Citizen Design Science: A strategy for crowd-creative urban design

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ABSTRACT

The last decades in urban design research are characterised by a focus on technological aspects of cities which is commonly known as the smart city strategy. The concerns and interests of citizens are coming to the forefront nowadays with the awareness that a liveable city does not only consist of good infrastructure and sustainable energy supply but also citizen input and feedback. In this paper, we present Citizen Design Science as a new strategy for cities to integrate citizens' ideas and wishes in the urban planning process. The approach is to combine the opportunity of crowdsourcing opinions and thoughts by citizens through modern information and communication technology (ICT) with active design tools. The active design feedback from a city's inhabitants is identified as a yet missing but essential way towards a responsive city. We therefore propose a system to merge Citizen Science and Citizen Design, which requires a structured evaluation process to integrate Design Science methods for urban design.

We show examples of existing approaches of Citizen Design Science and present the Quick Urban Analysis Kit (qua-kit) as an application of this methodology. The toolkit allows users to move geometries in given environments and provides the opportunity for non-experts to express their ideas for their neighbourhood or city.

1. Introduction and motivation

Cities around the world are facing tremendous challenges. For example, emerging cities in Asia and Africa often have to deal with unexpected side effects from mass transport, inadequate urban infrastructure, or other environmental side effects due to fast growth of urban areas and demand flexible and adaptive strategies for urban planning. The approach from the last decades was to harness innovative technologies and acquire knowledge through data mining strategies. This movement to optimise the city is known as the *smart city* concept.

There are several definitions of a smart city circulating in research. Our work invokes the standard that is based on the evaluation of several definitions by the International Telecommunication Union. They declare a smart city an "innovative city that uses information and communication technologies (ICT) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects" (Kondepudi, 2014, p. 13). The concept of smart cities characterises the city for aspects of efficiency and effectiveness and areas of concerns like energy consumption, administration and traffic.

The problem of this consideration is that the human aspects like the perception of space are not regarded. Smart city technologies are not a panacea for cities as pointed out by Battarra, Gargiulo, Pappalardo, Boiano, and Oliva (2016). Present strategies are therefore focusing on human-centred technologies and try to engage citizens in the planning process. This transformation is sometimes labelled as Smart City 2.0 strategies (Pomeroy, 2017). We will use the formulation of the *Responsive City* in this paper, as it is proposed by Goldsmith and Crawford (2014). This term reflects the changeover from top-down governed cities towards citizen-centred and citizen-inclusive governance in the best way.

The main reason for having the vision of a responsive city for future cities is that mere smart technologies fail to integrate evolving self-organizing entities by dealing with mainly post-occupied spaces and it cannot improve aspects of cities that go beyond easily quantifiable criteria. Such aspects are for instance the quality of life, also designated as liveability, or the citizens' identification with a place.

There are many solutions to make this vision practical. We concentrate in this paper on participatory design approaches in urban planning and from here develop a new strategy which combines active co-designing with crowdsourcing methods. The difficulty is that co-creation of design is typically based on a continuous communication between the designer and the co-creators (e.g. the user of the product). By including a large amount of people in a co-design process, it is not only an issue of how the design ideas of the co-creators can be collected

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but also how the information can be transformed to useful input for the designer. The presented method is more complex than a simple add-on of the existing co-creation. We therefore give the new strategy its own name and designate it as *Citizen Design Science*.

This paper begins with a short review of the history for participatory planning and some current approaches how ICT can improve urban design and planning processes. Another focus is on community workshops which enable active designing with residents.

We present the idea of Citizen Design Science while also taking the presented challenges as basis. After the discussion of the theoretical framework, we bring it in context of existing and upcoming user-centred and participatory design. At the end, we introduce the Quick Urban Analysis Kit (qua-kit) as a design tool that enables non-experts to do simple design tasks. Due to the simple handling for the user, we see it as an appropriate, powerful enabler for Citizen Design Science.

2. A sketch of citizen participation and participatory design in urban planning

Before discussing the research areas which affect Citizen Design Science, we want to clarify the different terms that are used for its description.

Citizen engagement or more commonly, **civic engagement**, refers to Adler and Goggin (2005) to "the ways in which citizens participate in the life of a community in order to improve conditions for others or to help shape the community's future". It is a very general description and can cover several citizen activities like volunteering in social projects or participating in public debates. More specific is the term of **citizen participation** which is understood as a political strategy. Heller, Price, Riger, Reinharz, and Wandersman (1984) defined it as "a process in which individuals take part in decision making in the institutions, programs, and environments that affect them" (p. 339).

The idea of interacting with people to benefit from their ideas does not only appear as part of governance. If the opportunity of integrating people into a developing process (e.g. of a software or product) is taken into account in general, it is called **user participation**. The participation of users which concerns the appearance and handling of the product or service, ergo its design, is named **participatory design**. Closely related to that is the term of **co-operative design** or **co-design** which refers to "collective creativity as it is applied across the whole span of a design process" (Sanders & Stappers, 2008). The act of collective creativity is called **co-creation** and means the process when "creativity […] is shared by two or more people" (ibid.). These people can either be trained designers or non-experts. The expressions of **community consultation** or **community design** are in this paper interchangeably used to user participation or co-design, respectively, and emphasise that the user is seen as part of an entity with similar ideas, needs and demands. **Design Thinking** is a broad term for different strategies of collecting ideas and finding developing innovation for what is desirable, viable and feasible for the user (Stimmel, 2015, p. 51).

Another vogue characterisation of processes, products and services is **user-centred**. We will use this term in this paper according to Sanders' definition (Sanders & Stappers, 2008). The user is in this kind of design process seen as subject and does not necessarily interact with the designer. The participatory approach is opposed to this a design process where the user is considered as partner. In a user-centred approach, design researchers serve as communicator between user and designer (Sanders, 2002). They interpret the information of the user, often in form of design criteria, and the designer interprets these criteria which is typically done in the language of sketches or scenarios.

New technologies have facilitated new opportunities of involving people in the design process. The combination of crowdsourcing ideas and co-design strategies is called **distributed participatory design** or **mass-participatory design** (Lorimer, 2016).

After this sortie to general design strategies, we will focus again on urban design. As we see citizens as the user of urban design, we can transfer the terms above to urban design by replacing 'user' by 'citizen' or specifying the expressions. **Participatory planning** comprises urban planning processes with citizen participation while **citizen-centred planning** encompasses urban planning processes which primarily focus on optimising the public space for citizens but not necessarily include citizen participation methods.

To explain and embed the strategy of Citizen Design Science in the varieties of participatory planning, we give an outline of research objects and discussions in the past decades.

The first attempt to structure citizen participation was carried out by Arnstein (1969). The presented ladder of participation contains eight rungs, namely manipulation, therapy, informing, consultation, placation, partnership, delegated power and citizen control. They are seen as hierarchical, though the author does not give instructions how to ascend to the next step of participation as pointed out by Berman (2015). In his work, he adds the practical dimension by classifying participatory practice regarding to their capacities of incorporating residents' perspective and needs into planning, which he develops as the Participatory Method Ladder. The hierarchical model was criticised fiercely by Grönlund because of the two basic assumptions for this model. This criticism was namely that typically more sophisticated technologies mean better participation and more participation means better democracy, but only proves to be true with direct democracy as the ideal value (Grönlund, 2009). The hierarchy in a model for participation was much discussed in literature (Collins & Ison, 2006; Fung, 2006; Tritter & McCallum, 2006). Since the strategy of Citizen Design Science works independently from the theoretical model the participation is based on, we want to leave the topic at the mention of the corresponding literature and focus on the benefits of participatory design in urban planning.

The feedback from research for citizen participation and especially participatory design in urban planning is generally positive.

Participation strengthens the role of the citizens and therefore direct democratic decision processes. Another effect is that the participation of people in community design activities or other collective local interest groups can be identity-establishing for the citizens and therefore seen as a part of community development (Saad-Sulonen & Horelli, 2010).

However, it is not only the identification with the community that is affected by participatory processes. Smith (1983) depicted the process and goal of citizen participation as a set of procedures to consult, involve, and inform the public to allow those affected by a decision to have an input for that decision. Citizen participation could be treated as the significant strategy towards the goal to construct liveable and resilient smart urban environments. Brown and Wyckoff-Baird (1992) consider multiple levels of local community involvement for the design, implementation and evaluation of projects or plans. As long as public benefits are touched, public participation could clearly bring benefits to scientific and technology policy making. Berntzen and Johannessen (2016) highlight citizen's role in the participatory process. They state that citizens' competences and experiences can produce better plans and services, and a democratic process is usually helpful to build liveable environments.

This review shows the potential and benefits of citizen participation and especially participatory planning. Nevertheless, these approaches also face some drawbacks.

1. Participatory design is time- and cost-intensive (e.g. Hughes, Randall, & Shapiro, 1992).
2. Community design in the framework of workshops is often not entirely representative. It is crucial that public participation includes the appropriate range of interests of the people (Abers, 2000). Bryson, Quick, Slotterback, and Crosby (2013) mention that participatory processes often end up by involving the ""usual suspects", people who are easily recruited, vocal, and reasonably comfortable in public arenas".