Sustainable Research Agendas

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ABSTRACT
This paper proposes a new conception of sustainability as applying to ICTD research agendas themselves, in contrast to only the resulting technology interventions. This distinction presents a new lens with which to study and initiate ICTD research projects. Just as sustainable technologies belong to the communities within which they reside, sustainable research agendas depend on local stakeholders for planning, findings, administration, and research. This view changes the traditional role of the ICTD researcher from that of remote-but-interested third-party to that of fostering local research of local needs. We draw on experiences deploying, maintaining, and planning the research agenda for the Mischief project, currently deployed in scores of schools across Southeast Asia.

Author Keywords
Sustainability, education, ICTD, development, methods.

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

INTRODUCTION
One of the goals of information communication technologies for development (ICTD) research is to produce *sustainable* interventions. Among other definitions, 'sustainable' as it is used here connotes the technology intervention's capacity to maintain its state and efficacy within its intended context completely, without adversely affecting the ecosystem it resides in.

However, current methods of designing such sustainable systems are crude at best; they adhere to a model whereby researchers observe local ecosystems and attempt to fit their technologies into them.

Why is sustainability so important in ICTD projects in particular? Ostensibly, it is so that the results of such projects can live on, positively affecting users while the researchers and caretakers are gone, having returned to their home contexts. This is particularly important when the intervention is relatively far or difficult to reach from the researchers' homes.

Another reason sustainability is important in ICTD projects is because the projects should not require large amounts of financial and human labor support, which are often already spread thin.

There are no laboratories in ICTD research projects. This lack of controlled, nearby environments of study is the primary feature distinguishing ICTD work from traditional HCI research. ICTD research occurs in the world, in foreign contexts which the researchers cannot hope to understand intricately without dramatic investment of time, energy, and resources.

The large number of surprising results from ICTD contextual inquiries is a testament to how complex and unpredictable local user ecosystems can be. Therefore, research is needed on methods to develop sustainable technologies that do not rely upon a foreign group of people comprehending such complexity and designing it purposefully into the interventions. Ideally, technologies should be designed and developed by local stakeholders for their own citizens, with experts abroad acting in peripheral roles. Some practical starting points will be presented in this paper that will help ICTD research move towards this goal.

SUSTAINABLE RESEARCH AGENDAS
Our team has been working on the Mischief [2] learning technology aimed at schools in developing regions for over two years. After much iteration, we have seen our technology being deployed by schools who lobbied independently for pilot deployments and even triggered parent donation of funds to cover the purchase of computer mice. This, compounded with corporate interests and a relatively stable high-fidelity and functional prototype, has led to the simultaneous deployment of scores of Southeast Asian schools.

Another reason for the adoption of the Mischief system is due to policy decisions. Because the technology is seen to save local government capital while adhering to

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institutional demands, we have seen numerous requests for pilots. In short, the governments and schools see Mischief deployment as a way to save money while addressing an existing goal (not creating a new one): increase the student-to-PC ratio while experimenting with teaching methodology.

While one may view this 'pull' by users to use our prototype as a success, the project is still in the research phase and is actively redesigning the interface, studying its effects, usage, and impact. Hence, our team was forced to develop a means by which to learn from these simultaneous deployments, gathering data and informing future changes. We perhaps could have stifled the growth of the Mischief userbase by not releasing the application, but this seemed to go against the spirit of ICTD research, where local stakeholders have a say in if and how research takes place.

Our previous experience with Mischief found local feedback and idea generation to be an invaluable resource [2] once the local users were told that they too are researchers and designers whose goal it is to help improve an immature system.

These experiences with Mischief led us to propose and design a new method of developing sustainable technologies: enrolling local researchers through a sustainable research agenda. We define a sustainable research agenda as *a research agenda that enrolls local stakeholders in the design, research, study, and administration of a sustainable technology intervention.* These stakeholders transform their roles to *local researchers* (as opposed to traditional, often Western, *foreign researchers*) who are trained or informed by the original project researchers and feed findings back to them as appropriate.

This model, under optimal implementation, serves multiple purposes:

- Insights about local context that may affect system design can come from more contact points and even when the researchers are not on-site.
- Develops a local sense of ownership of the technology intervention.
- Increases communication between locals and the research team that is grounded in research methodology and therefore less affected by cultural and language barriers.
- Eases eventual handoff to local deployment and support teams.
- Enable research in spite of the remote location of foreign research team.
- Indirectly informs the design of a truly sustainable technology.

The implication of this model is that the goals of ICTD research may be reconceptualized as fostering a local user-centered design research in collaboration with foreign experts. Short of this lofty goal, the purpose of a sustainable research agenda can be considered to help explain the local ecosystem to the foreign research team.

Local Researchers

The selection, training, and deployment of a local research team is a significant endeavor that may only make sense in relatively large research projects or when local stakeholders are sufficiently informed about the project's goals and process. Our experiences with Mischief saw local stakeholders, teachers, students, university professors, government employees, and third-party developers engaged in the research process.

Given a number of local stakeholders have been named researchers, what exactly do they do? As one might expect, it depends on the needs, structure, and goals of the research project.

Surveys

Paper surveys are an effective mean of enabling local researchers to collect data using a consistent protocol that has been strictly standardized based on foreign researcher input. One important consideration is that the instructions to the user before filling out the survey must be transmitted delicately and the physical presence of the local researcher may not be desired.

Observations

Local researchers observe usage of a technology with different historical and contextual knowledge. ICTD researchers often tap these sources for cultural translations but having a local researcher emphasizes the capacity to observe and interpret local usage. Training local researchers to do observations can certainly be time well spent. One way to effectively carry out such interviews is for local researchers to use templates during their observations.

Templated observation is another means of scaffolding data collection by local researchers in addition to training them. Such templates can include short textual areas as well as diagram templates and dialogue and thought-balloon fill-in-the-blanks, previous proposed as a method of prompting ideation in ICTD participatory design [1].

Structured Interviews

In general, interviews are a notoriously effective yet problematic means of ascertaining user feedback and mental models. The difficulty lies partially in the high potential for biasing through tone, verbiage, and pitch. Templated interviews should generally be videotaped to avoid interpretation biases. New, low-cost transcription services on the Internet that distribute translation burden among many translators are an effective way of giving foreign researchers insight.

Data Collection

Perhaps the most useful and objective methods of utilizing local researchers is to involve them in data collection. In the case of Mischief, local researchers are asked to collect log files off the local computers, record screen movement for select sessions, and so on. Recording the classroom using a video camera is another useful data collection method, in particular recording video at different stages in the adoption life cycle (before, during initial adoption, and after some familiarity).

User Training

Instructors using the Mischief system in their classrooms usually undergo an introductory training session to become accustomed to this classroom interaction system. We have found that local researchers are an effective means of training their fellow countrymen. Such trainers would be intricately knowledgeable about the system but, admittedly, will always have a lesser understanding than the Mischief developers will.

Limitations

Training local researchers will certainly require additional resources and time invested on the part of the project leaders. Further, adding members to a team increases the amount of complexity, coordination, and potential problems in the research process.

Further, adding local members may create a new dynamic between the research team. Instead of approaching and observing users directly, the foreign research team may depend on findings directly from the local researchers.

CONCLUSION

This paper proposes an addition to the reigning paradigm of conducting ICTD research: sustainable research agendas. This model asks the foreign research team to consider adding local stakeholders in a research capacity, training them to accomplish certain tasks. The costs and benefits have been presented, with potential for follow-up research and discussion.

BIOGRAPHIES

Neema Moraveji is a Ph.D. student at Stanford University's Learning Sciences and Technology Design research program. He also works with the Departments of Computer Science, Management Science and Engineering, and Communication. His background is in human-computer interaction and computer science. Before coming to Stanford, he was a researcher at Microsoft Research Asia in Beijing for two years and received his masters in Human-Computer Interaction from Carnegie Mellon University. His research interests include the study of large-group collaborative learning technologies and complex adaptive systems. He hopes to gain new insights into developing sustainable research agendas at the workshop.

Nasha Fitter is a senior product manager with Microsoft's Unlimited Potential Group, overseeing the worldwide deployment of MultiPoint, a new collaborative technology for emerging market schools. Within this, she is committed to working with partners to create new business models and opportunities. Nasha has spent many years working within the ICT for development and education space and founded two companies prior to joining Microsoft. She has worked with governments, NGO's and commercial education providers to design and deploy innovative and affordable education content. Nasha is an MBA graduate from the Harvard Business School.

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