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Envisioning alternatives in pre-structured urban sustainability transformations: Too late to change the future?

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ABSTRACT

In the governance of urban sustainability transformations, participatory futures practices are increasingly popular. Yet there is a rising awareness that the success or failure of these practices depends on how they are staged and the context in which they are conducted. These contextual factors are often less than ideal, and futures practices take place at the crossroads of many pre-determined agendas and priorities. We distinguish four factors that shape the effects of participatory futures practices: 1) how the institutional landscape constrains or enables a project aimed at urban sustainability transformations; 2) the participatory culture surrounding the project; 3) the project design; and 4) the futures methods applied. We assess these factors in three cities within the European H2020 IRIS Smart Cities project. In each city, project members participated in sessions where they designed citizen engagement using a futures methodology: the novel Scope and Ladder models. Each city reflects a different combination of the four contextual factors. We find that space for exploration and re-imagining can be found and optimized under imperfect conditions. Drawing on the results of the three cases, we conclude with a set of recommendations for the funders, project members and futures organizers of urban sustainability transformation projects.

1. Introduction

Global environmental change is threatening urban systems and demands urgent transformations toward sustainability (IPCC, 2018). Societal transformations emerge from complex, co-evolutionary dynamics that often involve both top-down governance and bottom-up processes (Patterson et al., 2017). A sense of urgency can be used as an argument to push the space for citizen engagement out of urban transformation processes – and this can be exacerbated when a small group of powerful

stakeholders seeks to pursue its own interests. Waylen et al. (2015: 112) refer to this as the *"'participation–prescription tension': a potential tension in attempts to simultaneously encourage participation and achieve prescribed goals or targets"*. With the right process design, citizen engagement processes can open up space for observation, reflection, interpretation, discussion and expression for all parties involved. However, the path to the future is paved with a diversity of interests, political visions and values. Opening up processes and their outcomes to the influence of citizens and other stakeholders can lead to unexpected or unwanted

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outcomes and even conflicts (Glucker et al., 2013).

Participatory futures practices can create space for open-endedness and plurality in relatively closed or pre-structured projects (Stirling, 2008). They offer a way to explore both future worlds and the transformations to practices that would be possible or desirable in these worlds (Sanders & Stappers, 2014). Space for consideration of alternative technological possibilities and alternatives to current policy orthodoxies can contribute to exploring more flexible, more inclusive and, arguably, more effective approaches to transformation processes (Beck & Mahony, 2017; Keith et al., 2020). For the purposes of this paper, we define 'space' as the possibility for the inclusive consideration of alternatives in a pluralistic manner. The implementation of these alternatives should be seriously considered.

The majority of futures literature focuses on the preconditions that make for an effective futures process (e.g., Vervoort and Gupta, 2018; Hebinck et al., 2018). However, a reverse order is arguably possible as well: one where the process is partly pre-structured, and space for participatory futures needs to be carved out at a later stage.

We aim to understand to what extent and how futures practices can guide the design of citizen engagement in large projects that aim for urban sustainability transformations. The main contribution of this paper is a framework that describes the contextual factors shaping the space for alternatives that result from the futures practices. The paper focuses on three case-study cities in sustainability transformations, each characterized by different contextual factors.

Insight is drawn from the citizen engagement process design within the international, multi-city H2020 IRIS Smart Cities project. This project comprises a variety of stakeholders with diverging interests and levels of power. The project, a consortium of European cities led by Utrecht (the Netherlands), aims to co-create smart and sustainable cities by testing and implementing a wide range of measures to improve mobility, lighting and heating, in collaboration with citizens. This article assesses the limits and possibilities for the use of a novel urban-futures design tool to open up this space and change practices within the project. The next section of this paper consists of a conceptual framework drawn up from a literature review, followed by a description of the cases and methodology. The results from the different cities are presented in the fourth section, and the fifth section discusses these results in context in order to formulate a set of recommendations. The final section of the paper provides a conclusion and recommendations for different scenarios.

2. Futures in citizen engagement

Large projects that aim at sustainability transformations are often characterized by pre-described objectives. Examples are prescribed reductions in pollution levels, transitions to renewable energy sources, and sustainable or shared mobility. These goals can be the reason a project is started and can be tied to its funding. This may be especially the case with projects that aim to implement smart-city measures. Much has been written about the smart city since the emergence of the term in 1994, and especially since it took flight in 2010 when it became a pillar of EU development strategy (Cocchia, 2014). The concept of the smart city was initially driven by new technology and ICT developments. Only recently has it been adopted by local governments as a comprehensive strategy for economic and environmental development (Ibid.). However, the technocratic and corporate orientation of the smart-city concept and its perceived oversimplification of the societal context are often criticized (Hajer, 2015; Kummitha & Crutzen, 2017; Lam & Ma, 2019).

A traditional definition of citizen engagement is *"the involvement of citizens in a wide range of administrative policy-making activities […] in order to orient government programmes toward community needs, build public support and encourage a sense of cohesiveness within society"* (Fox & Meyer, 1995: 20). More recently, citizen engagement and participation have expanded beyond the realm of policymaking, and are considered as a range of techniques that lead to interaction between citizens and decision makers (Bronsvoort et al. 2020).

In line with this broader definition, citizen engagement practices that are explicitly futures-focused can aid a complex system of actors, interests and institutions in conceptualizing and initiating future practices (Hebinck et al., 2018). Hebinck et al. (2018) define "*Practices bringing together actors around one or more imagined futures and through which actors come to share particular orientations for action*" as "*techniques of futuring*". Here, careful staging of futures practices in terms of sequence of events, participants and their interaction can cause particular ideas about the future to lose or gain traction. For more effective conceptualization and initiation of desirable futures, there are some guidelines: allow actors to break out of their usual routines, reiterate the process rather than organizing a one-time event, tailor the staging or "mise-enscène" to the actors and interest at hand, involve materiality and boundary objects, and create an immersive experience, in which the participants can engage with different futures (Ibid.)

In addition to the pre-defined objectives in projects that aim for sustainability transformations, a majority of futures literature is focused on the pre-conditions that make for a successful futures practice. In recent work, the governance context, social factors and methodological constraints have been synthesized and explored (Hebinck et al., 2018; Vervoort and Gupta, 2018; Muiderman et al., 2020).

We draw up a framework of four factors that shape the way in which participatory futures practices can open up space for consideration of alternative interventions and solutions. We build on Hebinck et al. (2018), who recognize three main factors: governance context, social dynamics and methodological design. We have adapted those three key factors to the cases studied in this research paper as institutional context, project plans and futures practices, and have added a fourth: participatory culture. This extra factor allows for a deeper analysis of existing citizen engagement practices and the "participatory culture" within the process: the way in which project managers view citizen engagement, including as co-creation, as a means of control or out of compliance with laws that prescribe participation (van de Grift et al., 2020).

The four factors build on one another: participatory culture, transformational project plans and futures practices are shaped by the institutional context in which they take place. Subsequently, the participatory culture shapes the project plans and futures practices. The project plans also determine the futures practices – their material aspects, tailoring them to the project and embedding them in the larger set of plans – and possibly methodology.

1. The first factor is the institutional context of the transformation process. Institutions make projects that aim for urban sustainability transformations possible, and can influence the way they are set up and how they are evaluated (Salmon et al., 2017). As such, space in the institutional context can be expected to significantly determine the open-endedness of transformation projects. If an approved project plan has already been pre-determined in terms of actions and timing, there will be very little perceived scope and time to shape participatory futures practices (Hebinck et al., 2018). Prescribed goals and participatory practices can be balanced, or there can be a tension between the two: the participation-prescription tension (Waylen et al., 2015). This starts at the institutional level when a project is incubated, and can subsequently carry on in the project plans.

2. The second factor is the participatory culture. If many of the stakeholders involved have experience with participatory processes and are working in a culture that encourages participation and has certain protocols for this in place, the role of participatory futures processes in generating alternative and more effective outcomes may be easier to achieve (Truex & Søreide, 2010). A strong participatory culture can enable a more critical distinction between types of citizen engagement (Arnstein, 1969), and enable project members as well as citizens to make participatory futures practices meaningful and effective (Groot et al., 2018). The expected benefits are also

culturally determined. Generally, these fall into one of the following three categories: (1) 'substantive' benefits, i.e., an improvement of decision-making through citizens' place-based knowledge and values; (2) 'instrumental' benefits, i.e., improving the acceptability and transparency of a plan, and thus its implementation; (3) 'normative' benefits, where inviting stakeholders into decision-making increases the legitimacy of decisions and supports democracy (Glucker et al., 2013; Waylen et al., 2015).

3. The third factor is project plans among the project members and within the governance of the project. Firstly, space is created if there is a mandate to conceptualize and initiate alternative and better plans. This space can then be reflected in the design and steering of project plans, citizen engagement and futures practices (Hebinck et al., 2018; Truex & Søreide, 2010).

4. The fourth factor is the intentional staging of the futures practices within the project. The methodology is important here: is it imaginative, open, planning-oriented or experimental? Material aspects are important as well: this includes the material aspect of the methods, but also the staging of the futures practices in space and time. Finally, the level to which the futures practices, and those in charge of them, are embedded in the local context is also relevant. If those organizing futures practices and the methods they use are strongly embedded, this creates possibilities for continual engagement, the building of trust and mutual understanding, and adaptation to changing conditions as needed (Davies et al., 2012; Vervoort et al., 2012; Hebinck et al., 2018; Hajer and Pelzer, 2018).

Subsequently, the aim of any futures practice is to outline alternative pathways and solutions. This can create space for consideration of alternatives in a pluralistic manner in the project plans. With the right mandate, this will have an effect on the project plans and strategies. While this change in project plans is the explicit goal of a participatory futures practice, we hypothesize that its effects can also feed further back and open up more space in the participatory culture and institutional context, depending on execution and impact.

Fig. 1 provides a visual synthesis of the various factors in the framework. It outlines how the space created in the larger institutional context, urban participatory culture and project plans shapes the conditions surrounding any futures practice, and consequently the possibility for such a practice to create space in turn for alternatives within the project plans and arguably the participatory and institutional contexts.

3. Methodology

3.1. Case description

This paper examines three cities within a European network of cities: Nice in France, Gothenburg in Sweden, and Utrecht in the Netherlands. All are members of the H2020 IRIS Smart Cities research project, carrying the title of leading "lighthouse" cities whose best practices are passed on to "follower" cities. One of IRIS's aims is to incorporate co-creation practices, as formulated in the project description:

> *"IRIS (**Integrated and Replicable Solutions for Co-Creation** in Sustainable Cities) is a HORIZON 2020 EU funded project beginning October 2017 for a duration of five years. The project has been developed around three lighthouse cities - Utrecht (The Netherlands, coordinator), Nice (France), and Gothenburg (Sweden) - who will work as **collaborators and test-beds** for follower cities Vaasa (Finland), Alexandroupolis (Greece), Santa Cruz de Tenerife (Spain) and Focsani (Romania). Each city will draw upon **a mix of universities and research organisations, local authorities, innovation agencies and private expertise** to accelerate entire communities to adopt ambitious energy, mobility and ICT initiatives"* (IRIS Smart Cities, 2018 [emphasis added]). One of the project's eight objectives is the following: *"Demonstrate active citizen engagement solutions providing an enabling environment for citizens to participate in co-creation, decision making, planning and problem solving with the Smart Cities"* (Ibid.).

The project runs for five years, and each city has formulated its own set of targets regarding smart energy grids, lighting, mobility and citizen engagement. While the aims are ambitious and strive for an answer to the present-day problem of adequate citizen representation and engagement, the number of actors and the variety of (fixed) project aims indicate tensions in the project design. The challenge in this case is twofold: there is the question of how to choose the most appropriate urban-futures methodology for specific cases on the one hand; and how to create space for the methods within the context imposed by a large project with diverging vested interests on the other.

3.2. Statement of research positionality

The group of authors on this paper consist of IRIS project members based in Utrecht as well as outside academics. For this reason, a brief reflexive statement of positionality is appropriate. The authorship's main expertise is at the intersection of governance and design. This is the lens through which the framework and methodology presented in this paper have been developed. The research was funded by the project which is under analysis in this paper. To mitigate the bias that is
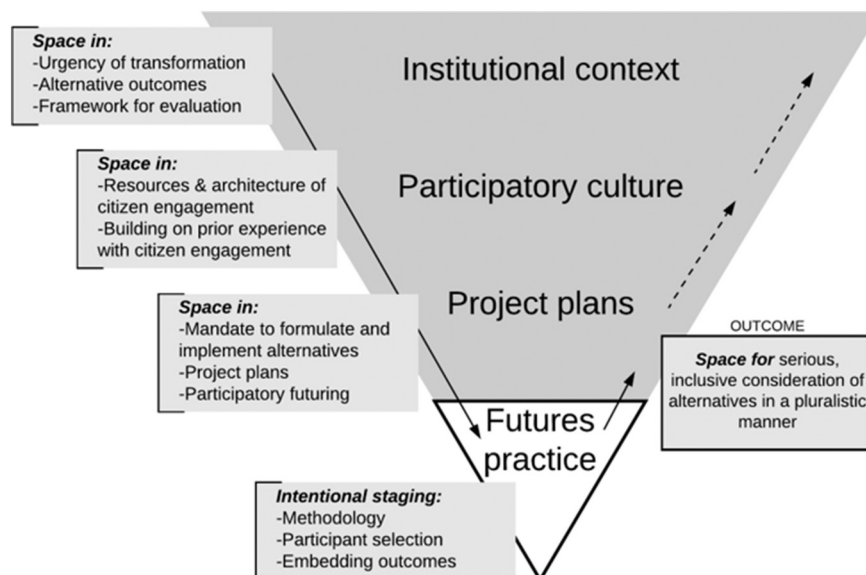

Fig. 1. Factors that shape the effectiveness of futures practices in creating space.

inherent in this, the lead author observed the futures process, which was designed by one of the co-authors. Data collection was done by other co-authors. Furthermore, three external co-authors have collaborated on the manuscript, providing an independent perspective. They also reviewed the contributions of the IRIS project members to this paper and adjusted where necessary it to filter out biased observations and uncritical reporting.

3.3. The Ladder & Scope models

Within the IRIS project, one of the five "Transition Tracks" is entirely dedicated to citizen engagement (IRIS Smart Cities, 2018). For the purpose of designing citizen engagement within the project, the Innovation Studio, based at Utrecht University of the Arts (HKU – a project member), has designed and set up two futures tools. The first tool, the Ladder model, is intended to take stock of existing smart-city solutions and the type of citizen engagement that would be most appropriate. The designers argue that whenever integrated solutions are planned to be implemented without possibilities for citizens to learn or to exert influence, there is only communication and no engagement. The Innovation Studio defines four distinct levels of possible citizen involvement, that are based on the steps of Arnstein's (1969) ladder. In the Ladder model used for the purposes of this paper, Arnstein's eight steps are condensed into four levels. This was done to simplify the model slightly so it would fit the needs of the IRIS workshops: i.e., it could be more easily used as a first step, followed by the Scope tool. The levels are as follows:

1. Informed: Citizens are transparently informed and aware of impending actions and changes in their neighborhood.
2. Involved: (Some) citizens are actively engaged in storytelling about the impending actions and changes in their neighborhood.
3. Contributing: Citizens help create active ownership of existing touchpoints to positively contribute to key performance indicators (KPIs) in the IRIS project.
4. Creating: Citizens co-design new products, services and initiatives to meet the project's KPIs.

The first two levels are forms of communication to or between citizens. The last two levels are forms of meaningful citizen engagement and co-creation. The IRIS project members participating in the workshop are asked to rank their planned urban interventions within the project on this ladder. This group of members consists of local government actors, local businesses and researchers. In assessing their projects with regard to these levels, they need to pay special attention to all *touchpoints* within the intervention – that is, to all of the contact points between the customer and the service provider where there is an interaction with a human need in specific time and place (Risdon, 2013). Touchpoints can either be passive or active. Passive touchpoints are those where citizens can learn about a measure, and be informed or instructed. Users are not put in active control of a measure. Examples of these are information letters, leaflets, meetings, blogposts and articles. Active touchpoints are those where citizens can take active control of a measure and use it,

configure it, change it or adopt it. Usually this implies some kind of interface. Examples are a physical object, a controller, an interactive display, an app or an interactive web interface.

The Scope model (Fig. 2) builds on the solutions that participants ranked on the ladder as having the highest potential for citizen engagement. It standardizes citizen engagement practices across the different cities in the project. This design tool is aimed at planning ahead and experimenting with solutions (fiches) and the necessary time investment (block) for each solution. There are four types of fiches, that represent different project stages. The orange fiches represent the discovery of new solutions. The blue fiches represent the development of these solutions, the plans for their implementation. The green fiches represent the delivery of the solutions: their realization in urban communities. The final, purple fiches represent the upkeep of the solutions, and possibly a reiteration of the development and delivery processes. Participants also reflect on who is responsible for the realization of each block. Mapping out the entire project in this way is a first step toward reflecting critically on the possibilities and limitations of the project and its context. Facilitating this reflection is an essential part of the Ladder and Scope model workshops.

3.4. Participants

The workshops involved local project members from each work package, with 13 to 20 people attending each session. These members were mid-to high-level stakeholders representing local government, private or semi-public companies (such as public transport providers and housing corporations), and academia: Utrecht University, Chalmers University of Technology and Université Nice Sophia Antipolis (Broekman et al., 2019; De Canson et al., 2019; Reuter Metelius et al., 2019).

3.5. Data collection

In Utrecht, the home city of the Innovation Studio employing the Ladder and Scope models, multiple sessions using the tools were held over time. The citizen engagement team was able to observe the developments over time. In both Gothenburg and Nice the main foundation for citizen engagement practices was laid in one workshop. Additional data on the Nice and Gothenburg workshop outcomes was collected in pre- and post-workshop surveys and semi-structured interviews with select participants. The questionnaires consisted of open questions. The pre-workshop survey contained questions about participants' previous citizen engagement experience, current citizen engagement practices and the participants' expectations of the workshop. The post-workshop survey contained questions about the Ladder and Scope model experience, points for improvement of the tools and the participants' intended future citizen engagement practices and takeaways. The complete questionnaires are included in Appendix 1. The interviews took place directly after the participants completed the workshop. These 10- to 15-min interviews were meant to provide further in-depth insights into the citizen engagement practices they described in their surveys. They were transcribed and coded using Nvivo software.

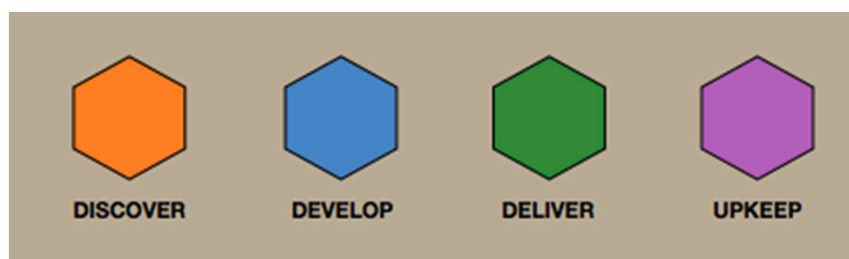The futures workshops were set up and hosted by the local project

Fig. 2. The scope model elements.

officer. The citizen engagement plans that were a result of the futures workshops in all three cities were captured in publicly available midterm reports to the funder, the European Commission (Broekman et al., 2019; De Canson et al., 2019; Reuter Metelius et al., 2019). These reports were used as a main source of data on the incorporation of the workshop outcomes in the project plans.

4. Results

The three "lighthouse" cities each have their own institutional context and pre-determined objectives for the project, mainly related to key "smart city" areas such as shared or electric transport and renewable energy. The results in this section are structured according to the contextual factors that are described as the baseline in the project reports, and subsequently the workshop outcomes. The results for each case follow the four layers of the framework of factors that shape the effectiveness of futures practices (Fig. 1).

4.1. Nice

4.1.1. Contextual factors

In Nice, the Éco-Vallée, a block of three areas with mixed industrial and residential use, was assigned as the testing neighborhood. At the institutional level, the main objectives are energy-neutral mobility and improvement of the grid for renewable energy. The baseline situation in the demonstration neighborhood, Éco-Vallée, in terms of socio-economic factors and attitudes is compared to a control group. It scores relatively low on knowledge exchange and entrepreneurialism. On resource mobilization, market formation, knowledge exchange and guidance of search the city scores the same as the control group. This section of the report ends with a set of questions and barriers to citizen participation, such as the aforementioned resistance to change, a language barrier in the immigrant community in this neighborhood and distrust toward institutions. The report describes the need to raise interest in and motivation to adopt new measures. There is no mention of engagement, participation, or other terms that are at the core of the project title and description.

In Nice, the plans in the project consist of three parts. Firstly, in a public awareness campaign on air quality, three solutions will be implemented: an urban awareness campaign, a project educating students on air pollution and an initiative to develop practices of car sharing for a cleaner commute. Secondly, there will be a public awareness campaign on energy and the environment, with the objective of both awareness and behavioral change. Finally, smart home appliances will be further developed, in order to engage citizens individually with their overall energy consumption. (De Canson et al., 2019).

4.1.2. Workshop focus: Services Bleues

In Nice, the Ladder and Scope model workshop led to a distinction between different project plans. Before the workshop, the majority of participants reported that they were cautiously optimistic about the workshop. The Ladder model outcomes feature heavily in the reporting. Certain measures were ranked as only in need of citizen information, not engagement. However, in the development of certain web-based tools, there was room for citizen engagement. In the Scope model, one plan with high potential for citizen engagement was mapped out. The "Services Bleues" form a system of "smart" shared mobility, such as bicycle and car sharing. Key project members are updating and expanding the existing infrastructure in Nice and much of the Cote d'Azur region.

They were able to use data supplied by citizens in this expansion, and co-design the expansion plan with those citizens. The Scope model exercise showed that besides this, there was little room for adding on citizen engagement with regards to the Services Bleues. However, it became clear that by testing halfway through the implementation, there was further room in the timeline of the intervention for some design iterations (Fig. 3). While the participants reported that the workshop

Fig. 3. Scope Model workshop in Nice. Photo: Astrid Mangnus.

was useful to them and they had the intention of using its outcomes, the report contains no explicit plan for the Services Bleues (De Canson et al., 2019).

4.2. Gothenburg

4.2.1. Contextual factors

In Gothenburg, the demonstration area is the Johanneberg neighborhood, characterized by the many students who attend the nearby university. In this area, the aims formulated at the institutional level are to find a sustainable balance between small-scale or private and large-scale energy systems and systems for heating and cooling, and decrease parking possibilities to stimulate other modes of transport. Project partners include an electric taxi company and a large housing corporation. In the Gothenburg report, the baseline section opens with a more critical reflection on existing citizen participation practices in Gothenburg. The city already has an extensive infrastructure for citizen participation and actively targets less involved groups of citizens and neighborhoods to involve them in the democratic process. One of the city's explicit goals is to involve citizens as early as possible, so that they can "exercise democracy, dialogue and participation" (2019: 26). Within the IRIS project, the Gothenburg members want to extend two existing tools for citizen engagement. The first is a digital version of the city in the game Minecraft, which can be used by citizens to build and shape their own environment. The second tool is "Min Stad" (my city), a platform where citizens can get involved with and respond to plans by the local government. Both tools are long-term methods to design more effective citizen engagement and enhance the democratic process, over which the City of Gothenburg takes ownership. The city aims to involve citizens in new smart-city measures, such as smart energy grids and mobility, but in the long term also aims for a lasting improvement of

citizen engagement and the involvement of less active groups in democracy, such as first-time voters and non-native Swedes.

The project plans consist of four parts. The first is to utilize the game Minecraft as a tool for citizen engagement, by involving it in planning processes, organizing a summer camp around the game, and educating citizens about the citizenship model of Gothenburg city by allowing them to play with the digital version of the city in Minecraft. The second objective involves using the citizen platform Min Stad as a tool for citizen engagement, by turning the platform into an online hub containing all smart-city plans: data describing ongoing plans, ongoing street work, planned events or documents, and information about political decisions, all geocoded to a geographic location or area. It can also be used as a dialogue-stimulating tool, for example in a challenge investigating what constitutes a "good life" for Chalmers university students, and to survey citizens. Thirdly, the project aims to demonstrate 3D VA/AR Sensor data in the office building "A Working Lab". The AR/VR Building Information Modelling demonstrator will virtually immerse users in the inner workings and properties of a building, and can give property managers an insight into the status of the building. Finally, the project aims to launch an app that monitors energy usage and gives feedback to users regarding their energy consumption.

4.2.2. Workshop focus: MinStad & Minecraft

Gothenburg was the first city where a one-day Ladder and Scope model workshop was held. The City of Gothenburg has developed Min Stad, a platform where citizens can engage with new plans and regulations. There is also a central role for a Minecraft-inspired app that allows citizens to alter their environment and give feedback to local decision makers directly though the app, as a tool for education and co-creation for children in the city. In the app, the entire city is mapped out in Minecraft, and students get to play and explore there. It exists for mobile and desktop.

Both interventions were mapped in the Ladder model and were deemed to benefit from meaningful citizen engagement. In the Scope model, the appropriate points for citizen engagement in this process were mapped. In the post-workshop survey, the participants were quite critical of the Ladder model, but the majority was positive about the Scope model exercise. The participants found that in online platform Min Stad, the space for citizen engagement was limited due to the platform already having its final form. Engagement possibilities thus emerged at the end of the map in the Scope model. For Minecraft, there were more possibilities. Accessibility is also key: maps are sometimes missing and they require digital skills and devices. There are opportunities to increase this in collaboration with citizens, as well as to add a feedback option in both apps. For both apps, detailed plans containing new decisions from the Scope model are included in the report (Reuter Metelius et al., 2019).

4.3. Utrecht

4.3.1. Contextual factors

In Utrecht, two important partners are a large public transport organization and a public housing corporation. They have assigned the relatively new and large neighborhood of Kanaleneiland as their testing ground for an increase in PV-panels, electric mobility and decrease in use of natural gas. The base line section of the report opens with the "Utrecht participation standard": a five-step protocol to involve citizens in the city's plans and projects. The five steps are: 1) mapping stakeholders; 2) determining the desired level of participation; 3) matching desired input from stakeholders to steps in the project; 4) making plans to involve citizens; 5) deciding on methods of engagement and suitable participation tools. The report describes extensive experience at the municipal level with this approach, including in the demonstration neighborhood of Kanaleneiland, which shows some socio-economic similarities to the Éco-Vallée in Nice. At the baseline, the report for Utrecht also compared Kanaleneiland to a control group in terms of

citizen experience with sustainable practices, traffic and green space in the neighborhood. The section ends by naming similar barriers to those mentioned in the Nice report, but also suggests "co-creation of attractive and inclusive services that support people in their own motivations to engage, express ownership, and change behaviour" (2019: 18) as a potential solution.

There are five key points of attention in the project plans. The first aim is to recruit "change agents" who can help in community building in Kanaleneiland. They can inform their neighbors about upcoming measures that are part of the IRIS project and their purpose, and raise support for them. The second aim is to involve schools in the district: these can serve as a gateway to the parents, who are otherwise difficult to reach. Children will receive special training in using smart solutions such as energy meters, and can pass this knowledge on to their family. The third aim is to co-create smart energy-meter interfaces with Kanaleneiland inhabitants. The fourth aim is related to this and involves co-creating a smart street-lighting system. The final aim is to develop a VR platform where tenants can experience their new homes, including infotainment and interactive training about the new smart energy and mobility services they may expect (Broekman et al., 2019).

4.3.2. Workshop focus: smart street lighting

In Utrecht, the project members ranked the intended project interventions according to the Ladder model exercise. This indicated that in some instances, such as in the case of placing solar panels on the roofs of social housing blocks, citizen engagement would not be meaningful or required. In other interventions, most notably in a plan to implement smart city lighting, the project members found lots of room for citizen engagement. This was partly due to the fact that preparations for this measure had not yet begun and targets and details were not pre-defined. Due to the citizen engagement team being based in Utrecht and part of the monthly meetings, the citizen engagement design process was elaborate and closely monitored by the team.

The project members designed a Scope model pathway in which citizens were involved from the start, co-designing a smart street-lighting plan that would be well loved in the neighborhood. They distinguished various steps and allocated time to each: a co-creation workshop with citizens, a feedback workshop with citizens, and development of the final product. The citizen engagement team set up three iterative workshops to gather information from all stakeholders, design solutions in collaboration with citizens and divide responsibilities for the realization of the solutions among the participants. In the report, the project members describe this steering of the intervention through a citizen engagement process as highly successful (Broekman et al., 2019).

5. Discussion

In this paper, we have developed and tested a new framework for the use of participatory futures to design citizen engagement in urban sustainability transformations. We note that in existing futures studies literature, much of the focus is on optimizing the conditions needed for a futures practice to succeed (Hebinck et al., 2018; Vervoort and Gupta, 2018; Muiderman et al., 2020). On the other hand, there is a body of literature on experiential and design futures, where the futures practice is at the core of the process and is thought to break open the process by speaking to the imagination of an unspecified public (Bendor, 2017; Candy & Dunagan, 2017). The literature on citizen engagement recognizes the need for attention to be paid to institutional context, power relations, interests and cultural differences, but often there is no explicit focus on the imagination of alternative futures (Glucker et al., 2013; van de Grift et al., 2020; Waylen et al., 2015). We argue that in many sustainability transformations, there is no perfect control over the starting conditions. However, through an honest assessment of the given institutional context, participatory practices and project plans, and an intentional design of the futures practices, the space for citizen engagement to shape alternative pathways can be maximized.

We investigated a number of cases where the same futures design methodology was adapted to different contexts – each reflecting different combinations of the factors outlined in the conceptual model. The model is the main contribution of this paper, and is tested empirically by applying it to the different cases. The more favorable the preconditions, the more effective a futures practice is expected to be. However, certain individual preconditions can also create some space for the imagination of different futures and the active engagement of citizens. If the driving forces behind the futures practice are more embedded in the project, their efforts can have more impact. Moreover, if the futures practice is spread out over a longer period of time or iterated on multiple occasions, space for futures and engagement is more likely to open up. Existing project plans that can incorporate engagement and open-endedness can provide this space as well, and a strong participatory culture can ensure ownership of the futures practice after one-time workshops or sessions.

Ideally, a multi-stakeholder process is designed with careful attention to representation, the structure of the process, the information that is used in the process, and the purpose of the outcomes of the process (Abelson et al., 2003). In an ideal futures practice, careful attention has been paid to scripting and staging a practice that can both break out of deadlocks and open up new possible futures (Hajer and Pelzer, 2018). There is a significant body of literature that supports the need for early involvement of stakeholders in change processes (Berner et al., 2011; Edelenbos & Klijn, 2006); alternatively, if stakeholder involvement is not considered relevant for certain elements of a change process, this should be clearly defined and explained.

In the Utrecht case, there were a number of pre-set objectives with regards to implementing renewable energy solutions and car sharing. The participatory culture may be categorized as 'substantive' according to Waylen et al. (2015): the project hopes for an improvement of decision-making through citizens' place-based knowledge and values. Especially due to the strong embeddedness of the method and those who led it, significant changes could be made to the project plans. This retroactively created space for process co-design using design futures methodologies, illustrating the value of repeated sessions and tweaking (Hajer and Pelzer, 2018), and two clear spaces for citizen engagement: co-design of smart meter interfaces and co-design of a smart street-lighting plan.

The Gothenburg case is an example of conditions where plans have been pre-designed and allow for little formal space for process co-design; where the futures practices and the organizers are not yet embedded in the larger process; but where there is good involvement and governance of stakeholders, and a culture of participation practices. Gothenburg has a very strong participatory culture, which could be categorized as 'normative': inviting stakeholders into decision-making is seen as vital to increasing the legitimacy of decisions and even supporting local democracy (Truex & Søreide, 2010; Waylen et al., 2015). However, the future design practice was led by outside facilitators and in a single event rather than through a process of continual engagement. As a result, the influence of the future design practice on the project plans can be characterized more as a general opening of space (for instance, extending the scheduling of the project) rather than more clearly demarcated changes to project plans such as those seen in the Utrecht case.

The Nice case is an example of a pre-designed change process, where the futures practices and the organizers are not yet embedded in the larger process, where governance of the process practices and stakeholders is fragmented, and where there is a limited pre-existing culture of citizen engagement practices. In addition to certain pre-set goals for bicycle and car sharing and changing energy systems, the participatory culture expressed in the project reports seems elementary. It could be categorized as 'instrumental': by being transparent about plans and decisions, the project members hope to improve the acceptability and transparency of their plan, and thus its implementation (Waylen et al., 2015). Similar to Gothenburg, the futures workshop was a one-off event

and led to limited change in project plans. In the absence of these enabling conditions, however, the futures methodology has still been valuable in outlining the participation challenge and getting stakeholder inputs in a consultative mode.

This comparison of the three cases within the framework proposed in this paper demonstrates that each factor impacts the way in which a futures practice can create space in a larger project for urban sustainability transformations. The expectations from the futures practice should be adjusted accordingly. An intentional design or "staging" is also essential for futures practices, and should take into account all factors that shape its context (Hajer and Pelzer, 2018). This may mean that expectations should be kept low and the focus should be on one or a few concrete urban interventions. However, the more favorable the institutional context, participatory culture and project plans are to the futures practice, the more systematically the effects of this practice can resonate, such as in the Utrecht case, where the futures team was embedded in the project and changed the plans and arguably the participatory culture.

We would like to emphasize that the framework offered in this paper is also useful for more utopian or radical urban futures than the ones offered in our case study. Imaginative and radical ideas can open up space in urban sustainability pathways, even if the transformations are not part of a project. For example, art installations, climate fiction and design practices can paint new and different pictures that re-shape how we see topics such as energy use, social sustainability and mobility (Candy & Dunagan, 2017; Hajer and Pelzer, 2018; Pelzer & Versteeg, 2019; Ashtari & de Lange, 2019). By mapping the institutional context, participatory culture and current plans regarding a topic within a city, such practices can be designed and staged better and their effects can be traced.

5.1. Limitations and future research

To put the results and discussions of this paper into perspective, a few limitations to our research should be noted. The empirical base for the study was relatively small and consisted partly of "learning-by-doing" through participatory observation. However, it indicates that the futures practice and the conceptual framework were appropriate and can be applied to various multi-stakeholder change processes. Applying the model to a larger case or project is an opportunity for future research. This larger empirical case could also serve to balance control and effect, which is a recurrent challenge in action research like this.

In this paper, we have made certain assumptions about the four preconditions of institutional context, participatory culture, project plans and futures practices. However, future research into each of these four levels can deepen our understanding of their composition and influence. In this paper, the futures practice is the same design-focused futures practice in all three cities. By repeating this study with different methodologies, it would be possible to see their effects, as well as any similarities and differences between them. Moreover, it would be interesting to repeat these futures practices in a more iterative, repetitive way, online, at a larger scale and at various governance levels. This may also serve to reduce the biases that we have identified in our statement of researcher positionality, by offering different conceptual lenses and separating designers from the research team, and the research team from the project in which they operate.

6. Conclusion

This paper took on the challenge crucial for many organizers of participatory futures practices: how to use 'futuring' to design citizen engagement and create space for alternative solutions in the middle of ongoing sustainability transformations? We noted that while a large section of the literature on futures studies and citizen engagement focuses on the conditions for success, in reality, many of these conditions are oftentimes imperfect. Building on literature on participatory futures

and anticipatory governance, we developed a framework that comprises four factors that shape the effectiveness of participatory futures practices in their contexts and explicitly includes the participatory culture. The framework consists of the space in the institutional landscape of a multi-stakeholder project; the participatory culture around the project; the project development; and the futures practices itself. We applied the framework to design citizen engagement with the support of futures tools in three "lighthouse" cities that are part of the international, multi-city H2020 IRIS Smart Cities project. From the results, we conclude that under imperfect conditions it is still possible to find and optimize space for exploring and re-imagining different pathways to urban transformation, provided that there is an intentional engagement with the context, culture and sustainability transformation project plans.

6.1. Implications: four scenarios

Building on our findings, we provide a set of scenarios that provide guidance for members of urban sustainability transformation projects when navigating the factors that shape the effect of a futures practice. We specifically provide possible avenues for action for funders, project leaders and organizers of futures practices within the project. The four scenarios speak to all four levels, going from more to less control over the conditions that shape the effect of futures practices. We have added an extra set of recommendations for the most open, unstructured circumstances.

In an ideal situation, where all four factors can be influenced, funding call parameters and terms of reference for participatory futures work can encourage openness to futures-oriented participation from the outset. Project leaders have the opportunity to be crystal clear about what space there is for citizen engagement, including stipulating when and with what potential effect it can occur. Under such open conditions, futures design practices are expected to have the most beneficial results for transformation processes. Organizers of futures practices within the project would benefit from being made more aware of the conditionalities for effectiveness, and training could emphasize the significance of their role to further successful citizen engagement within the project.

When the institutional context is pre-structured, but the other factors are open, it is important for funders to pay attention to progress reports from the project leaders in the policy context and the futures practice organizers throughout the project. When there are signals that the project needs to be amended, the funders can accommodate this. Project leaders can make an effort to retroactively create space for participatory futures in the project plans to relieve the participation-prescription tension. This has consequences for the futures practice organizers working as part of the project: ideally, these organizers are embedded in the local context to maximize the effects of their efforts. In a multi-city project where this may not be possible, the best option is to select futures practice organizers that have experience within the local context to ensure clarity about process governance and stakeholder involvement, and that have experience of using participatory methods with local stakeholders. Ideally the futures methodology would accommodate multiple sessions and opportunities for repetition and revisions, rather than one-time sessions and workshops.

When both institutional context and the project are pre-structured, but there is a strong participatory culture, futures design methods can be combined with continuous engagement to create mutual trust, understand local leverage points and adapt the process where necessary. If such locally embedded co-leadership is not possible, the next best option for project leaders is to take special care to come to the planning process with very concrete proposed changes, for which champions are identified to help make their implementation more likely. Futures practice organizers can benefit substantially from extensive collaboration with project co-leaders who are more embedded in the local context, and can focus on building local capacity for the design of meaningful citizen engagement by developing local future design expertise among their partners.

The funders of large urban sustainability transformation projects should allow space for participatory futures that are critical of their context if that context proves to be pre-structured in important ways, in order to highlight challenges and avoid allowing only positive messages to come through. In that way, the project funders can benefit from the insights coming out of such critical futures work by using these insights as learning experiences and input for the design of next funding round. For the project leaders, it is important to clearly identify the space for participatory futures in the process, and adjust the ambitions of the process to reflect what is feasible in the context. In the absence of all enabling factors, organizers of futures practices within a project can use their methodologies to highlight the challenges of the project and gather stakeholder perspectives that can still inform the change process later on, but in a consultative mode rather than a co-design mode.

CRediT authorship contribution statement

Astrid C. Mangnus: Conceptualization; Writing: original draft; Writing: review and editing; Supervision, **Joost M. Vervoort:** Writing: review and editing; Funding acquisition **Willem-Jan Renger**: Methodology; Project administration; Funding acquisition **Valentina Nakic**: Data curation; Writing: review and editing **Peter P.J. Driessen**: Writing: review and editing **Karin T. Rebel**: Writing: review and editing **Maarten A. Hajer:** Writing: review and editing.

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Declaration of competing interest

The authors declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cities.2021.103466.

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