

Design First, Technology Second

Jaspal S. Sandhu
University of California, Berkeley
6102 Etcheverry Hall
Berkeley, CA 94720
+976-9971-2480

jaspal@berkeley.edu

Alice M. Agogino
University of California, Berkeley
5136 Etcheverry Hall
Berkeley, CA 94720
+1-510-642-6450

agogino@berkeley.edu

ABSTRACT

In this paper, we argue for a human-centered approach to designing information systems for international development. The use of the phrase “information systems” instead of “technology”, “information technology”, or “ICT” is intentional as the thrust of our argument is that the focus of designers must not be on technological means, but rather on development objectives, suspending discussions of whether and technology makes sense until later stages of design. The implications that this stance has on the design process will be discussed in the context of ongoing ethnographic design research with rural, mid-level health professionals in Mongolia.

Categories and Subject Descriptors

H.5.m [Information Interfaces and Presentation (e.g., HCI)]:
Miscellaneous

General Terms

Design, Human Factors

Keywords

participant observation, ethnography, holism, rapid methods, user needs, Mongolia, rural health, technological determinism

1. INTRODUCTION

This paper advocates an approach to human-centered design in international development that emphasizes development objectives and does not assume a technological solution. This stance is open to the possibility that the design of information systems can in some cases be best improved without technology. Technology may be an appropriate solution, but if it is, it should be well-designed, including integration into a larger systems framework. This approach can and should impact the way that the design process is undertaken. This argument is presented in the context of an ongoing project to design improved information systems for *bagiin бага эмч (bagiin emch)*, mid-level health professionals who work in the most remote areas of Mongolia.

2. CONTEXT

Mongolia is unique among the world’s countries, developing or

otherwise, in that one-quarter of the overall population are pastoralist nomads or semi-nomads. Although this population lives entirely in rural areas, shared land use for grazing ensures that rural Mongolia one of the most sparsely populated places in the world. By many standards, the Mongolian health infrastructure is highly developed; however, facilities and human resources are increasingly limited in providing effective healthcare for rural populations that lie beyond *aimag* (provincial) and *sum* (county) centers. *Bagiin emch* provide services at the *bag* (smallest administrative unit) level by traveling to herder households by motorcycle or horse, or less frequently by Russian jeep or camel. As a formal part of the public health care system, many aspects of their work are dictated by the Ministry of Health, while the balance come from *aimag* health departments and *sum* hospitals. In almost all of these cases, the activities that they are expected to undertake contain an information management component: data collection, data reporting, diagnostic support for patient encounters, health promotion, continuing education. There is considerable variation in how individual *bagiin emch* manage information based on training, local organizational practices, and individual preferences. This research is focused on understanding the information management practices of individual *bagiin emch* in the context of their everyday lives¹ and in a broader context in order to design improved information systems to support their work.

3. METHODS

The primary fieldwork in this research consists of short-term participant observation with multiple *bagiin emch*. Here “short-term” translates to 3-5 days spent in each selected *sum*, with most of that time spent with an individual *bagiin emch*. Overall, 15 *sums* have been selected from 3 of Mongolia’s 21 *aimags*. In consultation with experts at the Ministry of Health and the Health Sciences University of Mongolia, the *aimags* were selected to represent the different regions of Mongolia. This work has additionally been supplemented by attending *bagiin emch* training and speaking to key informants at health departments – in these *aimags* as well as 6 others – and national and international organizations. The methods have been described previously elsewhere [7], so they won’t be presented in any more detail here. The focus of this paper is on advocating for a perspective in designing information systems for development that does not presuppose a technological solution, and to discuss how this perspective has impacted particular elements of this ethnographic design methodology.

[Copyright notice goes here]

¹ Distinctions between work and personal lives are difficult to make, and in fact impose an artificial means of understanding, as almost all *bagiin бага эмч* work out of their own homes and many continue to work as herders.

4. A WIDER LENS

The metaphor of a camera lens is often used to define the appropriate focus of ethnographic research. Traditional ethnographic research suggests a wide-angle lens, one that excludes very little of what is observed, especially at the onset. While acknowledging the benefits of a wide-angle lens, Millen proposes the use of a telephoto lens for use in applied ethnographic work because of the decreasing marginal benefit to additional data: “The vast quantity of data ... makes finding patterns all the more difficult. While there may be nuggets of gold in the data, they are just too hard to mine” [5].

Because of the need to focus not on particular technology, but on information systems more broadly, the research questions are not as focused, so a wider lens is required. Additionally, in the context of rural and international development, the context is generally less familiar to those conducting the research, even if they are from in-country. Given this unfamiliarity informal methods are required, as is a need to “approach social life with a wide-angle lens” [8].

Another issue is that some groups are poorly understood because they have not previously participated in research of any kind. One *sum* hospital director said in introducing us to one of her *bagiin emch*, “[She] has been working here for over 30 years, but nobody from the Ministry [of Health] or anywhere else has come to her home to see her. [Because of your visit] she’s very lucky today.” In many cases in development, the research may represent a singular opportunity to be useful for something beyond design recommendations [3], although design is expected to be a significant contribution in and of itself.

In this Mongolia research, it is precisely this wider lens, accompanied by longer time in the field, that has enabled discoveries regarding practices which were not revealed in discussions at national or regional levels, such as purchasing and reselling – usually at-cost – of medicines to herder families. This approach also reveals relevant herding practices that affect *bagiin emch* work – a key example is *otor*, the pasturing of livestock away from the normal pastures, often hundreds of kilometers away, in response to physical conditions of the land. This has a direct impact on information management, for example of childhood vaccines, pre-natal care, and chronic disease.

5. HOLISM

Blomberg et al. outline four key dimensions of ethnographic research: (1) it takes place in natural settings, (2) it is holistic, (3) it is descriptive, and (4) it strives to consider the member’s own perspective [2]. By holistic, we mean that the understanding is framed in systems larger than the immediate context. On the shorter timescale that is required of applied ethnographic design research due to budgetary and time constraints, each of these will suffer, but we argue that holism and the member’s perspective will suffer the most.

Understanding information practices in the larger context, that is holistically, is critical to coming up with recommendations that are both innovative and likely to succeed. Because of the importance of holism, and the need to consider adequately the member’s perspective, we advocate a longer time in the field than is typical of rapid ethnography.



Figure 1. A *bagiin emch* uses a PDA that has been provided to him by an Asian Development Bank project to support data collection.

In Mongolia, achieving a holistic understanding has involved supplementing direct interaction with *bagiin emch* with discussions with *sum* hospital colleagues with whom they interact – physicians, vaccinators, nurses, midwives, health statisticians, drivers, and pharmacists. Additionally, discussions with *aimag* health departments, *aimag* general hospitals, regional medical colleges, and national level organizations are critical to understanding multiple aspects of *bagiin emch* work. At the national level, the National Center for Health Development manages national health statistics; many of work requirements come directly from the Ministry of Health; several international organizations – the Asian Development Bank, GTZ², the World Health Organization – have all had relevant activities in the places where we have worked; all *bagiin emch* have trained in the capital Ulaanbaatar or in one of three regional medical colleges at Darhan-Uul, Govi-Altai, and Dornogovi. It has been essential to understand each participant’s work holistically, in addition to developing an understanding of overall patterns, as there is considerable local variation depending on factors such as presence of development projects, *sum* hospital management, and *aimag* health department directives.

6. TECHNOLOGY’S ROLE

Although the focus is off of technology and on information systems, technology does have a role to play in the early stages of design. As with Ramachandran et al., technology can be used as “tools around which observations and interviews are conducted”, in contrast to technology probes and cultural probes which are given to participants expressly for the purpose of collecting data [6].

Of the 15 *bagiin emch* participating in this research, 4 were selected from a set of *bagiin emch* who received PDAs (Personal Digital Assistants, see Figure 1) as a part of an Asian Development Bank project that is using information and communication technology to improve rural health services [1].

² Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation), a German entity focused on international development.

The PDAs are not emphasized as a central focus of the participant observation, but they do provide additional needs that could not be uncovered in their absence. While this may have relevance to technology selection and design, it is also the case that the presence of technology can be used to elicit understanding to improve non-technological systems.

7. CHALLENGES

Presuming a particular technological solution to achieve a development objective isn't too far from technological determinism, the idea that "the mere presence or absence of a technology has a determining affect on behavior and social development" [9]. Certainly HCI professionals are somewhat more sophisticated in that they may affect the design of a particular technology or possibly also the choice of technology, but this still assumes that technology is the key. Heeks' argument for i-development instead of e-development [4] – that is, the consideration of social and contextual factors in using information and communication technologies for development – is aligned with our bearing, but we go further in saying that technology may not be a part of the solution. We should be clear that our argument is absolutely not against technology, but rather it is for the judicious use of technology and the design of systems that meets the needs of users and stakeholders.

This Mongolia research has been situated first and foremost in a public health context; the idea has been to use methods and approaches from consumer product design and HCI in order to achieve public health objectives. The reality is that the sources of research funding, a very real constraint to how research will be conducted, have allowed for this. The main challenges relate to how to make this type of research possible.

On existing projects, is it possible to conduct research that may improve conditions without introducing technology? What if the best solution involves technology that is at odds with the funding entity, whether it is a technology company or a development agency? This approach takes more time than traditional rapid ethnography – is this realizable given typical time and budgetary constraints? How can funders be convinced of the open-ended nature of this design approach?

8. ACKNOWLEDGMENTS

Preliminary fieldwork in Mongolia was supported by a Foreign Language Area Studies grant. The primary field research was funded by a Fulbright Fellowship and an NSEP Boren Fellowship. The cooperation and assistance of the Asian Development Bank, Health Sciences University of Mongolia, Mongolian Ministry of Health, and health departments of Bayanhongor, Zavhan, and Suhaatar *aimags* have been invaluable. Acknowledgements are never complete without thanking the people most critical to this

work, the participants – in this case it is the *bagiin emch*, who have invited us into their homes and workplaces, to whom we are forever thankful.

9. REFERENCES

- [1] Asian Development Bank. 2004. Grant assistance (financed by the Japan Fund for Information and Communication Technology) to Mongolia for information and communication technology for improving rural health services, JFICT #MON 36245, Manila.
- [2] Blomberg, J., Burrell, M., and Guest, G. 2003. An ethnographic approach to design. In: Jacko, J.A., Sears, A. (eds.): *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications*. Lawrence Erlbaum Associates, Mahwah, New Jersey, 964-986.
- [3] Dourish, P. 2006. Implications for design. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (April 22-27, 2006, Montréal, Québec, Canada)*, ACM Press, New York, NY, 541-550.
- [4] Heeks, R. 2002. i-development not e-development. *Journal of International Development*, 14(1), 1-11.
- [5] Millen, D.R. 2000. Rapid ethnography: Time deepening strategies for HCI field research. In the *Proceedings of the Conference on Designing Interactive Systems (August 17-19, 2000, New York City, NY)*, ACM Press, New York, NY, 280-286.
- [6] Ramachandran, D., Kam, M., Chiu, J., Canny, J., and Frankel, J.L. 2007. Social dynamics of early stage co-design in developing regions. In *Proceedings of ACM Conference on Human Factors in Computing Systems (San Jose, California, April 28 - May 3, 2007)*, ACM Press, New York, NY, 1087-1096.
- [7] Sandhu, J.S., Altankhuyag, P., and Amarsaikhan, D. 2007. Serial hanging out: rapid ethnographic needs assessment in rural settings. In J. Jacko (Ed.): *Human-Computer Interaction, Part I, LNCS 4550, Proceedings of International Conference on Human-Computer Interaction (Beijing, China, July 22-27, 2007)*, Springer-Verlag, Berlin, 614-623.
- [8] Spradley, J.P. 1980. *Participant Observation*. Holt, Rinehart and Winston, New York, NY.
- [9] Warschauer, M. 2003. Dissecting the "digital divide": a case study in Egypt. *The Information Society*, 19(4), 297-304.