Scaling up Participatory Design

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Abstract. In this paper we elaborate on the *scalability* of Participatory Design (PD) with a special attention towards engagement. We ground our reasoning on the concepts of *scaffolding* and *infrastructuring* as instruments for *engaging* large groups of heterogeneous participants. Scalability is defined with reference to both the number of people and the space for active participation. We suggest that socio-technical scaffolding is needed to enable the infrastructuring process. Scaffolding and infrastructuring, meant as consecutive phases of design, can enact and support the scaling up of engagement.

Keywords: engagement, infrastructuring, scaffolding, scalability

1 Introduction

This paper is meant as a socio-technical reflection on how to *scale up* engagement in Participatory Design (PD) [13]. Our reasoning is based on some difficulties we have experienced in research projects aimed at engaging large and heterogeneous actor groups (i.e. citizens in public museums, older people in technology assisted homes and outdoors, students in a University campus). From our viewpoint, scalability, rather than being merely a problem of "quantity" or "size", also involves the issue of social/human and material/technical heterogeneity. Thus, scaling up is referred to both the number of participants and the space of participation for a vast array of people and things [11].

Drawing on Organization Studies (OS), Science and Technology Studies (STS) and PD literature, we elaborate on the scalability of PD to develop socio-technical infrastructures at a larger scale. This background paves the way for an innovative

multidisciplinary approach, by intertwining concepts such as *scaffolding* [14], *infrastructuring* [2] and *engagement* [19] which refer to OS, STS and PD respectively.

2 Related Work

Looking back at the PD projects conducted since the 1970s, Clement and van den Besselaar [4] found that, with a few exceptions, early PD projects "were generally small-scale and isolated from other levels of the host and sponsoring organization" [p.32]. Similarly, Shapiro [17] and Balka [1] advocated a reformist participatory agenda based on engaging with large-scale public sector organizations. Recently, Le Dantec and DiSalvo [10] argued that infrastructuring should be regarded as a socio-technical process for constituting and supporting a public, while Simonsen and Hertzum [18] claimed that "a review of PD experiments has been restricted to small-scale (often driven researchers) or to the initial parts of larger scale information systems development followed by a conventional contractual bid (…) Active engagement in – and documentation of results with – large-scale information systems represent a major goal for PD" [p.11]. Even though participatory methods and techniques are currently applied to a range of projects, spanning from software development to urban planning, their scalability cannot be taken for granted and heterogeneity of stakeholders poses several challenges. While describing a large-scale public project, Dalsgaard [6] stressed that "even though identifying different types of users and involving them is possible (…) [the] users' needs are heterogeneous and may change over time" [p.42-43] resulting in specific demands that must be addressed through techniques and technologies to scaffold participation [14]. Thus, acknowledging the urgency of scaling up engagement, we discuss how to support participation in large-scale projects.

3 Epistemological Tools

In the following subsections, the main features of scaffolding and infrastructuring are discussed. These concepts can be used as epistemological tools for the develop-

ment of design methods, devices or techniques for the engagement in PD. Their connection could lead to a solution to the issue of scalability.

3.1 Scaffolding

The word scaffold(ing) is commonly used in the construction industry to refer to the temporary structures that support building or renovation works. This term has been used to convey the organizational elements of what we may identify as the support and co-piloting work that enables transmission of the knowledge and culture of a practice [9]. Orlikowski [14] argues that "scaffolds include physical objects, linguistic systems, technological artifacts, spatial contexts, and institutional rules" [p.462] and describes their properties as follows [pp.461-462]:

- A scaffold is *temporary*: it typically exists for the duration of a project and is dismantled once the elements are completed or self-supporting.
- A scaffold is *flexible*: it is adapted to fit the particular local conditions.
- A scaffold is *portable*: it is easily moved, assembled, modified, and disassembled.
- A scaffold exists in *numerous forms*: there are many different kinds according to the goal.
- A scaffold is *heterogeneous*: it consists of different components according to what must be supported and the materials at hand.
- A scaffold is *emergent*: it is erected over time, changing in form and function, as needed to continue supporting the changing scale and scope of the element(s) being built over time.
- A scaffold is *generative*: it serves as the basis for other (creative) work, facilitating the performance of activities that would been impractical without material support (augmentation).
- A scaffold is *dangerous*: it is vulnerable to breakdown and failure because it is a temporary, emergent, and rapidly constructed assemblage.
- A scaffold is *constitutive*: it is constituted both of human activity and outcomes.

Bearing these properties in mind, how can we scaffold participation at design time and at a larger scale? The answer cannot overlook the concept of infrastructuring.

3.2 Infrastructuring

The term "infrastructure" evokes vast sets of collective equipment necessary to human activities so that people envision infrastructure as a system of railroad lines, pipes and plumbing, electrical power plants, and wires. Drawing on STS, the term

could be defined and conceptualized as a multifaceted notion referring to interrelated technical, social and organizational arrangements involving hardware and software technologies, standards, procedures, practices and policies, along with digital configurations in support of human communication and capabilities [5]. Starting from [21], Bowker and Star [2] described the salient characteristics of infrastructure [p.35]:

- An infrastructure is *embedded*: it is sunk into, inside of, other structures, social arrangements, and technologies.
- An infrastructure is *transparent*: it does not have to be reinvented each time or assembled for each task, but invisibly supports those tasks.
- An infrastructure is *aimed at*: it may be either spatially or temporally oriented. Infrastructure has reach beyond a single event or one-site practice.
- An infrastructure is *taken-for-granted*: it is made up of artifacts and organizational arrangements which are learned as part of membership in a community of practice.
- An infrastructure is *linked with conventions of practice*: it both shapes and is shaped by conventions of a community of practice.
- An infrastructure is *standardized*: it embodies standards.
- An infrastructure is *built on an installed base*: it does not grow *de novo*, but wrestles with the inertia of the installed base and inherits strengths and limitations from the base.
- An infrastructure is *visible upon breakdown*: it is normally invisible but becomes visible when it breaks.
- An infrastructure is *incremental*: it is big, layered, complex, and it means different things locally, so that it is never changed above. Changes take time and negotiation, and adjustments with other aspects of the systems involved.

Later, with their book titled "How to Infrastructure?", Star and Bowker [20] stressed a focus on *doing* and fostered an exploration of infrastructur*ing* as a more comprehensive term for the creative design activities of professional designers and users [15]. Recently, Le Dantec and DiSalvo [10] defined infrastructuring as the work of creating socio-technical resources for the *attachment* of people who may become a motivated public over time. In this view, technologies act as drivers for socio-technical relationships, not as their end. This perspective implies a shift from a technocratic view of innovation to a view puts the emphasis on the entanglement of social and material aspects [13]. The concept of attachment introduces the idea of PD as a process to create fertile ground to sustain, over time and space, a community of participants. Brandt, Binder and Sanders [3] claim that "in a particular design project, participatory tools and techniques can be seen as the scaffolding for the temporary

community of practice in the making" [p.148]. So, how could the connection between our epistemological tools generate a large-scale engagement? We will address this point in the final section.

4 Discussion

The challenge of any participatory approach applied to a large-scale project lies in devoting attention to human and material agency. For the researchers who are used to apply a participatory approach at a small-scale, this could sound as an obvious statement, as design methods are usually concerned with preparing settings and tools for the involvement of people [8]. However, underestimating the different challenges of engagement at a larger scale, with heterogeneous groups of participants to involve actively as co-designers, can result in several problems [12] [16]. A large scale has a different impact on the research activity than a small scale, calling for scaffolds that adapt to the features listed by Orlikowski [14]. Whereas a list of the properties characterizing the concepts of scaffolding and infrastructuring has been produced, to the best of our knowledge there is no such list for the concept of engagement. Thus, by reviewing the PD literature [e.g. 19] and starting from our research experience [7] [22], we identified the main properties of engagement. Engagement is *polyphonic* (its success is strongly linked to the different voices who are able to contribute to design), *embedded* (related to people, technologies and practices at stake), *embodied* (influenced by the knowledge and competences of the people involved), *encultured* (entrenched in values, rituals and culture shared by the people to engage), *cooperative* (based on a mutual learning process between users and designers), *pragmatic* (benefiting from the insiders' specific knowledge of the environment targeted by the design), *iterative* (based on design-test-measure-redesign cycles repeated as often as necessary), *ambiguous* (it stimulates the participants' creativity, giving them the possibility to influence actively the design process).

In order to generate such engagement at a large-scale, we suggest considering scaffolding and infrastructuring as two interrelated and consecutive steps of a process. The design of a scaffold (e.g. participatory tools and techniques, web platforms, social networks) is the starting point: it should stick as much as possible to the features listed

in Table 1. In particular, scalability of engagement in a PD project is fostered by an *emergent* scaffold, as defined in section 3.1, because this characteristic refers to its adaptability to participants, theirs needs and features. At the same time, we highlight that a scaffold should be *flexible* and *portable* enough to be used in different projects, as well as meeting the budget requirements, which usually represent one of the main constraints to scaling up.

Table 1. Features of Scaffolding, Infrastructuring, Engaging

Scaffolding	Infrastructuring	Engaging
• Temporary • Flexible • Portable • Numerous forms • Heterogeneous • Emergent • Generative • Dangerous • Constitutive	• Embedded • Transparent • Reach or scope • Taken-for-granted • Linked with conventions of practice • Standardized • Built on an installed base • Visible upon breakdown • Incremental	• Polyphonic • Embedded • Embodied • Encultured • Cooperative • Pragmatic • Iterative • Ambiguous

Scaffolding enables the socio-technical infrastructuring. However, the occurrence of this turning point cannot be planned or predicted, due to the situated nature of each design process: some processes need to be supported by a scaffold for a longer time, due to the specific socio-technical complexity, while others require less time for scaffold to turn into infrastructure. The double dimension – social and technical - of infrastructuring needs to be properly stressed [7]. We refer to *social* infrastructuring as the set of engaged people, and to the *technical* infrastructuring as the ensemble of technologies which are at their disposal to actively participate. Therefore, the passage from scaffolding to infrastructuring is marked by the engagement of participants who develop attachment towards the design process. Such a process, based on the connection of scaffolding and infrastructuring, is suitable for both small- and large-scale design projects, even though it becomes all the more advisable to engage a larger and heterogeneous public.

5 Conclusion

Scaffolding and infrastructuring are not only useful concepts for elaborating on how to scale up the engagement in PD. They also contribute to refresh the socio-technical literature. Our proposal is theoretical in its premises, multidisciplinary in its development and pragmatic in its intention, which hopefully makes it a more effective contribution to the studies about the scalability of engagement at design time.

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