Co-Creation and Sustainable Urban Planning: Who Co-Creates Sustainable Mobility Solutions at the Neighbourhood Level? Experiences from the Horizon 2020 Project "Sunrise"

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1 ABSTRACT

Co-creation is applied as a key concept to develop, implement, assess, and facilitate learning about new ways to address urban mobility challenges at the neighbourhood level in the HORIZON 2020 project SUNRISE[1] ("Sustainable Urban Neighbourhoods - Research and Implementation Support in Europe"). SUNRISE's objective is to contribute to sustainable urban development by stimulating co-creative processes and problem solutions in neighbourhoods in the field of new mobility concepts and new forms of mobility. Towards this aim, six cities (Bremen, Budapest Jerusalem, Malmö Southend on Sea, Thessaloniki) are fostering comprehensive collaborative processes with various actors in specific neighbourhoods with the explicit mandate to implement sustainable mobility solutions.

The involvement of different actors is an important aspect and a challenge for co-creation processes. On the one hand, the involvement of residents and other stakeholders in sustainable urban planning is seen as promising. in terms of achieving better results to improve the adaptability of socio-ecological systems. On the other hand, there are often questions such as: "who is participating?", "how can different actors be reached?" and "what results can be achieved with co-creation?". This paper provides answers to these questions based on experiences from co-creation processes in the SUNRISE project. After defining and embedding the term co-creation in planning theory, this paper gives an overview of the involved actors in the co-creation processes in SUNRISE, the co-creation activities carried out, and the mobility solutions developed on the neighbourhood level. Finally, the challenges of involving various actors in co-creative processes and the opportunities for co-creation when planning sustainable mobility solutions on the neighbourhood level will be discussed.

Keywords: Sustainable Mobility, Mobility Planning, Participation, Co-Creation, Neighbourhood

2 INTRODUCTION

New calls for transformational development processes and fresh urban planning agendas are being fuelled by the effects of climate change, discussions about necessary shifts in energy and transport, as well as the demand for liveable cities. In urban planning, participation is considered an important element in promoting sustainable spatial development (Zimmerman & Höflehner 2016: 1). In participatory planning, residents and other stakeholders are invited to participate in planning or decision-making processes with the idea that participation can influence the content of planning (see Healey, 1997; Innes, 1998; Innes and Booher, 1999). The involvement of residents and other stakeholders in urban planning is seen as promising, for example to achieve better results and improve the adaptability of socio-ecological systems (Healey, 1997; Innes and Booher, 1999; Olsson et al., 2004).

Participatory planning allows for integrating the needs and requirements of local stakeholders into urban planning and is often seen as a good lever to solve urban challenges (Zimmermann & Höflehner 2016: 1). Nevertheless, existing participation practices in urban development are partially insufficient to address new demands and needs arising from these urban problems creating dissatisfaction among stakeholders. Furthermore, participatory planning processes are often criticized for inefficiency. Residents and other actors are disappointed with the lack of opportunities to have an influence on the planning process while planners remain uninformed about residents' concerns, experiences, and the local conditions (Reed, 2008; Grönholm, 2009). Therefore, urban planners, policy makers, and citizens are experimenting with new collaborative approaches like co-creation to tackle persistent urban issues, such as climate change adaptation, quality of life, and urban inequalities (Puerari et al. 2018: 1).

In the HORIZON 2020 project SUNRISE, co-creation is the key concept applied to the development, implementation, assessment, and facilitation of learning about new ways to address urban mobility challenges at the neighbourhood level. SUNRISE's objective is to contribute to sustainable urban development by stimulating innovative, participatory, and problem-solving processes in neighbourhoods in the field of new mobility concepts and new forms of mobility. Towards this aim, six cities including Bremen, Budapest, Jerusalem, Malmö, Southend on Sea, and Thessaloniki apply comprehensive collaborative processes in specific neighbourhoods. Their explicit mandate is to foster and implement innovative solutions for and with their residents and other actor groups.

The involvement of different actors is an important aspect of and challenge for co-creative urban planning processes. On the one hand, the involvement of residents and other stakeholders in sustainable urban planning is seen as promising, like to achieve better results and improve the adaptability of social-ecological systems. On the other hand, there are often questions such as: "who is participating?", "how can different actors be reached?" and "what results can be achieved with co-creation?". This paper provides answers to these questions based on experiences from SUNRISE co-creation processes for planning sustainable mobility solutions on the neighbourhood level. After defining and embedding the term co-creation in planning theory, this paper gives an overview of the involved actors in the co-creation processes in SUNRISE, the co-creation activities carried out, and the mobility solutions developed on the neighbourhood level. Finally, the challenges of involving various actors in co-creative processes and the opportunities to co-creatively plan sustainable mobility solutions on the neighbourhood level will be discussed.

3 CO-CREATION AS NEW FORM OF PARTICIPATORY PLANNING IN SUSTAINABLE URBAN DEVELOPMENT

3.1 Co-Creation: A new term in urban planning

In urban planning, participation is an important element in promoting sustainable spatial development. New participatory concepts like co-creation are developing and spreading worldwide, with the aim of supporting sustainable urban transition and transformation. Originally conceived in the 1990s as a new business strategy for customer engagement (Leading Cities 2014: 1), co-creation is an increasingly common concept in the context of urban planning today integrating various actors in planning processes to create something together (Schönfeld et al. 2019: 1). However, the concept of co-creation in urban development is by no means clear and well-defined (Leading Cities 2014: 3; Lund 2017: 29; Puerari et al. 2018: 4).

In the program "ERA-NET Cofund Smart Urban Futures", the European Commission defines co-creation as "an approach where heterogenous actors collaborate to produce knowledge, instruments, technology, artefacts, policy, know-how, etc." (JPI Urban Europe 2016: 52). Schneidemesser et al (2019: 3) add a processual aspect and define the concept of co-creation based on the following three dimensions:

- In a social dimension, co-creation describes a reciprocal exchange-based collaboration between heterogeneous actors.

- In a material dimension, co-creation describes how the interaction of different perspectives generates something unexpected, which the involved actors can use.

- In a temporal-spatial dimension, co-creation describes those processes that enable relatively autonomous actors to exchange ideas or to create values together.

From this perspective, co-creation is a form of collaboration in which knowledge, instruments, technology, artefacts, policy, know-how, plans etc. are created through an ongoing process among heterogeneous actors (Schönfeld et al. 2019: 3). The research group Leading Cities (2014: 3) identify the heterogenous actors and define co-creation as "the active flow of information and ideas among five sectors of society: government, academia, business, non-profits, and citizens - the Quintuple Helix - which allows for participation, engagement, and empowerment in developing policy, creating programs, improving services, and tackling systemic change with each dimension of society represented from the beginning".

In summary, co-creation is characterized by the fact that heterogeneous actors from different sectors are mobilized in a collaborative process to create something together. Based on the definitions above, Haufe & Franta (2019: 55) understand co-creative urban planning as the set of interconnected processes in which heterogeneous actors mutually interact and work together to develop answers to urban challenges in the form

of knowledge, instruments, technology, artefacts, policy, know-how, and plans, etc. (Haufe & Franta 2019: 55).

In contrast to traditional participatory practices in urban planning, which still often only aim at engaging citizens, the inclusive nature of co-creation provides the public, private, non-profit and academic sectors as well as citizens themselves the opportunity to serve as equal stakeholders. In co-creative processes, new forms of cooperation and mutual learning processes emerge between actors among different sectors of society (Zimmermann & Höflehner 2016: 1-2). In order for this to happen, it is necessary to socio-culturally (open of diverse group of participants), strategically (thematic openness, open-ended results, open structures) as well as operationally (open flow of information, knowledge and ideas) open up the processes (Raffl et al. 2014: 47). Doing so provides the opportunity for everyday and expert knowledge to work together to solve problems and to develop ideas (Petrin 2016: 163). Co-creative urban planning thereby focuses on integrating different forms of knowledge into urban processes in order to create innovative solutions for complex urban problems (Haufe & Franta 2019: 58).

What further distinguishes co-creation from other participation initiatives is the involvement of the various stakeholders from the beginning to the end of the planning process. Rather than ask people to "plug into" existing pre-determined programs, initiatives, or campaigns, co-creative approaches should help people form and promote their own decisions, create new stakeholder maps, and develop open-ended processes (Leading Cities 2014: 5). Co-creation is ideally an endless process and can be understood as an overarching development philosophy (Davis & Andrew 2016: 653). Therefore, co-creation focuses primarily on long-term culture change, rather than on short term outcomes, issues, or achievements, and includes a cross-section of entire communities rather than parts of them (Leading Cities 2014: 5). In this sense, co-creation is not only an approach for creating product or service innovation, but also a way of creating social innovations such as the intentional reconfiguration of social practices like collectively shared values, knowledge etc. (Puerari et al., 2018: 5).

In recent years co-creation has become a buzzword in urban planning and is often also seen as a new concept in planning. However, as a form of collaboration among multiple actors, the concept of co-creation in planning is based on participatory literature of previous decades. The following section shows that co-creation is not a new concept but rather a concept based on the communicative and collaborative planning theory developed within the last four decades.

3.2 Urban planning as collaborative practice

In response to the growing crisis of technocratic planning in the 1970s, various planning approaches in the 1980s and 1990s focused on the stronger involvement of different actors in planning processes. With the realisation that expert knowledge alone did not achieve the 'optimal' solutions for spatial development, a new paradigm of planning developed, which defined planning as a communicative practice (e.g. Forester 1989, Healey 1992, Innes 1995, Selle 1996). This new planning paradigm is based on an understanding which recognises the diverse ways of living that exist in pluralist societies. In comparison, traditional planning focuses on scientific rationalism in a culturally homogeneous community with a public interest (Healey, 2006). In planning literature, this change is also called "communicative turn" or "argumentative turn" (Forester 1989, Healey 1992, Healey 1996). Several scholars (Innes and Booher 1999; Margerum 2002; Healey 2003; Maginn 2007; Lofgren and Agger 2008) have also defined this new planning paradigm as collaborative planning.

Patsy Healey, one of the main proponents of collaborative planning, outlines that a city its residents identify with requires the inclusion of the diverse urban actors and the actors' various interpretations of the city in the planning process (Healey 2002: 1778). The collaborative understanding of planning assumes that common solutions to planning problems can be found only through participation of all relevant actors, the consideration of their life worlds and the creation of political communication and cooperation structures (Healey 1997). The focus is on negotiating a consensus that represents the best possible solution for all involved (Streich 2005). Collaborative processes thus include the articulation of different interests, the critical questioning of expert opinions, the agreement on relevant topics and content, the formation of opinions and a final decision, which everyone can agree upon (Innes 1996). The aim is to overcome one-sided communication between government or experts and the population by initiating active exchanges

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between all state, economic, and civil society actors (Innes and Booher 2004) to establish a common understanding for future planning (Healey 1992).

Collaborative planning theory approaches operate at the intersection between planning bureaucracy and actors in society (Ipsen 2010: 238). These collaborative planning approaches question both, the hierarchical relationship between bureaucracy and societal actors, and the role of state-sovereign planning as the only planning authority. Instead, a consensus-oriented planning process is designed in which the legitimacy of planning practices only can be produced by negotiating with various public and private actors (Gribat et al. 2017: 10). According to communicative planning perspectives, participation is at the root of planning (e.g. Friedman 1987 & 1989, Healey 1992, Innes 1995). To plan according to this view is to communicate, argue, debate, and engage in a discourse for the purpose of aligning attention and defining the possibilities for action (Puerari et al. 2018: 4).

Habermas' theory of communicative action (1981) and his discourse ethics (legitimacy, truth, accessibility, argumentation logic) provided the basis for communicative and collaborative planning (Ipsen 2010: 238). Healey described collaborative planning as "a new form of planning, a respectful argumentative form of planning through debate, appropriate to our recognition of the failure of modernity's conception of 'pure reason', yet searching, as Habermas does, for a continuation of the Enlightenment project of democratic progress through reasoned inter-subjective argument among free citizens" (Healey 1992: 160).

The distinguishing feature of collaborative planning to technocratic planning is that it delegates the responsibility for planning directly to involved actors (Gunton & Day 2003: 6). It encourages people to engage in a dialogue in a situation of equal empowerment and shared information, to learn through mutual exchange, to create innovative outcomes, and to build institutional capacity. The dialogue promotes sharing information, understanding the perspectives of other partners, and creating innovative results. Institutional capacity, which is considered a combination of social, intellectual, and political capital, proliferates through networks of mutual trust and makes civil society more competent (Innes and Booher, 2004; Healey, 2006). The collaborative process is a cycle that includes dialogue, trust building and commitment, shared understanding, and (intermediate) outcomes (Purbani 2017: 138).

Co-creation is a form of collaboration in which knowledge, instruments, technology, artefacts, policy, know-how, plans etc. are created through ongoing process among heterogeneous actors (Schönfeld et al. 2019: 3) This section showed that co-creation is not a new concept but is rather based on the communicative and collaborative planning theory developed in the last four decades. Nevertheless, co-creation has become a buzzword in urban planning because urban planning today is based on the assumption that urban spaces have a social significance that cannot be met by technocratic planning alone. The increasing demands on the city require an approach that takes the needs and perspectives of different actors into account in an inclusive and democratic manner. For this reason, it is important to keep an eye on the diversity of urban society in order to ensure constructive development of topics and processes that are difficult to predict (Grünzel 2014: 75).

When arenas for mutual exchange and collaborative planning are created, the focus is on questions such as "Who is participating?", "How can different actors be reached?", "What is being negotiated?". With the Horizon 2020 project SUNRISE as an example, the following section will analyse the implementation of co-creative processes with local actors for finding sustainable mobility solutions at the neighbourhood level.

4 CO-CREATION IN PRACTICE - THE HORIZON 2020 PROJECT "SUNRISE"

4.1 Development of sustainable mobility solutions at the neighbourhood level: The Horizon 2020 project SUNRISE

Since the Paris Climate Accord of December 2015, it is clear global carbon dioxide emissions will have to be dramatically reduced if global warming is to be limited to 1.5 degrees compared to the pre-industrial era. For the mobility sector, this means the need for (infra-)structural and behavioural changes in addition to the phasing out of fossil fuels also at city level. In 1989, Newman and Kenworthy were able to determine in an international comparative study of urban regions that the use of cars, the volume of traffic, and the energy requirements of transport negatively correlated with the density of settlements. These results are an argument for compact, mixed-use neighbourhoods, which not only helps to reduce greenhouse gas emissions, but also offer great potential for the attractive design of cities and neighbourhoods (Neumann 2010: 207). Therefore,

neighbourhoods are increasingly becoming the focus of sustainable urban development (Roselt, 2016: 1). For co-creation, neighbourhoods may be ideal "real-life laboratories" to experiment, learn, and advance transformation which ideally has a positive impact on the entire city (Brocchi 2019: 250).

In the HORIZON 2020 project SUNRISE ("Sustainable Urban Neighbourhoods - Research and Implementation Support in Europe"), co-creation is the key concept to develop, implement, assess and facilitate learning about new ways to address common mobility challenges at the neighbourhood level. Towards this aim, six SUNRISE cities (Bremen, Budapest, Jerusalem, Malmö, Southend on Sea, Thessaloniki) are fostering collaborative processes in specific neighbourhoods as "Neighbourhood Mobility Labs" with the explicit mandate to implement innovative solutions for and with their residents and other actors.

All SUNRISE activities are structured along the phases of the innovation chain and based on co-creation. In a multi-stage process, actors from different sectors of society jointly identify mobility-specific problems in the neighbourhood and cooperatively develop mobility solutions. These mobility solutions will be jointly implemented as part of the SUNRISE project. Continuous monitoring and evaluation accompany the co-creation process in SUNRISE as well as dissemination and learning activities.

The co-creation processes in each SUNRISE neighbourhood are initiated by local city partners from administration, community management or by integrated planning offices. A steering committee called "Core Group", composed of different local actors representing their neighbourhood, steers the co-creation process. For the collaborative planning processes, each SUNRISE action neighbourhood combines various methods and tools to bring together citizens and other stakeholders to learn from each other in order to address urban challenges in transforming neighbourhoods and cities.

By halfway through the project duration (05/2017 to 04/2021), all SUNRISE neighbourhoods have completed the phase of problem identification and measure development. Reaching such a milestone calls for reflection upon several aspects of the SUNRISE project such as involved actors, the methods and tools of collaboration applied and the outcomes of the co-creative processes so far..

4.2 Actors in the process of problem identification and mobility solution development

In general, co-creation is characterized by the fact that heterogeneous actors from different sectors are mobilized in a collaborative process to create something together. The research group Leading Cities (2014: 3) delineate the different actors and define co-creation as "the active flow of information and ideas among five sectors of society: government, academia, business, non-profits, and citizens - the Quintuple Helix - which allows for participation, engagement, and empowerment in, developing policy, creating programs, improving services, and tackling systemic change with each dimension of society represented from the beginning."

The SUNRISE mission is to develop, implement, assess and facilitate co-learning about new, collaborative ways to address common urban mobility challenges at the urban neighbourhood level. The conceptual key-term of this project is the idea to "co-create" a more sustainable mobility future. Therefore, local actors and other stakeholders should be involved in all phases to live up to SUNRISE's "co-creation" spirit. By means of regularly-updated stakeholder mapping exercises, relevant actors for co-creating sustainable mobility futures were identified collaboratively in each partner city, showing a diverse actor composition unique for each neighbourhood. Table 1 shows the actors that took part in defining mobility problems and developing and selecting measures across all SUNRISE neighbourhoods.

Despite the broad range of actors in the SUNRISE processes, government, academia, business, NGOs, citizens and media rarely collaborate directly in physical space. Rather, these local initiators of the co-creation processes collect the information, ideas, and solutions proposed by the individual groups of actors and pass them on to other groups of actors.

Central aspects of the concept of co-creation is the openness for diverse groups of participants, the thematic openness as well as open flow of information, knowledge and ideas (Raffl et al. 2014:47). Co-creation focuses on an ongoing and iterative collaboration (Davis & Andrew 2017: 653), but as every open planning process, co-creation also needs shared information in order to achieve innovative outcomes (Haufe & Franta 2019: 57). Therefore, SUNRISE shows that beyond the Quintuple Helix (government, academia, business, non-profits, and citizens), the media sector is an important actor for promoting the flow of information

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including knowledge of and ideas from the co-creation processes. In the SUNRISE neighbourhoods, the local newspapers were particularly important to inform the actors of the different sectors of society about the current status of the co-creation processes and the opportunities for participation. Local newspapers also spread mobility-related knowledge about the developed ideas to the wider public.

Sectors of Society	Actor Groups
Government	district administration, district development agency, members of the district parliament, district mayor, departments of the city administration (environment, transport, urban planning, education, work, social affairs, tourism, business development, communication)
Academia	universities
Business	local businesses, real estate / housing companies, business associations, tourism associations, representatives from planning, architecture, participation, industrial design
Non-Profits	cultural associations, traffic associations, representatives of the police, the fire brigade, healthcare, mobility providers, educational institutions, schools, youth centres, cultural centres
Citizens	residents, citizens' initiatives, citizens from other neighbourhoods, seniors, youth, students, parents
Media	local newspapers

Table 1: Actors of the co-creation process in SUNRISE (adopted from Haufe & Franta 2019: 66)

In collaborative planning processes like co-creation, residents and other actors are invited to participate in planning or decision-making processes with methods such as questionnaires, web forums, public meetings, and field trips, with the idea that participation can influence the content of planning (Faehnle & Tyrväinen 2013: 332). In diverse actor settings (see Table 1), specific attention has to be paid to methods and tools in order to be able to target each actor according to their needs. Methods which were used for the co-creative problem identification and mobility solution development in SUNRISE and actors which were reached with these methods will be covered in the next chapter.

4.3 Methods for the co-creative problem identification and mobility solution development in SUNRISE

A co-creation process has specific requirements which define the successful, purposeful, and inclusive involvement of heterogeneous actors. Therefore, selecting suitable methods and tools out of the plethora of participation formats available is an important aspect. The local actor setting needs to be taken into account for defining and selecting suitable methods and tools for co-creation. In principle, a method or tool may be aimed at the general public and thus to all interested actors in order to reach as many potential actors as possible. A method may, however, also target a selection of representatives from different interest groups or to all those directly affected by a particular topic or the subject-matter of the participatory procedure. In order to address various target groups in co-creation processes, it is useful to apply a mix of methods. A good mix consists of different, complementary methods (Senatsverwaltung Berlin 2011: 160) that promotes dialogue in a situation of equal empowerment and shared information in order to enable the exchange of mutual learning, to create innovative outcomes, and to build institutional capacity.

Every co-creation process and every single method of participation needs to take local culture, customs, and socio-spatial context into account. Spaces and places in the neighbourhood are needed not only because they provide the relevant conditions to facilitate interaction among and access to actors, but also because they bring innovative ideas and resources which catalyse interactive learning and innovation (Puerari et al. 2018: 6). Therefore, in order to reach the different target groups in the SUNRISE neighbourhoods, people were addressed in their everyday life spaces (markets, subway stations, squares, etc…), in "learnt" spaces (schools, museums, community centres, etc…), and local networks (sports club, folklore groups, etc...). Given the trend of digitization, the importance of digital tools in developing urban solutions is growing, especially if urban planning is understood as a collaborative societal effort. Digital tools also create options for integrating local actors into decision-making and implementation processes relevant to urban development (Dübner et al. 2018: 141). Therefore, the SUNRISE action neighbourhoods combine a blend of offline and online methods to bring together heterogeneous actors around shared information, to learn from each other and create new mobility solutions.

An important aspect at the beginning of the co-creation processes in SUNRISE were public events in the neighbourhoods. The objective of these public events was to inform as many people as possible about the process and encourage them to participate. Citizens and other stakeholders were invited to SUNRISE-specific events like the public meeting, but also market-type stands at public street festivals or other events in the neighbourhood where informational material and plans were shared to involve the visitors in the SUNRISE process. At the beginning, the public events were used to advertise the co-creation process and spark interest in participating. During the process, these formats were also used to inform about the current status of the SUNRISE process. Depending on the type of event, different groups of actors can be reached. These public events in SUNRISE were aimed mainly at "citizens", but actors from government (district mayor, district and city administration, members of the district parliament), business (local businesses, business association, tourism association) and the "non-profit "sector (representatives from cultural associations, healthcare, youth / cultural centres from the neighbourhood) also participated at these events. From the sector of media, representatives joined the public meetings to report on SUNRISE. In addition, an often-used method to involve the wider public was an on-tour series of smaller activating events where problems, needs, and ideas are collected via mobile stands in various highly-frequented locations in the public space (streets, market places, shopping centres, cultural centres, train stations, schools, universities etc.). The mobile stands at different locations can reach a large number of people on the one hand and specific user groups on the other by visiting places where these groups can be found. Through the direct exchange, this method can not only be used to share information, but also to learn from each other and to create innovative outcomes. This can happen through a more extensive exchange by discussing ideas together, negotiating advantages and disadvantages and discussing further cooperation especially when smaller groups meet at the mobile stands and engage in a conversation. Different groups of actors can be reached with the mobile stands. In SUNRISE, this method enables reaching a wide range of interested citizens from the neighbourhood and from other neighbourhoods who work, shop or have any other business in the neighbourhood as well. Especially if set up near schools, playgrounds or parks, specific sub-groups of the sector citizens like pupils, youth, parents, and seniors could be reached via these mobile stands. Also, in some SUNRISE neighbourhoods, information points have been created as a point of contact for residents and local actors. In order to operate information points in a way that conserves resources and at the same time intensifies the network of the project within the neighbourhood, cooperation's with local associations, community centres or other NGOs were established. Embedding the information centres in this way through cooperation's allows multiplier effects to be used in the neighbourhood and to build institutional capacity. The visibility and perception of SUNRISE was also increased by various public relations activities (flyers, posters, press releases, etc.) in the neighbourhood. Mainly local actors (citizens, non-profits, businesses) in the SUNRISE neighbourhoods could be reached with these methods.

Furthermore, the SUNRISE cities used methods for co-creation that are based on a selection of representatives from different interest groups or to those directly affected by a particular topic. An important part of the co-creation process in SUNRISE was an entity called "Core Group", which was formed with the aim of serving as a steering committee to accompany the whole process. The Core Group consists in most neighbourhoods of a stable group of 5 to 10 committed people, some of whom operate on an honorary basis while others are members of the city administration or from local politics. The main purpose of the Core Group is to guarantee transparency for the process and its contents internally and externally. Through regular updates, the core group ensures the flow of information in the processes, advises and reflects on the process, and communicates transparently to the wider public, media etc. In most neighbourhoods, the Core Group was also consulted when decisions had to be made, whether of a substantive or procedural nature. In this way, the Core Group served as a co-creation method, not only to promote dialogue in the process, but also to learn from the process through reflection and to advise and co-validate decisions.

A central aspect of the co-creation processes in the SUNRISE neighbourhoods were workshops in which a selection of representatives from different interest groups could participate in defining the problems and developing the measures. Playful approaches with building blocks or other materials in combination with maps or orthophotos have greatly promoted the exchange and creativity among the participants. In the phase of measure development, the workshops proved to be fundamental: design workshops, mini-future workshops or similar activities were used in the SUNRISE neighbourhoods to elaborate the content of the mobility solutions and to locate them in the neighbourhood. In addition to the development of measures, the

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workshop formats also offered the opportunity to discuss, adapt, and select specific measures. Therefore, workshops in SUNRISE offered the generation of information, dialogue but above all collaboration between selected interest groups to create innovative outcomes. The workshop formats in the SUNRISE neighbourhoods allowed the involvement of different groups of actors, for example, citizens (residents, pupils, youth, seniors), government (district and city administration), businesses (housing companies, local businesses, business association, tourism association, representatives from architecture, planning, industrial design), and non-profits (cultural associations, traffic associations, fire brigade, police, educational institutions, youth centre, mobility provider). In general, actors from academia rarely took part in the SUNRISE processes. Only in workshops did academic partners from within the SUNRISE project (representatives from international universities) involve themselves as consultants.

The aim of the SUNRISE process was not only to involve the usual suspects who regularly share their points of view, but also the perspectives of hard-to-reach groups (e.g. older people, children, young people, people with a migration background or people with disabilities). Therefore, various methods were used to address specific groups. These were, for example, walks through the neighbourhood with people with disabilities or targeted interviews in retirement homes, schools, and community centres. The methods had a mainly informative, but in some cases also a conversational nature which increased the inclusivity of the engagement methods. In addition, excursions were also used to take a look beyond the borders of the neighbourhood to get ideas or learn from best practice examples. In SUNRISE, excursions as a method were used for selected actors who participate with long-term commitments (in SUNRISE, the members of the "Core Group") to visit other cities that are facing similar challenges but have already developed or implemented solutions.

In addition to face-to-face methods, digital tools also create options for integrating different groups of actors and provide opportunities for information, dialogue, learning and creating innovative outcomes. In SUNRISE, mainly neighbourhood-specific project websites were used as an online tool for actor information and involvement. The websites were used as virtual information centres, where all information material is made available. Some SUNRISE-neighbourhoods, a web-based mapping forum was implemented through the website. The objective of this forum was the collection of geo-referenced problems, needs and ideas, which are subsequently rated or commented by other users. Websites and online tools in SUNRISE were largely aimed at sharing information with the wider public. Through an exchange among each other (e.g. in SUNRISE the mapping tool), moments of dialogues and co-creation can also be generated, especially if the online tool allows open discussion and has the option for joint steps in the direction of common ideas or vision development. Digital tools create options for integrating the wider public into co-creation processes, but many online tools like the mapping tools in SUNRISE have the disadvantage that it remains often unknown who participated.

4.4 Developed mobility solutions and side effects of the co-creation process

Co-creation is characterized by the fact that heterogeneous actors from different sectors are mobilized in a collaborative process to create something together (Haufe & Franta 2019: 55). Co-creation can have two distinct goals: One purpose of the co-creation can be "making" together a situation where people work together towards an output such as a product, service, or process innovation. A second purpose of co-creation can be "learning" together through situations where actors collaborate towards building knowledge, learning from one another, and creating networks between actors (Puerari et al. 2018: 4). Frequently, both goals are sought, though often the "making together" or the output is in the focus of co-creation in every day practice.

In the co-creative processes of the six neighbourhoods in SUNRISE, a total of 33 solutions for the identified mobility problems of the respective neighbourhoods were developed. Between three and nine mobility solutions were developed for each neighbourhood. The mobility solutions result from the individual neighbourhood-specific, co-creative processes and reflect the respective problems of the neighbourhoods, but can be divided into six categories:

- Public space (10 measures): As part of the co-creative processes, a number of improvements for the quality of stay in public spaces were developed. These include the construction of street furniture (in particular benches), the greening of squares and streets, additional opportunities for children to play, and activities (e.g. festivals, events, initiatives with specific focuses in cooperation with local associations) in public spaces to increase the feeling of security.

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- Bicycle traffic (8 measures): Improvements for bicycle traffic were a result of the co-creative processes in five of six SUNRISE neighbourhoods. The measures developed include the installation of bike racks at central locations in the neighbourhoods and in housing complexes, the establishment of rental stations for cargo bikes, the redesign of bicycle underpasses and intersections, as well as information campaigns for the use of bikes in the neighbourhood and the intermodal use of the bike.

- Pedestrian traffic (7 measures): Mobility solutions for pedestrian traffic were developed in all SUNRISE neighbourhoods. In many neighbourhoods, the focus was on improvements of school routes, including information and education campaigns for safe and sustainable school routes as well as a walking bus ("school bus on foot") for kindergarten children and pupils. In addition, pedestrian routes in the neighbourhood will be redesigned and pathfinding improved.

- Motorized private transport (6 measures): In three SUNRISE neighbourhoods, measures were developed that aim to reduce motorized private transport. The measures developed include the establishment of Tempo 30 zones, targeted parking management and micro-hubs for delivery services and car-sharing stations. Measures for sustainable and safe school routes have also been developed, including measures to reduce delivery and pick-up traffic by means of motorized individual transport and kiss & ride zones in front of schools and kindergartens.

- Local public transport (2 measures): In only one SUNRISE neighbourhood, measures for local public transport were developed. The focus here is on public transport stops, including measures to improve the quality of stay at stops as well as improved information through timetables, neighbourhood maps, and real-time information.

In addition to the mobility measures developed, SUNRISE showed that the co-creation process produces side-effects due to the opportunity to "learn" together, to build up knowledge and to create networks between people. New collaborations and learning processes developed between departments of the city administration that had never worked with each other before in some SUNRISE cities. The co-creative development of mobility solutions with and for the neighbourhood also created new collaborations and learning processes between local actors. For example, in a SUNRISE neighbourhood, residents organised in an initiative that wants to implement a temporary SUNRISE measure on a permanent basis. These side-effects are an indicator that co-creation is not only an approach for creating product or service innovations, but also a way to create social innovations, responsibility, identification, and acceptance of mobility solutions in context.

5 CONCLUSION

In the context of urban planning today, co-creation is an increasingly common concept to integrate various actors in planning processes to create something together. In general, co-creation is characterized by the fact that heterogeneous actors from different sectors are mobilized in a collaborative process to create something together. Co-creative urban planning can be defined as the set of interacting processes in which heterogeneous actors mutually interact and work together to develop answers (e.g. knowledge, instruments, technology, artefacts, policy, know-how, plans etc.) to urban challenges.

Nowadays, co-creation has become a buzzword in urban planning and is often also seen as a new concept in planning. This paper shows that co-creation is not a new concept but based on the communicative and collaborative planning theory developed in the last four decades. Co-creation is a form of collaborative planning practice in which knowledge, instruments, technology, artefacts, policy, know-how, plans etc. are created through an ongoing process among heterogeneous actors. The distinguishing feature of collaborative planning from technocratic planning is that it delegates the responsibility for planning directly to involved actors. It encourages people to engage in a situational dialogue of equal empowerment and shared information, to learn through mutual exchange, to create innovative outcomes, and to build institutional capacity.

With the Horizon 2020 project SUNRISE as an example, this paper gives an overview of the involved actors, the applied methods, the formats of collaboration, and the outcomes of a co-creative process for finding sustainable mobility solutions at the neighbourhood level. The six co-creative processes in SUNRISE show that in practice co-creation offers the opportunity to involve a wide variety of different actor groups from different sectors in the planning process. In addition to the Quintuple Helix (government, science, business, non-profit organizations and citizens), the co-creation processes in SUNRISE show that the media sector in co-creation processes is also an important actor to promote the flow of information to the wider public.

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In order to address various actors and target groups, it is useful to apply a mix of methods. The SUNRISE neighbourhoods have used a variety of different face-to-face and online methods to reach both a large public and specific target groups. Despite the broad range of actors in the SUNRISE processes, government, academia, business, NGOs, citizens, and media rarely collaborate directly in physical space. Rather, the local initiators of the co-creation processes collect the ideas and solutions proposed by the individual groups of actors and pass them on to other groups of actors.

The co-creation approach in SUNRISE offers an opportunity to develop local mobility solutions or neighbourhood mobility concepts. A total of 33 solutions for the identified mobility problems of the respective neighbourhoods were developed in the course of the co-creative processes in the six SUNRISE neighbourhoods. Between three and nine mobility solutions were developed for each neighbourhood. The mobility solutions result from the individual neighbourhood-specific, co-creative processes and reflect the respective problems of the neighbourhoods. The developed mobility solutions include improvements for the quality of public spaces (e.g. greening of squares, construction of street furniture), for bicycle traffic (e.g. installation of bike racks), mobility solutions for pedestrian traffic (e.g. safe and sustainable school routes), and for reducing motorized private transport (e.g. tempo 30 zones) as well as individual measures for local public transport (e.g. quality stay at stops).

The mobility solutions developed in SUNRISE are small-scale measures tailored to local conditions to attract and improve sustainable mobility in the neighbourhood. Mobility solutions are less about the objective (technological) novelty than about the question of whether an idea or solution is new or innovative for the neighbourhood. For this reason, the solutions developed in co-creative processes need to be viewed less from a global or supra-local, but rather from the perspective of the local socio-spatial constellation. Only through the local context can the degree of innovation of the solutions developed with co-creation be understood and classified in a meaningful way.

In addition to the developed mobility measures, SUNRISE shows that co-creation processes also built institutional capacity and created new collaborations and learning processes between local actors. In some SUNRISE cities, new collaborations and learning processes developed between departments of the city administration that had never worked with each other before. In one SUNRISE neighbourhood, residents organised an initiative to implement a temporary SUNRISE measure on a permanent basis. These side effects are an indicator that co-creation is not only an approach to creating product or service innovations, but also a way to create social innovations, responsibility, identification and acceptance for the mobility solutions and its context.

Regarding the potential of the co-creation approach in sustainable urban planning, we conclude that co-creation offers opportunities to create broad awareness and sense of responsibility for sustainable urban development in a local context. Whether co-creation is able to lead to long-term changes in local culture, collaborations, learning processes and institutional capacities, however, requires further research. In terms of mobility, the impact of mobility solutions on sustainability at the neighbourhood level (e.g. shifting traffic to other neighbourhoods) needs to be closely examined.

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