

Reflections Over a Socio-technical Infrastructuring Effort

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Abstract. In this paper we present some reflections stemming from a case study aimed at building a socio-technical infrastructure for supporting participatory design and development. We summarize and abstract our experience into an hourglass approach defined by the intersection of two co-evolving dimensions of infrastructuring: the social and the technical ones. Different subsets of the community, characterized by the increasing involvement of volunteers, position themselves along the two axes and have different roles in the design and use of the generated artefact.

1 The case study

The approach we propose derives from a case study at the University of Trento, in Italy, which involved the design and implementation of a mobile application by the students-users. The app, called *iFame* (a play on words, since in Italian it is pronounced as “hai fame?” which means “are you hungry?”), addresses students’ concerns on the University’s canteen services. The app allows checking the length of the queue at the canteen through real-time webcam streaming, view daily and monthly menus and possibilities for menu composition, and rate the dishes served. This case study is part of the *Smart Campus* project, which started in the context of establishing a large-scale Living Lab in the Trentino Province and has the local University among its partners. In the short term, the goal of the project is to create an ecosystem that can foster students’ active participation in campus matters; in the longer term, the goal is to act as a sandbox for the development of infrastructures to foster active participation of citizens in social innovation [1]. This case study allowed us to elaborate on some of the issues that emerge when applying participatory design (PD) into the public sphere: scale, context and ethical responsibilities, among others.

2 The hourglass approach

The hourglass approach we propose integrates and expands existing proposals related to social innovation such as crowdsourcing [8], democratizing innovation [1] and End User Development [5]. It addresses two concurrent dimensions of innovation infra-

structuring: we refer to *technical infrastructuring* as the ensemble of computing technologies which support the use and production of IT services and to *social infrastructuring* as the set of human actors who influence, shape and represent the community. Together, these two axes define an *hourglass* structure (Figure 1) [4], which is meant to create the conditions for the application of PD and participatory development in an environment that involves a large collective of mobile users and that is only partially receptive to participation.

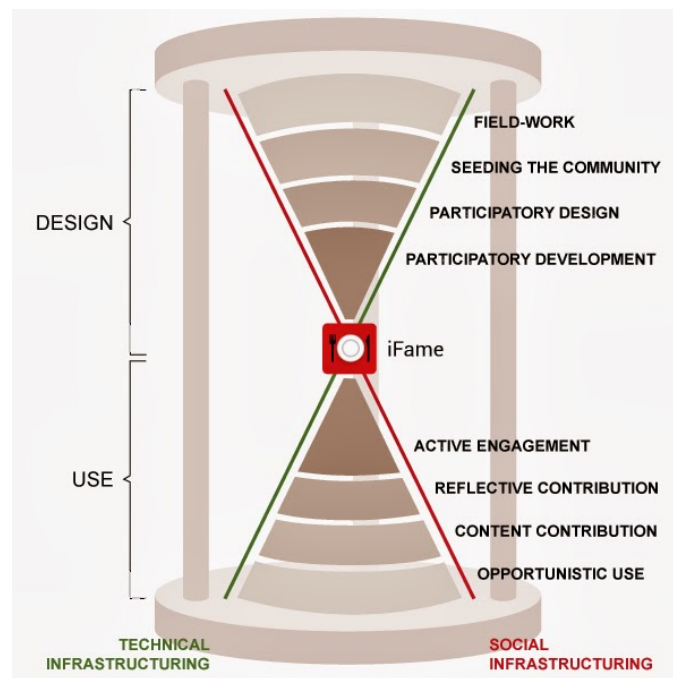


Fig. 1. A representation of the Hourglass approach

The upper and lower parts of the hourglass delimited by the intersection of the two axes define the phases of design and use respectively, and frame the emergence of the *iFame* artefact, which can be seen as a point of infrastructure [7]. Since it represents a temporal process, the hourglass shows the progressive evolution of the social and technical infrastructuring together with the kind of community involved at each stage. The horizontal sections represent different subsets of users with different degrees of involvement: the darker the colour, the more involved the related group is. Moreover, the size of each section also reflects the size of the group it represents: for instance, the number of users involved in the fieldwork is much larger than the number of users involved in participatory development.

In the field-work phase, we focused on building the foundations for our infrastructuring endeavour: to this end, we applied traditional User Centered Design (UCD) techniques with the goal of understanding the general domain, clarifying who the users were, and setting up the adequate conditions for applying PD. This implied the involvement of a large user base among the students of a local Italian university and the development of a service platform; the members of the lab created a first set of Smart Campus mobile apps on top of it. In order to seed the community, HCI and PD practices were incorporated into the academic career of computer science students to whom the Smart Campus apps were released for testing. At the same time, several channels were set up to facilitate the communication between the students-users and the Smart Campus lab: a forum, diaries, surveys. From this stage on, we moved from UCD to PD: a group of students in fact started developing the conceptual design of iFame as part of an academic assignment. These students then took a paid internship at the Smart Campus lab, thus actively contributing to the design and development of the app and allowing to further move to the participatory development phase. It is important to note that each subset of users spontaneously emerged from the social infrastructure, rather than being selected based on some unique characteristics as it usually happens for example with lead users [9].

Similar to a grain of sand, iFame fell through the lower part of the hourglass to be received by the user community seeded in the design phase. Most members of the community just profited from the information provided by the app; some of them, however, also contributed content to the app by commenting and rating the food. A smaller part of users chose to contribute at a higher level, reflecting on the app and sharing their opinions with the staff and the rest of the community through the forum, diaries and surveys. Finally, as the community expanded also to students of other departments, we have some evidence of the willingness of some members of the community to engage even more actively by contributing to the further development of the technical and social infrastructuring, in different ways corresponding to their different skills.

3 Considerations

The hourglass approach integrates and expands previous proposals to social innovation. First of all, the initial steps of the design phase resemble a crowdsourcing approach in the emphasis put on the wisdom of a large number of people [8], but they aim at transforming the crowd into an active community. Then, the participatory steps unfold on democratizing innovation [1], but they push the boundaries of participation to the physical assembly of the artefact, following the philosophy of EUD [5]. Finally, the student developers can resemble lead-users [9] in that they have special skills: however, in the hourglass approach this group spontaneously emerged from the social infrastructure, rather than being selected based on some unique characteristics; furthermore, involving a smaller group of informants was a more practical approach to move towards the development of the envisioned designs while incorporating the feedback provided by the larger group.

The hourglass is a temporal process: by the time we reached the stage of participatory development, we had also created a receptive environment through the incubation in the lab (which provided technological, political, organizational and logistic support), the establishment of the platform as a technological infrastructure, and an acceptance of participation also at an institutional level. Moreover, an instrumental knowledge base was built, for instance by incorporating PD practices into the academic career of students; this knowledge increased as they went through the hourglass. The social and technical streams evolved in parallel to create the conditions for the actual pursuit of social innovation: however, neither of them alone was sufficient to achieve this goal, and thus they needed to intersect at some point (in our case study, generating iFame).

The co-evolution of the social and technical infrastructures contributes to coping with scaling issues [3], adapting to the innovation milieu [1], and defining responsibilities [6]. To scale and reach a larger number of potential informants we exploited a variety of UCD techniques; furthermore, by integrating participation to the project into the students' academic practice, PD education was accompanied by an immediate recognition of the importance of their involvement. The potential of this approach is witnessed by the many students who maintained an active role in the project well after the academic course was over.

The innovation milieu where the project originated is a mid-size University campus in Italy characterized by limited possibilities for direct participation. Since the beginning of the design, the milieu has been changing and the selection of roles the students could play evolved from mere testers and informants to active designers and developers. This suggests that we succeeded in creating a space for collaborative development, and at the same time in creating a receptive environment for participation. Finally, the staged process proposed by the hourglass approach facilitates the definition of responsibilities in a dynamic environment. Designers fine-tuned their intervention preparing a socio-technical ground to maximise participants' gains and minimise failures [2].

We believe that the hourglass approach can show some potential when dealing with a context that is not historically and culturally oriented to public participation. For instance, the university feared that the canteen community would use the communications channels in an inappropriate way: our social and technological intervention has allowed them to overcome these worries. On the other hand, user participation also raised some difficulties; bringing user representatives through the hourglass approach is especially hard when unpopular decisions have to be taken. The hourglass structure also represents a dynamic system that in some cases can be turned upside down, starting a new cycle of innovation.

In conclusion, nurturing and maintaining "infrastructures" are among the main challenges that bottom-up approaches to innovation are currently facing. These challenges are intensified if innovation is the hub where research, education and business converge. Involving and accommodating different stakeholders and activities to unfolding situations requires a shift from current approaches adopted in these areas: this shift entails constant dialog among stakeholders, modification of current processes, and the capability to adjust to changing circumstances. We believe that the hourglass approach can facilitate these processes.

4 References

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