Experiments for a Real Time Crowdsourced Urban Design

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Abstract. We present a case study that encompassed an interactive urban design workshop held in Nebrija Architecture University in Madrid, Spain, in March 2013. In this workshop, an urban survey was held and an urban intervention proposal was participatorily developed for an empty plot in a nearby neighborhood. Different online collaborative design tools and data mining were used and monitored over the span of a year, and results were analyzed last March 2014. The findings show that collaborative tools help distribute work and gather knowledge from different sources, but seldom are the span and intensity of these work stages taken into consideration. The timeline and completion of the agenda was a key element during the workshop, determining the success or failure of many of the tools used depending on the time dimension. This temporal dimension still retro-feeds the work process, as some of those tools have become obsolete or redundant in a matter of few months. The lessons learned will lead to future studies on this subject.

Keywords: Collaborative design · Crowd sourcing · Time-sourcing · Time-sensitive design · 4D design

1 Introduction

In March 2014 we organized a workshop that was originally aimed at developing an existing small scale urban intervention in Tetuan, a 150,000 inhabitants neighborhood close to the faculty building in Madrid (Spain), by collecting all relevant data, from project inception to its final completion. In this paper we report how the target area was identified, how stakeholders were defined, how the design process evolved and how human and material resources were mobilized until the project completion. Moreover, the follow up and the real use of the project's installation was monitored over the span of a year.

The aim of the workshop was to study all stages of a real previous intervention, analyze the whole process, and propose an alternative way to carry it on, in order to optimize each design stage by reengineering the whole process adopting open source software that was available to anyone outside the design community. In so doing, we aimed to define a method to replicate similar processes in the neighborhood [1].

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As several options adopted during the process actually failed we want to focus here on the lessons learned and define a set of convenient and efficient tools to crowdsource user opinions about any related issue and collaboratively design a urban solution.

The target of our analysis was an existing small scale urban intervention that created an "urban oasis" with multiple possible uses on an empty plot with no planned use (see Figure 1). This was an intervention designed by a local architecture studio for the area. The designers involved got to know the plot by taking some walks in the area surroundings. More than 500 empty plots like these exist in Tetuan neighborhood, where "a-legal" (but not necessarily illegal) uses like temporary urban gardens, bike parks or just meeting places are installed, and coexist with daily activities. An actual map of the interventions is currently up to date on the openstreetmap platform, and a network of uses is being built.

Fig. 1. Time-lapse from initial state to project completion

In our study we focused on the traditional project process itself, irrespective of the intended use of the installation. This process was articulated in four stages, namely:

1. Urban study walks.
2. Plot allocation.
3. Design.
4. Result publishing: call for users.

A first identified concern regarded the lack of "visibility" of the whole process, which generally is opaque to the intended end-users of the final installation. Once completed, the intervention needed to be "published" and shared with the neighborhood inhabitants to find a use with their collaboration.

The workshop proposed to reverse the traditional process and find a way to crowdproduce the project in a bottom-u manner. To this aim, the field study included a urban survey that involved both university students and the neighborhood inhabitants, in order to collect their impressions and thoughts on a number of issues related to the intervention, like the detection of the most suitable areas for its deployment and of the needs for specific uses. This poses an interesting analogy between this activity and the task of requirement elicitation in software engineering.

All the software applications used was open source to evaluate their applicability to this kind of projects. The alternative process was conceived to be almost a reverse sequence of the traditional one, where to discuss a previous agenda and give it a strong initial visibility were considered as important as the development of the process itself.

2 An Alternative Process

Accordingly, publishing the problem at hand was made first, and framed as part of a bigger scale strategy aimed at the whole Tetuan district to regenerate the most deteriorated areas of that large city area. The idea behind this was that developing awareness of the problem was key to create a collective sense of appropriation of the solutions achieved [1]. The new process was then articulated in the following steps:

5. Calling for contributions.
6. Problem mapping.
7. Survey-based collection of problems, needs and desired uses.
8. Urban-to-detail scale Modeling.
9. First Collective Publishing.
10. External feedback provision.
11. Mapping material resources (donations, work contributions, etc.)
12. Execution.
13. Final Publishing and dissemination of results.

As said , even more than the design process, the focus was to design a sustainable and effective process, and engage stakeholders along its enaction and unfolding to improve knowledge and appropriation. In what follows we will describe each step in some detail.

2.1 Calling for Contributions

In this firs step, we aimed to call for crowdsourced contribution through traditional social networks and put the problem on the table, so to say. To this aim, we composed a Web page and shared it through a public folder on the Dropbox platform[1]. This was meant to allow all participants to edit the page content without any particular installation or knowledge of file transfer protocols like FTP or the like. Moreover, we created a Facebook page with a wall to post comments, a Twitter hashtag, and a WhatsApp chat group. These efforts notwithstanding at the beginning user engagement was low. To increase it, we invested more efforts in proposing the use of some more interactive tools, like the online survey already mentioned and state-of-the-art 3D online modeling tools, whose online resources were linked in the Web resources mentioned above. We noticed a positive impact in the collaborative discussion and traced back this phenomenon to a stronger feeling of the users involved to be contributing with “real inputs” to the project, and not just with “messages in a bottle”. This could be also related to a climb in the participation ladder[2] from the consultation level, i.e., a kind of tokenism, to a preliminary form of partnership, which is associated with a higher empowerment of the citizens involved.

[1] The page is still accessible at th following URL: https://dl.dropboxusercontent.com/u/5322317/Tetuan/web/index.html.

2.2 Problem Mapping

In this step we literally wanted to "map" potentially problematic areas in the neighborhood, and to this am we employed a collaborative online map editor. In this tool, overlaps and location pictures indicated the most degraded areas (see Figure 2). Spots indicated human and material resources and the indicative timeline of the intervention.

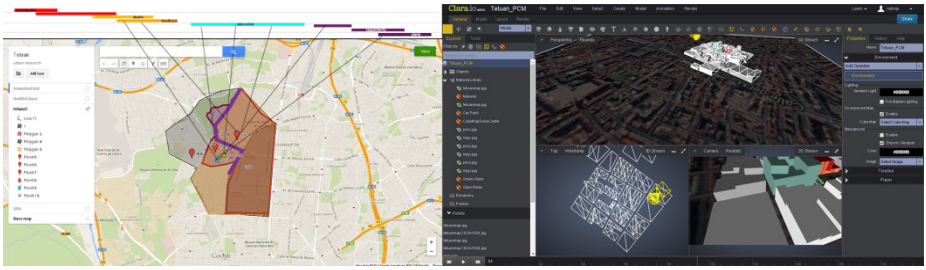

Fig. 2. Google maps engine collaborative work time sensitive map, Google timeline map diagram of future interventions and clara.io 3d open editor

To this regard, our next research will be aimed at employing 4D models, that is, visual representations of the evolution of the 3D model over time from inception to its completion. The potential of 4D modeling is still untapped, especially for its capability to link designs and maps with time- or schedule-related information. To this aim, we will implement a mashup of different open-source tools, like Google Map timeline, and the data sets collected in this user study.

2.3 Online Survey

In this step we designed, tested and deployed an online questionnaire to probe prospective users about potential uses, perceived lack of services, and other usually hard to pinpoint factors such as familiarity with new technologies, sense of neighborhood belonging and conviviality. To this aim the Limesurvey platform was used for its flexibility and power, as we needed to integrate in some of the questionnaire pages interactive maps. These latter interactive maps were used: to ask the survey respondents to insert points of interest in terms of "flags", to indicate potential areas of interventions or lack of services (to be chosen in a predefined list of essential city services); draw polygonal maps, both to circumscribe vaster areas of interventions and to probe the respondents' knowledge of the neighborhood borders; and choose between alternative solutions and pictures of the city surroundings, to understand which places were considered more enjoyable and which more deteriorated, like in the Urbanopticon project [3]. As the survey is still open, we are collecting new responses on a daily basis. So far, we have collected 56 complete questionnaires, while other tens of unfinished questionnaires (i.e., filled in only partially) were used to extract some useful indication nevertheless.

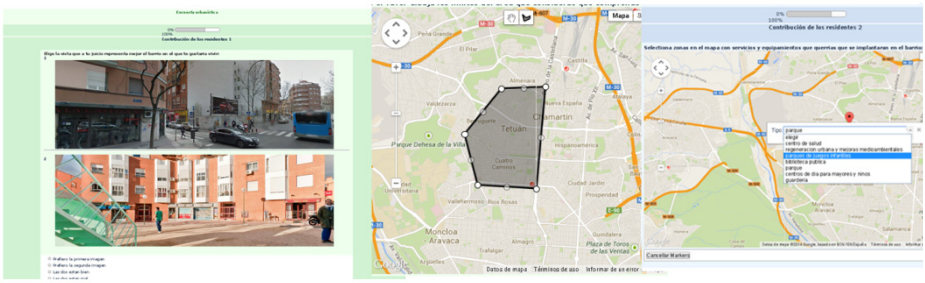

Fig. 3. Screenshots from the online questionnaire. On the left, an example of picture selection; in the middle an example of area drawing, and on the right, of insertion of points of interest.

2.4 Urban to Detail Scale Modeling

In this step, we performed a feasibility study to understand the degree of maturity of state-of-the-art tools that could be adopted in order to enable and support massive online 3D design, like Sketchup and Clara.io online open editor [4]. In this process, we favored either open-source or freeware solutions and considered online accessibility a top priority requirement. User-friendliness and the availability of multiple format for exporting the design models were also considered. We discarded a number of tools, mainly for their "closed" nature, also from the point of view of simple configuration and tailorization, for interoperability problems and lack of support of collaborative processes (e.g., data sharing and messaging). As a general finding, real-time response and feedback of the editing environment was considered critical to keep engagement sufficient to gather useful contributions from the "crowd". In figure 4 the detail scale is shown.

2.5 Collective Publishing

In this phase we wanted to share all the prospective models participatorily built to the public, so that the best option could be detected on the basis of the votes collected for each alternative solution. To this aim we exported the models in obj format on a Web GL 3D engine, which is a format that most desktop computers and even mobile devices can handle and manipulate natively. Figure 4 depicted the best solutions identified in this phase.

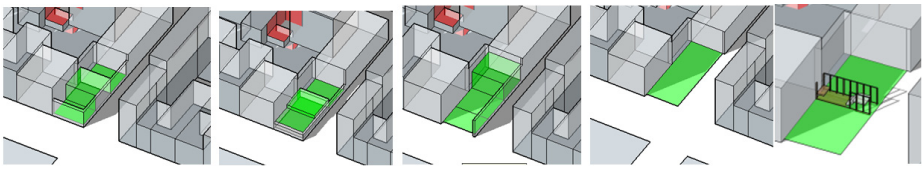

Fig. 4. Main design options chosen among 16 other

To this respect a number of open format were actually available (like kml, dxf, obj, csv, xml) to convert user ratings into graphics attached to geographical data or 3D models. In order to shorten the digital divide a mostly visual language was considered the best solution to adopt to get the opinion also of people not familiar with all these formats. As said above, the focus of the project was not on the technological side, but aimed at understanding what specific combination of tools could engage users more effectively and to what extent this toolset could be adapted to different, but yet strongly related, concerns and goals.

2.6 Feedback Provision

Results were published in real time in public Dropbox repositories and standard Web resources, for over 6 months, gathering feedback through different communication channels that encompassed stakeholder meetings, emailing, phone calls, and Web forms. In particular, feedback was collected through emails, model sharing and open-ended interviews. At a preliminary analysis, no particular difference in engagement was detected between different age or gender groups.

2.7 Completion

In this step we proposed an idea for a crowdsourced call for 3D printed parts of a larger model, without further details. To this respect, market is almost frantic in proposing more powerful and stable solutions: during the study at hand new powerful and easier 3D print tools have been released (e.g., reprap, tinkercad, autodesk 123d). The future work will leverage the contributions of the building and construction department of the university to develop a mock-up of the proposal in the next workshop.

2.8 Final Publish and Maintenance of a Web Site

A follow-up site was published and it is still accessible, where contents are updated and planned events advertised periodically. Something important that deserves a comment is that online social networks didn't really help as process starters or working platforms, but rather as follow up sites. The whole experiment served as a touchstone for the developing of new communication interfaces between designers and citizens.

3 Final Remarks

This preliminary user study has provided indications in the intersection of several fields like urban planning, community informatics and 3D modeling, and addressed related ambits of research like: how to collect knowledge from large communities of citizens [5], real time testing of ideas, citizen agency in the design process. As it is clear from the concise outline of the project reported above, further work and new field studies and workshops are needed before definitive finding can be proposed to

the research community. That notwithstanding, some ideas can be extracted from the experience and shared in the following points:

- The scope of the project was not to evaluate classic parameters of urban design and planning such as cost or quality of execution, but rather aspects subject to temporality like the interest and degree of appropriation that this project could raise among the neighborhood inhabitants. To this aim, the designers created the collaborative platform, by simply integrating off-the-shelf, but yet state-of-the-art, Web-based technologies, and called for ideas and contributions. Notably, online social networking sites like Facebook and Twitter did not really help as process triggers or working platforms, but rather as scaffolding resources and follow-up resources of dissemination. To this respect, the user study reported here provides motivations for the development of better interfaces that could improve communication and knowledge sharing between designers and citizens [6].
- All stakeholders tended to engage for a longer time when they felt to be part of the process and could appropriate it [7].
- Content, in the sense of use program, must be planned in advance, allowing some "slack room" for spontaneous or unexpected evolution [8].
- A determined life cycle or intervention agenda and its evolution must be thought ahead of the beginning of the process. There is a new temporal dimension to urban design [9].
- Design on itself is just a stage among many others in the overall process of shaping a final installation in city areas. Cost control, planning, scope and the final closing of the project are other key steps to the final success [10]
- Arnstein described citizen participation adopting the metaphor of the ladder [2], where the two first critical steps were to "educate" opinions into people and get them back from the crowd as a substitute for genuine participation.
- Open access software tools are increasingly appearing and blurring the limits between designer and the end user [11]. The client, as in other fields, is becoming a responsible and empowered end user.

These and other lessons learned from this year long experience were gathered and an agenda has been established for the next months. We realized that the design and execution stages worked reasonably well but the quality and timing of the input proved to b critical and therefore must be improved. Citizens must be persuaded that surveys of urban design are truly aimed at gathering their opinions, as a preliminary but necessary means so that the design community can take their ideas seriously. Even more than this, new Web 2.0 tools and visual 3D modeling suites can be integrated as effective tools to have designers and citizens communicate, collaborate and put collective ideas into action.

How these tools and procedures should be adapted so to become suitable for other collaborative initiatives of social, cultural or sustainable nature is still an open problem that deserves more studies, where the main challenges lie in the heterogeneity of the stakeholders involved and hence of the requirements to satisfy.

In particular, we will aim our next research efforts in considering the temporal dimension along which this kind of projects unfold, and also the visibility dimension of such a project trajectory, all together with its partial and final outputs. In this latter case, effective indicators of citizen awareness, engagement, adoption and appropriation of the final installation should be investigated and tested in the field, by combining quantitative and qualitative techniques.

References

1. Brabham, D.C., Sanchez, T.W., Bartholomew, K.: Crowdsourcing public participation in transit planning: preliminary results from the next stop design case. In: TRB 89th Annual Meeting Compendium (2010)
2. Arnstein, S.R.: A ladder of citizen participation. Journal of the American Institute of Planners **35**, 216–224 (1969)
3. Quercia, D.: Urban: crowdsourcing for the good of London. In: Proceedings of the 22nd International Conference on World Wide Web Companion, pp. 591–592. International World Wide Web Conferences Steering Committee (2013)
4. Rosenman, M.A., Gero, J.S.: Modelling multiple views of design objects in a collaborative cad environment. Computer-Aided Design. **28**, 193–205 (1996)
5. Cabitza, F., Simone, C.: Investigating the role of a web-based tool to promote collective knowledge in medical communities. Knowledge Management Research & Practice **1**, 392–404 (2012)
6. Orlikowski, W.J.: Material Knowing: The Scaffolding of Human Knowledgeability. European Journal of Information Systems **15**, 460–466 (2006)
7. Seltzer, E., Mahmoudi, D.: Citizen Participation, Open Innovation, and Crowdsourcing: Challenges and Opportunities for Planning. Journal of Planning Literature **28**, 3–18 (2013)
8. Robinson, M.: Design for unanticipated use. In: Third European Conference on Computer-Supported Cooperative Work, pp. 187–202. Kluwer Academic Publishers, Milano (1993)
9. Carmona, M.: Design coding: mediating the tyrannies of practice. In: Urban Design in the Real Estate Development Process, pp. 288–303 (2011)
10. Sanders, E.B.-N.: Generative tools for co-designing. In: Scrivener, S.A.R., Ball, L.J., Woodcock, A. (eds.) Collaborative Design, pp. 3–12. Springer, London, London (2000)
11. Van Abel, B., Evers, L., Troxler, P., Klaassen, R.: Open design now: why design cannot remain exclusive. BIS Publishers (2014)