap in our understanding of the governance required to navigate this transformative shift effectively (Servou et al., 2023). While the term smart mobility has gained prominence in recent years encompassing a wide range of technological solutions from autonomous vehicles to real-time transit systems (Lopez-Carreiro et al., 2023), there is still limited knowledge about the governance structures necessary to ensure their responsible deployment and equitable outcomes. This gap is particularly crucial to address given that technology is deeply embedded within the social structure of our urban environments, beyond its role as a mere tool. Therefore, it is essential to adopt a sociotechnical perspective that comprehensively examines both technological progress and its societal consequences in shaping the trajectory of urban mobility (Geels, 2019).

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Traditional governance focusses on policy instruments and institutional frameworks, but the increasing complexity of mobility ecosystems necessitates a shift towards value-based governance, where public values are at the core of decision-making (Bromell, 2012). Past research indicates that wider stakeholder participation in governance fosters knowledge-sharing and enables policymakers to benefit from a diverse array of perspectives (Sadiq et al., 2023). Yet, it is also well-established that conflicting needs and values among stakeholders can hinder effective governance (Sahel, 2016). Previous research has already identified values such as sustainability (Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018), transparency (Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018) and inclusion (Kronsell & Mukhtar-Landgren, 2020; Müller & Steen, 2019; Pereira et al., 2018) but lacks the prioritization of these values. Thus, at the heart of smart mobility governance lies a crucial, yet underexplored, challenge: how to prioritize and align public values.

Bridging this gap in literature is crucial for three main reasons. First, the rapid advancement of smart mobility technologies (Docherty, 2020). Second, the importance of enhancing the legitimacy of future governance discourse by unifying the varied values of stakeholders (Ribeiro & Macaya, 2022). Third, the necessity of providing policymakers and practitioners with guidance for more informed decision-making processes.

This paper addresses this gap in understanding how stakeholders in the Belgian mobility ecosystem prioritize public values within the context of smart mobility. By examining perspectives across stakeholders in the Quadruple Helix (government, academia, civil society, and industry), it identifies key public values using stakeholder interviews and ranks them according to relative importance using the Analytic Hierarchy Process (AHP) (Saaty, 1994). The central contribution of this paper is developing a deeper understanding of how public values can be prioritized and integrated into the governance of smart mobility. Moreover, it provides future researchers with a methodology to prioritize public values. This stakeholder-driven approach shifts focus from pure technological innovation to a balanced governance model emphasizing efficiency, sustainability, and inclusivity. It provides policymakers with practical insights for a more equitable mobility ecosystem.

The article is structured as follows: Section 2 provides a conceptual background by outlining smart mobility, its challenges, and the role of governance and values. Section 3 and 4 detail the study context and methodology. Section 5 presents our findings. Section 6 discusses their implications within the existing literature. Finally, Section 7 acknowledges the limitations of the current study and proposes future research directions.

2. Conceptual background

2.1. Smart mobility as a socio-technical transition

Smart mobility refers to the integration of digital technologies, alternative transportation modes, and innovative business models to create a more efficient, sustainable, and inclusive urban transportation system (Moscholidou et al., 2023). It involves the use of information and communication technologies (ICTs) to enhance operational efficiency, improve the quality of services, and promote the well-being of citizens (Bokolo, 2023; Müller & Steen, 2019; Savastano, Suciu, Gorelova, & Stativa, 2023). Smart mobility initiatives leverage data analytics, connectivity, and automation to optimize transportation networks, reduce congestion, and minimize environmental impacts (Lopez-Carreiro et al., 2023). In a smart city context, smart mobility goes beyond traditional transportation paradigms by prioritizing accessibility over ownership and promoting a shift towards shared mobility and multi-modal transportation solutions (Papa & Lauwers, 2015).

The concept of smart mobility emerges as a response to the growing recognition of the unsustainable nature of current transportation systems (Pangbourne et al., 2020; Schulz et al., 2023) and is often described by scholars from socio-technical perspective (Docherty et al., 2018; Lyons, 2018; Pangbourne, 2021). Socio-technical transitions refer to complex processes of change in socio-economic systems, where technological advancements interact with societal norms, cultural beliefs, economic structures, and institutional frameworks (Geels, 2019). These transitions are not solely driven by technological innovation but are influenced by a multitude of factors and involve shifts in practices, values, and infrastructures that fundamentally alter the way societies operate (Dijk, 2015; Smith et al., 2005). Unlike traditional views that merely emphasize technological advancements, the transition to smart mobility involves a complex interplay of cultural, economic, and institutional factors (Servou et al., 2023). At its core lies the recognition that mobility systems are not just about vehicles but encompass a broad spectrum of elements including cultural perceptions, economic structures, and regulatory frameworks (Docherty et al., 2018). The transition towards smart mobility reflects a broader shift towards a more sustainable and equitable urban future (Pangbourne et al., 2020). It requires holistic approaches that consider the complex interactions between technological possibilities, social dynamics, and governance structures (Mukhtar-Landgren & Paulsson, 2021). Thus, for a seamless transition to smarter mobility, active engagement from civil society is essential to ensure that these technological innovations are effectively integrated rather than merely remaining as isolated technological advancements (Docherty et al., 2018; Sharmeen & Meurs, 2019). Because urban problems and the knowledge necessary to solve these problems are often socially constructed through interactions with others (Jiang, 2021).

2.2. Smart mobility challenges

The transition to smart mobility presents a paradigm shift in transportation, offering the promise of a more efficient, accessible, and sustainable future (Papa & Lauwers, 2015). However, this transition is filled with multifaceted challenges that span environmental, technological, regulatory, financial and societal domains, highlighting the pressing need for a deeper understanding of governance. From an environmental perspective, the current climate crisis necessitates immediate and fundamental transformations within the mobility sector. Smart mobility initiatives, while offering solutions for various contemporary mobility challenges, cannot be viewed in

isolation. This is because the wider automobility system remains heavily reliant on private cars (Moscholidou et al., 2023).

From a technological perspective, the rise of self-driving and electric vehicles necessitates corresponding advancements in infrastructure, such as robust network connectivity and a widespread network of electric charging stations (Paiva et al., 2021). At the same time, from a regulatory perspective, existing policies must undergo significant revisions to accommodate innovations like connected and autonomous vehicles (CAVs) and integrated 'Mobility as a Service' (MaaS) platforms (Docherty, 2020). Additionally, the involvement of new players poses challenges to traditional regulatory frameworks, as some of these new global players might operate under different rules (Liao, 2020). Making legal clarity is key in navigating the complex web of stakeholders involved in smart mobility (Liao, 2020). Moreover, financing smart mobility initiatives poses a significant challenge, with a need for innovative models of public-private partnership to secure sustainable funding for these projects (Liao, 2020). Citizen data collection raises another hurdle, as citizens become more invested in how mobility is organized and how their personal data contributes to the system (Docherty, 2018). In addition, effectively managing and integrating this data is equally complex, as high-quality data is essential (Schulz, Gewald, Böhm, & Krcmar, 2023; Liao, 2020; Paiva et al., 2021). These data management challenges need to be thoroughly understood before large-scale transitions to smart mobility can be undertaken (Paiva et al., 2021; Liao, 2020). Beyond the technological and regulatory challenges, societal considerations are crucial for a smooth transition to smart mobility. For example, privacy concerns emerge as connected devices generate vast amounts of personal data (Paiva et al., 2021). Secondly, concerns over job displacement and job losses highlight the societal impact of this transition (Liao, 2020). Additionally, the rise of the sharing economy alters mobility dynamics and could potentially intensify inequalities regarding accessibility (Liao, 2020).

In summary, the successful implementation of smart mobility relies heavily on robust governance frameworks capable of adapting to new technologies and evolving consumer demands. However, establishing these governance structures is more complex than it may initially appear (Docherty, 2020). Given that existing systems and networks of transportation governance have frequently proven ineffective, even in less complex contexts, the disruptions brought about by smart mobility are likely to present additional challenges (Docherty, 2018). Collaborative efforts between public and private sectors, along with innovative financing models, are essential to address these challenges effectively (Papa & Lauwers, 2015).

2.3. Smart mobility governance

Governance involves coordinating networks of diverse societal actors to achieve a common goal (Dijk, 2015). Stead (2016) identifies three key dimensions of governance: politics, representing power dynamics and key stakeholders; polity, characterizing the institutions and processes involved; and policy, which includes the tools and mechanisms used. Governance varies across and within countries, influenced by non-governmental actors and cultural factors (Stead, 2016). Smart mobility governance is crucial in modern urban management, requiring an approach that integrates technological innovation, policy frameworks, and social engagement (Bokolo, 2023; Geels, 2019). However, smart mobility governance initiatives may face challenges due to the disruption of traditional transport norms (Pangbourne, 2021). This is because smart urban mobility transcends beyond the conventional notion of supplying modes of transportation; as it also encompasses connectivity, affordability, effectiveness, attractiveness, and sustainability (Lyons, 2018). This holistic perspective underscores the interplay between user requirements and the goals of urban mobility providers, and the need for solutions that are not only user-friendly but also economically viable and environmentally sustainable (Pereira et al., 2018). This means that effective governance of smart mobility necessitates balancing key objectives; including effectiveness, equity, responsiveness, and robustness (Bennett & Satterfield, 2018).

However, the existing literature on effective governance reveals recurring challenges, such as; uncertainty, multi-level alignment, complex networks, volatile market conditions, disruptive provider practices, and data asymmetries (Moscholidou et al., 2023). Docherty et al. (2018) also highlight challenges such as information asymmetries, the dichotomy between short-term and long-term perspectives, and issues of equality and inclusion, emphasizing the need for clear overarching ambitions and stakeholder engagement platforms aligned with local needs. Similarly, Bokolo (2023) argues for prioritizing stakeholder participation, data integration, interoperability, and ongoing assessment to ensure resilient, equitable, and smart transportation systems.

Collaborative governance mechanisms are suggested to navigate the complexities of smart mobility, promoting support and legitimacy for initiatives (Mukhtar-Landgren & Paulsson, 2021; Ribeiro & Macaya, 2022). Additionally, inclusive governance can effectively address volatile market conditions and foster resilience against disruptive practices (Dijk, 2015; Tomor et al., 2019). In conclusion, research indicates that stakeholder engagement and dialogue are essential components of smart mobility governance, aligning expectations and goals to achieve inclusive, integrated, and safe mobility (Dijk, 2015; Geels, 2019; Servou et al., 2023). However, it is crucial to guard against specific stakeholder interests influencing the structure. Therefore, collaboration should embody openness, consensus-building, transparency, accountability, inclusivity, agility, and distribution (Sahel, 2016). Thus, focusing on values rather than on stakeholder needs, may be the way forward to build effective collaborations within governance.

2.4. The role of values in governance

Values play a crucial role in governance, particularly in promoting good governance and ensuring ethical conduct. Good governance aims to implement ethical values in society, which requires competent administration, participatory decision-making, and a focus on citizen orientation (Ali, 2020). The focus within this research is on public values. Most commonly, public values are defined as the values providing consensus about the rights and benefits to which citizens should be entitled and the principles on which the government should be based (Van der Steen, Van Twist & Bressers, 2018). Public values can entail different dimensions, including user value, social value, environmental value and political value. Moore's Strategic Triangle of Public Value provides a strategic framework for effectively

managing governance challenges by balancing three key elements: **Public Value**, **Legitimacy and** Support, and **Operational Capacity** (Moore, 1995).

1. **Public Value**: This dimension focuses on achieving outcomes that benefit society, such as social welfare, environmental prosperity and economic stability. The alignment of public values with public expectations and enhance quality of life (Bromell, 2012) is therefore essential for determining what is beneficial for society and setting governance objectives.
2. **Legitimacy and Support**: For public managers to act effectively, a strong **authorizing environment** and **support from stakeholders and community** is required (Bromell, 2012). Stakeholder engagement fosters a coalition that ensures policies and initiatives are politically and socially sustainable (Hoppe, 2017).
3. **Operational Capacity**: To achieve the desired outcomes of public value requires harnessing resources, skills, and infrastructures. This involves internal resources as well as collaboration across sectors to mobilize the necessary resources (Hoppe, 2017).

Moore's Strategic Triangle thereby provides a structured approach to managing value conflicts, gaining support, and ensuring resources are appropriately mobilized.

Yet, especially in a governance context, values pluralism provides a significant challenge, as multiple public values may coexist and conflict with each other (Nabatchi, Sancino & Sicilia, 2017), because of value incompatibility (De Graaf & Paanakker, 2015). Another challenge is the incommensurable nature of public values, as there is no single currency or scale on which conflicting values can be measured (De Graaf & Paanakker, 2015). These challenges underscore the complexity and nuance involved in value-based decision-making (Nabatchi, Sancino & Sicilia, 2017). Balancing different values in a governance framework is essential for effective decision-making and addressing diverse perspectives. The inclusion of multiple stakeholders, such as governments, corporations, and citizens, can help ensure that various values are considered and integrated into the governance process (Sacchetti & Catturani, 2021). Furthermore, co-production is expected to lead to the co-creation of public value through better use of each other's assets and resources (Jaspers & Steen, 2021). Ensuring and enhancing public value should be a key governance aim (Docherty, Marsden & Anable, 2018).

To overcome these challenges, it is essential to consider the role of public values, especially within specific sectors such as mobility. To the best of our knowledge, there is only one article to date exploring the importance and the role of public values specifically in the mobility context. Jørgensen and Sørensen (2012), in their "codes of good governance", stress the importance of adopting a public values approach, and identify several key public values that should be considered crucial, including public interest, regime dignity, political loyalty, transparency, neutrality, effectiveness, accountability, and legality. In the following section, we aim to explore how these principles apply in a smart mobility context. Because the transition from traditional mobility to smart mobility involves the integration of advanced technologies and data analytics to enhance transportation (Moscholidou et al., 2023), we cannot guarantee that these core public values remain unaffected in this shift.

2.5. Values and values-based governance in smart mobility

In the domain of smart mobility, the fusion of technological advancement with societal values is crucial for shaping a transportation landscape that not only prioritizes efficiency but also reflects the diverse needs of communities (Docherty et al., 2018; Müller & Steen, 2019). Pragmatic considerations such as cost and time efficiencies are found to influence travel mode choices (Kurniawan et al., 2018), yet they do not exist in isolation. Thus, the governance of smart mobility cannot solely rely on providing transport but needs to ensure that critical priorities are met, such as accessibility, connectivity, affordability, effectiveness, attractiveness, and sustainability (Lyons, 2018; Pangbourne, 2021). Furthermore, within the smart mobility community and the literature surrounding it, citizens are still often considered as ‘consumers’ or ‘users’, rather than individuals with agency (Kronsell & Mukhtar-Landgren, 2020). Yet, we must acknowledge that these “users” do have agency. Specifically, human agency in governance refers to recognizing the active role people

Table 1
Values identified through literature.

Smart mobility-related values identified from current literature		
Classification	**Value**	**Source**
Service-oriented values	Transparency	Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018
	Accountability	Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018
	Creativity	Pereira et al. (2018)
	Entrepreneurialism	Pereira et al. (2018)
	Openness	Pereira et al. (2018)
	Innovation	Müller and Steen (2019)
	Ease of access	Müller and Steen (2019)
Social-oriented values	Inclusion	Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018; Müller & Steen, 2019
	Participation	Kronsell and Mukhtar-Landgren (2020)
	Sustainability	Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018
	Equality	Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018
	Social justice	Kronsell and Mukhtar-Landgren (2020)
	Resilience	Pereira et al. (2018)
	Empowerment	Müller and Steen (2019)
	Privacy and security	Müller and Steen (2019)

play in shaping their societies, and thus, recognizing this, governance must be purpose-driven, adaptive, responsive, and empowering (Docherty et al., 2018). While user-centric perspectives are vital for enhancing service usability, they fall short of the broader ideals of participation and inclusion envisioned for fostering good governance (Müller & Steen, 2019).

Table 1 shows how previous research has examined the core values described within contemporary smart mobility literature. Noticeably, a range spanning from service-oriented (focus on delivering quality and efficiency) to social-oriented values (focus on community well-being) can be observed (Müller & Steen, 2019). This diversity highlights the multifaceted nature of concerns within the discourse. However, it is crucial to mention that, while these values are highlighted as important in the context of smart mobility, the relative importance has not been identified.

While discussions on smart mobility governance have greatly explored technological advancements and operational efficiency, there is a lack of research on the critical role of public values. And additionally, while discussions surrounding public values have gained traction within the broader context of smart cities (Müller & Steen, 2019), with a focus on efficiency, effectiveness, sustainability, and inclusiveness as fundamental values (Barrutia et al., 2022), the specific alignment of these values is nearly unexplored.

3. Study context

Data for this article was obtained through the OptiRoutS project. OptiRoutS is a Belgian mobility project that started in September 2022 and ends in September 2024. The main objective of OptiRoutS is to establish a new public-private ecosystem of in-car traffic management that proactively contributes to smooth, safe and sustainable mobility. More specifically, the project aims to create a new routing system that will guide individual users towards more prosocial routes using altruistic reward schemes. Essentially, the goal of OptiRoutS is to clear the way for an efficient, just, and sustainable future in urban transportation - one in which personal decisions align with the goals of society and the environment. As part of the project, a stakeholder prioritization of public values was created in the context of smart mobility. For this, a mixed method approach is employed combining stakeholder mapping, semi-structured interviews and a co-creation workshop.

4. Methodology

4.1. Stakeholder mapping

Starting from the quadruple helix innovation framework (Carayannis & Campbell, 2009), four types of actors were identified: academia, government, industry and society. This model is based on the earlier 'triple helix' model by Etzkowitz and Leydesdorff (1995), but with the addition of 'society' as a fourth helix, it brings higher social benefits and empowers actors, such as citizens, to take on an active role of creators of innovation (Cai and Lattu, 2022).

Through purposive sampling, over 50 stakeholders were identified in the four quadrants including government bodies, public transport agencies, private enterprises, startups and civil society organizations in the Belgian mobility context. The initial stakeholder map was updated in terms of actors as well as the relationships among them based on the outcome of the subsequent interviews. The mapping of the networks between these stakeholders was done in Gephi (i.e., visualization and exploration software for graphs and networks) and can be found in Appendix 1.

4.2. Semi-structured interviews

All identified stakeholders were invited for an interview, of which 18 representatives accepted the invitation (2 in academia, 3 in government, 9 in industry and 4 in civil society). All participants were Belgian citizens, yet they differed in demographic characteristics (e.g., gender, age) and work-related characteristics (e.g., tenure, job function, workplace type). Respondents' diverse roles and experiences allowed us to gain a holistic view of the dynamics of the mobility ecosystem (Roloff, 2008).

The interviews were semi-structured and aimed to uncover stakeholders' perceptions of public values and their role in smart mobility governance (Adams, 2015). These interviews were designed to explore not just general stakeholder opinions but specific values that should guide governance decisions. To achieve this, the interview guide was carefully structured into different sections. We first asked participants to describe their roles in the mobility ecosystem and the nature of their interactions with other stakeholders. This allowed us to understand the power dynamics and influence each actor holds in decision-making processes. The core of the interviews focused on uncovering public values. We used a combination of closed and open-ended questions to first provide a structured understanding of values from the literature and then expand into an open question: "What values do you believe should guide decision-making in the smart mobility ecosystem?" This question was designed to let participants freely express their thoughts, allowing us to capture a wide range of values from their perspectives. The interviews concluded by asking stakeholders to reflect on the challenges they foresee in embedding these values into governance frameworks and what improvements could be made in the future. The open-ended nature of the questions allowed stakeholders to introduce values that might not be immediately evident from the literature. The full interview guide can be found in Appendix 2. The interviews were conducted online between July 2023 and September 2023. Interviews were organized in Dutch, the participants' native language. To avoid social desirability bias and to put participants at ease, we assured absolute confidentiality and anonymity in the reporting of results. The interviews lasted between 24 and 53 min, with an average of 32 min.

All interviews were audio-recorded and transcribed verbatim before being coded and analyzed with MAXQDA (Version 2022). We used thematic analysis (Braun & Clarke, 2006) to code and categorize the data from the interviews. Relying on an inductive approach,

codes were given to the data after all the interviews were conducted and were later assembled into different themes. This process was repeated until the information gathered was saturated and the themes encapsulated the results (Braun & Clarke, 2006). The inductive coding process involved identifying themes related to public values such as sustainability, safety, and quality of life. We paid particular attention to the frequency and emphasis of each value mentioned by the stakeholders. This approach helped us identify the most significant values driving governance decisions in the smart mobility sector. To enhance credibility and validity of the outcomes, methodological triangulation (Denzin, 1978; Patton, 1999) was employed, combining outcomes of the semi-structured interviews with insights of the literature, such as the governance challenges in the smart mobility domain (Docherty et al., 2018), the values that emerge within the mobility context (Kronsell & Mukhtar-Landgren, 2020; Lyons, 2018) and the importance of stakeholder communication (Jaspers & Steen, 2021).

4.3. Co-creation workshop

Following the semi-structured interviews, participants were invited to a follow-up session to gain a better understanding of the previously identified values. 6 participants accepted the invitation, of which 1 represented academia, 1 represented civil society, 1 represented government and 3 represented business. The workshop took place at the academic premises of Vrije Universiteit Brussel, and lasted 2 h. The main goal was to determine the relative importance of influencing factors in the smart mobility ecosystem, ranked by experts through pairwise comparisons. An overview of the factors was created based on the 18 interviews. For a structured overview of our methodology, see Fig. 1. During the workshop, first, two break-out groups were made, where participants could briefly discuss what they initially thought would be the more important factor in each comparison and gave a score. Afterwards, all participants came together to resolve potential differences between the two groups and jointly decided on the final scores they would give each comparison.

Throughout the co-creation workshop, the analytic hierarchical process (AHP) was employed to research stakeholders' preferences for influencing factors in the mobility sector. AHP is a structured approach developed to tackle wicked decision problems involving multiple criteria and alternatives (Saaty, 1994). The process involves pairwise comparisons, where the decision-maker assesses the relative importance of elements using a numerical scale. Starting with the decision hierarchy, each level undergoes pairwise comparisons, resulting in comparison matrices. Then, the geometric mean of individual evaluations is calculated for evaluating the priority level of a specific concept. Finally, the consistency ratio is computed to ensure the reliability of judgments (Saaty, 2004). Although a ratio up to 0.1 is generally considered to indicate a consistent ranking for grouped responses (Saaty & Tran, 2007), several authors argue that a score of up to 0.2 can be considered tolerable for grouped responses (Golany & Kress, 1993; Wedley, 1993). Schmidt et al. (2016) further found that when they compared weights from interviewees with CR $\leq$ 0.1 or CR $\leq$ 0.2, the mean weights between those two groups did not differ significantly. The consistency ratio obtained from this session is 0.1568.

5. Results

5.1. Interview results

The interviews conducted within the study's context provided valuable insights into the Belgian mobility ecosystem and identified several barriers that could hinder the innovation of smart mobility and prosocial navigation initiatives. Discussing these findings is essential before presenting the results on the drivers and values, as they offer crucial context for understanding the ecosystem in which our framework will be developed.

5.1.1. Relationships among stakeholders in the ecosystem

In examining the stakeholder dynamics within Belgium's mobility ecosystem, our study uncovered a complex interplay of various

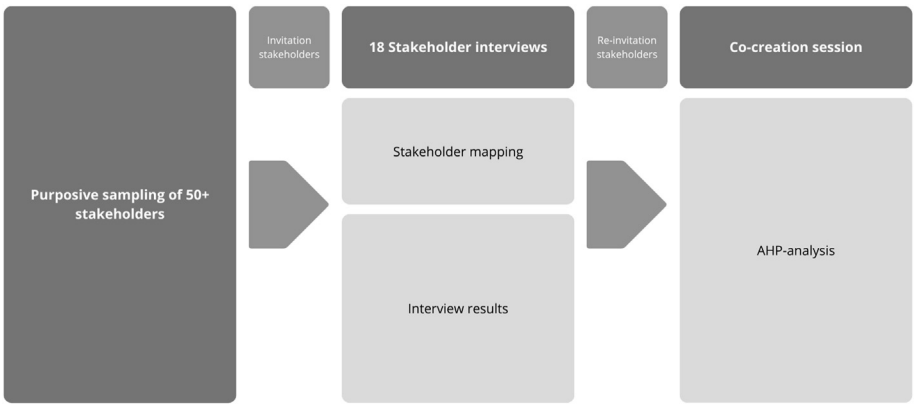

Fig. 1. Overview of methodology.

actors, each contributing to the shaping of the landscape. Using the answers of our participants, we began to build a network of connections between our stakeholders. We observed the pivotal role of government entities. The stakeholders most prominently on the map (Figure A1, Appendix 1) emerged as central players in the mobility context. However, given the sensitivity of the data and the need to protect the privacy of our interviewees, we have anonymized the stakeholders by categorizing them according to their company type or sector. This approach allows us to share insights without compromising the confidentiality of individual participants.

5.1.2. Barriers to sustainable route optimization

The respondents also identified several barriers hindering progress of innovating sustainable routing within the Belgian mobility ecosystem. Foremost among these challenges is the presence of fragmented gps-systems, each offering differing specifications and information. This fragmentation leads to user inconvenience and inefficiencies in route planning and execution. Moreover, concerns regarding data availability and quality emerged as significant obstacles. Questions surrounding the reliability and real-time nature of data essential for route optimization underscored the need for robust data infrastructure. Infrastructure readiness also surfaced as a barrier, with existing infrastructure often ill-equipped to support routes with minimal marginal costs. Furthermore, our analysis revealed a lack of expert-oriented knowledge exchange and communication within the ecosystem, further complicating efforts towards sustainable route optimization. These barriers underscore the multifaceted challenges that must be addressed to realize the full potential of initiatives that try to optimize routes for sustainability within the Belgian mobility ecosystem.

5.1.3. Factors influencing governance in smart traffic management systems

Based on our interview respondents' answers to the open question of which factors they deemed the most important in the current mobility system, we identified the following: 1) sustainability (mentioned by nine participants); 2) quality of life: noise pollution, accessibility, congestions, etc. (mentioned by nine participants); 3) road safety and the safety of our children (mentioned by ten participants); 4) attention for the climate and emissions (mentioned by five participants); 5) attention for the road classification (mentioned by three participants). For a more detailed review of the identified factors, consult Appendix 3. However, the relative weight of each factor varies greatly by stakeholder type. Fig. 2 shows the factors mentioned by the different stakeholders (each factor was counted once per interview). Other drivers mentioned by participants included transparency, open communication, more shared information, and expertise-driven decisions. However, these were solely mentioned by one participant each.

To streamline our analysis, these factors were consolidated into four main drivers for the AHP-analysis: Safety, Sustainability, Quality of life, and Road classification.

- In this research, sustainability encompasses the environmental impact and long-term viability of mobility solutions. It includes the factor of "attention for climate and emissions" due to their significant overlap. Both focus on reducing emissions, promoting green practices, and ensuring that mobility solutions do not compromise future generations' ability to meet their needs. Combining these factors simplifies the prioritization process and helps participants focus on broader, more integrated sustainability goals. By combining these factors, we ensure a more coherent and streamlined analysis, allowing participants to concentrate on holistic sustainability goals without being obstructed by overly specific distinctions. This approach aligns with the broader objectives of promoting eco-friendly practices and ensuring the long-term viability of mobility solutions.

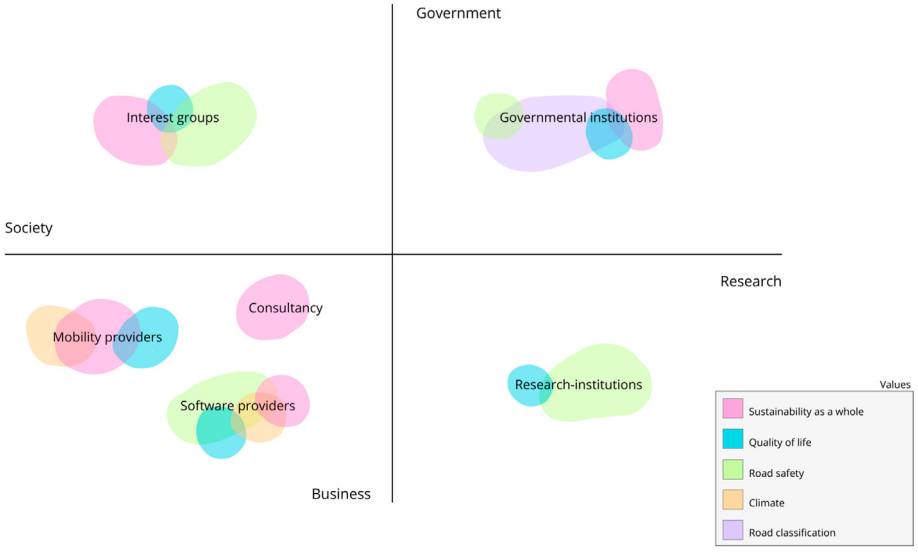

Fig. 2. Relative importance of the identified driving factors per stakeholder-type.

- We consider quality of life the overall well-being and satisfaction of residents, including factors like reduced traffic congestion, noise pollution, and improved public health. This driver directly affects people's daily experiences, making it essential to maintain as a distinct category.
- Safety focuses on the degree to which the mobility system protects its users from harm and ensures safe travel conditions. Ensuring the safety of all users is a primary concern in any mobility initiative, making this a critical driver.
- Road classification involves the categorization and management of roads based on their usage, capacity, and strategic importance. Proper road classification is essential for effective traffic management, infrastructure planning, and policy development.

5.2. AHP-analysis results

Following identifying the drivers of smart mobility governance, pairwise comparisons were made in the co-creation session by employing the AHP method The AHP method is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. It allows for pairwise comparisons between factors, which helps in determining their relative importance (Saaty, 2013). During our co-creation session, participants made pairwise comparisons of the identified drivers. This means they compared each factor against every other factor, one pair at a time, to decide which one is more important and by how much. Table 2 shows the relative weight of each factor to the others (i.e., the previously identified values). For example, a value of 6 under 'Safety' compared to 'Sustainability' means that Safety is considered six times more important than Sustainability by the participants. See Appendix 4 for the scores of each pairwise comparison as voted during the final group discussion.

The geometric means (i.e., the weight given to a concept in each pairwise comparison divided by the total weight of a concept) can be seen in Table 3 along with the priority vector of each factor. The geometric mean is used here to derive a more balanced weighting, considering the multiplicative nature of pairwise comparisons. The priority vector represents the overall weight or importance of each factor relative to the others. For instance, Safety has a priority vector value of 0.5025, indicating it is the most important factor among the stakeholders.

From these priority vectors, it is evident that among the stakeholders, there is a consensus that safety should be the absolute priority. However, it became clear in the discussions that this decision was made because there was a belief that sustainability would automatically follow after the other factors were implemented. Remarkably, Road Classification came out of this AHP-analysis as the second most important driver, while in the interviews it was only mentioned by government institutions. To give a clear overview of the factors identified in the interviews and their importance (gathered from the AHP-analysis), a comprehensive diagram was made (Fig. 3).

During the co-creation workshop, participants engaged in discussions over the definition and overall importance of influencing factors that impacted the subsequent pairwise comparisons of the AHP-analysis. First, the conversations showed that having a clear understanding of the influencing factors at hand is of utmost importance, a term that was heavily discussed, for example, was sustainability. Questions about its definition, potential overlap with other concepts and relative impact were recurrent. Participants emphasized the need to clarify what sustainability means in the context of navigation systems and how it should be balanced with other priorities. Participants also acknowledged the interconnectedness of the four pillars (safety, sustainability, quality of life, and road classification). The recognition of these ties influenced the scoring and emphasized the importance of considering these values collectively rather than in isolation. Moreover, the debate over whether to prioritize long-term or short-term outcomes surfaced consistently during discussions, particularly concerning road classification and the overall impact on sustainability.

Decision-makers recognized the importance of balancing immediate safety concerns with the long-term implications of their choices. The participants also recognized the critical role of road classification in ensuring safety, emphasizing the need for a well-organized spatial order.

The iterative nature of the discussions was evident, with initial scores evolving as participants engaged in thoughtful conversations. Critical notes and reflections during the session led to more nuanced and refined perspectives on the importance of each value. The evolution of perspectives underscored the collaborative and dynamic nature of the co-creation process, which might also point to the importance of having different perspectives within a governance system.

6. Discussion

6.1. Identification of public values

Now that we've essentially uncovered the prioritization of these driving factors, it's crucial to translate these identified factors (Sustainability, Climate, Quality of Life, Road Safety, and Road Categorization) into values. Even though, some of these factors already possess some of the same tendencies as values, this step is still critical to ensure alignment with societal goals. They serve as guiding

Table 2
Relative weight of the factors.

	Safety	Sustainability	Quality of Life	Road Classification
Safety	1	6	3	4
Sustainability	0,1666667	1	0,25	0,142857143
Quality of Life	0,3333333	4	1	0,25
Road Classification	0,25	7	4	1

Table 3
Geometric means and priority vector.

	Safety	Sustainability	Quality of Life	Road Classification	*Priority*
Safety	0,57142857	0,333333333	0,363636364	0,741721854	*0,50253003*
Sustainability	0,095231	0,055555556	0,03030303	0,026490066	*0,05189669*
Quality of Life	0,19047619	0,222222222	0,121212121	0,046357616	*0,14506704*
Road Classification	0,14285714	0,388888889	0,484848485	0,185430464	*0,30050625*

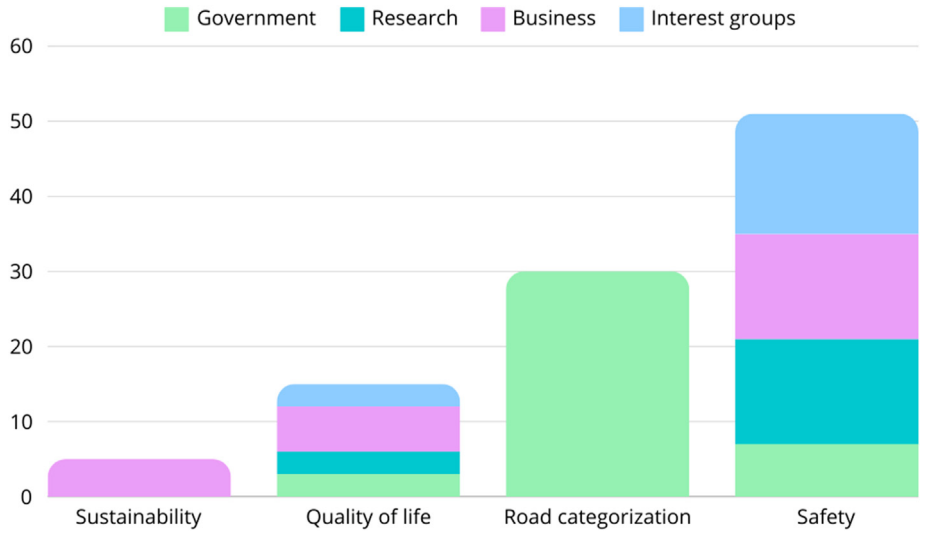

Fig. 3. Combination of the initial interview factors and the priority vectors from the AHP.

principles that help ensure consistency in governance actions and policies related to the identified driving factors. Additionally, values can evolve over time as societal norms, priorities, and circumstances change (Rinaldi & Ladini, 2022), therefore translating these factors

Table 4
Translation of driving factors into values.

Factors identified in the interviews and their corresponding values	
Sustainability/ Climate	*Value*: Sustainability Sustainability/Climate *Explanation*: These driving factors emphasize the importance of reducing environmental impact and promoting sustainable practices within the mobility ecosystem (Gallo & Marinelli, 2020). Through combining the driving factors "climate" and "sustainability" (that was generally viewed as more broad) and focusing solely on the value and nature of sustainability to "*meet the needs of the present without compromising the ability of future generations to meet their own needs*" (Scoones, 2007), we aim to clarify that sustainability (as we define it here, as a value) overlaps with the driving factor "climate".
Quality of life	*Value*: Well-being (Societal and Personal) Quality of life *Explanation*: Quality of life is closely tied to the well-being of individuals and society as a whole. Therefore, it has a long history of getting measured and compared with (subjective) well-being (Felce & Perry, 1995; Schalock, 2004; Diener, 1995). The reason for dividing this driving factor into two values (Societal Well-being/Personal Well-being) lies within the discussions about what constitutes quality of life for our stakeholders. Concepts like noise disturbance, that relate more closely to personal well-being, were mentioned. Yet, congestion and the accessability of cities were also presented and seem to be more aligned with societal well-being (Stokols & Novaco, 1981).
Road Safety	*Value*: Safety Road Safety *Explanation*: By translating this driving factor into the value of safety, the emphasis remains on ensuring that transportation systems prioritize the protection of all road users, reducing accidents, injuries, and fatalities (Wegman, 2017).
Road Categorization	*Value*: Trust in Authority Road Categorization *Explanation*: While road categorization itself may not directly translate into a value, the underlying concept of clear regulations and transparent guidelines can foster trust in authority. Trust in authority reflects the confidence people have in the decisions and actions of governing bodies responsible for managing and regulating the transportation infrastructure (De Cremer & Tyler, 2007). Clear road categorization and consistent enforcement could contribute to this trust by ensuring transparency and accountability, as transparancy has the ability to vastly increase trust in governance (Grimmelikhuijsen et al., 2013). Shared values and norms also foster trust in authority (De Boer, 2002) and government authorities that we spoke to insisted that the road hierarchy they made already embedded values like sustainability and wellbeing.

into values allows for greater adaptability to governance and evolving needs and challenges. Finally, values inherently encompass ethical considerations, making it possible to embed ethical principles such as equity, justice, and responsibility (Van der Steen et al., 2018). Table 4 presents the driving factors identified in this study, along with their corresponding value translations and explanations.

6.2. Prioritizing public values to address smart mobility governance challenges

In the examination of both the literature and our own research findings, several key values emerged as central to the discussion of smart mobility. Our research findings align with the literature in several respects but also highlight some differences. For example, the literature emphasized the importance of transparency and openness in governance structures and decision-making processes (Pereira et al., 2018), in line with our own research findings which underscored the significance of transparency and openness for fostering trust and accountability. Similarly, sustainability emerged as a shared value, reflecting a growing awareness of the need for policies that promote environmental well-being (Lyons, 2018). Furthermore, topics such as inclusion and equality were recognized as important within the literature (Kronsell & Mukhtar-Landgren, 2020) and mentioned in the co-creation session when discussing quality of life (or societal well-being). However, some disparities were also evident between the values highlighted in the literature and those uncovered through our own research. For example, while creativity, entrepreneurialism, and privacy were featured in the literature (Pereira et al., 2018), our findings placed greater emphasis on safety and trust in authority. This variance suggests a nuanced perspective on the priorities and concerns within the context of smart mobility, potentially influenced by the sector, the unique demographics or cultural factors in our research sample.

Although one of the most significant outcomes of this study is the clear hierarchy of values that emerged from the stakeholder-driven analysis, in addition to the identification of these values, this research also contributed to the current discourse regarding the challenges of smart mobility governance. From previous literature and our own research, several common challenges emerged. Firstly, the tension between short-term objectives and long-term goals. While safety dominated the short-term concerns, sustainability and quality of life were viewed as critical for the long-term success of smart mobility initiatives. This dynamic between short- and long-term priorities is a recurring challenge in the governance of socio-technical systems, where immediate gains often overshadow more enduring goals (Geels, 2019; Docherty et al., 2018). Another shared difficulty that came up was the presence of information asymmetries and issues surrounding data quality and quantity (Schulz et al., 2023). Concerns about the reliability, accessibility, and standardization of data were evident in current discourse (Liao, 2020) and our discussions with stakeholders. Stakeholder alignment and collaboration arose as another common challenge. The literature emphasized the need for coordinated dialogue among various stakeholders to effectively implement smart mobility initiatives (Mukhtar-Landgren & Paulsson, 2021). Our research similarly established stakeholder engagement as essential for overcoming barriers and driving meaningful change in mobility governance. However, our results also showed the difficulty of operationalizing these values in practice, particularly when stakeholders must balance competing interests (Nabatchi, Sancino & Sicilia, 2017). For instance, while safety and sustainability were both seen as important, stakeholders often struggled to articulate how these values could be simultaneously prioritized without compromising one for the other. Lastly, infrastructure demands were also recognized as an obstacle in both the literature and our research. The rapid pace of technological advancements has placed pressure on existing infrastructure, necessitating innovative solutions to accommodate evolving mobility needs (Paiva et al., 2021).

6.3. Integration in the public value theory

This study also builds on Moore's Strategic Triangle by integrating a specific prioritization of public values within the smart mobility governance context. Moore's model emphasizes three core areas: **Public Value**, **Legitimacy and Support**, and **Operational Capacity** (Moore, 1995), which are essential for creating sustainable public outcomes. In our research (see Fig. 4), we expand on these areas in a

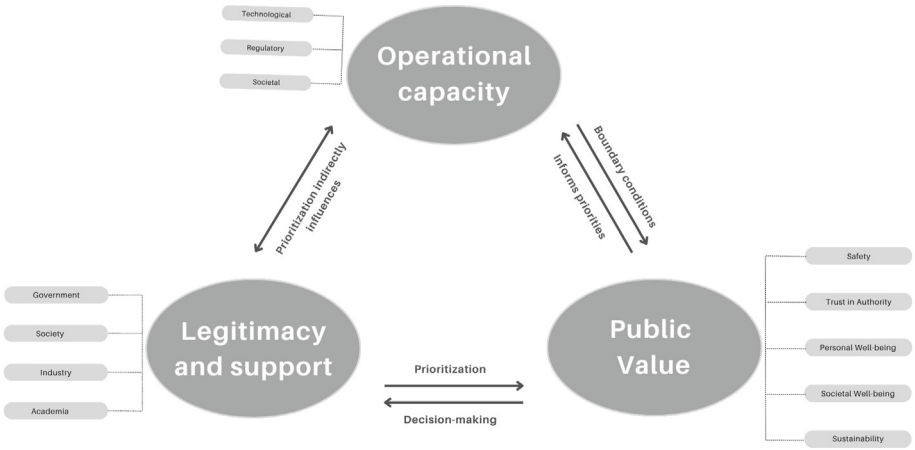

Fig. 4. Our value prioritization integrated within an extended version of Moore's Public Value theory.

few ways. First and most important, by identifying and ranking key public values that are particularly relevant to smart mobility, namely Safety, Trust in Authority, Personal Well-being, Societal Well-being, and Sustainability. These **Public values** emerged as key drivers within the governance of smart mobility and are fundamental for aligning technological, regulatory, and societal dimensions, as illustrated under **Operational Capacity** (see Fig. 4). We added context, highlighting that this operational capacity spans technological, regulatory, and societal fields, and must address challenges discussed in our literature review. Additionally, **Legitimacy and Support** are reinforced through a multi-stakeholder approach, involving actors from government, industry, academia, and society. Our adaptation of Moore's theory (Fig. 4) clearly emphasizes the importance of involving the entire quadruple helix (Carayannis & Campbell, 2009) and shows how prioritizing values (in)directly impacts operational capacity, legitimacy and support, and the way these two interact with each other.

In Fig. 4, we illustrate how the Strategic Triangle and the public values identified in this study are interconnected. The prioritization process we conducted reinforces legitimacy and support by ensuring that the initiatives pursued are genuinely reflective of public needs and values, strengthening the credibility of governance efforts. A multi-stakeholder approach further bolsters this legitimacy. Noticeably, the influence goes both ways because the stakeholders all contribute to the prioritization, but afterwards it also helps them with their future decision-making. Operational capacity, in turn, benefits from this prioritization by enabling decision-makers to allocate resources effectively and focus on the most impactful values, even when navigating complex or conflicting demands. However, it's important not only to consider how public values can inform priorities for operational capacity, but also how operational capacity provides context and sets boundary conditions for the prioritization process. In conclusion, by clearly ranking public values, public managers and policymakers are equipped to make informed, strategic decisions. This added layer of value prioritization enhances the practical applicability of Moore's framework within the complex context of smart mobility governance. Through this approach, public managers are better equipped to navigate conflicting values.

7. Limitations and future research

While this study provides important insights into the prioritization of public values in smart mobility, several limitations should be acknowledged. First, the research is based on a relatively small sample size of 18 interviews and a single co-creation workshop. Although this sample provides a diverse cross-section of stakeholders, the findings may not fully capture the span of perspectives within the wider smart mobility ecosystem. Future studies could benefit from including a larger and more diverse group of stakeholders. In case of future studies wanting to replicate ours, but also with a small sample size, a possible mitigation strategy would be to conduct a sensitivity analysis on the results.

Second, the study was conducted in the Flemish context, which may limit the generalizability of the findings to other regions or countries. This is because different regions face unique challenges related to smart mobility, such as traffic congestion, infrastructure development, and public transportation usage patterns. There are also cultural and behavioral variances to keep in mind. People's behaviors and attitudes toward transportation can vary based on cultural, social, and economic factors (Del Baldo & Demartini, 2010). Thus, the governance of smart mobility should be localized and may not be translatable to other countries (Stead, 2016). However, the values prioritized here—such as safety and sustainability—are broadly relevant to many advanced economies with similar socio-technical infrastructures. Nonetheless, an interesting future research direction would be to conduct comparative studies across different countries or regions to evaluate the generalizability of the findings. Additionally, future research could consider cross-cultural analyses to understand how cultural and behavioral factors influence attitudes towards smart mobility. This would help to broaden the scope of policy recommendations, making them more applicable to diverse settings.

Furthermore, a limitation may have arisen from focusing on "driving factors for smart mobility policy-making" instead of directly addressing "values", as there is the potential for misinterpretation or bias in translating factors into underlying values. This approach risks oversimplifying or misrepresenting the complex motivations behind participants' responses. While qualitative methods are useful for understanding certain dynamics in an in-depth manner (Fossey et al., 2002), the use of open-ended questions in this case could be a two-sided sword, leaving too much room for interpretation or mistakes. Future research could therefore use a mix between open-ended and more structured questions to understand the values at play.

Another limitation of our study is that the participants assumed sustainability would naturally follow from the implementation of other drivers, particularly Safety and Road Classification. This assumption may have influenced their prioritization and could have introduced a bias in the results. Normally, in an AHP-analysis, each alternative is considered independently without overlap or dependency on other factors. This overlap contradicts the fundamental principle of the AHP method, which assumes that each criterion should be evaluated on its own merits. Consequently, the perceived interdependence between sustainability and other drivers could have skewed the priority vectors and potentially affected the overall conclusions drawn from the analysis. Finally, while the study focused on prioritizing public values, it did not fully explore how these values could be operationalized in practice. Further research is needed to investigate the specific mechanisms and strategies that can translate these prioritized values into actionable outcomes in smart mobility governance.

CRediT authorship contribution statement

Mirte Brouwers: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Dorottya Varga:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization. **Ruben D'Hauwers:** Methodology, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1. Stakeholder mapping

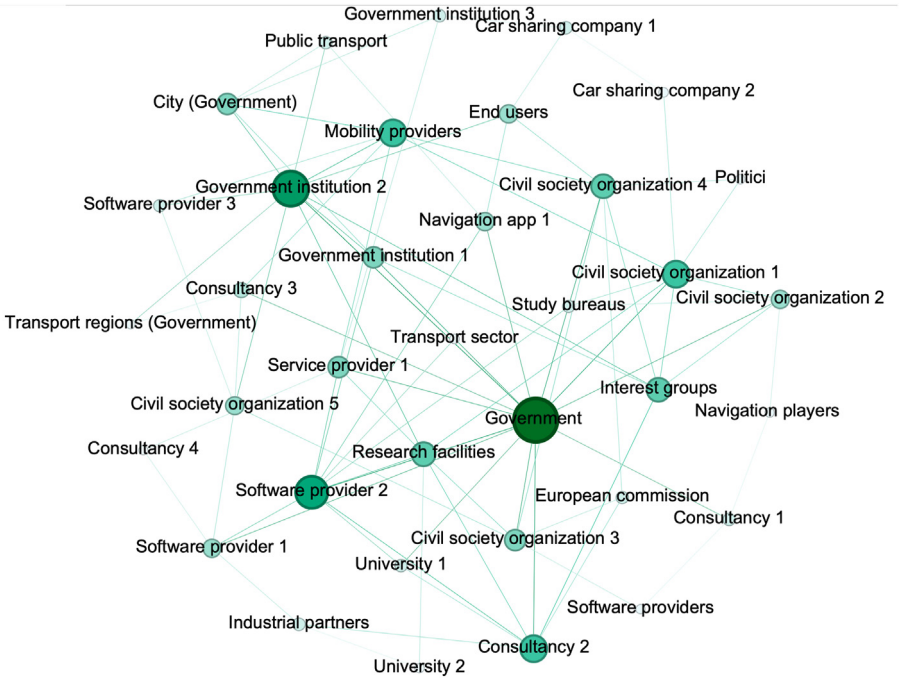

Fig. A.1. Stakeholder map

Appendix 2. Interview guide

1. What is your role in the mobility ecosystem?
2. With which stakeholders do you interact and how?
   2.1 Which (in)formal channels do you use and how often?
   2.2 How much influence do you think you have through these channels?
3. Which processes or structures exist at the moment for collaboration between stakeholders?
   3.1 How can these be improved?
4. What are your values? (What is your DNA?)
5. Which values or priorities should guide decision-making in the mobility ecosysteem?
   5.1 What guides it at the moment?
   5.2 Is this how it should be?
6. Do the values you possess sometimes conflict with those of other stakeholders? If yes, how?
7. To which social costs should a prosocial navigation system pay extra attention?
8. What are the most significant challenges regarding navigation systems you face at the moment?
9. How would different stakeholders have to interact with OptiRoutS so we, as a society, can attain our mobility goals?

Appendix 3. Codes derived from interviews

Table A.1
Factors identified from the interviews with triangulation

Themes	Sub-themes	Number of mentions	Mentioned in	Literature source
Sustainability	Making Belgium cleaner	1	Interview 10	Lyons, 2018; Pangbourne, 2023; Kronsell & Mukhtar-Landgren, 2020; Pereira et al., 2018
	Three V's for sustainability	2	Interview 4, interview 18	
	Comprehensive perspective	6	Interview 6, interview 7, interview 9, interview 11, interview 13, interview 16	
Road safety	Avoid accidents	7	Interview 3, interview 5, interview 6, interview 7, interview 12, interview 17, interview 18	Müller and Steen (2019)
	Safety for children	3	Interview 2, interview 4, interview 11	
Quality of life	Delays	7	Interview 3, interview 5, interview 6, interview 7, interview 12, interview 13, interview 17	Müller & Steen, 2019; Lyons, 2018; Pangbourne, 2023
	Noise pollution	2	Interview 4, interview 10	
	Accessibility	1	Interview 17	
Climate	Emissions	1	Interview 10	Moscholidou et al. (2023)
	Environment	4	Interview 5, interview 12, interview 13, interview 16	
Road Classification	Government reflection of sustainability	3	Interview 10, interview 11, interview 17	/

Appendix 4. Pairwise comparison scores of AHP-method

Fig. A.2. Pairwise comparison (Sustainability-Quality of life)

Fig. A.3. Pairwise comparison (Sustainability-Safety)

Fig. A.4. Pairwise comparison (Safety-Quality of life)

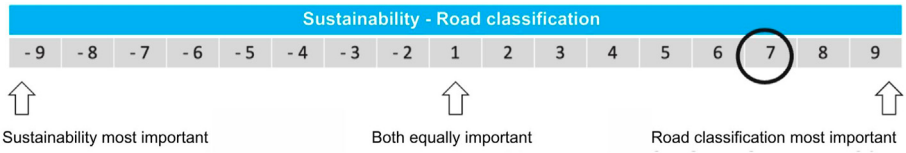

Fig. A.5. Pairwise comparison (Sustainability-Road classification)

Figure A; 6: Pairwise comparison (Safety-Road classification)

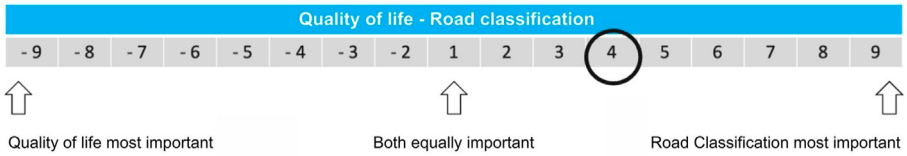

Fig. A.7. Pairwise comparison (Quality of life-Road classification)

References

Adams, W. C. (2015). Conducting semi-structured interviews. In K. E. Newcomer, H. P. Hatry, & J. S. Wholey (Eds.), *Handbook of practical program evaluation* (pp. 492–505). John Wiley & Sons.

Ali, Y. (2020). Exploring the role and challenges of ethical values to impart good governance: The case of dessie town, south wollo, Ethiopia. *Journal of Humanities and Social Sciences, 3*(1).

Barrutia, J. M., Echebarria, C., Aguado-Moralejo, I., Apaolaza-Ibáñez, V., & Hartmann, P. (2022). Leading smart city projects: Government dynamic capabilities and public value creation. *Technological Forecasting and Social Change, 179*, Article 121679.

Bennett, N., & Satterfield, T. (2018). Environmental governance: A practical framework to guide design, evaluation, and analysis. *Conservation Letters, 11*(6).

Bokolo, A. J. (2023). Sustainable mobility governance in smart cities for urban policy development-A scoping review and conceptual model. *Smart and Sustainable Built Environment*, 1–23.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Bromell, D. (2012). Creating public value in the policy advice role: A reflection from the front line. *Policy Quarterly, 8*(4), 16–22.

Cai, Y., & Lattu, A. (2022). Triple helix or quadruple helix: Which model of innovation to choose for empirical studies? *Minerva, 60*(2), 257–280.

Carayannis, E. G., & Campbell, D. F. (2009). 'Mode 3'and'Quadruple helix': Toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management, 46*(3–4), 201–234.

De Boer, H. (2002). Trust, the essence of governance? In A. Amaral, G. A. Jones, & B. Karseth (Eds.), *Governing higher education: National perspectives on institutional governance* (pp. 43–61). Netherlands: Dordrecht: Springer.

De Cremer, D., & Tyler, T. R. (2007). The effects of trust in authority and procedural fairness on cooperation. *Journal of Applied Psychology, 92*(3), 639.

De Graaf, G., & Paanakker, H. (2015). Good governance: Performance values and procedural values in conflict. *The American Review of Public Administration, 45*(6), 635–652.

Del Baldo, M., & Demartini, P. (2010). Values-based public-private networks. Best practices in Italian local government: The case of 'Regione Marche. *Corporate Ownership and Control Journal, 8*(1), 772–784.

Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods* (2nd ed.). New York, NY: McGraw Hill.

Diener, E. (1995). A value based index for measuring national quality of life. *Social Indicators Research, 36*, 107–127.

Dijk, M. (2015). From government to multi-stakeholder governance for sustainable mobility. *Transitions to sustainability*, 131–140.

Docherty, I. (2018). New governance challenges in the era of 'smart' mobility. In *Governance of the smart mobility transition* (pp. 19–32). Emerald Publishing Limited.

Docherty, I. (2020). Crafting effective policy instruments for 'smart mobility': Can multi-level governance deliver? *Shaping Smart Mobility Futures: Governance and Policy Instruments in times of Sustainability Transitions*, 57–73.

Docherty, I., Marsden, G., & Anable, J. (2018). The governance of smart mobility. *Transportation Research Part A: Policy and Practice, 115*, 114–125.

Etzkowitz, H., & Leydesdorff, L. (1995). The triple helix–university-industry-government relations: A laboratory for knowledge based economic development. *EASST review, 14*(1), 14–19.

Felce, D., & Perry, J. (1995). Quality of life: Its definition and measurement. *Research in Developmental Disabilities, 16*(1), 51–74.

Fossey, E., Harvey, C., McDermott, F., & Davidson, L. (2002). Understanding and evaluating qualitative research. *Australian and New Zealand Journal of Psychiatry, 36*(6), 717–732.

Gallo, M., & Marinelli, M. (2020). Sustainable mobility: A review of possible actions and policies. *Sustainability, 12*, 7499.

Geels, F. W. (2019). Socio-technical transitions to sustainability: A review of criticisms and elaborations of the multi-level perspective. *Current Opinion in Environmental Sustainability, 39*, 187–201.

Golany, B., & Kress, M. (1993). A multicriteria evaluation of methods for obtaining weights from ratio-scale matrices. *European Journal of Operational Research, 69*(2), 210–220.

Grimmelikhuijsen, S., Porumbescu, G., Hong, B., & Im, T. (2013). The effect of transparency on trust in government: A cross-national comparative experiment. *Public Administration Review, 73*(4), 575–586.
Hoppe, M. (2017). New public organizing: Towards collaborative innovation in the public sector. *NFF Conference: Inter-organizational collaboration for innovation* (pp. 1–21).
Jaspers, S., & Steen, T. (2021). Does Co-production lead to the creation of public value? Balancing the dimensions of public value creation in urban mobility planning. *Administration & Society, 53*(4), 619–646.
Jiang, H. (2021). Smart urban governance in the 'smart'era: Why is it urgently needed? *Cities, 111*, Article 103004.
Jørgensen, T. B., & Sørensen, D.-L. (2012). Codes of good governance: National or global public values? *Public Integrity, 15*(1), 71–96.
Kronsell, A., & Mukhtar-Landgren, D. (2020). Experimental governance of smart mobility: Some normative implications. In *Shaping smart mobility futures: Governance and policy instruments in times of sustainability transitions* (pp. 119–135). Emerald Publishing Limited.
Kurniawan, J. H., Ong, C., & Cheah, L. (2018). Examining values and influences affecting public expectations of future urban mobility: A Singapore case study. *Transport Policy, 66*, 66–75.
Liao, R. (2020). Smart mobility: Challenges and trends. *Toward Sustainable And Economic Smart Mobility: Shaping the Future Of Smart Cities, 10*, 1–11.
Lopez-Carreiro, I., Monzon, A., & Lopez, E. (2023). MaaS implications in the smart city: A multi-stakeholder approach. *Sustainability, 15*, Article 10832.
Lyons, G. (2018). Getting smart about urban mobility–aligning the paradigms of smart and sustainable. *Transportation Research Part A: Policy and Practice, 115*, 4–14.
Moore, M. H. (1995). *Creating public value: Strategic management in government.* Cambridge: Harvard University Press.
Moscholidou, I., Marsden, G., & Pangbourne, K. (2023). Steering smart mobility services: Lessons from Seattle, greater manchester and stockholm. *Sustainability, 15*, 4566.
Mukhtar-Landgren, D., & Paulsson, A. (2021). Governing smart mobility: Policy instrumentation, technological utopianism, and the administrative quest for knowledge. *Administrative Theory and Praxis, 43*(2), 135–153.
Müller, A. P., & Steen, T. (2019). Behind the scenes of coproduction of smart mobility: Evidence from a public values' perspective. In *Electronic government: 18th IFIP WG 8.5 international conference, EGOV 2019, san benedetto del tronto, Italy, september 2–4, 2019, proceedings 18* (pp. 338–352). Springer International Publishing.
Nabatchi, T., Sancino, A., & Sicilia, M. (2017). Varieties of participation in public services: The who, when, and what of coproduction. *Public Administration Review, 77*(5), 766–776.
Paiva, S., Ahad, M. A., Tripathi, G., Feroz, N., & Casalino, G. (2021). Enabling technologies for urban smart mobility: Recent trends, opportunities and challenges. *Sensors, 21*(6), 2143.
Pangbourne, K. (2021). Smart mobility governance. In *The routledge handbook of public transport* (pp. 568–582). Routledge.
Pangbourne, K., Mladenović, M. N., Stead, D., & Milakis, D. (2020). Questioning mobility as a service: Unanticipated implications for society and governance. *Transportation Research Part A: Policy and Practice, 131*, 35–49.
Papa, E., & Lauwers, D. (2015). Mobility governance in smart cities of the future. In *Adaptive mobility: A new policy and research agenda on mobility in horizontal metropolis* (pp. 177–190). In-planning.
Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research, 34*(5/2), 1189.
Pereira, G. V., Parycek, P., Falco, E., & Kleinhans, R. (2018). Smart governance in the context of smart cities: A literature review. *Information Polity, 23*(2), 143–162.
Ribeiro, M., & Macaya, J. (2022). Smart governance approaches and indicators in smart cities measurement frameworks. *ACM International Conference Proceeding Series, 353*(359).
Rinaldi, B., & Ladini, R. (2022). On values as they evolve: A presentation of the world values survey and the European values study. *Intercultura, 2022*(105), 11–18.
Roloff, J. (2008). Learning from multi-stakeholder networks: Issue-focused stakeholder management. *Journal of Business Ethics, 82*(1), 233–250.
Saaty, T. L. (1994). How to make a decision: The analytic hierarchy process. *Interfaces, 24*(6), 19–43.
Saaty, T. L. (2004). Decision making – the analytic hierarchy and network processes (AHP/ANP). *Journal of Systems Science and Systems Engineering, 13*(1), 1–35.
Saaty, T. L. (2013). The modern science of multicriteria decision making and its practical applications: The AHP/ANP approach. *Operations Research, 61*(5), 1101–1118.
Saaty, T. L., & Tran, L. T. (2007). On the invalidity of fuzzifying numerical judgments in the Analytic Hierarchy Process. *Mathematical and Computer Modelling, 46*(7–8), 962–975.
Sacchetti, S., & Catturani, I. (2021). Governance and different types of value: A framework for analysis. *Journal of Co-operative Organization and Management, 9*(1).
Sadiq, M. N., Ngo, T., Pantamee, A., Khudoykulov, K., Ngan, T., & Tan, L. (2023). The role of environmental social and governance in achieving sustainable development goals: Evidence from ASEAN countries. *Economic Research-Ekonomska Istrazivanja, 36*(1), 170–190.
Sahel, J. (2016). Multi-stakeholder governance: A necessity and a challenge for global governance in the twenty-first century. *Journal of Cyber Policy, 1*(2), 157–175.
Savastano, M., Suciu, M. C., Gorelova, I., & Stativă, G. A. (2023). How smart is mobility in smart cities? An analysis of citizens' value perceptions through ICT applications. *Cities, 132*, Article 104071.
Schalock, R. L. (2004). The concept of quality of life: What we know and do not know. *Journal of intellectual disability research, 48*(3), 203–216.
Schmidt, K., Babac, A., Pauer, F., Damm, K., & von der Schulenburg, J. M. (2016). Measuring patients' priorities using the analytic hierarchy process in comparison with best-worst-scaling and rating cards: Methodological aspects and ranking tasks. *Health economics review, 6*, 1–11.
Schulz, T., Gewald, H., Böhm, M., & Krcmar, H. (2023). Smart mobility: Contradictions in value co-creation. *Information Systems Frontiers, 25*, 1125–1145.
Scoones, I. (2007). Sustainability. *Development in Practice, 17*(4–5), 589–596.
Servou, E., Behrendt, F., & Horst, M. (2023). Data, AI and governance in MaaS–Leading to sustainable mobility? *Transportation Research Interdisciplinary Perspectives, 19*, Article 100806.
Sharmeen, F., & Meurs, H. (2019). The governance of demand-responsive transit systems: A multi-level perspective. In M. Finger, & M. Audouin (Eds.), *The governance of smart transportation systems: Towards new organizational structures for the development of shared, automated, electric and integrated mobility* (pp. 207–227). Springer.
Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research Policy, 34*(10), 1491–1510.
Stead, D. (2016). Key research themes on governance and sustainable urban mobility. *International Journal of Sustainable Transportation, 10*(1), 40–48.
Stokols, D., & Novaco, R. W. (1981). Transportation and well-being: An ecological perspective. In *Transportation and behavior* (pp. 85–130). Boston, MA: Springer US.
Tomor, Z., Meijer, A., Michels, A., & Geertman, S. (2019). Smart governance for sustainable cities: Findings from a systematic literature review. *Journal of Urban Technology, 26*(4), 3–27.
Van der Steen, M., van Twist, M., & Bressers, D. (2018). The sedimentation of public values: How a variety of governance perspectives guide the practical actions of civil servants. *Review of Public Personnel Administration, 38*(4), 387–414.
Wedley, W. C. (1993). Consistency prediction for incomplete AHP matrices. *Mathematical and Computer Modelling, 17*(4–5), 151–161.
Wegman, F. (2017). The future of road safety: A worldwide perspective. *IATSS Research, 40*(2), 66–71.