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# SigCHI Sustainability Community

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**Abstract**

We propose the formation of a new SigCHI Community focused on environmental Sustainability. A number of researchers in the Human-Computer Interaction community have already started to publish research regarding links between end-user behavior and sustainability. Starting from these early works, we estimate the potential size of this new community and describe the approach to be used to launch and stimulate content and to identify participants and volunteers.

**Keywords**

Sustainability, Environment, User Behavior, Complexity

**ACM Classification Keywords**

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

**General Terms**

Sustainability, Community

**Introduction**

Environmental sustainability generally refers to the balance between the consumption and the production of resources. By definition, the use of non-renewable resources implies permanent environmental damage, while the use of renewable resources can mitigate this problem. Material consumption can be measured in a

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number of ways including global warming potential, land use competition, and human toxicity. Taken together, an environmentally-weighted material consumption value can be formulated [2].

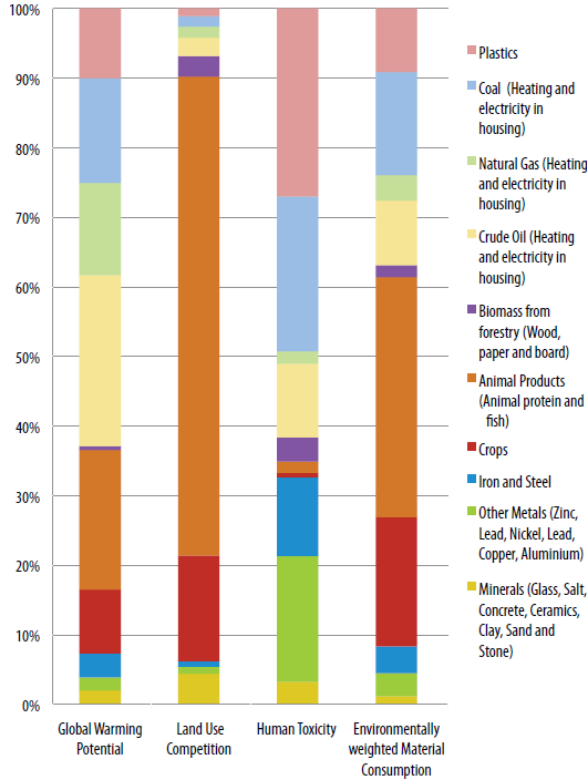


figure 1. Relative contribution of groups of finished materials to total environmental problems (total set at 100%) [2].

The Sustainable Consumption & Production Branch of the United Nations Environment Programme (UNEP) reports that the relative contribution to the total environmental problems caused by material

consumption is led by Animal Products (34.5%), Crops (18.6%), and Coal (14.8%). See Figure 1 adapted from [2]. These environmental problems result in a combination of emissions and waste. Emissions can broadly be classified as air and water pollution.

The impact of human activity on sustainability in terms of anthropogenic pollution, including chemical and biological wastes, has affected biodiversity, climate, and human health. In particular, air pollution data from the United States Energy Information Administration (EIA) [6] and the United Nations Food and Agriculture Organization (UN FAO) [5] report the three primary causes of the production of anthropogenic greenhouse gases (GHG) to be *buildings* (48%), the *meat industry* (18%) and *transportation* (14%). Each of these industry sectors has previously operated in a business environment where GHG production was not a concern. However, as these problems are identified, and as citizen and consumer demand turns to significantly reduce air pollution, a number of interrelated issues surrounding these problems (from climate change, to diet, to building efficiency) enter the global narrative.

**SigCHI Sustainability Community**

We believe that the SigCHI community can have a major positive impact on these problems. Specifically, through a SigCHI Sustainability Community, information from related disciplines critical to the understanding of these problems can be brought to the broader HCI community in support of researchers interested in applying their knowledge-bases to sustainability. In this way, SigCHI can show leadership in this important emerging field. The SigCHI 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. At SigCHI 2010, sustainability-related publications have started to examine trans-theoretical modeling, supply-chain carbon accounting, water conservation, indoor air quality, power usage and the role of feedback [4].

### **Approach to Community Growth**

To estimate the current the size of the SigCHI sustainability community, we draw on the data collected by DiSalvo et al. [1] who found 157 papers from 2009 that have sustainability in HCI as a central focus. Kaye [3] shows the average number of authors of a 2007 SigCHI paper to be “slightly over 3.5 authors with a mode of 3 authors per paper.” This would imply that about 549 people participated in the research that was reviewed and, at an acceptance rate of 22%, a total of 2495 authors would be participating in this area. In any case, SigCHI 2010 presented approximately a dozen papers related to sustainability representing about 40 authors. While this is a good start, it falls short of the full amount of HCI work being done in this area according to DiSalvo et al. Bringing the full body of work to SigCHI could increase overall attendance by 20%, assuming no overlap of contributing authors with current accepted papers on non-sustainability topics.

Going beyond this, there are two major areas where additional researchers could be brought to SigCHI. First, as highlighted by DiSalvo et al., a large number of design professionals and engineers, who already understand their role in sustainable design, could greatly benefit from seeing HCI advancements in their tool sets. Second, the entire domain of modeling and simulation is a critical tool for addressing areas of great complexity precisely like sustainability, and our

community must include support for this domain. In addition to these two, a number of current HCI topics, such as large displays, feedback, social networks, mobile computing, infoviz, ubicomp, and end-user programming could all be refocused on sustainability problems to great benefit for the environment. Finally, researchers in more geographical regions could be motivated to participate, reflecting the global aspect of the challenges we are considering. Participants and volunteers can be recruited in all of these ways and, in fact, must be included given the massive scale of the problem space. Overall, we can help architects to design more efficient buildings, help food consumers to make more sustainable food choices, and help consumers to reduce indirect and direct transportation usage. In general, designing interactions that support real consumption and production decision-making will be critical. Our goal is to see 20% of SigCHI working on sustainability.

### **Organizers' Qualifications to Lead the Community (Biography)**

Azam Khan is Head of the Environment & Ergonomics Research Group (EERG) within Autodesk Research. He is a Senior Research Scientist in HCI and has over 30 papers published at venues such as SigCHI, UIST, AVI, and I3D on 3D navigation and orientation, interaction with large displays, and more recently at other venues, building efficiency for sustainability, occupancy modeling and simulation (M&S), and complex constraint authoring. Khan has given keynotes and has spoken at several labs including Lawrence Berkeley National Lab (LBNL) and the Florida Institute for Human & Machine Cognition (IHMC). He has served on the ACM SigCHI Committee as Chair of alt.chi.

Mr. Khan takes a community-based approach, as the problems being addressed are global in scale, to help architects, designers, and engineers create better, longer lasting, less wasteful, more useful and usable objects, devices, structures, and infrastructures. Working with academic and industrial partners, the group focuses on Building M&S and Biomechanical M&S.

Building M&S is a highly multi-disciplinary area but is currently separated into silos. To greatly increase collaboration across the disciplines of general simulation research, building physics research and architecture research, Azam Khan founded the SCS Symposium on Simulation for Architecture and Urban Design (SimAUD) in 2009. Key academic and industrial research partners contribute to the SimAUD mission to help propel the disruptive changes needed across the entire building sector to address the global problem of anthropogenic Greenhouse Gas (GHG) production. The dominant cause of GHG (48%) is the generation of power needed to operate buildings.

Biomechanical M&S also involves many types of expertise, so Mr. Khan partnered with the Dept. of Anatomy at the University of Toronto to found the Parametric Human research consortium in 2008. The consortium is developing a shape-description language for anatomical structures as well as physics-based M&S of the musculoskeletal system. To develop a multiscale biomechanical control system, Khan's team is studying human activity and behavior, from epistemic action to modeling emotion and decision-making.

To summarize, the organizers' have great interest and experience in developing new collaborations between individuals and between disciplines. In studying sustainability from many perspectives, the organizers' have gained unique insights that can benefit the SigCHI Community and through their active communication efforts, can reach a global research audience in a broad range of disciplines to solicit contributions to the proposed SigCHI Sustainability Community.

### References and Citations

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## CHI 2011 Sustainability Community

### **Important Dates**

- 24 Sep 2010: Submissions are due for Papers and Notes.
- 8 Oct 2010: Submissions are due for Workshop Organizers, Panels, Case Studies
- 14 Jan 2011: Submissions are due for SIG meetings, Works-In-Progress, alt.chi, Videos, and Data Sets

### **Message from Azam Khan, Sustainability Community Chair**

Sustainability is about decision-making. In some cases, we may know what a sustainable choice would be and we have to communicate this to the user or to the stakeholders. In other cases, the complexity is so high that we need better tools to help us find the choices. Some choices are behavioral while others are implicitly imposed on us by our infrastructure. This is a fascinating area that touches all aspects of human-computer interaction because human activity is central to the issues.

The SigCHI community has a strong history in designing more useful and usable technologies through an interdisciplinary process. Work with us to extend this foundation by joining the SigCHI Sustainability Community to help users, designers, engineers, and architects to create better, longer lasting, less wasteful, more useful and usable objects, devices, structures, and infrastructures. From sense-making to affective computing, social networks, large displays, user experience, mobile computing, and end-user programming; almost every area in HCI can be targeted toward sustainability.

Not sure how to get started? Let's talk! Contact me anytime and let's get the conversation going. And see you soon in Vancouver!

Azam Khan ([sustainability@chi2011.org](mailto:sustainability@chi2011.org))

### **Types of Submissions**

You can submit proposals in the following categories:

- Papers & Notes

- Workshops
- Panels
- Case Studies
- Work-in-Progress
- Data Sets

Submissions about sustainable design, sustainability research, resource consumption and production, and local projects are requested to any of these forums.

We especially encourage you to submit interesting Case Studies that illustrate how sustainable practices help to create unique solutions and valuable outcomes for other communities.

A good Sustainability Case Study

- Tells a story about a real project.
- Poses several questions related to issues that the project raised.
- Uses the narrative of the story to answer address these issues and provide the reader with a clear understanding of the consequences and opportunities involved in these unique circumstances.

There are two options for Case Studies: Long Case Studies (maximum of 16 pages); Or, Short Sketches (4 pages). Both will be presented at the conference, and will appear in Extended Abstracts; on the proceedings DVD and stored for long term reference in the ACM Digital Library. Submissions for Case Studies are due by 8 Oct 2010.

Data Sets is a new category of submission that has similar Case Studies in most respects with the addition of the submission of a significant set of data that would be valuable to the SigCHI Sustainability Community. Data Sets could be sensor readings from a building, spreadsheet logs of human behavior, 3D models of urban areas, or any compilation of data that you feel would help with cross-validation or future combination. The extended abstract would explain the history of the data set, how it was collected, and its value to the community.

For more information you can follow any of the links above, or see the Call for Participation.

**Review Process and Criteria**

The basic criterion for presentation at CHI 2011 is new information that will advance the field in important ways. For each type of forum there are additional criteria listed for it in the Call for Participation. If you prepare a submission that focuses on Sustainability as it relates to the Interaction between People and Technologies we will make every effort to get it to reviewers who are technically knowledgeable, experienced, and passionate about Sustainability and its role at CHI.

**Preparing Your Submission**

You must prepare your submission in the format that is required for each type. Please use the term "sustainability" in the title, abstract, or author's keywords to help us get it to qualified reviewers. You can contact us at [sustainability@chi2011.org](mailto:sustainability@chi2011.org) if you have questions about sustainability submissions. Please be sure to check the due dates of your submission type, read the requirements for your submission ideas, and start now, if you haven't already. Good luck. We hope to see your work in Vancouver!