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ORIGINAL PAPER

Scaling local experiences to global challenges: insights from grounded design and value sensitive design

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Abstract
This VSD nugget considers how the small-scale effects of practice-based design activities can be sustained and scaled up to contribute to global societal change. Examining in particular the character of social networking activity, we discuss how the sustainability of an initiative is related to its ability to: (i) be scaled up and linked with like-minded initiatives; (ii) navigate diverse values; (iii) establish organizational structures beyond the scientific context; (iv) establish a voice in public discourse; and (v) identify and involve relevant policy makers.

Keywords Change · Children · Computer clubs · Global challenges · Grassroots movements · Grounded design · Value sensitive design

Introduction

The urge to design and develop, to plan and to write so as to make this world a 'better place' has been driving researchers from various scientific disciplines for years (see, for instance, Eagle and Greene 2014). An abundance of research is located at the intersection between policy and public discourse, social, political and economic action. It follows one over-arching question: what could and should be don e to make this world a place that is equitably livable for everyone.

In research and politics alike, change is frequently project-driven, resulting in short-lived or small-scale effects. Two opposing approaches mark out general solutions to global challenges. One of these aims to bring about a 'global mind' (Jokinen 2005); implementing change in a top-down manner and on a broad, even boundary-crossing basis to maximize effect. The other one has its roots in the local; mobilizing individual people through bottom-up strategies and thus finding strength in the unification of a great number of voices and people in a grassroots movement of some kind. Here, the effects of small-scale projects can be estimated, their impacts assessed and their consequences documented.

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This VSD nugget considers how these small-scale effects can be sustained and possibly scaled up to have larger effects. Can global societal change be brought about through the social networking of small-scale engagements? If global societal change can be achieved in this way, what will be the nature of these social networking activities? What role does the negotiation of values and perspectives play—on both a broader basis and at a smaller scale? To explore these questions we focus on the example of a Grounded Design activity that was founded upon a practice-based approach to human-centered computing (Wulf et al. 2017).

Global challenges and grassroots movements

Global challenges in academic as well as public discourse have been approached from a number of perspectives, most prominently through politics (e.g. Jokinen 2005) and environmental issues (e.g. Kinzig et al. 2013).

A recurrent pattern in many approaches to tackling global challenges is the search for, and training of, a 'global mindset' that is capable of overseeing the complex structures and interdependencies of action that global change entails. Grassroots movements, by contrast, follow a bottom-up strategy, seeking to mobilize people for the development and implementation of solutions to a global issue. These movements take a direct, personal contact with global challenges

to be the starting point for change. Research in political science and sociology has recognized a subjective element to be immanent in efforts to mobilize people into action in grassroots movements. In recent years, this aspect of perception or consciousness has been conceptualized in social-psychological terms as 'framing' (Johnston and Noakes 2005), which functions "in much the same way as the frame around a picture" (Johnston and Noakes 2005, p. 2), focusing the viewer's attention on what is relevant and fading out items obstructing the view.

Three key attributes have been recognized as required for socially responsible action: "the ability to act, a willingness to act, and the awareness of needs" (Vanasupa et al. 2006, p. 374). For engineers as well as designers and IT specialists, the first ability translates into technical competence and is covered by curricula and vocational training. The other two abilities, however, have no fixed position in the vocational skill-building of scientists and practitioners. They demand for an awareness that what we call "life on earth" can be considered to be a series of interlinked and interacting systems (Capra 2004). From both a 'global mindset' and grassroots points of view, this awareness calls for a holistic, participatory and reflective attitude.

Two approaches: grounded design and value sensitive design

Two main methodologically-related approaches come together when considering the small-scale effects of practice-based design case studies in response to global societal challenges in the study that we shall be reporting here. These are: (1) grounded design; and (2) value sensitive design. Their foci and relationship to each other are detailed below.

Grounded design

Grounded Design (Wulf et al. 2011, 2017) assesses the quality of IT design through evaluation of emerging changes in social practices which result from the (long-term) appropriation of IT artefacts. It is applied in case studies where we reconstruct the social practices observed before and during the design and, later, the appropriation of innovative IT artifacts. We call these context-specific research endeavors 'design case studies'. The approach here largely adopts three perspectives: (1) the empirical analysis of given practices in a specific field of application; (2) the creation and development of innovative ICT artifact designs that are related to the empirical findings; (3) the investigation of how the technical artifact is appropriated over a longer period of time.

By conducting design case studies, Grounded Design (Wulf et al. 2011, 2017) builds upon well-established research methods such as ethnographic field studies, participatory design, and participatory action research. At the same time it commits itself to the recognition of the (often heterogeneous) values involved.

Value sensitive design

It is beyond dispute that criteria such as usability, utility, reliability, efficiency and correctness are important in conventional systems design. However, there is also a growing consensus among system designers and researchers that there is a need to determine the criteria associated with human values and the ways in which they are negotiated in system design processes. Value Sensitive Design as an approach (Friedman 1996; Friedman et al. 2017), is explicitly committed to the recognition of (once again, heterogeneous) values; for instance, those to be found across culturally diverse settings (Burmeister 2013). With its immanent methodological openness, this approach recognizes the iterative and deliberative way in which outcomes may be achieved.

From a methodological perspective, Value Sensitive Design follows a tripartite structure by iteratively undertaking "conceptual, empirical, and technical investigations" (Borning and Muller 2012, p. 1125). The perspectives of direct users of a technology are acknowledged together with the perspectives of those individuals who are not direct users, but who are nonetheless somehow affected. On the one hand, individuals and social systems and, on the other, technology development are seen to be in a reciprocal relationship.

Snapshots of design case studies of computer clubs

Over the course of the past decade, we have conducted Grounded Design case studies related to (intercultural) computer clubs in different regional settings. We will describe some select features of these case studies, before moving on to an examination of how the networking of the local insights gleaned from such studies can be scaled up to have a larger effect.

Over time, then, we have been establishing a social network of the afore-mentioned intercultural computer clubs. The clubs were founded in socially and culturally diverse neighborhoods in various cities in Germany. They were designed around values of cross-cultural understanding and respect. These values emerged from a larger societal debate on migration and diversity in Germany (e.g. Klopp 2002), following the country's adoption of certain policies regarding labor migration in the 1960s and 1970s. The computer clubs have aimed to foster these values at a local level within diverse neighborhoods by offering to the neighborhood's mainstream and immigrant groups open yet guided

access to computer technology and modern media, together with any related skills (e.g. Schubert et al. 2011; Stevens et al. 2005; Weibert et al. 2017). Thus, the computer clubs work to foster community dynamics and the strengthening of social ties—at a family, school and neighborhood level. Our long-term study of the clubs has shown that this has a number of structural implications when it comes to navigating diverse stakeholder values. One immediate implication is that access to the computer clubs needs to be voluntary and free of charge. The clubs do not follow a lesson plan. Instead, topics for project work emerge from everyday life in the local neighborhood and are jointly decided upon by the participating children and adults. The majority of the clubs are located in schools—a location that can be seen as common ground to a diverse range of people in the neighborhood. Children and adults from the neighborhood are invited to participate in the club's activities together. In this way, an intergenerational learning experience is established that can spill over into family or neighborhood contexts. Tutors and teachers also provide guidance and help with the computer club project work as needed. By adopting this structure, the intercultural computer clubs are building on the principles of situated learning (Lave and Wenger 1991) and constructionist thinking (Papert 1980) that were first articulated in US computer clubhouses (Kafai et al. 2009).

Looking beyond immigration issues within any one single country, the creation of the state of Israel, the Gulf War, the Syrian and Iraqi Civil Wars, and various other civil wars and unrest have all been major triggers for huge movements of population over recent decades. We were interested in understanding the living conditions for these refugees and what opportunities might exist to improve their quality of life. We initially started working with two Palestinian refugee camps in the West Bank and were quite appalled by the way the Israeli occupation was having an impact upon the living conditions and, indeed, the very existence of the camp populations. We learned to understand the outsider role the camp populations were being obliged to play within Palestinian society. Against this background, we set up computer clubs to offer educational opportunities to kids and families within the camps and with the hope of being able to connect them socially with mainstream Palestinian society (Aal et al. 2014). Here, the establishment of the computer clubs was not always welcomed by the refugee camp population and it even caused a fight between university student volunteers and young camp residents. A well-known member of the refugee camp community and a partner for the computer clubs was involved and mediated between the two groups. In another incident, the moral values of local stakeholders collided with those of one of the researchers when a discussion arose about whether the holocaust had actually happened. Denial of the holocaust was commonplace amongst the inhabitants of the camp. At the outset, the researchers hesitated to discuss this sensitive topic, however, as trust grew between the researchers, the partners and the local community, the discussion was able to continue on more level ground.

Outside of this, as part of an ongoing research project, we have been looking at the impact of ICT on a remote, traditional rural community in a valley in Morocco's High Atlas Mountains. This valley has not long been connected to the outside world with an electricity line and a paved road. While there remains no telephone line at the time of writing, mobile networks were made available to the valley's inhabitants not so very long ago. In our study, we have been seeking to understand how the newly-given access to mobile IT, along with other emerging infrastructures, may be giving rise to changes in social practices. As a part of this, we have taken an interest in the developing public discourse and the forms it may be taking under the conditions of a clan-based society. Up to the present moment, a research team consisting of male and female researchers has spent several weeks in the villages located in the valley. They have been using ethnographic methods to gain the trust of the local inhabitants and to establish initial contact with local political leaders and NGOs. Apart from this, the research team has begun to gain some insight into the local political structure of the valley itself and its relationship with the Moroccan government. The team has been particularly concerned to try and understand the local conflicts between nomads and semi-nomads and between tourist guides and the regular valley inhabitants. Preparations have also been made for the establishment of a media-space in the next phase of the project. This is based on the idea of a computer club and will consist of a room provided by a local NGO that will be equipped with various kinds of ICT resources. The aim here will be to provide ICT access to the various demographic groups in the valley, notably the women and children. As with the computer clubs, the establishment of the media-space will be an endeavor that will have to be sustained together with the local population.

Reflections on sustainable effects

The practice-based design case studies described above have, to varying degrees, attempted to bring about or have achieved sustained positive effects. Studying the strategies employed by the researchers in close collaboration with the case study participants may reveal some general insights regarding the ways in which global social change can be accomplished by sustaining such small-scale engagements:

1. *The Participant Observer—Documentation as a Starting Point for Change*: A key point of several of the small-scale engagements described above consists of

the identification of everyday practices that are hidden or overlooked in public (media) discourse, but that are central to the development of a solution for a societal problem. Identification and documentation of these hidden practices may serve as a way of bringing them to bear upon more mainstream discourses or may help to facilitate the processing of an issue or a problem. In this respect, the Value Sensitive Design perspective strengthens the Grounded Design approach in that it enables the explication of values motivating the everyday practices surrounding a specific societal issue (see Friedman et al. 2017 also in this regard).

2. *The Grassroots Approach—Transferring Successful Interventions*: It is common research practice to explore the transferability of a specific research outcome by applying it to a similar setting in a different place. For the intercultural computer clubs, this has been the starting point of growing the computer clubs into a social network in different cities across Germany. More recently this has begun to span national borders as the networking of the computer clubs has proceeded in Palestine and Morocco. Here, sustaining positive effects goes along with local stakeholder ability to recognize the motivating effects of the networking activities, together with the researchers' and designers' ability to recognize the support needed to foster this scaling-up process and to contribute to its realization. The computer clubs example shows how this transition is always accompanied by a process of intensive discourse and negotiation of perspectives and values with the local stakeholders in the new place. Here, the Value Sensitive Design perspective incorporates a willingness to rethink established practices and to adapt them to the characteristics of the new surroundings and to the values and perspectives of the stakeholders involved (Friedman et al. 2017).
3. *Linking the Like-Minded—Networking Local Stakeholders*: Linking the like-minded gives individual initiatives more weight. This can prove especially helpful for things like distributing resources. This was experienced in the intercultural computer clubs when it made sense to share resources, tools, and technologies as and when they were needed for project activities, e.g. 3D-printing or basic electronics (Weibert et al. 2017). It is also the case that linking like-minded people can broaden perspectives by creating awareness of the larger dimensions that may be attached to local issues and values. Thus, an upcycling activity conducted by several of the computer clubs not only increased locally-grounded environmental awareness among the participating children, but also made the children realize how environmental conditions and the values of stakeholders affected by them can be very different around the world. So, when it came to water supply, for instance, this was considered a scarce resource in Palestine but was not even thought about as anything special by the children in Germany prior to their engagement in the project (Weibert et al. 2017).
4. *Letting Go—Fostering the Establishment of Organizational Structures*: With its foundation as a non-profit association, the network of intercultural computer clubs has recently established an organizational structure that is outside the university context. This has proved to have a sustaining effect in multiple ways: (1) by increasing the identification effect for the local stakeholders involved; (2) by involving the local stakeholders in decision-making processes; and (3) by institutionalizing the social aims of the initiative in a publicly acknowledgeable way. This format may also provide a helpful response to the problems posed by changing institutional structures and spheres of interest. The computer clubs in Palestine were particularly obliged to cope with this in their work.
5. *The Integration of Politics—Fostering an Understanding through Participation*: When operating at the center of a larger societal issue or conflict, it is critical that small-scale initiatives like the ones described above be able to identify and involve relevant community officials and leaders, even at an early stage of the study and intervention. Cooperation and local, social networking ties with NGOs and local policy-makers were established as early as possible for the initiative in the High Atlas Mountains in Morocco. Without these kinds of connections who are already somehow associated with the local government, it is more or less impossible to reach out to target groups (such as women and children) and gain enough acceptance from local inhabitants or even start a project in a politically sensitive domain.

Conclusion

We have presented snapshots of our design-oriented work and have argued that there are ways in which to scale up small-scale design interventions that may currently be generating very context-specific results, such that they can have a larger-scale societal impact. The scaling up is obviously work in progress and will need further critical reflection as it progresses.

Engagement with social practice, for us as researchers, will clearly always have some kind of normative dimension. The first neighborhoods in which we established the intercultural computer clubs were not accidentally chosen but rather represented, to varying degrees, a value statement by the researchers involved. There needs to be careful observation of whether and how, in the course of a specific project, the values of the actors in particular fieldsites are getting incorporated into the project work and how value conflicts are

being dealt with. This means that we also need to research our own design research practices. These types of investigations can be termed 'meta-research' (Dachtera et al. 2014). Meta-research needs to be conducted in a critical and honest manner to enable processes of self-reflection. This is also specifically the case with regard to value tensions and conflicts that may be part of the research work being conducted. Again, a Value Sensitive Design perspective can help here by providing a means of explicating the values motivating the (inter-)actions of all of the stakeholders involved.

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