Forum

User-Centered Design Considered Harmful¹ (with apologies to Edsger Dijkstra, Niklaus Wirth, and Don Norman)

Studies of IT for development have often identified the importance of the usability of IT systems and the need for IT systems to be matched to the needs of host communities. These two issues are central concerns for the discipline of Human–Computer Interaction (HCI), or Interaction Design. Within HCI and Interaction Design, user-centered design is just one particular view on how design processes can be organized to achieve such aims.

This paper reports on discussions arising from a workshop held at the Computer/Human Interaction (CHI) 2007 conference in San Jose, California. CHI is the largest HCI conference in the world. The workshop brought together a group of 45 interaction designers and development practitioners from around the world and included participants from 17 countries, including many researchers and practitioners based in emerging economies such as India, China, South Africa, Namibia, and Benin. The aim of the workshop was to examine how interaction design could contribute to the success of IT for development. Although many issues were discussed, this is a necessarily selective report focusing on some of the principal themes of the workshop.

The Current Situation

IT for Development is a growing field of study. Office-based IT systems clearly have an important role in the coordination and management of large private and public organizations and are also recognized for their use in nongovernmental, or third sector, organizations. In the domain of systems designed for commercial organizations in the private and public sector, some emerging economies, notably India, have developed their own software industries that compete for market share in the developed world

More recently, there has also been an increasing interest in how access to information and communication technologies, such as connecting to the Internet, might impact social and economic development by, for example, enabling farmers to discover ways to improve their agricultural

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^{1.} The workshop was initiated as part of the U.K. Engineering and Physical Sciences Research Council projects, "Bridging the Global Digital Divide" and "Rural e-Services." The U.S. National Science Foundation and the Association of Computing Machinery Special Interest Group on Computer Human Interaction (ACM SIGCHI) also sponsored the workshop by providing funds for participants from developing countries to travel to attend the workshop. The workshop was organized by Andy Dearden, Michael L. Best, Susan Dray, Ann Light, John Thomas, Celeste Buckhalter, Daniel Greenblatt, Shanks Krishnan, and Nithya Sambasivan. I would like to thank all of these contributors for their helpful input in creating this report.

output, or to obtain better prices; supporting education programs (Arora & Joseph, 2007; Dickelman & Arias, 2007); or enabling migrant workers to communicate with their families and friends that they have left behind (Liu & Meng, 2007). Another way ICT can make an impact on poverty is by supporting key activities of development organizations in areas such as microfinance (Gupta, 2007) or the development of novel applications that address the economic, social, and personal needs of communities (e.g., the ChikanCAD software used for computer-aided design by craft weavers in Lucknow [Sharma, 2007]).

The mobile phone has appeared as an important communication platform that could make a significant contribution to poverty reduction. Many participants reported on the high levels of mobile phone use in the settings where they were working (Marsden, 2007; Kolko & Rose, 2007; Ouko, 2007). Kavanaugh, Reese, & Pérez-Quiones, (2007) argued that the mobile phone might act as a "scaffolding" technology to aid users in learning how to operate other computing systems. Other technologies such as personal digital assistants (PDAs), digital cameras, and programmable mobile phones have also been used to support specially designed applications (Parikh & Brunskill, 2007; Parikh & Schwartzman, 2007; Kam & Ramachandran, 2007) that contribute to community and national development. In all such projects, two critical success factors are the degree to which the technology can be easily used and appropriated by users and the degree to which the services offered by the technology address the primary needs of intended beneficiaries.

The discipline of HCI, or Interaction Design, is specifically concerned with the ways in which humans work with and through ICT systems and how ICT systems can be designed to ensure effective and satisfying interactions. Many HCI researchers and practitioners (Frohlich, 2007; Parikh & Brunskill, 2007; Gupta, 2007) have engaged with IT for development projects to design novel solutions tailored to specific local needs. In the United Kingdom, a national research network called "Bridging the Global Digital Divide" has been formed to create design responses to IT for development issues. However, the workshop in San Jose was the first time the community of HCI designers came together to ex-

amine how the discipline could contribute its knowledge and experience to global development and explore the challenges that might arise in that effort.

Clarifying Our Objectives

There are questions about the objectives of design. In HCI, a common point of reference is the concept of usability, which the International Standards Organization defines as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."

These criteria of efficiency and effectiveness in relation to specified goals are typically interpreted in terms of economic efficiency—a discourse around individual productivity and satisfaction that often risks a narrow consumerist interpretation. The workshop participants questioned whether user-centered design was the right metaphor for design for development (Bednarik et al., 2007), and concluded that a more community-centric view was required.

Introducing IT systems into a community or organization is likely to disrupt social relations, bringing benefits to some and disadvantages to others. Such disruption is a commonplace observation in information systems literature. As Athavankar (2007) explains, designing *for* international development cannot successfully be realized unless interaction designers develop a rich understanding of *development*. As a result, the workshop reported back to the wider conference using the slogan "User-Centered Design Considered Harmful" and suggested in its place a new approach of community-centered design.

Exploring this communal perspective is useful in thinking about systems that are developed to meet specific needs of communities located in the developing world, but may also be useful in thinking about how a global community can engage with development. Many contributors to the workshop reported on novel uses of technology to support collaboration, discussion, interaction, mutual learning, and support among communities spread among *developed* and *developing* regions (Diehl, 2007; Disse, 2007; Aykin, 2007; Buckingham-Shum, 2007; Boettiger, 2007).

^{2.} See www.bgdd.org for more information.

The Design Challenges

International development projects raise several design challenges, and interaction design is no exception. Most computer systems are designed for users who are assumed (typically) to be literate and who are expected to have had some experience with other computer platforms (e.g., keyboards, mice, pointers, screens). Often designs assume that the computer will have a reliable connection to the Internet (i.e., electrical power and telephone connectivity will not be a problem). Designers and users may share important elements of cultural background such as language, education, history, and working arrangements. These assumptions are rarely valid when designing systems for use in the developing world (Wilson, 2007; Yeo, Songan, & Hamid, 2007). Toyama (2007) highlighted the danger of a variety of assumptions that technology designers (and development practitioners) might make about community and individual attitudes toward new technology.

Designing for development requires systems that are usable by people with limited literacy, who have little prior experience with computers, who may not be familiar with core concepts applied in computing such as hierarchical classification (Marsden, 2007), and whose primary language may not be the approved "official language" of the country where they live. Furthermore, it requires systems that can cope with intermittent power supplies and limited infrastructure, make sense in cultural contexts that are likely to be very unfamiliar to the technology designers (Kotze, 2007), and overcome cultural norms such as established working and governance practices that constrain the implementation of designs conceived by other cultures (Ho, Luk, & Aoki, 2007). Additionally, design must still consider the wider issue of making systems accessible to users with disabilities (Wong, 2007; Kotze, 2007) and must be maintainable in field settings where even basic tools such as spanners (wrenches) are difficult to obtain (Godjo, 2007; Dhewa, 2007). Designing applications that will run on mobile phones and PDAs becomes even more complex because all interaction (e.g., the display of outputs and user feedback) must occur through a very small interface, which in turn restricts the options users have to provide input to the system. Despite these challenges, some systems have been designed that have successfully delivered development benefits.

One topic for discussion was how culture plays out in the form of the system itself and some of the surprises that occur when technology is introduced into new contexts. For example, in Bombay, automatic teller machines for banks, where users make deposits, have proven popular with prostitutes who use them to deposit their earnings during the night so they do not have to deal face-to-face with the bank. Ways of working need to be reflected in technology design. For example, the workshop discussed how the importance of word-of-mouth and personal networking in finding work were reflected in the design of a recruitment portal for cleaning work in India.

The workshop discussion identified the following three distinct processes whereby technology is shaped to support development:

- Internationalizing existing products that were developed initially for a Northern market (e.g., a local version of Microsoft Word)
- Extending indigenous social shaping of ICTusing existing products, but developing new practices around those products (e.g., using computer-aided design to support craft weavers [Sharma, 2007])
- "Contextual innovation" in a practice area designing new solutions and new platforms/ technologies/software in the specific context of development (e.g., Parikh & Brunskill, 2007)

Design Methods and Techniques

Although designs have proven successful in a few contexts, most existing projects are unsustainable (Hettiarachchi, 2007). This phenomenon suggests that the value delivered for the community of beneficiaries is not sufficiently large to cover the costs of developing and deploying the technology (Kitner, Beckwith, & llahiane, 2007). For a designer, this raises the question of how to improve the design of both project and technology so sustainable development can be achieved.

One problem is that the techniques and methods that are used successfully for designing ICT in developed world contexts rely upon certain assumptions about how users and developers can interact and discuss ideas that are not necessarily valid in developing world settings (Winschiers, 2007; Chetty & Grinter, 2007; Medhi, 2007). One particular tradition in interaction design is the participatory design

school, which has concentrated on questions of how end users and other stakeholders can be more actively involved in the creation of software. The participatory design tradition is most closely associated with software design and development in Scandinavian countries, where the discourse on design has addressed questions about the power relations between software developers, customers, end users, and other stakeholders in the software development process. However, Scandinavia is recognized as a region where social relations are exceptionally egalitarian compared with more distanced, hierarchical relations that are typical in many (though not all) developing countries. Similarly, many techniques in interaction design rely upon the words that informants utter; for example, it is common practice to transcribe interview notes. However, in some cultures, the need to avoid loss of face can mean that verbal utterances should not be interpreted without careful attention to details of the associated nonverbal signals.

It is clear that new, context-specific techniques may be required to achieve successful design.

Bridging the Gaps Between Users and Designers

There was general agreement that participatory approaches to design are highly relevant to design for development, but the notion of participation reguires further examination (Maunder, 2007). Winschiers (2007) and Yuan (2007) argued that methods for engaging with users need to be translated and adapted to different cultures, just as software does. One workshop group focused on how to achieve "culturally appropriate community engagement," dealing with issues such as intra-community diversity, power relationships, and expectations. They reported that in their experience it is often necessary to have the support of local leadership or local government officials before trying to work directly with community members. Without this support, the community members are often unwilling to participate or do not trust the new arrivals. Another route into the field may be working through existing established relationships—either through family relations or through NGOs that are already working on the ground (Medhi, 2007; Parikh & Schwartzman, 2007). Communities are often suspicious of outsiders coming in with big promises that

may or may not be converted into practical action in the longer term. Adopting technological solutions carries both benefits and risks, and very vulnerable communities may not be ready to afford those risks (Kitner et al., 2007). In addition to resolving issues of trust, a local partner can act as a cultural interpreter and may help a team to avoid mistakes.

Design for development requires that system designers examine their conception of development. In many cases, system designers may be unaware of the implicit assumptions that will have a significant impact on the potential effectiveness of ICT for development (Hettiarachchi, 2007; Athavankar, 2007). In the context of researching interaction design for development, the software developers may have their own motivations and incentives (e.g., to generate publications, to attract future funding) that must be honestly acknowledged if a truly open design debate is to be possible. Thus the procedures for establishing projects that are typical of software creation for commerce in the developed world need to be reconsidered, as do the ethical issues that arise in forming relationships with communities (Parikh & Schwartzman, 2007; Spittles & Dunckley, 2007; Marsden, 2007).

Another group at the workshop sought to identify possible heuristics to guide design processes for development and research on ICT design for development. It was recognized that perhaps heuristics might need to be specific to countries or regions. Following are examples of the heuristics suggested:

- The importance of identifying a human access point or a local partner who is already working directly with the community. This may be through family relations or through other mechanisms such as NGOs.
- Doing groundwork and homework before entering the field—you should know a fair amount about the area, and the work of the community *before* you contact them. This knowledge demonstrates that you actually care about the community, otherwise the community is not likely to trust your motivations. Key words are "safe," "communication," and "credibility."
- Critical Action Research may be a useful perspective.
- There has to be a sense of mutual learning the designers must expect to learn from the

- community and vice versa. This learning needs to take place both before and during the project
- Sustainability needs to be built into thinking from the beginning.
- Evaluation and publishing papers has to be a jointly owned activity. Just as with ethnographers, we need to work out our ethical stance in relation to the communities we work with. We as researchers are benefitting when we publish papers; the community may not see any benefit, but they do see a cost—they are being represented. We need to ensure their rights to fair reporting and involvement in how their story is told.

Looking Ahead

The final part of the workshop was devoted to identifying key challenges and forward planning. In taking our vision of community-centered design forward, some critical debates are required around ideas such as *development*, *participation*, and *community*. These ideas will strongly influence the generation of new approaches, new ideas, and new design contributions to development. Without such a grounding, interventions may be well-meaning, but ineffective or even counterproductive.

Following are practical steps that were identified to support that debate:

- Publishing some form of handbook, or textbook, for field practitioners and students. A first step in this direction could be preceded by introducing a chapter on interactive systems design in existing development studies texts.
- Establishing and supporting networks of practitioners and academics working in interaction design in developing nations (Smith & Dunckley, 2007; Aykin, 2007; Akorli, 2007).
- Building international communities of collaboration that can discuss and explore relevant issues and developing bilateral links between research groups.
- Conducting follow-up on workshops and discussion panels. Discussions were planned for HCI International 2007, Interact 2007, HCI 2007, CHI 2008 and Designing Interactive Systems 2008. In the medium term, a structured effort is required, perhaps establishing a con-

ference series, or a track within an existing conference. A proposal for a track on interactive systems design for development has been put forward for the HCI International 2009 conference.

Workshop Papers

The full set of workshop papers can be downloaded from: http://www.cc.gatech.edu/~mikeb/ UCDandlDWorkshop/accepted.html

- Akorli, F. K. (2007, April). Sustaining a post-graduate study program in ICT in a developing country: A case study at the National University of Rwanda.
- Arora, S., & Joseph, P. (2007, April). *Position paper:* For participation in user-centered design and international development.
- Athavankar, U. (2007, April). *Rediscovering UCD4* development.
- Aykin, N. (2007, April). Global innovative design for social change.
- Bednarik, R., Kamppuri, M., Tedre, M., & Vesisenaho, M. (2007, April). *Alternative to technology-driven development: An approach based on authentic needs.*
- Boettiger, S. (2007, April). Small Scale Agricultural Technologies (SSAT) information resource.
- Buckingham-Shum, S. (2007, April). Mapping dialogue and argumentation in international development: The case of Compendium and OpenLearn LabSpace.
- Chetty, M., & Grinter, R. (2007, April). HCI4D: How do we design for the Global South?
- Dhewa, C. (2007, April). *Participation is like a journey.*
- Dickelman, G., & Arias, S. (2007, April). Fast and effective contextual analysis for ICTs in education: User-centered design fills the gap.
- Diehl, J. C. (2007, April). *INTOCONTEXT: Creating appropriate solutions for peer to peer microfinance in East Africa.*
- Disse, K. (2007, April). *UCD4D DIVO project—Dialogue for development*.

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- Frohlich, D. (2007, April). Applying digital storytelling technology to community radio in India.
- Godjo, T. (2007, April). Innovative techniques for engaging users in food processing equipment design in developing world contexts: The case of Benin.
- Gupta, S. (2007, April). Software development of SafalFin2 and user-centered design perspective.
- Hettiarachchi, C. (2007, April). Role of information and communication technologies (ICTs) in human development in South Asia.
- Ho, M., Luk, R., & Aoki, P. M. (2007, April). *Applying user-centered design to telemedicine in Africa*.
- Kam, M. & Ramachandran, D. (2007, April). *MILLEE: Mobile and immersive learning for literacy in emerging economies.*
- Kavanaugh, A., Reese, D. D., & Pérez-Quiones, M. (2007, April). Mobile phone as scaffolding technology: How low literacy groups learn computing?
- Kitner, K., Beckwith, R. R., & Ilahiane, H. (2007, April). *Development or stasis: The dilemma of ICT4D.*
- Kolko, B., & Rose, E. (2007, April). *Design for Digital Inclusion research group*.
- Kotze, P. (2007, April). *User-centred design in a developing country and international context.*
- Liu, Z., & Meng, Q. (2007, April). Usability and digital divide: A study on usability issues for off-farm workers in China.
- Marsden, G. (2007, April). Position paper.
- Maunder, A. J. (2007, April). Designing ICT based solutions for the developing world.
- Medhi, I. (2007, April). CHI workshop position paper on user-centered design and international development.

- Ouko, L. (2007, April). Designing for the DrumNet application: A cell phone based information and transaction platform for Kenya's agricultural sector.
- Parikh, T., & Brunskill, E. (2007, April). Lessons from prototyping a microfinance distance learning tool.
- Parikh, T., & Schwartzman, Y. (2007, April). *Establishing relationships for designing rural information systems*.
- Sharma, C. (2007, April). Background report on the Chikankari Computer-Aided Design (CAD) software.
- Smith, A., & Dunckley, L. (2007, April). *Issues for human-computer interaction in developing countries*.
- Spittles, Y., & Dunckley, L. (2007, April). *Ethical considerations for usability testing in Kenya using Kiswahili and English.*
- Toyama, K. (2007, April). Resolving user contradictions through fieldwork.
- Wilson, I. B. (2007, April). Creating solutions that are sustainable in context (case study of Sierra Leone).
- Winschiers, H. (2007, April). A cultural appropriation of usability engineering and participatory design practices—A Namibian experience.
- Wong, C. Y. (2007, April). Addressing challenges in bridging the digital divide and user-centered design initiatives: A Malaysia perspective.
- Yeo, A. W., Songan, P., & Hamid, K. A. (2007, April). Providing equal access to ICTs for rural communities: A user-centred design perspective.
- Yuan, Y. (2007, April). Get the right participants for UCD studies in different markets.