

Crowdsourcing Contextual User Insights for UCD

Brian E. Tidball

ID-StudioLab, Delft Technical University
Landbergstraat 15, 2628CE Delft, NL
b.e.tidball@tudelft.nl
+31 (0) 64 381 8377

Pieter Jan Stappers

ID-StudioLab, Delft Technical University
Landbergstraat 15, 2628CE Delft, NL
p.j.stappers@tudelft.nl
+31 (0) 15 278 5202

ABSTRACT

In this paper we present our vision and approach to using crowdsourcing as a tool to bring contextual insights into design. For over a decade, ID-StudioLab has been working with and developing design tools and methods that engage users and elicit user-driven contextual insights for the design process. We see a number of links between these generative techniques and the creative contributions prevalent in crowdsourcing. Our initial excursions into these links are looking beyond typical uses of the ‘on demand workforce’ and exploring the boundaries of both the roles of participants (users, researchers, and designers) and the use of results (production, information, and inspiration).

Author Keywords

Crowdsourcing, User Generated Information, Human-Computer Interaction, User Centered Design, Research Vision.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Human Factors, Design.

INTRODUCTION

For more than a decade the ID-StudioLab has been developing tools for eliciting, analyzing, and communicating user-driven insights to support designers in the early phases of design. In recent and ongoing work we are exploring the use of crowdsourcing to gain user-driven insights.

User research techniques, both on paper and online, have seen considerable growth, over the last decade, in using ethnographic techniques to inform design. Methods such as probes [8] and generative techniques [15] offer the ability to gather rich and even tacit insights from users [15,16]. This rich, visual, and authentic information is desired by

designers to gain empathy and understand how new designs can more suitably fit into the everyday lives of people [3,18]. The challenge is that these tools are often expensive and involve intensive fieldwork and analysis, making them difficult to integrate with existing practices. Some studies have adapted these tools to online use with some success [9,10].

Crowdsourcing is widely viewed as an online production model capable of completing work and developing solutions. This production model is having a transformative effect on many disciplines, and the field of HCI is no exception. Research on crowdsourcing is building a foundational understanding by defining who participates [4,13], their motivations and the effects of rewards [5,6,13], and controls for quality [7,14,19]. A growing number of case studies demonstrate the diversity of what the crowd produces [1,2]. Specific to HCI, research is beginning to unite crowdsourcing with existing user-centered tools [11,17] including creativity and innovation [6,20,21]. All of this provides a substantial foundation to explore the benefits of crowdsourcing for HCI and how it may transform the design practice.

We see a number of potential links between the creative contributions prevalent in crowdsourcing and the processes, interactions, and results of generative techniques used in design. These similarities provide promising opportunities for involving the contributions of many people at a marginal cost to generate rich information about users and their contexts. On the other hand, the many small contributions carry the risk of being shallow; and it is not clear how to divide complex design questions into individual contributions. Considerable research is needed to understand the full potential of these opportunities for design. To unlock this landscape of opportunities we are exploring a variety of ways to embed crowdsourcing techniques with user-centered design processes.

EXPERIENCES WITH CROWDSOURCING

We are participating in a variety of crowdsourcing activities as contributors, participants, solvers, requesters, and seekers. This experience includes contributions and solicitations on Aardvark, Yahoo Answers, Amazon’s Mechanical Turk (MTurk), Innovation Exchange, Flickr, iStock, Threadless, Ideaken, Quirky, Field Agent, and Hatchwise. Throughout these experiences we have been alert for opportunities for accessing information from and

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

CHI 2011, May 7–12, 2011, Vancouver, BC, Canada.

Copyright 2011 ACM 978-1-4503-0267-8/11/05...\$10.00.

about users and have spotted some promising opportunities, which go beyond the conventional use of crowdsourcing of ‘getting a straight answer to a straight question’, to more explorative and inspiration-oriented applications.

Below we describe three exploratory studies. Early findings highlight the flexibility of crowdsourcing and suggest a perspective on crowdsourcing that focuses on a creative dialogue with and between participants rather than a strictly problem-focused Q&A machine.

Study 1: Unexpected Contextual Insights

Our first trial used Amazon’s Mechanical Turk to collect personal photographs. We were interested in the feasibility of using crowdsourcing to collect information and opinions on a theme, and to see how the crowdsourced images differ from other inexpensive online image sources. The assignment asked people to “Please, submit a picture of something your family does to live sustainably.” Within 3.5 days we received the 40 photos we solicited on MTurk (see Figure 1). Simultaneously we captured the first 40 images, on the same topic, from Flickr, iStock, and Google. The resulting image sets were presented to designers. The designers’ expressed their appreciation for the contextual insights gained from each image set, and were intrigued by the differences between sources. They expressed a preference for images that show ‘real people’ ‘doing things’ and image sets with a lot of diversity or visually ‘tell a story.’ The images from MTurk highlighted an unexpected connection between religion and sustainability and a perceived emphasis on family events (weddings, births, vacations). In comparison, the images from the other sources were less diverse and metaphorical; especially the Google Images search turned up primarily corporate presentations of architecture and sustainability adverts.



Figure 1. The 40 personal photos submitted on MTurk
 “...something your family does to live sustainably.”

Study 2: Participation, Motivation, and Influence

Our second foray into crowdsourcing once again solicited photographs, but from a class of 200 students, seeking

contextual information about their digital and physical desktops (see Figure 2). Our study focused on why students chose to participate and practical influences of the solicitation. The results indicate that for those students who chose to participate most expressed multiple motivations. The most common reasons were interest in the topic, simplicity of the task, support of fellow students, and obligation (being asked by a professor, thought not mandatory). These results support existing research on motivations in online participation and the influence of multiple factors and provided insight on how motivations may be influenced, including appealing to intrinsic motivations.



Figure 2. Digital & Physical Desktops (a small sample)

Study 3: Designers’ Reaction to Creative Contributions

This study observed two design students as they hosted a logo contest on Hatchwise.com. The aim of the contest was not to find the best design, but in observing how designers deal with other people’s solutions as a source of inspiration and broaden their view of potential solutions (see Figure 3). Through this process we observed and documented the students interactions with contributors and their reactions to the submissions and feedback. These observations provide additional insight on how to influence participation, placing emphasis on the wording of the assignment and how feedback/comments responding to the submissions each had a noticeable impact. There is an interesting conflict in providing enough information to guide submissions toward a desirable solution while allowing enough freedom to produce diverse and creative results. Arguably the most valuable outcome for the student designers were the discussions evoked by the process about the logo and the project as a whole.

Theses experiences provide insights into crowdsourcing and begin to develop a vision for the use of crowdsourcing to engage the crowd and inform the user-centered design process.



Figure 3. A broader solution space, 120 logos from 32 designers

RESEARCH VISION

To enhance our understanding of how crowdsourcing can be used to support HCI there are two primary research areas that draw our interest. First there is a need to understand crowdsourcing as set of interactions and mechanisms to consider when designing for and with crowdsourcing. The second focus is on understanding the benefits (and limitations) of crowdsourcing as a tool and resource for HCI.

Crowdsourcing research has primarily focused on building a foundational understanding of the mechanisms and the content that is exchanged. Recent studies explore who contributes, why they participate, what they contribute, the effect of rewards, and controls for quality. This knowledge opens the door to account for these unique interactions and underpin our use of crowdsourcing as a tool for HCI. While significant progress has been made on crowdsourcing for problem solving. There is still significant work to be done especially with growth of crowdsourcing into new domains such as inspiration gathering and creative dialogue for HCI. Within these research efforts, there are opportunities to explore creative contributions, social aspects, increased user involvement, and what motivates meaningful interactions between contributors and solicitors.

Complementary research should specifically address the use of crowdsourcing as a tool for HCI. As stated earlier the process of adopting and adapting existing HCI tools to crowdsourcing applications has already begun. These efforts will continue to strengthen our understanding of the foundational mechanisms, and uncover the benefits and limitations to this approach. This research must emphasize the information needs specific to HCI. This transition will need to answer a wide range of questions with a focused emphasis on the use of crowdsourcing for HCI.

- Where are the opportunities?
- What does it contribute?

- What is the value for user and contributor?
- How do you phrase the assignments?
- How do you motivate participation?
- Do you use existing applications or build your own?
- Which crowds are appropriate? When?
- Do the roles (user, contributor, designer, engineer, decision maker, etc.) change? How?
- How or can designers use the outcomes?
- Does it integrate into current practices?

These questions and many more will need to be answered for a variety of applications and will ultimately strengthen our HCI toolbox.

As an addition, to the adaptation of existing tools, crowdsourcing looks like a powerful opportunity for the HCI community to access and engage users in new and exciting ways. Potential opportunities may reside in the social or collaborative attributes of crowdsourcing, the creative contributions, and voluntary or intrinsic motivations. By pushing the boundaries of both HCI and crowdsourcing we hope to discover hidden gems that strengthen HCI practices.

BIOGRAPHIES

Both authors are researchers at ID-StudioLab within the Faculty of Industrial Design Engineering at Delft University of Technology, in The Netherlands.

Brian Tidball

Brian Tidball is currently in the second year of his PhD research on the topic of using crowdsourcing as a user research tool for the early stages of design. He focuses on the benefits of crowdsourcing user-generated information to inform the conceptual phase of user-centered design. Before starting this research he taught undergraduate courses at the US Air Force Academy: human factors, HCI, HSI, and systems engineering. Before teaching he managed and conducted a variety of formative and summative user studies across several domains (aircraft maintenance, medical rehabilitation, information systems, and ruggedized computing equipment). Brian's education includes degrees in Human Factors and Bio-Medical Engineering at Wright State University, Ohio (MSE 2006) and in Industrial Engineering at the University of Washington, Seattle (BSE 1998).

Pieter Jan Stappers

After an education in experimental physics (MSc 1984), Pieter Jan Stappers made the switch to Industrial Design Engineering at TU Delft, and followed a research path, which led from human perception, spatial imagery, Virtual Reality (PhD in 1992), to design tools and participatory design techniques. His current activities as full professor of design techniques (as of 2002) encompass coordinating

Delft's Master program of Design for Interaction, being informal director of ID-StudioLab, and heading the research subprogram on tools and techniques for the conceptual phase of design. Key interests are 'research through design' (how to bring design skills into research), 'experiential prototypes' (experience-centered simulation of not-yet-existing products and services), contextmapping (designerly techniques for user involvement in design), which can be found on his webpage <http://studiolab.io.tudelft.nl/stappers/>.

REFERENCES

1. Albors, J., Ramos, J.C., and Hervás, J.L. New learning network paradigms: Communities of objectives, crowdsourcing, wikis and open source International Journal of Information Management, 28 (2008), 194–202.
2. Bernstein, M., Little, G., Miller, R.C., Hartmann, B., Ackerman, M.S., Karger, D.R., Crowell, D., Panovich, K. Soylent: A Word Processor with a Crowd Inside. *UIST 2010*.
3. Bødker S. and Iversen, O. Staging a Professional Participatory Design Practice-Moving PD beyond the Initial Fascination of User Involvement, *Proc. NordiCHI 2002*, ACM Press (2002), 11-18.
4. Brabham, D. Crowdsourcing as a Model for Problem Solving. *Convergence*, 14, 1 (2008), 75-90.
5. Brzozowski, M.J., Sandholm, T. and Hogg, T. Effects of Feedback and Peer Pressure on Contributions to Enterprise Social Media. *Proc. GROUP'09*, ACM Press (2009), 61-70.
6. Cardoso, M. and Ramos, I. Open innovation and the solver community. In *ProcGROUP'09*, ACM Press (2009), 373-374.
7. Feng, D., Besana, S. and Zajac, R. Acquiring high quality non-expert knowledge from on-demand workforce. In *Proceedings of the 2009 Workshop on The People's Web Meets NLP: Collaboratively Constructed Semantic Resources*, (2009), 51-56.
8. Gaver, W., Dunne, T., and Pacenti, E. Cultural probes. *Interactions*, 6, (1999), 21–29.
9. <http://www.7daysinmylife.com/wordpress/>
10. Kaptein, M.c., Weisscher, A., Terken, J.M.B. and Nelissen, H. Online contextmapping: using the opportunities of Web 2.0 for the contextmapping procedure. *CoDesign*, 5, 4 (2009), 213-228.
11. Kittur, A, Chi, E. H, and Suh, B. Crowdsourcing user studies with Mechanical Turk. *Proc. CHI 2008*, ACM Press (2008), 453-456.
12. Kumar, V, Whitney, P. (2003) Faster, Cheaper, Deeper User Research. *Design Management Journal*, 14, 2 (2003), 50-57.
13. Lakhani, K. R. and Panetta, J. A. The Principles of Distributed Innovation. *Innovations: Technology, Governance, Globalization* 2, 3 (2007), 97-112.
14. Little, G., Chilton, L.B., Goldman, M. and Miller, R.C. TurKit: tools for iterative tasks on mechanical Turk *Proc. of the ACM SIGKDD Workshop on Human Computation*, ACM Press (2009).
15. Sanders, E.B.-N. and Stappers, P.J. Co-creation and the new landscapes of design, *CoDesign*, 4, 1 (2008), 5-18.
16. Schuler, D. and Namioka, A. Eds. *Participatory Design: Principles and Practices*. Lawrence Erlbaum, (1993).
17. Schmidt, L.A. Crowdsourcing for Human Subjects Research, *CrowdConf 2010*, October 4, 2010, San Francisco, CA, (2010).
18. Sleeswijk Visser, F., Stappers, P.J., van der Lugt, R. and Sanders, E.B.-N. Contextmapping: Experiences from Practice. *CoDesign*, 1, 2 (2005), 119-149.
19. Snow, R., O'Connor, B., Jurafsky, D. and Ng, A.Y. Cheap and fast - but is it good? Evaluating non-expert annotations for natural language tasks. *Proc. of EMNLP 2008*.
20. Soukhoroukova, A. *Creating and Evaluating New Product Ideas with Idea Markets*, PhD Thesis (2007).
21. von Hippel, E. and Katz, R. Shifting Innovation to Users Via Toolkits, *Management Science* 48, 7 (2002), 821-833.