What is the Best Possible Design for All My Users?: A Single Question to Guide User-Centered Design in Low-Resource Environments

Elly Searle

Human Centered Design & Engineering, University of Washington

esearle@uw.edu

ABSTRACT

This paper discusses how methodological frameworks are often too cumbersome to be used in full by field workers in low-resource environments. When time, money, and political capital are scarce, there often isn't time to follow every prescribed step. This research looks at helping field workers incorporate user-centered design when creating technology solutions through a *single-question framework*. It follows the author's case study of considering different wording for the single question, and then describes her experience implementing the lightweight framework while redesigning an attendance system for Entity Green Training in Jordan. The method is promising as an efficient way to expand one's thinking during the design process, but needs more testing to validate its benefits for workers who lack training in user-centered design methods. This research is particularly valuable for people working in low-resource environments where they lack the time and money to iteratively fix problematic designs.

Keywords

HCI, user-centered design, user experience, low-resource environments, design for digital inclusion

INTRODUCTION

Few designs are created in a resource-rich environment.[1] Designers always seem to be working with a shortage of some sort: time, money, political capitol, technical resources, etc. These shortages are particularly acute for field workers and agencies in developing countries or crisis situations. Frameworks, heuristics, and other tools are valuable in structuring a project, but the resource constraints mean practitioners generally don't have the luxury of implementing these processes in an orderly and comprehensive fashion. Practitioners are constantly looking for ways to do more with less, and this is just as true with design and training processes as with money and time.

This paper discusses the investigation into creating a lightweight alternative to resource-intensive design methodologies for fieldworkers tasked with creating technology solutions. It explores the value of using a one-question methodology to guide practitioners in complex, low-resource environments through a user-centered design process. The work was carried out over a summer at Entity Green Training (EGT), an organization in Jordan located just outside of Amman, that provides vocational training for Iraqi and Palestinian refugees. I was brought in to evaluate and improve the current stipend distribution system, which included taking attendance in the training sessions, entering the attendance, reporting the data to the third-party non-profit that funded the program, and then disturbing the payments to the participants.

The inspiration for finding a lightweight design methodology came from studying how many humanitarian

---

Reviewing Statement: This paper has been fully double blind peer reviewed.

---

[1] This paper takes a broad view of design, which includes projects, documents, applications, systems, and policies. The primary emphasis is on designs that involve user interaction on some level and therefore merit a user-centered design philosophy.

organizations design and implement technology solutions. It is readily apparent that field workers function in a complex system of competing priorities and limited resources, while working within funding restrictions and cross-cultural challenges. In preparing to enter this world of development field work, I had an informational interview with Marshall Wallace of CDA Collaborative Learning Projects[2], an organization committed to improving the effectiveness of international actors who provide humanitarian assistance, sustainable development, and peace efforts. Wallace is the director of the Do No Harm (DNH) project, which teaches how to do the least amount of harm and the maximum amount of good when bringing resources into a conflict-ridden, resource-constrained environment. We discussed the challenges of creating frameworks and trainings that efficiently help practitioners instead of adding to their work burden in an already low-resource environment. These situations call for a lightweight design framework that is easily learnable and adaptable to numerous settings, but most frameworks I have encountered seem cumbersome to carry out in their entirety. Even a framework I helped create, an expanded version of Brinkerhoff and Crosby's stakeholder analysis framework (2002), was presented to field workers from an NGO working in Mozambique and Malawi who deemed the process as impractical in an environment where much was out of their control, and time, money, and cultural capital were in greater demand than supply.

Wallace agreed that designing a tool that practitioners adopt in its entirety is extremely difficult. He volunteered that not all parts of the DNH were used equally. However, CDA was finding interesting patterns around who incorporated DNH philosophies and practices into their work. He found that successful practitioners frequently asked themselves, "Will this do harm?" when making any type of decision. While the knowledge and resources required to answer the question were still complex, the simple question kept people's focus on the key issues.

This analysis started me thinking: is there a single question, a maxim of sorts, that could help practitioners create more user centered designs? That could help designers keep their focus on their users' needs, wants, and challenges while working in a complex system[3] with moving parts, finite resources, and competing priorities? To explore this space, I proposed the following research questions:

- What would be the wording for a single question that could guide designers to a thoughtful, appropriate solution?

- Is repeatedly asking and answering this question sufficient to guide practitioners to a high quality, appropriate design or to productive management of an on-going complex environment?

To answer these questions, I conducted my own case study. During the summer of providing systems consulting for EGT, I kept field notes that focused on these questions. I chose this site because the situation presented myriad challenges: competing priorities in a resource-constrained complex system, multiple stakeholders with diverse needs, cultural differences, high turnover of staff and audience, and my own limited knowledge of the environment.

To answer my first research question, I carefully and systematically considered aspects of different wording possibilities for the question. While I want asking the question to be simple, I want the process of answering the question to inherently guide designers to key design issues. These issues include considering all types of stakeholders (funders, end users, field workers, etc.), the available resources, sustainability, and on-going management of a technical solution.

In this paper, I also reflect on how that question guided my own design process as I created and recommended process improvement solutions and created tools for the organization. I recorded if coming back to the initial question helped my design process and, if so, how it helped. Finally, this paper documents my conclusions, discusses limitations I found with my method, and suggests future work in this area.

LESSONS LEARNED FROM CDA, INC AND DO NO HARM

For the purpose of this paper, it is not important to understand the fundamental principles of Do No Harm. What is relevant is how these principles are taught and adopted. However, a brief overview of the framework and what it aims to achieve will provide context. As explained by CDA, a key concept is that DNH "helps us to understand more clearly the complexity of the conflict environments where we work" (CDA webpage). The philosophy and teachings focus on how bringing aid into these environments can never be a neutral act. Therefore, organizations

---

[2] For more information, visit http://www.cdainc.com.

[3] The idea of a complex system is based on Bertalanffy's open system (1969) as part of his general systems theory.

should strategize how to implement those resources in a way that maximizes good and minimizes harm. For example, building separate clinics for each side in a conflict zone rewards the conflict; DNH suggests building a single clinic in a neutral zone or close to the border to minimize repetition of services and to encourage neutral interaction between the opposing sides. The framework is not about providing solutions, but rather about imparting tools that can be used in on-going management of a complex system. Ways to learn DNH principles include attending a training session or by reading the book, *Do no harm: How aid can support peace--or war*, by M. B. Anderson (1999).

As the project has matured, CDA has surveyed trainees to track the ways they implement the DNH framework and made the survey, results, and findings available on their website. Their findings provide interesting evidence for how field workers implement and adapt the framework to real life situations. From these finding, we can speculate how other people adapt frameworks when designing and managing solutions, particularly in resource-constrained complex systems.

Here are some of the key findings presented in their short paper, "Thinking and Using DNH" (2009) and from "Key Lessons from Do No Harm and Their Implications for Training" (2009):

- More people have learned DNH than use it. This coincides with the finding that some people embrace and use tools and others do not. Energy is best spent focusing on the tool users as non-tool users are unlikely to adopt the framework no matter how the training is presented.

- How thoroughly practitioners adopt the DNH principles depends on their confidence level:
    - Most confident/expert: A worker at this level constantly asks if their organization's activities or plans will bring harm, and is able to answer that question with details and contingency plans.
    - Somewhat confident/intermediate: A worker who is only somewhat DNH questions at specific moments in planning process or after things have gone wrong, but not before. When answering questions about how the organization's action could bring harm, their answers are based on personal experience as opposed to comprehensive or analytical knowledge, or they just hope that their chosen solution won't cause problems.
    - Low confidence/novice: A novice has been taught the DNH concept, but does not have a sense of ownership over the principles. They also have little or no confidence or ability to answer whether or not a solution will bring harm.

- People consistently use a single idea from the framework, the dividers and connectors, but little else. Trainees are able to latch onto this part of the framework and use it effectively to make good decisions.

- CDA believes that everyone can become experts if they work in a team and if they constantly ask themselves and other team members the question, "Will this cause harm?"

Based on these results, it appears that field workers will adopt one or two key concepts in a framework if they feel that concept is usable and useful to them, even if they do not adopt the entire framework. The more practitioners know about their domain, the more comfortable they are asking and answering key questions. However, lack of expertise can be supplemented by continuing to ask key questions, but to a group instead of just to oneself. These findings suggest that having a simple question to guide entry into a complex environment helps practitioners explore the complexities when making a decision instead of avoiding them. For DNH, the question "Will this cause harm?" has been a useful tool to guide practitioners to search out important information before making decisions.

BUILDING A SIMPLE ENTRY INTO A COMPLEX SYSTEM, OR ASKING THE RIGHT QUESTION

As a user experience (UX) designer, I wondered if there was a similar question that I could use to bring UX and user-centered design (UCD) thinking to field workers who are not trained in UX/UCD but tasked with implementing technology. While I believe every designer can benefit from learning Jakob Nielsen's 10 Usability Heuristics and Donald Norman's take on mental model and affordances, I know that people on the ground rarely have time pursue topics that are not directly related to their current project. However, I do believe that they have valuable knowledge and opinions about what works and does not constitute good design in their domain. It does not require an advanced degree in UX design to know that manually updating complex formulas in Excel is bad design and that automating the process and reducing the opportunity for error is better design. Field workers can identify what problems they have with an existing system and often provide useful suggestions on new designs that would address these

problems. However, thinking through a system as a whole and how competing needs can be resolved is a less common skill. I believe some of the key reasons a new technology does not succeed in a new environment are because it doesn't meet everyone's needs so it is never adopted, or it cannot be maintained and is abandoned. To me, this suggests a need to guide designers through a wide range of design possibilities encompassed by the full range of users and their environments. They also need to think through when a design won't work for all of the stakeholders. What I wanted to provide is a question that would incorporate what they already know into the process of designing new technology solutions, thereby improving their designs' user experience.

At first, I tried a question similar to "Will this do harm?" and asked, "**Is this designed around my users?**" Upon consideration, the question seemed vague and didn't prod designers to consider anything they hadn't considered in the original design. It did not push them to ask new questions or explore new territory. While the question needed to be simple, it also needed to guide them into the complexities of multiple audiences and a variety of design challenges. Field workers in humanitarian aid and crisis management often need to consider a range of stakeholders with disparate needs, from end users to donors. They also need to consider their users' environment, which may differ from the designer's, particularly if the designer is new to the area or designing remotely. The goal is to stimulate thinking about the benefits and problems each stakeholder might encounter when interacting with the technology, and how people will maintain the technology over time. This question does not accomplish those goals.

My next variation moved to address these deficiencies: "**Is this the best possible design for all of my users?**" Still brief, but it challenges the designer to consider possible shortcomings or areas for improvement in the design. It also leads to the follow up questions, "Do I know who all of my users are?" and "Do I know what's best for all of them?" It lends itself well to inviting team members to discuss pros and cons of the design. However, it lacks the proactive stance of "Will this do harm?" Changing the wording to "**What is the best possible design for all of my users?**" inherently inserts itself at the beginning of the design process, where it belongs. Asking the question throughout the design process is important, but asking the question at the beginning is essential.

A PRIMER ON USER-CENTERED DESIGN

As mentioned earlier, the DNH findings are based on practitioners who had all participated in a DNH training. I am unaware of a similar training aimed at educating humanitarian aid organizations on the principles of user-centered design. While most employees can judge whether or not a given technology helps them do their job, they may lack the vocabulary to describe why. This summary of Nielson's 10 usability heuristics[4] is a starting point for those new to user-centered design.

1. Give users feedback through progress bars, spinning icons, and helpful dialogues to communicate what the system is doing at all times.

2. Any user-facing text (filed labels, on-screen instructions, etc.) should speak the users' language, with words, phrases and concepts familiar to the user, rather than technical terms.

3. Support undo and redo actions. Give users clear ways to fix their mistakes.

4. Use standard and consistent wording throughout the system, so that users do not have to wonder whether different words, situations, or actions mean the same thing.

5. Design to prevent errors. Ways to do this include automating actions or validating information to ensure it matches expectations.

6. Because recognition is easier than recall, prompt users with options or link back to relevant information. Fields that automatically list relevant options as the user types is one example.

7. Provide smart defaults and simple paths to help new users, but also incorporate advanced controls and customization for experts.

8. Keep the design minimalist and do not include unnecessary information.

9. Write all error messages in plain language (no codes), and precisely indicate the problem and then suggest a solution.

---

[4] The original list is available at: http://www.useit.com/papers/heuristic/heuristic_list.html.

10. Provide easily accessible help and documentation.

CASE STUDY: WHAT IS THE BEST POSSIBLE DESIGN FOR EVERYONE AT ENTITY GREEN TRAINING?

My role during my 10 weeks at Entity Green Training (EGT) was to analyze their existing attendance system. EGT instructors took attendance on paper, the office staff entered the data into an Excel spreadsheet and then sent it to International Relief and Development (IRD), who audited the Excel report and then handed out envelops containing the participants' stipends. My investigation started with reading background reports on the organization, touring the facilities, and watching the staff work and asking them to explain the process to me (contextual inquiry). I talked to the program manager and got a sense of their goals for the attendance system. The two staff members in charge of attendance (one international and one local employee) had many other responsibilities, so one goal was to make the attendance reporting more efficient. There had been some typos that resulted in more lost time, so improving accuracy was important. Money and time were limited resources, so any expense needed to be justifiable and not require large amounts of training. Furthermore, there wasn't readily available technical support. However, since the program was maturing, anything I could do to increase its professionalism to the students and IRD would be greatly appreciated.

I started this project at a critical juncture for EGT: they were submitting reports to IRD to have the program's funding renewed. As such, they did not have extra time to spend working with me on the attendance project and much of my work was done as a solo practitioner. Over the first five weeks, my process was: spend most of the day researching different technologies for tracking attendance, when possible conduct contextual inquiries into how the current attendance system worked, and interview participants for constructive feedback on the overall program. In my downtime, I wrote field notes and took the time to reflect on my single-question framework. The last five weeks were spent creating the spreadsheet template, user testing and iterating the design, completing my end user interviews, and writing the troubleshooting guide, the recommendation report, and a summary of themes from the interviews. I spent less time writing field notes during the second phase and my frequency of asking my question decreased, although I still came back to it from time to time.

As I researched various reporting options, I found it very helpful to have a question that checked my design decisions. For example, I investigated using card readers to swipe ID badges. This solution would be great for students, who appreciated anything that gave them an "official" ID to offset their uncertain refugee status. It would also be good for the organization, which had spent a decent sum on purchasing an ID badge printer that was sitting around unused. However, when I took a break from researching and asked myself if this was the best design for all possible users, I realized that creating the badges would take too much staff time and also put the organization at risk if former students tried to use the IDs in interactions with police or other officials.

The benefit of stimulating my thinking with my single question continued while I was implementing our selected design, an Excel template. I knew that to improve usability I needed to protect cells against accidentally deleting rows and automating tasks. As I had no background in Excel, this required several hours of research on my part to code macros that ultimately made the template error-resistant and efficient. However, I started letting my engineer tendencies get away with me when coding the macros. I started trying to educate myself on Visual Basic coding, which requires a fair amount of studying to understand. While I had the time to learn this and knew VB would benefit me in future projects, I realized when I asked, "What is the best possible design for all of my users?" that I was setting them up for a tech support nightmare. That question encouraged me to carefully consider how far to go with automating tasks and kept me focused on only coding things that I felt the staff could run and support. The result was less elegant code, but it was entirely human readable and the staff members could read it and fix it if there were future problems.

Another advantage of asking myself "What is the best possible design for all of my users?" is that I sometimes found I didn't know the answer. This is often what inspired me to reach out to various users to get their opinion on the subject at hand. For example, mulling over this question before having lunch with an IRD staff member prompted me to ask him about what was important to his organization in terms of attendance reporting. This lead to scheduling a full interview with him and learning valuable information about compatibility issues and ideal future directions. Much like CDA's Do No Harm findings, the process of asking the question to other people lead me to an improved design.

The final step of the process was having my users train on and test the new system. Making sure we scheduled this with enough time for me to fix any problems that we found, I got the three key staff members together and had them

prepare their monthly report. I did not actively give them instructions, but pointed them to the start page I had created in the workbook and a print out of the troubleshooting and training guides I wrote for them. I had confidence that the template I created was a good design, but now was my chance to see if it was a good design for my users. The local user, who had less Excel experience than the international workers, did have a some trouble understanding how the linked fields populated throughout the workbook, but caught on quickly when I was able to demonstrate by changing a value and then showing him how it changed on subsequent pages (for example, setting the session start date on the first sheet automatically set the date on the attendance data entry sheet). This was enough feedback for him to understand that feature. My design decisions in terms of keeping the macros simple were rewarded when one user generated an error and then was able to read the macro well enough to fix the problem. When he saw that the program highlighted the line of code that cause the problem and saw that he could read the code well enough to identify how to solve the problem, he sighed with relief; he had been concerned that something would go wrong with the spreadsheet shortly after I left and they would just revert to the previous, more laborious method. This process gave him confidence that they could maintain and even improve the template over time. The spreadsheet was also tested by IRD before I left.

The honest answer to my question was that I had not created the *best* possible design; I had created the best possible design for *right now*, and that was important. Asking for the best does not mean you will reach it, but at least it keeps you questing for it. To help EGT continue to get to closer to a best possible design, I wrote them a recommendation report that researched many other methods for tracking attendance and distributing payments. For each option, I explained the trade offs and requirements. For example, bar codes could automate attendance taking but would require purchasing and maintaining more hardware and software, and switching to reporting software would be beneficial if they could secure someone to set it up and train them. While I didn't have the resources to give them the best possible design, I did give them the foundation for future improvements.

I did attempt to use other UX/UCD tools during this process, such as task analyses and heuristic evaluations. However, I found that when researching multiple attendance reporting options that I was not rigorous about completing a task analysis or heuristic evaluation for each possibility. However, in the process of asking myself if I was designing the best possible solution for all of my users, I prompted myself to consider what good design meant for my current situation and focused on those areas, such as coding in affordances to make it easy to identify the first of the month, creating a troubleshooting guide so they could troubleshoot when I was gone, and perhaps most importantly, deciding what not to implement.

CONCLUSIONS, LIMITATIONS, AND FUTURE WORK

Based on CDA, Inc.'s findings about how people use frameworks and my own personal experiences, I can draw two conclusions:

1. Using a single question instead of a lengthier framework can be a valuable tool when designing new technology, particularly when designing technology for use in low-resource environments like humanitarian aid field work. In these environments, starting a complex framework is often off-putting whereas a single, repeated question is a lightweight and practical enough to be adopted and used frequently during a design process.

2. The question, "What is the best possible design for all of my users?"can accomplish the goal of introducing a user-centered design element to the process of designing new technology in low-resources environments.

Particularly in situations where the project lead is not necessarily both a design expert and a domain expert, this line of questioning can start group discussions about what really would be best for everyone involved. This is particularly important for high stress, low resource situations where the end goal is to help people in need. A potential consequence of abandoning a longer, more structured design framework is that focus on important principles may also be abandoned for a "get it done now" mentality that introduces service problems instead of solving them. Giving field workers a simple way to stay focused on process, to aim for a high quality design, and to address the needs of myriad users is a compromise that doesn't burden the designers with requirements while still providing a tool to guide them.

I think my experience using this question to inform my design would have been improved if, as suggested by CDA, I had involved more people in the process of asking the question. One possibility would even be to post the question on a wall as a frequent reminder to revisit the idea of striving for the best possible solution that works for everyone.

If you can't find a design that works for everyone, at least you have started a conversation about why the current suggestions don't work and can then address the new issues or revisit the problem from a new angle. I think an organization that is struggling with technology solutions would find value in testing this method.

A possible weakness with this method is that the designers may not know what makes good design, and therefore don't get very far when thinking through possible answers to "What is the best possible design for all of my users?" CDA reported that field workers have problems maintaining the DNH framework because they don't have access to it after the training is complete. (To be clear, the DNH framework is much more comprehensive than just asking "Will this do harm?"; they have just found that people best use the Do No Harm training if they frequently start by asking themselves that question.) That's a risk with this framework, as well. A practitioner using this question still needs to understand some of the basic principles of user research and user-centered design to feel truly confident about answering the question. However, the alternative of waiting for organizations to have time and money to train their staff in user-centered design seems unlikely, and starting by prompting them to expand their thinking beyond if their design is *good* to if it is *the best possible design for all of their users* is bound to expand their vision.

I think a beneficial direction for this research would be to have a researcher work with one or more organizations to adopt this approach in their next technology project. It would be worthwhile to find out if the organizations found any value in adding the question, "What is the best possible design for all of my/our users?" to their design process and if so, what was valuable about it. If they do not find it valuable, it would be interesting to find out why they felt the question didn't add anything to their design process. If, as with CDA's findings, they felt they didn't have enough domain knowledge to answer the question authoritatively, a worthwhile next step would be to provide them with the seminal UCD texts referenced earlier, Nielsen's heuristics and Norman's *Design of Everyday Things,* and see if that improves the field workers' confidence in asking and answering the question.

I believe this lightweight framework would benefit organizations that are looking for a way to make their designs more user-centered without hiring staff dedicated to that role, particularly in low-resource environments where there isn't money or time to fix problematic designs.

ACKNOWLEDGMENTS

REFERENCES

1. Anderson, M. B. (1999). Do no harm: How aid can support peace--or war. Boulder, Colo: Lynne Rienner.

2. Bertalanffy, L. v. (1969). General system theory; Foundations, development, applications. New York: G. Braziller.

3. CDA, Inc. (2009). Thinking and Using Do No Harm. http://www.cdainc.com/cdawww/project_profile.php?pid=DNH&pname=Do%20No%20Harm.

4. CDA, Inc. (2008). Key Lessons from Do No Harm and Their Implications for Training. http://www.cdainc.com/cdawww/project_profile.php?pid=DNH&pname=Do%20No%20Harm

5. Nielson, J. (accessed on Nov. 20, 2009) http://www.useit.com/papers/heuristic/heuristic_list.html.

6. Norman, D. A. (1988). The design of everyday things. New York: Basic Books.