CHI 2011 Sustainability Community Invited Panel: Challenges Ahead

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Abstract
As part of a new CHI Sustainability Community, focused on environmental sustainability, this panel will discuss specific ways in which HCI research will be critical in finding solutions to this global challenge. While research to date has primarily focused on the end consumer, the panel will be challenged with enlarging the discussion to include the designer as a target user and to consider interfaces and interactions that support sustainable design and sustainable manufacturing, as well as sustainable consumption. Specifically, to make real progress, we seek to enumerate ways that HCI needs to grow, as well as to find ways that can help more HCI researchers to become involved.

Keywords
Sustainability, Environment, User Behavior, Design

ACM Classification Keywords
H5.0. Information interfaces and presentation (e.g., HCI): General.

General Terms
Design

Introduction

The CHI community can have a major positive impact on environmental sustainability [1]. To help propel the efforts of HCI researchers in this area, *Sustainability* has been selected as a *Featured Community* at CHI 2011. Featured Communities are a new addition to CHI with the aim of growing a research community by expanding participation and fostering new types of research in the community's area[1].

At CHI 2010, sustainability-related publications examined trans-theoretical modeling, supply-chain carbon accounting, water conservation, indoor air quality, power usage and the role of feedback [2]. The CHI 2011 Sustainability Community will attempt to create a common space to discuss projects and techniques like these, to foster collaboration, and to consider broader issues. This panel is one of the components of this community at CHI 2011.

Sustainability is a complex topic that involves almost every technology and virtually all human behavior. Any solutions that will be effective will be highly multi-disciplinary. The CHI community has already demonstrated a unique and impressive ability to cross multidisciplinary bridges and this same skill will be central to any progress made in this area.

Topics

At the panel, five primary topics will be posed for discussion covering strategy, behavior vs. infrastructure, materials research, visualization, modeling and simulation. In the same way that it could be claimed that HCI research did not actively help to design the user experience for the internet, the domains listed above also seem to exist beyond the borders of active HCI research. Can we move HCI from an afterthought to an active element in the design of these domains?

Strategy

Can HCI research help in multiple strategies working toward sustainability? For example, the kaizen approach to continuous improvement in manufacturing is process-oriented instead of results-oriented or innovation-oriented. Can we borrow kaizen principles for environmental sustainability? Specifically, what processes are needed to support both short-term goals (results) and long-term goals (innovation)?

Behavior vs. Infrastructure

HCI research has traditionally focused on broad classes of users such as office workers and, in recent years, knowledge workers and general consumers. However, engineers, architects, economists, urban planners, construction workers and scientists have not been greatly studied by the HCI research community, even though the size of these classes of users may outnumber many of the user groups normally targeted. Furthermore, by our community ignoring the very group of people that make the world we live in, we could be holding back progress needed to create the sustainable world we desire.

Material Science

Another area of great activity relevant to environmental sustainability is that of the development of novel materials. Insulation, clothing, smart materials, phase-shifting compounds, and more generally, nanotechnologies may be able to help manufacturing

[1] http://chi2011.org/communities/index.html#featured-communities

processes to move away from hazardous materials and chemical compounds that result in permanent environmental damage. What tools do these knowledge workers use? Do their interactions require unique methods to investigate these promising outcomes?

Visualization
A common mantra in management, attributed to Peter Drucker, is "if you can't measure it, you can't manage it." This seems to especially ring true for topics of high complexity, such as sustainability. The instrumentation of the physical world, as well as virtual processes, is the first step. Beyond measurement, the visualization of the data will be necessary for data sets of any level of complexity. In particular, if sustainability is the balance of resource production and resource consumption, then a global resource visualization system would be needed as an important step toward resource management. Furthermore, a visualization system for such a massive data set, even if it was incomplete, would require an innovative set of interactions for sense-making, in support of decision-making.

Modeling and Simulation
HCI research could fundamentally modernize interfaces for the tasks of modeling and simulation, which, in many cases, have scarcely moved beyond the command line. If sustainability is indeed a complex system, irreducible to simpler components, modeling and simulation is one of the few approaches available to attempt to understand emergent behavior. Of course, in this situation, cause and effect will be weakly linked and other approaches to discover parameter sensitivity will be needed. Consider the approaches used by software development for debugging. Can we build a planet debugger? Can the advent of abundant high-performance computing help make these large simulations fast enough to be called interactive so that users can at least develop intuitions about design choices? Can serious games for climate change, general understanding of weather systems or ecosystems, help to involve greater numbers of people thinking about these problems?

Panel Structure
As the CHI 2011 Sustainability Community is new, the panel session will provide a significant portion of the time for open participation. To frame the discussion, each panelist will present a brief overview of their work and perspective as it relates to environmental sustainability. The moderator will then pose the series of challenges outlined above to the panel to elicit properties of HCI research that will help or hinder the application of the particular domain to sustainability. In particular, user behavior has been gaining the attention of HCI researchers in recent years. But can we expand the investigation up the production chain going beyond consumers to designers? Beyond structures to infrastructures? Panelists will relate their thoughts on the role of HCI with respect to these questions and the discussion will be opened to the attendees to participate.

Statements from Panelists
AZAM KHAN: **(MODERATOR)**
Azam takes a community-based approach to foster change, as the problems being addressed are global in scale. His goal is to help architects, designers, and engineers create better, longer lasting, less wasteful, more useful and usable objects, devices, structures, and infrastructures. As founder of the CHI

Sustainability Community, Azam hopes to help connect HCI efforts to include as many areas as possible to help propel real change.

LYN BARTRAM: **SUSTAINABLE HOUSING**

Lyn is interested in how the rich visual modality of motion and animation can be used in information visualization and affective interfaces. Her practical focus applies these to design and deploy distributed visual environments to help people monitor their energy and resource use in the home. Together with Rob Woodbury, she is the co-lead of the SFU Team for North house, a fully net-zero solar house entered into the US International Solar Decathlon.

ELI BLEVIS: **ROLE OF HCI**

Dr. Blevis' primary area of research is sustainable interaction design, situated within the confluence of human computer interaction as it owes to the computing and cognitive sciences, and design as it owes to the reflection of design criticism and the practice of critical design. Dr. Blevis has given several invited colloquia internationally on sustainable interaction design and the larger context of notions of design.

CARL DISALVO: **SOCIAL SUSTAINABILITY**

Carl's work is rooted in the humanities and arts and might best be characterized as a kind of design inquiry. He is particularly interested in understanding and describing the social and political uses of technology in cities. As part of this research technology platforms and participatory programs are designed that engage and enable urban communities. Carl is also deeply committed to the development of design theory and criticism.

JON FROEHLICH**: IMPROVING LIVES AND THE ENVIRONMENT**

Jon's research focuses on how technology can be used to effectively sense and report information about environmental behaviors to promote awareness and enable positive behavior change. He has worked on projects involving shared bicycling, alternative transit, and natural gas, water, and electricity monitoring. Recently, he served as a Program Committee member for the Behavior, Energy and Climate Change conference, which hosted over 750 attendees from industry, government, public utilities, and various academic disciplines focused on the relationship between individual and organizational behavior and the environment.

GORD KURTENBACH: **DESIGNING FOR DESIGNERS**

Gord Kurtenbach is the Director of Research at Autodesk where he oversees a group whose focus is research on 3D interactive graphics in the areas of Human-Computer Interaction and Computer Graphics. Prior to Autodesk, Gordon was a researcher at Xerox's Palo Alto Research Center working on pen based user interfaces for wall-sized display systems. Before Xerox, Gordon was a member of Apple Computer's Advanced Technology Group researching gesture-based input techniques for graphical user interfaces.

References

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[2] Mynatt, E. *Ed.* (2010). CHI '10: Proceedings of ACM CHI. *ACM CHI*.