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Designing Urban Participation Platforms – Model for Goal-oriented Classification of Participation Mechanisms

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Abstract Citizens are increasingly shaping their city self-determined. To do so, they use digital platforms to start projects, gain awareness or raise funds. These and other participation mechanisms enable citizens to participate in manifold ways. With the help of the tree ring model introduced in our contribution, we present a tool that is intended to support practitioners in evaluating and developing their platforms. The model was designed based on the analysis of 22 existing platforms as well as a literature review and evaluated in qualitative interviews. The result is a tree ring model that shows a new understanding of participation apart from hierarchical structures. The citizens' role classification and the possible mechanisms that can offer practitioners effective implications for the design of participation platforms.

1   Introduction

Citizens are increasingly shaping their city self-determined and independently. This urban trend aims to make urban space more livable (Finn, 2014) and is summarized under the term bottom-up urbanism (Kickert & Arefi, 2019). The focus lies on the citizens and their needs. In this type of participation, self-development, the responsibility and the decision-making power for urban design is transferred from the city government level to the citizens themselves (Abel, Miether, Plötzky, & Robra-Bissantz, 2021). The resulting freedom of design and decision-making (e.g., over the distribution of available resources) takes place in accordance with the needs of the citizens, but detached from the level of government (Rauws, 2016).

Bottom-up initiatives, such as community gardens, are initiated, planned and organized by citizens. The implementation of projects takes place with little financial means, independent of city administrative structures and with the help of digital participation platforms (Abel et al., 2021). The aim of the initiatives is to shape the city according to the ideas of its residents (Finn, 2014). Citizens participating on the platforms act as consumers and producers of content at the same time (Manetti, Bellucci, & Bagnoli, 2017).

For the classification and evaluation of participation, the Ladder of Participation by Arnstein is the *"benchmark"* (Collins & Ison, 2009). But Arnstein's hierarchical model understands participation as a *"categorical"* concept of the distribution of powers (Arnstein, 1969). Today's understanding has changed and participation is no longer understood as a hierarchical concept of maximum authority. Rather, the focus has shifted to the consideration of the citizens and their reasons for participation (Tritter & McCallum, 2006). Which leads to a more open and broader understanding of participation with diverse levels and roles.

In addition to our previously outlined understanding, the way we participate is also changing. If participation is supported by information and communication technology, it is called eParticipation (Sæbø, Rose, & Skiftenes Flak, 2008). Even if eParticipation in general is an area that has already been extensively researched (Medaglia, 2012; Sæbø et al., 2008; Susha & Grönlund, 2012), digital participation platforms are still a largely unexplored subject of research. Initial research results can

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be found in the field of political platforms (Irani et al., 2012) and in the context of urban design (Falco & Kleinhans, 2018; Gün, Demir, & Pak, 2019).

It remains to question the application of these research results, the generalizability of the findings and the transfer to individual sub-areas of participation and to demand an adapted model (Panopoulou, Tambouris, & Tarabanis, 2014). Otherwise, there is a risk that tools of participation will be inappropriately applied to the context (Collins & Ison, 2009).

The hierarchical model of Senbel & Church (2011) is often used to classify participation platforms (Falco & Kleinhans, 2018; Gün et al., 2019). This evaluates a platform as a whole and only at the highest level of participation that is offered. This approach neglects the participation mechanisms for lower levels within a platform and thus the different roles of the users. But there is not a linear conceptualization of participation with a clear delimitation of the levels (Tritter & McCallum, 2006).

In the cities of the future, there is growing interest in the term Smart City. In addition to the technological perspective, the discussion also focuses on social interaction and participation (Gil-Garcia, Gasco-Hernandez, & Pardo, 2020; Nam & Pardo, 2011). Despite this increased interest, there is a lack of a thorough understanding and practical application (Collins & Ison, 2009).

Practical models show different understandings of roles at the institutional level and from the citizens' perspective (Straßburger & Rieger, 2014). However, the models lack the transfer of the understanding of roles on platforms and which functions can be implemented in practice. In the application of participation platforms in the context of bottom-up urbanism, we see different goals and thus also the participation mechanisms offered differ (Abel et al., 2021).

The questions about framework, roles and mechanisms form the starting point of this work, which pursues the goal of making a scientifically sound and practical contribution in the field of participation platforms in bottom-up urbanism. As a result, we aim at answer the following research question:

How can the mechanisms of participation platforms in the area of bottom-up urbanism be classified in the spectrum of participation?

Specifically, the participation mechanisms used by platforms are to be categorized, classified and visually demarcated in a participation model in order to fill the current gap of systematization of functionalities and mechanisms in platform design (Falco & Kleinhans, 2018; Tambouris, Liotas, Kaliviotis, & Tarabanis, 2007) and to make them accessible as a practical tool.

2   Theoretical Background

The question of how we will live in cities in the future is currently being discussed in the context of smart cities. There, *"smart citizens"* are increasingly being envisioned as central actors who network, use new technologies and actively shape their environment themselves (de Waal & Dignum, 2017). The focus lies on participation (Gil-Garcia et al., 2020) and the change to a participatory city administration (Albino, Berardi, & Dangelico, 2015). Participation is understood as taking part or being involved and addresses the insight and influence of the citizens involved in planning and decision-making processes (Collins & Ison, 2009). This development overtakes Arnstein's hierarchical understanding of participation (Arnstein, 1969). Rather, the focus should be on the problem and thus, the type of participation and collaboration as well as the mechanisms to be used with it (Collins & Ison, 2009).

According to Wilcoxes' (1994) model, the competition of the levels is shifted into a collaborative idea of participation. The levels of participation differ in their use depending on expectations and interests. With its framework of different dimensions, it creates an equal connection between levels of participation, the course of the project and the stakeholders. For Wilcox, the levels of participation are a means to the end of meeting expectations and covering the various interests that change during a project and that involve stakeholders in their changing roles.

This actor-centered perspective also extends the model of Hurlbert & Gupta (2015) by adding the problem to be solved to the participation levels. Participation processes are also understood as a learning field, around the problem and the solutions, which goes hand in hand with the further development of the citizens.

The Senbel & Church (2011) model represents a concrete and practical approach for participation in urban design processes and is often used to classify digital participation platforms. Even though there is a growing body of knowledge on technology in participatory processes (Desouza & Bhagwatwar, 2014; Ertiö & Bhagwatwar, 2017; Falco & Kleinhans, 2018; Gün et al., 2019) there has been no specific research regarding the highest level of participation on platforms. These levels of participation are understood as levels with increasing empowerment and thus shifting Arnstein's (1969) understanding that power of citizen only exists at the highest level.

Empowerment through participation is a central theme of participation, which can act as a differentiation of levels. Involvement is the degree of temporal commitment and activities (Wolf-Wendel, Ward, & Kinzie, 2009). This perspective can be used for the platform operator as well as the design of the participation mechanisms. Similarly, engagement is used as a qualitative degree of involvement from the perspective of the participants, i.e., how they feel involved (Wolf-Wendel et al., 2009). The engagement thus represents a perspective of the citizens on the participation opportunities applied by them.

In the participation pyramid by Straßburger & Rieger (2014), the growing scope for citizens to be creative is emphasized in line with their increasing degree of participation and the perspective of institutions and organizations is taken. This reflects the changed understanding of the role of the citizen towards becoming a co-creator, who helps develop the cities or shapes the design independently (Foth, 2017; Simonofski, Asensio, & Wautelet, 2019).

The differentiation of levels raises the question where *"real"* participation, being a subset of participation in general, begins. It implies the following aspects:

(1) The joint and consensual decision-making through mutual communication in contrast to sovereign action. (2) The participation in decisions in public space (3) by parties, who do not routinely make such decisions. (4) Participation implies a transfer of power to the groups of people involved, which in turn, (5) embody people with legitimate concerns in a sufficiently representative manner so that they distinguish themselves from simple lobbying work. (Newig, 2011)

3   Methodology & Study Design

In order to answer the leading research question in this article, the authors based upon the research framework of Design Science Research (DSR) along the five-phase cycle of the General Methodology of DSR according to Vaishnavi & Kuechler (2015). The design-oriented approach and the interlinking of theory and practice motivated the selection of the DSR for the practice-oriented research project (Frauchiger, 2017).

First, the authors conducted a literature search using the central concepts of *"participation"*, *"DIY urbanism"*, *"social media"*, *"bottom-up urbanism"*, *"eParticipation"* and *"self-governance"* in various databases (including Google Scholar, Science Direct, SpringerLink) and tracked down further specialist articles with the help of the *"snowball method"* in order to work out the theoretical grounding for the research project from existing models and theories. Second, as part of a preliminary study on the population and definition of digital participation platforms from the area of bottom-up urbanism, we identified 22 out of 143 platforms which provide their users the highest level of participation. These allow the creation of projects by citizens and empower the citizens themselves to implement and realize these projects mostly in a do-it-yourself manner (Abel et al., 2021); this basis is used for the present study. The object of investigation on the platforms were the participation mechanisms that provide active involvement in the citizens' projects by enabling functions on the platforms. In the sense of triangulation, the authors recorded participation mechanisms that were identified independently of one another in a matrix structure (see Table 1) and sorted them according to functions (inductive category formation). Differences and similarities were discussed in the research team in order to confirm or adapt the categories formed. Third, based on the literature and platform analysis, a first model prototype was created to classify and systematize participation mechanisms. In a joint design process the authors incorporated the theory and research as a "creative leap" (Kuechler & Vaishnavi, 2012) into a tangible artifact. Forth, for reflection with the aim of evaluating the designed model prototype, a qualitative survey in the form of semi-structured interviews was then carried out with four participation platform operators. This step took place within the DSR evaluation in order to assess the contribution to problem solving of the artifact (Hevner, 2007). We chose stratified sampling to *"capture major variations"* from the original preliminary study with the outcome of different priorities funding, discussion and implementation (Patton, 2014).

The one-hour interviews were recorded as audio files and then transcribed using the amberscript software. This was followed by a systematic systemic evaluation of the interviews according to Mayring & Fenzl (2019). In the pursuit of this, the research team assigned statements by the respondents to the categories of participation mechanisms identified through an empirical study on the platforms in order to evaluate their relevance from a practical point of view. In addition, the interviewer then presented the visualization of the model to each platform operator surveyed (see Chapter 4) and asked for an interpretation of the model shown, followed by a discussion and reflection of the individual components. As a result, criticism of individual aspects could be discussed to gradually improve the model.

4 Results

The empirical study on the platforms led to the partial result of the identification of ten participation mechanisms on platforms, which can be assigned to four identified goals of participation (*transparency, co-determination, decision making, self-governance*). Table 1 provides an overview of the mechanisms found on each of the 22 participation platforms examined.

Transparency as a goal includes the *like* and *follow* functions as a measure of the reputation and trustworthiness of the liked post, with the follow mechanism acting as a substitute or supplement to the consenting like because of its additional networking function. For the *information* mechanism, the platform acts as a medium for collecting and providing information on the project. (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011)

Table 1: Investigated platforms and mechanisms used

mechanism	sum of mechanisms	information	like	follow	comment	share	survey	crowdfunding	(offline)involvement	team entry	project start
goals		transparency			co-determination			decision making		self-governance	
frequency		100%	45%	9%	64%	5%	68%	68%	68%	7%	82%
Sandkasten	8	●	●		●		●	●	●	●	●
WeChange	8	●		●	●	●	●		●	●	●
Space Hive	8	●	●	●	●		●	●	●		●
Raumpioniere	8	●	●		●		●	●	●	●	●
Openberlin	7	●	●				●	●	●	●	●
die Urbanisten	7	●	●		●		●	●	●		●
Place 2 help	7	●	●		●		●	●	●		●
Les Co-citoyens	7	●			●		●	●	●		●
Ecocrowd	7	●	●		●		●	●		●	●
Voorjebuurt	6	●	●		●		●	●			●
Hannovermachen	6	●	●				●	●	●		●
ioby	5	●			●			●	●		●
Nordstarter (Startnext)	5	●			●		●	●			●
Rabryka Welt	5	●					●		●	●	●
Move for Hunger	5	●					●	●	●	●	
Gut für Nürnberg	5	●			●		●	●			●
Yooweedoo	4	●					●	●			●
PLATZprojekt	4	●					●		●		●
Casa Schützenplatz	4	●			●		●	●			

Patronicity	4	●		●	●	●
Urban Green Newcastle	2	●			●	
Sager der Samler	1	●				

Source: own elaboration; presentation based on Gün et al. (2019)

At the level of the goal of *co-determination*, *crowdfunding* for networking and *financing a project* on the part of a large number of (external) project supporters and *(offline) involvement* are classified (Gerber & Hui, 2013; Schwienbacher & Larralde, 2010). The latter mechanism enables project participation even for a limited period of time in order to achieve intermediate goals.

The *self-governance of the citizens* shows the goal with the highest citizen involvement and includes the functions of *joining a team* and *starting an own project*. A conscious *team entry* as a member (Oser, Ullrich, & Biedermann, 2000) within the framework of bottom-up urbanism is when the participating citizen consciously decides to support a project for a longer period of time and supports through various forms of assistance such as knowledge, time and physical training contributes to the project. The mechanism *project start* offers the possibility not only to consume content but also creating new content in the form of a project before its implementation. In this way, users can submit their own projects, thus laying the foundation for further collaborative and creative cooperation (Bruns, 2007).

The results of the platform analysis illustrate that not all of the platforms examined contain all of the defined mechanisms. Furthermore, the mechanisms are implemented in an extremely diverse way, which results in a strong heterogeneity of the respective platforms.

The *project start* mechanism occupies a special position. Platform users who start a project initiate the participation of other platform users. Project initiators share their vision of the future and thus invite participation to build it together.

To provide a tangible outcome of our research we developed the tree ring model (see Figure 1) as a result of the DSR process with several iteration loops. Our aim is to offer practitioners assistance in selecting the appropriate participation mechanisms for the respective situation.

In the synthesis, the following aspects from the theoretical background are integrated into our model. (1) A framework in a non-hierarchical form, participation subsets in connection with the degree of involvement & engagement. The framework area is based on Collins & Ison (2009) and Wilcox [28] elliptically designed framework, which visualizes information, consultation and participation as subsets of social learning. This contour reminiscent of tree rings as a metaphor for personal development of participants is where the model takes its name from. (2) The functional role of the citizens involved, were derived from the Split Ladder of Participation by Hurlbert & Gupta (2015) and the changing relationship between citizens and the city administration (Foth, 2017). In consideration of bottom-up urbanism, various roles are therefore derived from Foth (2017) and Simonofski et al. (2019) (observer, expert, central designer, collaboration partner) distinguished from citizens. (3) A systematization of the participation mechanisms specified for digital platforms. Thereby, the goals reflect the intention of the participation design, while the sub-ordinate mechanisms embody the reason to reach this goal.

They are increasing gradually according to the degree of involvement & engagement which is based on Straßburger & Riegers (2014) participation pyramid.
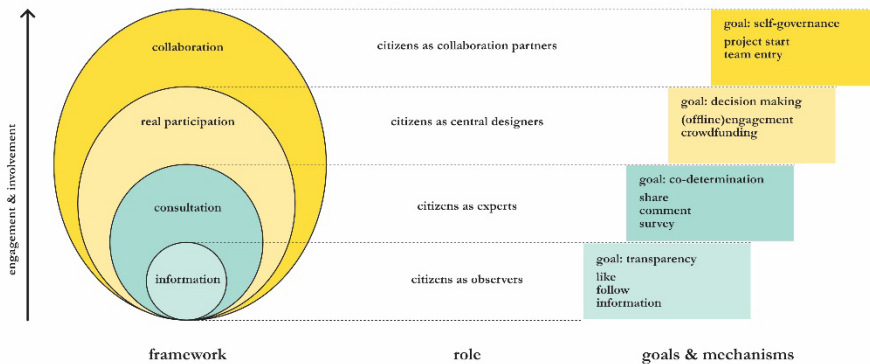

Figure 1: **Tree Ring Model**
Source: own elaboration

If there is a situation in which a platform operator would like to promote citizen involvement, the appropriate tree ring of participation can be identified depending on the situation. The framework should serve to classify and delimit participation characteristics in the model. The ellipses are to be understood as integrative subsets.

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This means that information and consultation represent a subset of *"real participation"*, but that *"real participation"* is differentiated from the other two sub-areas downwards – also in terms of color. If the role and the sub-area fit together, the designer moves horizontally to the right-hand side and finds the goal of the sub-area and the associated participation mechanisms there.

In the context of the classification of the mechanisms in their respective ellipses, the information mechanism occupies a special position within all mechanisms, which is mainly due to its generality and passivity of the user. It is elementary for participation platforms in order to guarantee transparency and was found on every participation platform.

The like, follow, comment, share and survey mechanisms are assigned to the consultation. These mechanisms have in common with the information mechanism that they achieve a visible effect, be it on the platform itself or be it on other social media platforms. The platform user becomes active by means of these mechanisms, insofar as he produces or distributes content himself, although sometimes only in the form of a reaction (e.g., like, share).

With the mechanisms crowdfunding, (offline) involvement and team entry, participation in the narrower sense is mentioned for the first time. The assignment of the mechanisms is based on the requirements for *"real participation"*. In the meaning of a subset of participation, *"real participation"* is mainly defined by its cooperative character, which calls for a joint exchange of resources between the actors involved. In this context, cooperation requires the right to co-determination of all those involved, which in turn presupposes a handover of power by those usually in power. In the case of crowdfunding, this resource is funds. In the case of (offline) involvement and team joining, the shared resources correspond, depending on the specific role, to e.g., drive, knowledge or skills. The citizen thus actively contributes to the design of the project and at least indirectly determines the implementation of the project.

5   Evaluation

The tree ring model offers a formalization of participation mechanisms of digital participation platforms. By restricting the variety of platforms and their mechanisms, a classification based on literature and reflected by expert interviews could be carried out along the level of participation. The model primarily serves platform operators and founders in the (further) development of their platform. Participation mechanisms should be selected based on the anticipated role of the citizen. This application was confirmed in expert interviews with the platform operators of the four digital participation platforms Sandkasten, Raumpioniere, WeChange and Rabryka. The practitioners suggested the color design for a better understanding of the demarcation between participation and real participation or the sharpening of the term *involvement and engagement* (instead of prior involvement). The classification of the participation mechanisms within the associated goals found its way into the model through the reflection of the platform operators. In addition, as part of the evaluation, some mechanisms were shifted to other levels, as this turned out to appear more reasonable, especially in practical application. For example, the mechanism for *"team entry"* changed its original position from the *"real participation"* level to the *"collaboration"* level. The main reason for this was the structural differentiation between helpers and team members by the practitioners.

At the same time, the unresolved main point of criticism arises from the individual experiences of the platform operators that the model greatly generalizes and simplifies the actual individuality of participation platforms, although the participation mechanisms on the respective platforms have different weightings and values – depending on the context, as well as the implementation and interaction of the mechanisms. The authors also noticed the diversity of the platforms examined, both in terms of their structure and in terms of the mechanisms and divergent intentions selected. It should therefore be noted critically that, depending on the design of a platform and the interpretation of the mechanisms, practitioners might gain different insights. As a result, the tree ring model should be understood as a framework for orientation and users should always be encouraged to make individual adjustments (e.g., specializing the term *"citizen"*, adding roles or mechanisms).

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As an orientation framework, the simple structure of the model was understood by all four interviewees and highlighted positively. In particular, the *"tree rings"* (in the left model area) are highlighted as a successful alternative, as opposed to a hierarchical model. In addition, the platform operator of Raumpioniere confirmed that the model would be helpful for the intended target groups, platform operators and functionaries. The feedback validates the model design with regard to its intended user group.

6   Conclusion and Outlook

With the trend towards bottom-up urbanism, a large number of participation platforms have emerged that offer their users a wide range of participation options. This diversity is primarily due to the respective offer and the design of the participation mechanisms of a platform. The attempt to formalize these mechanisms makes a contribution with the presented tree ring model to systematize the mechanisms of participation platforms and to classify them in the spectrum of participation in the area of bottom-up urbanism. In addition, the term *"real participation"* was separated from the hierarchically subordinate functions of information and consultation and upwards from collaboration.

The achievement of the research goals and the benefits of the tree-ring model of participation developed iteratively from theory and practice was confirmed in expert interviews, but at the same time provides the starting point for necessary further research in this area to shape an understanding of arising forms of participation. We see our research value as another piece of the puzzle to understand and design bottom-up participation of the 21st century. The tree-ring model offers a zoomed out perspective to shape the understanding of our roles in a bottom-up society to build the future cities we want to live in. And if we zoom in on the existing platforms the concrete model helps to make this discourse tangible.

However, there are some limitations, since both the participation platforms analyzed and the platform operators surveyed come mainly from Germany and the northern hemisphere although participation platforms are represented worldwide. As a result, an application or further development for international participation platforms has to be researched and possible cultural peculiarities have to be taken into account for

the classification of the mechanisms. The mechanisms themselves are also more fundamentally defined and the user perspective, such as motivation, was not part of this work, but might be a valuable extension.

In conclusion, we demonstrated that a participation platform primarily defines its individuality. A large number of configurations can be summarized under the ten identified mechanisms. One example is the different design of the *Like* mechanism on the Sandkasten and Raumpioniere platforms. Some mechanisms fit into different sub-areas and, depending on the platform design, can be assigned to *"real participation"* or lower levels of involvement & engagement. Depending on the founding phase or platform intention, this can lead to the goal and effect of the mechanisms contradicting the results presented here. Future research projects could investigate to what extent an adaptation of the model to different platform concepts is reasonable and valuable.

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