Co-Creation in Urban Strategy Making – Variety in Participant Recruitment and Interaction Formats for the Dresden Smart City Model Project

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ABSTRACT

The success of smart city initiatives relies on the active involvement of diverse stakeholders. This article addresses the practical implementation of citizen engagement in smart city development, specifically focusing on elaborating a smart city strategy. The article presents the participative and co-creative formats that have driven the elaboration of a smart city strategy for Dresden, Germany. A comprehensive set of analogue and digital participation activities with open, random and selective participant recruitment has been implemented to ensure a maximum width and outreach of participation while ensuring the requisite depth and thoroughness of knowledge and expertise. From online surveys via showcase events to hands-on participation in public tram lines, various approaches have been used that complement each other. The methodical interplay of these various measures and their systematic synthesis and integration into Dresden´s smart city strategy has model character for other cities seeking to establish future-looking urban development strategies. Actual results of the diverse formats include the streamlining of digitisation efforts among administrative departments as well as insights into and capacities for iterations in complex and changing environments, potentially generating resources and creativity for sustainable urban digitisation.

Keywords: Smart City, Co-Creation, Digital Participation, Urban Development

1 Background and Research Interest

The success of smart city initiatives depends not only on advanced technology but also on the involvement of a wide variety of stakeholders (Arnkil *et al.*, 2010; Calzada, 2018; Leydesdorff and Deakin, 2011; Mora *et al.*, 2019; van Winden and van den Buuse, 2017). In conceptual terms, involving diverse stakeholders in smart city development aims to apply innovation concepts such as quadruple-helix innovation to smart city development (adding universities and civil society to the public-private smart cities (Borghys *et al.*, 2020; Vallance *et al.*, 2020). Notably, "quadruple helix" smart cities involve citizens as co-creators and bottom-up implementors of urban innovation (Carayannis and Rakhmatullin, 2014: 220). At the same time, smart city developments bring new opportunities for citizen participation, allowing civil society actors to deliver and evaluate public services (Calzada, 2018; Castelnovo *et al.*, 2016; Farías and Widmer, 2018; Mancebo, 2020). In practical terms, scholars highlight the potential for "a people-centred smart city 2.0" (Trencher, 2019; also Baccarne *et al.*, 2014; Farías and Widmer, 2018; Hollands, 2008), while public administrations also increasingly recognise the relevance of involving a wide variety of stakeholders. However, the practical implementations of the "actually existing smart citizen" are "failing to include the voices of 'average' citizens in decision-making processes" (Shelton and Lodato, 2019: 48). To engage citizens in decision-making and empower them as co-creators of their urban environment, various tools and strategies have emerged that draw on different participant selection methods and use different approaches for communication and decision-making (Cardullo, 2020; Cardullo and Kitchin, 2019). Despite numerous comparisons of these

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tools across different administrative contexts and locations, there still remains a deficiency in controlling external factors by situating multiple participation processes in the same administrative context and location. To address this gap, this paper aims to compare different techniques of stakeholder involvement within the same administrative contexts and locations (i.e., the same smart city development process). In this sense, this article reviews different tools used for stakeholder involvement at an early step of smart city development: the elaboration of a smart city strategy.

To empirically explore the effectiveness of citizen engagement tools in smart city development, this study focuses on the development of a smart city strategy for the city of Dresden, Germany. The exemplary case chosen for this research is the project "Intelligent Neighborhoods", undertaken in collaboration between the municipal administration of Dresden and the WISSENSARCHITEKTUR Laboratory of Knowledge Architecture at TU Dresden. This project operates within the framework of the "Smart City Model Projects," a federal funding program initiated by the German government. Dresden is one of 74 cities that are supported with federal subsidies in developing exemplary practices and transferrable solutions that promote innovative smart city solutions, digital transformation, and sustainable development.

The first phase of the model project, spanning 1.5 years, was dedicated to creating a comprehensive smart city strategy under the leadership of the WISSENSARCHITEKTUR Lab. The strategy embodies a visionary perspective for Dresden's smart city development, encapsulated by the theme of a "Creative city for sustainable development and resource creation." It identifies four main areas of activity and presents a series of nine projects to be implemented in the subsequent four-year phase. Central to the co-creative development of the smart city strategy were various participatory activities that informed and shaped the process. Using coordinated formats, the local community could actively engage and ensure that the strategy reflected their aspirations and needs (Noennig *et al.*, 2023).

By examining the empirical case of Dresden's smart city strategy development, this study aims to provide insights into the efficacy of citizen engagement tools in shaping inclusive and sustainable urban environments. The findings want to contribute to advancing (practical) knowledge in smart city governance, aiding policymakers, urban planners, and researchers in pursuing effective and time-efficient citizen involvement for smart city development. In the subsequent sections, this article will delve into the approach and methodology employed in these participatory activities while elucidating how the outcomes were integrated into the overall smart city strategy.

2 Theoretical Framework: Assessing Varieties in Participation

This study into different techniques for stakeholder involvement in elaborating a smart city strategy mobilises multiple concepts related to innovation studies and participatory governance (Mello Rose, 2022). Concepts from innovation studies, such as quadruple-helix innovation (Carayannis and Rakhmatullin, 2014; Castelnovo *et al.*, 2016; Vallance *et al.*, 2020) and user co-creation (Bogers *et al.*, 2010; Grabher *et al.*, 2008; Prahalad and Ramaswamy, 2004; von Hippel, 2001) highlight the relevance for involving diverse types of stakeholders in smart city development. Quadruple-helix innovation stems from the notion that greater civil society participation allows the evaluation of implemented technologies in terms of the generated public value (Castelnovo *et al.*, 2016: 735). Co-creation emphasises "the potential impact of collaborative interaction between public and private actors on the ability to foster new and innovative solutions to intractable problems" (Torfing *et al.*, 2019: 804). In quadruple-helix innovation and co-creation, citizens and civil society actors are involved in smart city development to contribute with different forms of tacit knowledge that public decision-makers might lack. This includes *everyday knowledge* that helps to assess novel technologies in real-life contexts; (2) *problem knowledge* through which novel areas of application are detected;

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and (3) *solution knowledge* through which citizens co-produce actual problem-solving tools (Bogers *et al.*, 2010).

Participatory governance concepts, such as different (forms of) democratic innovation (Pogrebinschi, 2023; Smith, 2009) and different participation-enabling technologies (Bua and Bussu, 2020; Ferrer, 2017; Kurban *et al.*, 2017; Mancebo, 2020) propose diverse formats to implement stakeholder involvement efficiently. Under the right circumstances, public participation can reduce power inequalities and exclusion (e.g. Fung, 2006; Quick and Bryson, 2016), mitigate frustrations with the democratic system (Pogrebinschi, 2015), support government legitimacy (Fung, 2006; Quick and Bryson, 2016).

Since the 1960s, researchers have been analysing the level and extent of involvement by defining and creating models of "scales of participation" (Arnstein, 1969; Davidoff, 1965) which have since been occasionally updated (Brownill and Bradley, 2017; Conn, 2011; Innes and Booher, 2000; Healey, 2003). For instance, Cardullo and Kitchin (2019) examined citizen involvement in smart city projects using Arnstein's (1969) ladder of participation. However, Arnstein's famed "ladder of participation" lacks an acknowledgement that different types of participants are involved (or not involved) in a given participation process in different ways (Fung, 2006; Gordon *et al.*, 2011). Moreover, this conceptualisation lacks a deeper analysis of how knowledge is collected and systematised in different participatory processes. Yet, merely "inviting the public to participate is insufficient for fostering legitimate and sustainable public engagement" (Gordon *et al.*, 2011: 506). In contrast, Fung's (2006) "democracy cube" allows us to also compare citizen participation processes about information beyond Arnstein's ladder of participation. Crucially, Fung's conceptual framework adds two dimensions to Arnstein's scale that account for different methods of participant recruitment and different modes of communication and decision-making.

As the different forms of authority in decision-making are kept constant in the participatory process we study, this investigation focuses on the two scales introduced in Fung's (2006) "democracy cube". The first scale, *participant selection*, ranges from greater inclusion to a more careful selection of participants. While most citizen participation processes are open to anyone willing and able to participate, this form of self-selection risks that wealthy and educated elites use participatory processes to safeguard their status (Fainstein and Lubinsky, 2020; Gerber *et al.*, 2018; Swyngedouw, 2005). To overcome this, participatory processes can implement dedicated participant selection strategies. Random selection is used in decision-making to ensure fairness and diversity of representation without bias from self-selection. Selective recruitment is a method that aims to involve individuals who are typically underrepresented, such as those from low-income or minority communities. This is done by hiring community organisers to promote meetings and encourage participation. Moreover, in specific circumstances, selective recruitment can also involve hiring professional participants from organised interest groups or public officials with specific expert knowledge, which is necessary to resolve a particular policy issue (Fung, 2006). In this sense, participant selection methods range from engaging with a "diffuse public sphere" over involving randomly selected "mini-publics" to recruiting "expert administrators" (Fung, 2006).

The second scale, modes of communication and decision-making, ranges from basically no communication between participants (i.e., the spectator mode) to participants collaboratively elaborating public policies by finding a consensus (Fung, 2006). Based on Fung (2006), we distinguish the following modes of communication and decision-making: The "Spectator Mode" involves participants attending events to receive information about policies or projects. In the "Expression Mode", individuals have the opportunity to express their preferences or opinions, notably through statements made at public meetings or online platforms. The "Exploration and Aggregation Mode" fosters discussions and small group interactions, allowing participants to explore, develop, and potentially transform their preferences and perspectives. The

"Deliberation and Negotiation Mode" encourages individual and collective deliberation, where participants exchange perspectives, reasons, and arguments with the aim of reaching an agreement on public matters.

3 Context: The Participatory Strategy-Building Process

The participatory elaboration of the overarching smart city strategy was the key project in the first phase of the smart city model project (01/2022-06/2023). The initial design of the strategy-making process connected multiple stakeholder involvement techniques over roughly half a year (Noennig *et al.*, 2023). Overcoming the intense time pressure of implementing this strategy-building process in such a short time requires the combination of regular activities of a strategy-building process (e.g., assessment of the status quo, creating visions) with ample stakeholder involvement to generate a solid creative momentum in two directions (Fig. 1):

1) **Forward momentum**: Members of the municipal administration of Dresden (precisely: the Municipal IT Corporation EBIT who acted as formal project leader) and the scientific team of the WISSENSARCHITEKTUR Lab at TU Dresden acted as process drivers to generate a strong forwards momentum towards the finalisation of the strategy within the short timeframe imposed by the federal funding agency;
2) **Lateral momentum**: At the same time, the project leaders and the academic counterparts created lateral momentum towards drawing on the capacities present in Dresden by involving stakeholders from industry and civil society in diverse different participatory formats.

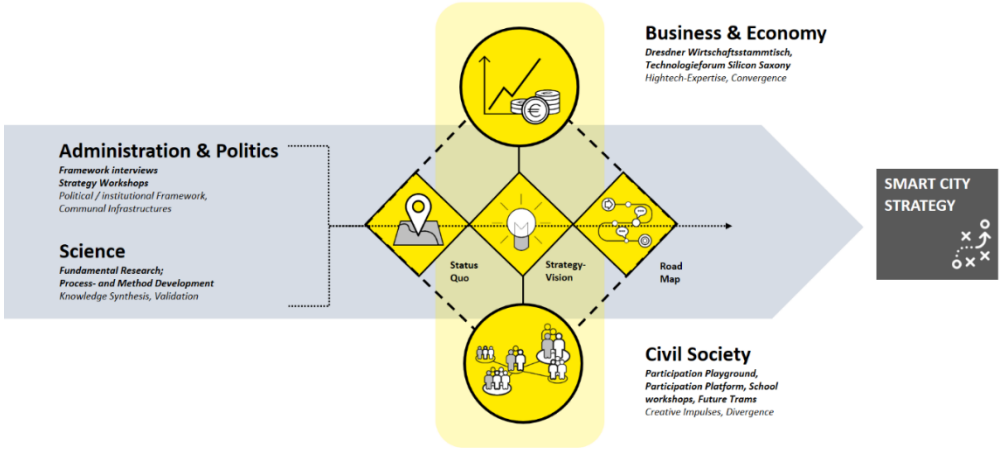

Figure 1: *Initial Scheme for Smart City Strategy-Making Process (own elaboration).*

This forward and lateral momentum aims to not only dynamically involve diverse stakeholders to increase the acceptability of the proposed innovation to public space but also to collect the different forms of tacit, non-expert knowledge that these diverse stakeholder hold. However, the short time period in which all participatory processes had to be carried out stipulated the use of agile development practices. These practices rest on using multiple layers of cyclic activities that drive progress forward. The strategy development processes thus underwent several iterations, particularly regarding stakeholder involvement, to maintain a balance between divergent and convergent thinking for innovation and creativity.

4 Broad Citizen Participation Put into Practice

A central aim in the overall strategy-development process was broad and comprehensive participation to foster the lateral momentum. These participation formats sought to cover the relevant stakeholder groups as indicated in quadruple-helix innovation. Stakeholders from civil society (individual citizens, NGOs,

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associations etc.), as well as industry-related stakeholders (enterprises, tech clusters, economic development agencies etc.), had to be involved in an appropriate manner.

In this sense, the WISSENSARCHITEKTUR Lab at TU Dresden developed a toolbox of participatory formats that include the different forms of participant selection and of communication and decision-making modes (Fig.2). Due to time constraints, not all selection methods could be covered. In this sense, the participator process used three selection methods (open, self-selection; random selection; and selective recruitment of experts) and mainly distinguished between two different communication and decision-making modes (expression mode and deliberation and negotiation mode).

Moreover, the different formats include regular, extended or repeated activities (e.g., expert interviews, strategy workshops, "future tram", online survey) and individual events (presentations at "Saxony Transfer Roadshow", "Long Night of Science", the "Sustainability Club"; and the "scientific reflection"-workshop).

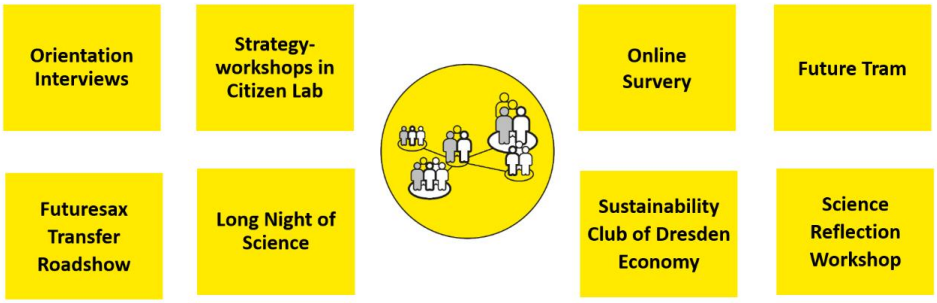

Figure 2: *Participation Formats carried out 2022-2023 (own elaboration)*

4.1 Expression Mode Participation Formats: Gathering information from diverse stakeholders

Open, self-selective participant recruitment was used for gathering information from diverse stakeholders. This was most clearly used in the online participation process over two months (12/2022-01/2023). During roughly four weeks, citizens were asked about their expectations and fears concerning Smart City development. This low-threshold participation through a citizen survey allowed for assessing satisfaction with the established priorities in shaping a "Smart City Dresden." The majority of the over 600 participants were residents of Dresden. Moreover, representatives from civil society, academia, businesses, administration, and politics participated in the survey. They provided insights into how a smart city could address challenges from their personal and professional lives but also could highlight what they perceived as risks of digitisation. The survey enabled participants to express their perspectives on visions, risks, and opportunities and to develop further and refine the results of vision workshops. In addition to questions about expectations regarding a "Smart City Dresden," guiding principles were presented for discussion.

However, previously the participation process had already used open, **self-selective participant recruitment in combination with elements of random selection**. This recruitment strategy was used in an early participatory format, during the summer of 2022, in an initial digital co-design campaign during the "*Long Night of Sciences*" event on July 8, 2022. In this format, which took place at the Technical University, the digital participation platform U_CODE stimulated citizens to express their "visions" and design preferences regarding the future developments of the three model districts located in Johannstadt, Friedrichstadt, and the extended eastern part of Dresden/Prohlis. The districts were represented as 3D models, and citizens could express their preferences for future development precisely on other locations they felt required improvements. Approximately 50 persons engaged in this activity, and the collected information was later used as creative input to the subsequent participation formats. Situated within a city-wide event that aims to open up academic research to the wider public, this participation format was open

to all participants who desired to express themselves. However, the fact that this was not advertised as a single participatory event but rather drew on the public that was already participating in *Long Night of Sciences* adds randomness to the participant selection processes. By holding a participatory event in an unconventional location and at an unusual time, we were able to recruit participants in an **open, self-selective manner** while also allowing for some **randomness** in participant recruitment by involving primarily individuals who had not planned to attend a participatory forum.

The "Future Tram"-format draw on **fully random participant recruitment** to allow those that typically would not engage in participator processes to express themselves. To involve citizens and individuals with limited digital media affinity in the conceptual work, a collaboration with the Dresden Transport Company (DVB) enables the implementation of three "Future Trams" on January 14 and 17, 2023. In this format, three regularly operating trams were transformed into idea labs, where passengers could contribute their thoughts on the "Smart City Dresden" while using public transport. Passengers were given a notepad that confronted them with a smart city key question. To express their ideas and suggestions for a "Smart City Dresden", passengers wrote on sticky notes, which they attached to posters on the trams' windows. Three tram lines were selected in partnership with the DVB, intersecting all targeted model districts and reaching the city's outskirts (North-South Line 7, East-West Lines 1, 10/12). This allowed randomly-selected passengers from all model districts to participate in the problem analysis, better depicting a cross-section of the population while at the same time also raising awareness of the Smart City model project. This participatory format resulted in the collection of 455 comments highlighting unexpected pain points in different areas of urban life.

The participation formats at various industry events represented a **combination of selective participant recruitment and random selection**. Similar to the participation format at the "*Long Night of Sciences", t*he approach of using larger events as sites for stakeholder involvement was also to engage with industry-related parts of the quadruple-helix innovation ecosystem. The specific selection of local IT experts and industry stakeholders was implemented by participating at the "Silicon Saxony Day" on June 28, 2022, and at the "IT and Organizational Forum Saxony" on September 7 and 8, 2022. During these events, the *Transfer Roadshow,* which presents the smart city research projects of TU Dresden Knowledge Architecture Lab, was used as a site for randomly involving participants of these two events (that likely were local IT experts and industry stakeholders). During this event, participants engaged in participatory stakeholder mapping. The resulting "smart city radar" collected the projects, relevant topics, and actors the participants deemed relevant to Dresden's smart city development. Moreover, participatory mapping and the presentations of the model project also aim to support the active involvement of industry stakeholders in the broader project.

Furthermore, the participatory process supporting the development of a smart city strategy drew on the **fully selective recruitment of participants** during the "orientation interviews". Early in the participatory process, members of the WISSENARCHITEKTUR interviewed various high-ranking officials from Dresden's municipal administration, including the mayor and council members. During the 1-hour-long semi-structured interviews, the challenges, municipal policy objectives, and specific initiatives were discussed in detail. Afterwards, members of the WISSENARCHITEKTUR analysed the interviews. They created short summaries that would be used for participation formats in an exploration and aggregation mode, along with most other input gathered from diverse stakeholders.

4.2 Deliberation and Negotiation Mode: Participatory Evaluation of Previously Gathered Information

"Strategy- and Vision Workshops" largely ran in parallel to the participatory processes outlined above and aimed to brainstorm on smart city challenges and future projects, leading to the formulation of

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comprehensive smart city visions. While participation was **open to all interested persons**, some participants were also **deliberately selected experts**. The workshops were initially held online and later transitioned to the Citizen Lab in Dresden City Hall. Participants from administration, civil society, business, and academia collaborated to establish foundational content and guiding principles of the smart city strategy based on their experience and views, but also considering the previously implemented participation formats. Taken together, the workshops involved approx one hundred participants. The intensive interaction between different stakeholders within the administration was strengthened, allowing the creation of synergies to existing frameworks for urban development (e.g., the smart city Charta, the SDGs and the integrated urban development plan).

Towards the end of the participatory strategy elaboration, two workshops with selected participants aimed to strengthen the academic and industry perspectives in the final strategy draft. To actively involve local stakeholders from the business sector in the implementation of the Smart City strategy and its planned measures, a participatory workshop was conducted in collaboration with the Economic Development Department of the city of Dresden on January 25, 2023. Representatives from Dresden's business and industry sectors provided insights into the national funding program "Smart City Modell Projects" and evaluated Dresden's smart city strategy in this light. The workshop focused on enabling sustainable digitalisation in implementing the Smart City strategy. A scholarly reflection workshop took place on January 30, 2023, involving representatives from the Leibniz Institute of Ecological Spatial Planning (IÖR) in Dresden, the Knowledge Architecture Laboratory of Knowledge Architecture, and the Digital City Science research group at HafenCity University Hamburg. The workshop centred around critical discussions about the strategy and implementation process, particularly on scientific support, impact assessment, and synthesis research in Phase 2. Participants actively provided their expert knowledge regarding the co-creative development of indicators approaches for monitoring impacts and utilising qualitative narratives.

Table 1: *Overview of different participant selection methods and communications modes mobilised in the participatory elaboration of Dresden's smart city strategy*

	Expression Mode	**Deliberation and Negotiation Mode**
Open participation of lay participants (self-selection)	• *Online Smart City Survey*	• *Strategy- and Vision Workshops (in part)*
Random selection of participants	• *Long Night of Science;* • *Future Tram;* • *Transfer Roadshow*	
Selective Recruitment of professional Stakeholders	• *Orientation Interviews*	• *Scientific Reflection;* • *Sustainability Club;* • *Strategy- and Vision Workshops (in part)*

5 Conclusion and Discussion: Lessons from the Messy Realities of Combining Participant Recruitment Methods and Communication Modes in a Short Period

Proper citizen participation and stakeholder involvement take time. However, beyond the realm of academia, such ideals often fail to be implemented in the messy and ad-hoc political and administrative realities. In these cases, processes much run in parallel and in different 'directions' to create both a forward momentum, ensuring the rapid advancement of the policy process, and a strong lateral momentum, that aims to involve diverse sets of stakeholders in the best way possible. While there are natural trade-offs between focussing on each momentum, using the full scope of available participation instruments can enable time-efficient and broad stakeholder involvement.

We hold that the stakeholder involvement in the strategy elaboration accounts for the relevant lessons from innovation scholars and participatory governance. On the one hand, innovation studies highlight the value of creating quadruple-helix innovation systems as all types of stakeholders have relevant knowledge, even if this knowledge lies outside expert wisdom and instead relates to practical, day-to-day observations or routine economic practices (Bogers *et al.*, 2010). Co-creation with future uses of innovations (including future users in the administration) undoubtedly played a significant role in improving the smart city strategy. On the other hand, the strategy-elaboration process also accounted for the risks and limits that citizen participation frequently faces, i.e., the exclusion of marginalised communities. This issue was approached head-on by including citizen participation processes that randomly recruited participants that happened to take a specific tramway to their destination.

6 Limits and Outlook

Naturally, this process has limits and could be improved in many regards. The parallel implementation of many participation formats limited the interaction between each format's findings. In the case of some citizen participation formats, the necessary evaluation of the collected material format could only take place after drafting the strategy. Moreover, the reduced period during which all participation processes had to be implemented led to limitations in the extent to which multiple formats could be repeated.

Figure 3: *Linkage of Strategic Projects Scheduled for Implementation*

In this sense, in the ongoing implementation phase (2023-2027) of the Smart City Model Project in Dresden, the synthesis research team has a crucial responsibility of continuously refining the current smart city strategy based on the information that stakeholders expressed during the participatory processes. Moreover, the current version is conceptualised as a "living document" that requires ongoing updates and refinement. In addition, it's essential to establish a strategic connection and integration between the planned projects in Dresden's neighbourhoods. This will allow their impacts and findings to be replicated throughout Dresden and possibly beyond (See Fig. 3 for reference.). To facilitate these activities' forward and lateral momentum, further involvement of all relevant stakeholder groups is required. Here the potential of using the entire width of participatory methods (in terms of participant recruitment and communication and decision modes) will be particularly handy. A format of "continuous participation and

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co-creation" will be established for that purpose, probing into new (digital) formats as well as continuing the use of already established formats (e.g., Future Tram, Citizen Lab Workshops a.o.).

7 Declarations

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