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Urban transformation and citizen science: A systematic approach to open urban sustainability hubs

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ABSTRACT

This article addresses citizen science as an approach to transformative experimentation in urban planning and research. On the basis of the research project "Open Urban Sustainability Hubs" (OPUSH, www.opush.net), the role of knowledge infrastructures such as libraries and museums is exemplified, and how their potentials can be investigated in applied research processes and their capacities strengthened at the same time.

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1. Introduction

An essential prerequisite for sustainable development is that transformative knowledge and action can unfold in cooperative processes. The applied research project „Open Urban Sustainability Hubs“ (OPUSH, www.opush.net) seeks to analyse the role of local knowledge infrastructures in the context of open science ecosystems for urban transformation in line with the UN Sustainable Development Goals (SDGs) and to find measures to strengthen these infrastructures in an international and transdisciplinary project partnership over a period of three years. In four cities (Barcelona, Delft, Tallinn and Vienna), cooperation between science, libraries, museums, city administration, civil society and other stakeholders of urban development will be established and approaches of citizen social science will be tested in these local networks. Capacity building is therefore realised in the dimensions of individual competency development, social learning and inter- and transdisciplinary learning.

2. Urban transformation and citizen science[1]

Today, urban development plays a central role for sustainable development, which is now aspired to in international agreements and is based on comprehensive scientific findings. The socio-political urgency is increased by the fact that the actual process of change has so far not lived up to expectations. In science and politics, transformation in this context has been established in recent years as a term for radical change, but there is still a great deal of disagreement about what characterises this change in different local contexts and about the best ways to achieve this change. In other words, urban development as practised so far is increasingly becoming an urban transformation task necessary on a global socio-political scale.

This paper is focusing on urban planning as a field of action constituting an integral planning and implementation process that encompasses the socio-politically legitimised ecosystem of actors and their framework conditions - actors, mind you, who are in a permanent competition for the socio-political mandate for urban transformation. In this complex situation, processes of open scientific work and experimentation offer an interesting opportunity, especially for democratically constituted societies, to address the challenges and claims of interest in a broader societal context and to manage concerted and transparent comprehensible steps of implementation. The benefits of citizen science need to be identified and the question is how these can be transferred to urban transformation processes.

If one is aware of the essential qualities of citizen science approaches, despite manifold definitions and nuances [1, 2], then it is astonishing that these multifaceted and differentiated approaches have hardly been taken up yet for the urgent challenges of urban transformation and that they still play at best a marginal role in urban planning. At the same time, it is also noticeable that knowledge infrastructures, especially those of research institutions such as libraries and museums, are attributed great importance for the strengthening of citizen science in current

[1] Urban development and more specific urban planning is a genuine way to achieve urban transformation, where citizens' engagement could be enhanced in many ways. Urban planning is understood as a social activity that follows a rational orientation and is systematically directed towards solving societal problems. This definition of planning includes all forms of planning practice as well as various forms of governance. Urban development, though, serves as an umbrella term for all processes of urban change.

international understandings of open science [3, 4] and that their interest groups have themselves recognised this importance and encourage consistent implementation in corresponding roadmaps [5] and guidelines [6]. Nevertheless, studies show that so far only little importance has been attached to actual implementation by the institutions concerned [7].[2] This general state of affairs largely corresponds to the observations made so far in the partner cities of OPUSH, although there are definitely differences in local experiences and existing support structures.

These observations are not primarily understood as a critique of the theory and practice of planning or of the service quality of research libraries and museums, but rather raises the question of whether there are plausible reasons for these gaps, and whether knowledge about it can help to prepare the most meaningful approaches to citizen science.

3. The OPUSH research approach to urban transformation

Therefore, OPUSH follows a strategic-relational institutionalist and learning-oriented transdisciplinary approach (figure 1). The linchpin in OPUSH is collaborative work on sustainability knowledge, where open science and in particular citizen science is gaining momentum. Today, the role of citizen science in society is characterized as „an open and participatory approach to science, reducing the distance between science and society, and contributing to the goal of an inclusive society." [11, p. 7] The full potential of citizen science unfolds when the focus is not only on answering scientific questions and generating valid data „but also on the possible pressures, drivers, and effects on society and social innovation." (ibid.)

The way in which knowing is shaped and generated by knowledge networks within urban transformation processes involves a set of relevant connections that goes beyond that of planning practice, where the latter can be considered as one of several potential nodes and driving forces in this network [12]. The notion of open urban sustainability hubs is closely linked to processes of situated learning and collaboration in co-creative settings, where bounded networks, such as epistemic cultures [13], communities of practice [14] or critical social learning systems [15], are potentially supported/facilitated and shaped by infrastructural resources and activities. By focussing on inter- and transdisciplinary collaboration on sustainable development these co-creative settings are fostering urban transformation.

[2] While the aim of open science is to create the general conditions for a more active link between science and society, there are also more specific ideas about how research libraries - and globally all libraries - can make a significant and exemplary contribution to sustainable development. Library advocacy groups such as LIBER and IFLA have also addressed the role of libraries in the context of sustainable development [8, 9]. A systematic literature review of articles between 2000 and 2020 performed by Khalid et al [10] is identifying major sustainable development challenges in libraries as follows: the absence of sustainable strategies, the lack of sustainable education in the curriculum of library and information science, the lack of sustainable operations, services and buildings designs and massive energy consumption due to long service hours of libraries.

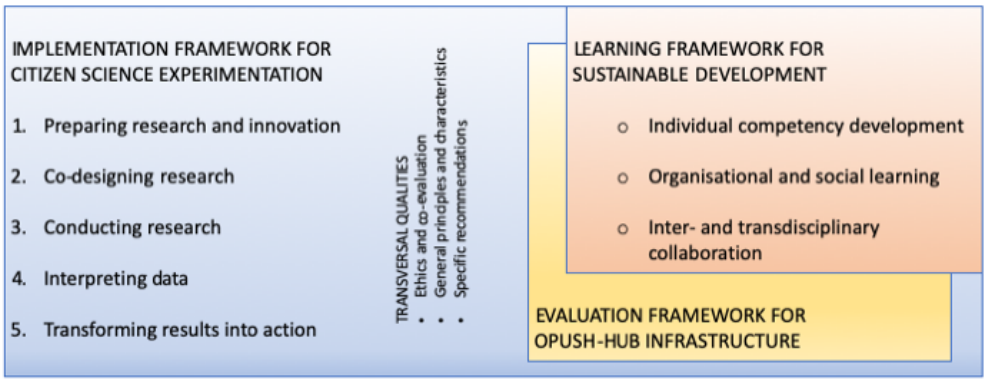

Figure 1: OPUSH research framework.

In OPUSH, the local open science landscape has been analysed first by approaching the urban institutional framework as a social learning system, mapping the supportive networks for citizen science and the multitude of communities of practice in citizen science, and the more specific citizen science projects in the context of urban transformation. It is in this context that the engagement of societal actors in an open science ecosystem is closely linked to open knowledge infrastructures.

Second, in each partner city at least two citizen science experiments are tested. Therefore OPUSH is drawing on the general principles and guidelines of the European Citizen Science Association [3] and a concrete framework for the implementation of a cyclical research process of citizen social science, the CoAct research cycle (https://coactproject.eu/coact-research-cycle/). The five main steps of this research cycle are preparing research and innovation, co-designing research, conducting research, interpreting data and transforming results into action. The research cycle is further guided by both transversal concepts, ethics and co-evaluation.

In terms of capacity building, OPUSH follows a threefold learning approach that is oriented towards theories of social learning systems and is inspired by a commitment to learning by doing. This framework is placed alongside the cyclical research process to provide a clearly structured analytical approach to the practice of learning. Against this background, the learning framework for sustainable development in OPUSH has been elaborated, by asking how open urban sustainability hubs are supportive to these dimensions of learning.

As open science infrastructures are often the result of community-building efforts, which are crucial for their long-term sustainability, the UNESCO [4] recommends that these infrastructures should be "not-for-profit and guarantee permanent and unrestricted access to all public to the largest extent possible." The multifaceted role of infrastructure for citizen science is defined in OPUSH according to a contemporary understanding "as physical structures, social exchanges, and conditions for making and sustaining collective and democratic life." [16, p. 92]

4. First lessons learned from the preparation phase of citizen science experiments

Given the quite different local conditions and practical experiences with citizen science in the partner cities and countries, the OPUSH-team had to be methodically agile and use the specific services on site. Barcelona has had a citizen science office for a decade and research units like Open Systems gained experience with social citizen science approaches at an early stage. In Vienna, the services of the national citizen science platform "Österreich forscht" could be used to good effect. Meanwhile, support for citizen science in the other partner cities is still less pronounced, which in turn makes the efforts of these project partners for local capacity building all the more important. For OPUSH, European level approaches, like guidelines and policies for citizen science (i.e. ECSA), provide a common orientation or at least a basis for discussion and are therefore playing an important integrative role.

The application of citizen science to urban transformation in the context of urban planning requires elaborate approaches that need a good understanding of relational urban spaces and infrastructures and the importance of multi-actor constellations. Neither expertise in citizen science nor in urban research alone can meet this requirement. The inter- and transdisciplinary approaches needed require sufficient time for professional exchange, whereby multi-media formats and visualisations as well as regular physical meetings can significantly facilitate communication. Identifying and approaching to relevant local challenges of urban transformation and processes of urban planning is key to OPUSH. Therefore trusting relationships with local partners like the city administration and other stakeholders in urban development and citizens had to be built first. Besides the higher education system and organisations regularly performing research, there are many other organisations and institutions that can play an important role for citizen science.

Establishing the different steps of the research cycle consistently and integrating them into the urban transformation process requires great efforts from the research teams. It cannot be assumed that all co-researchers involved immediately recognise the importance of each step. It is therefore all the more important to provide all participants with low-threshold access to the research process and its results, possibly also to the interpretation of empirical findings.

Sustainability means, among other things, that open science should be built on long-term practices, services, infrastructures and funding models. In this sense, scientific institutions should promote open science with their own practices and offerings and thus proactively contribute to opening up the innovation landscape.

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