

Evolving the Role and Agenda of HCI for Sustainable Development

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The paper examines the evolving role of HCI for sustainable development. We claim that HCI is central to the idea of designing for development and sustainability. We therefore propose the idea that researchers in HCI have to strive for a greater balance between attempting to produce global and local knowledge. HCI designs for local knowledge can create case-studies that can be drive and be driven by theories and models that could lead to global knowledge.

1. INTRODUCTION

Lately, sustainability has become a popular term within the Human-Computer Interaction community. In 2007, Blevis won the best paper award at CHI [1], presenting a claim for Sustainable Interaction Design (SID), and several interest groups have emerged in this space. In this context, sustainability has mostly been associated with the environmental implications of design. At the same time, ICT for development has become a relevant topic in the HCI field, tackling several aspects concerned with sustainability [2]: In this context, sustainability has rather been associated with the design implications on cultural and financial development.

So what do we intend with sustainability after all, and how does it relate to HCI and interaction design?

In this paper we try to tackle this question, and to consider the relationship and potential differences and convergences between HCI agendas in the so-called ‘developed’ and ‘developing’ economies. We claim that HCI has become an essential component of designing for sustainability and development. Any project embarking on a sustainable design agenda should involve a person well versed both in the theory and practice of HCI. To this end, we argue that HCI needs to re-consider some of its assumptions and borrow from some of the principles of sustainable design. From this point of view, we reflect on the differences between local and global perspectives of HCI, and how developed and developing economies can benefit from each-other in leveraging the HCI knowledge.

1.1 Defining Sustainability

In the 1987 United Nations Commission report on Environment and Development (Brundtland Commission) entitled “Our Common Future”, *sustainable* is defined as “...development that meets the needs of the present without compromising the ability of future generations to meet their needs.” There are different ‘lenses’ and frameworks through which one can look at sustainability: We like to consider the synthesis suggested by Shedroff [5], which considers *human, natural and financial* capitals. Shedroff presents several existing frameworks (e.g., cradle to cradle [7], sustainable return on investment, Natural Capitalism [6]), which are focusing on some of those three capitals in particular, in the attempt to assess or measure sustainability. In this paper our main focus is on sustainability of social capital, being aware that the environmental and financial ones are connected to that, in respect of the holistic complexity of sustainability.

2. THE EVOLVING RELATIONSHIP BETWEEN HCI AND SUSTAINABILITY

While sustainability has actually been a design topic for a long time already (e.g., [4]), the relationship between HCI and sustainability is more recent, and somewhat still in evolution. We speculate that there are some main reasons for this:

2.1 Historic Reasons: The Inclusion of Design in the HCI Field of Research

HCI has its origins in the '80s in human factors, and was first motivated by enhancing interaction in the military domain, where technology was first implemented. But it has evolved as an interdisciplinary field of research over the last 30 years. Its interdisciplinary nature has influenced the creation and evolution of user centred design methods; furthermore the inclusion of human sciences in the field has triggered an agenda which considers human values and social implications, i.e. its impact on social capital. In the transition from human factors and cognitive psychology to a more interdisciplinary area of research, the inclusion of design disciplines has raised differences in opinion about practice vs. research, and utility vs. knowledge. Nevertheless, design has brought to evidence the value implication of HCI, and ethical questions about technology design and implementation. We claim that HCI for sustainability cannot be agnostic of the values it promotes, and of its impact on social, as well as on environmental and financial capital.

2.2 Technological Reasons: The Diffusion of Computing Technology in Everyday Life

The inclusion of a more 'human centric' perspective has been co-responsible of the evolution of interaction techniques: Such interaction techniques, building on technological evolutions (accelerometers in small devices, capacitive sensing, and camera vision for example) have started to become more common-place, and utilize a broader bandwidth of human input capabilities (e.g., 3D gestures, multi-touch). In other words, interaction techniques have evolved not only through technology driving innovation but also because there is more concern on human capabilities and the related business opportunities.

In the industrialized economies, computing in the form of desktop computers and laptops has become a central part of everyday life, thus pushing the HCI agenda towards the design of interfaces that are accessible to a broader range of users in a broader set of contexts. At the same time, emerging economies such as India are communication and technology enriched through televisions, radio-sets and mobile technology (see [10] for example). Thus interaction with digital technology is radically different in industrialized and emerging economies. This fact poses new challenges for HCI and its implications for sustainability.

2.3 HCI for Access to Digital Economy

The reason why HCI has become an essential aspect of sustainable development is quite simple: The access to digital information and communication has become an indispensable resource for survival in a global economy and society. Still, whereas this is a disposal resource in some geographies or populations, similar to water, it is a scarce resource in many others. The reasons are not only related to the infrastructure. Because of the regions where computing technology has grown, interfaces have been designed with the values, mental models, stereotypes of the western industrialized economies in mind. Those often prevent the access to other types of users, who possibly have literacy, linguistic, physical barriers, or simply have different cultures and mindsets. As technologies reach new regions and populations, those assumptions need to be challenged to guarantee inclusiveness and democratization of access.

How does this impact the HCI agenda? Despite the fact that there is an everlasting conflict between fundamental and applied research, in this paper we argue that HCI for sustainability cannot be agnostic of its impact.

3. IMPACT VS SCIENTIFIC CONTRIBUTION: AN ONGOING DILEMMA

The scientific contribution of work in the field of HCI is often questioned when it derives from case studies: What are the lessons that the specific case study teaches, and that can be generalized so as to inform other cases? The researcher's approach to case studies is often one of problem-solving with the goal of having a beneficial impact on a specific problem at hand, and in a specific context (sees Fig. 1). For example, the design of a mobile application for community digital library access in an Indian village [10]. On the other hand, empirical studies aim at answering more fundamental questions, which can be more easily generalized to form predictive theories such as Keystroke-Level Model and Fitts' Law [9]. It is often neglected, still, that even those empirical studies and measures - that have informed the HCI body of knowledge - are mostly based on mental models and measure parameters that are conventionally agreed upon in some cultures, but

can be different in others. This often means those values and mental models are mostly based on western cultures. As computing technology is reaching new regions and cultures, the HCI community needs to become more inclusive: Case studies from cultures and contexts that so far have been marginalized from digital technology can inform the HCI body of knowledge by revealing issues about accessibility and methodology that are sometimes taken for granted. At the same time, the existing HCI body of knowledge can inform the approach to case studies in terms of theory and methodology.

To achieve such a balance, it is our taking that the HCI community needs to embark into intercultural collaborations. Addressing cultural sustainability is, in our eyes, an indispensable condition for any design striving for sustainability (and all the aspects thereof).

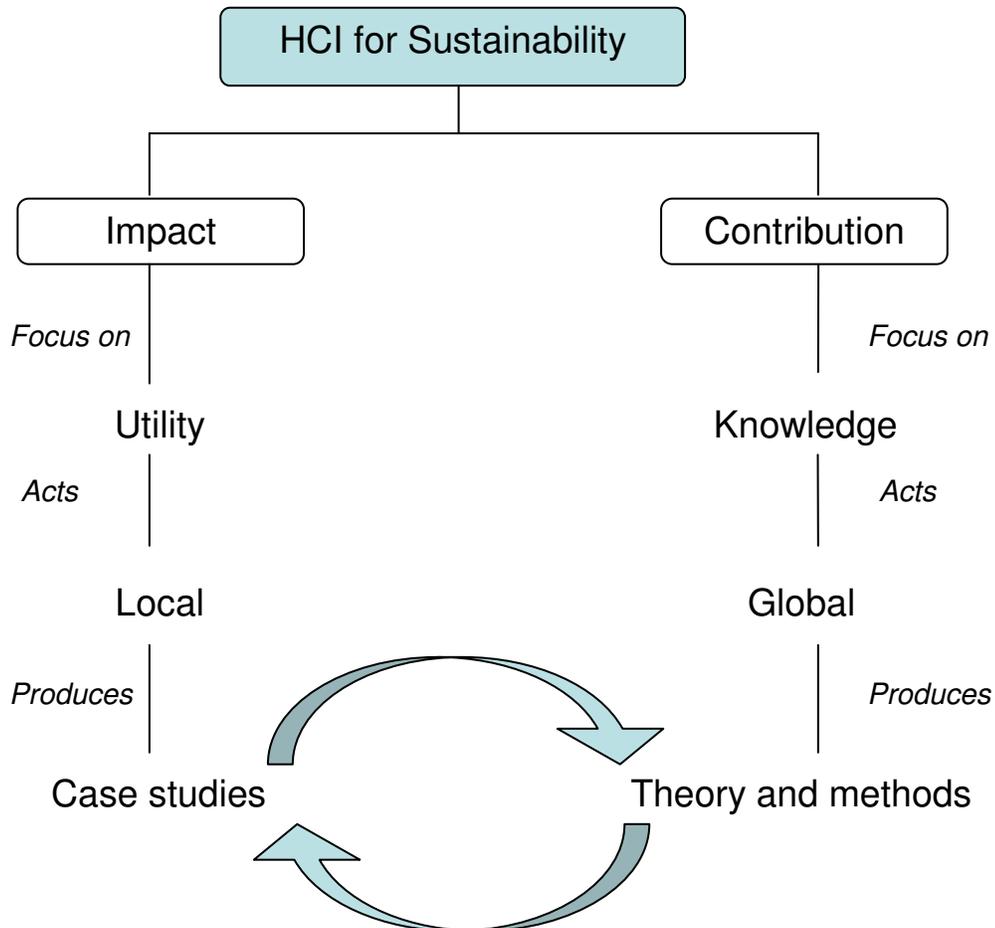


Figure 1: HCI for sustainability must consider both its contextual, local impact, and its universal, global contribution: Thus, case studies and theories of HCI must iteratively inform each-other.

4. SUSTAINABLE DEVELOPMENT THROUGH COLLABORATION

The inclusion of a growing and diverse population in the digital economy will challenge the HCI community to find a balance on the continuum between the maintenance of cultural identity (i.e., maintenance of cultural diversity) and the leveraging of standard solutions (i.e., definition of conventions for scalability and interoperability). To this end, we believe it is important that the HCI discipline is taught and an HCI culture is developed across the world with a focus on inclusivity, ethics and sustainability. HCI, indeed, can become a catalyst for sustainable development if it succeeds in informing the design of solutions that facilitate access to the digital economy.

In order to create universal knowledge and specific designs that can maintain the balance between diversity and intercommunication, and create value in context, it is important that HCI scholars and practitioners from different cultures assume a *design with*, rather than a *design for* attitude, engaging in cross-cultural collaborations.

An example for this is the Network on Interactive Technologies for the End Users, which we have initiated in early 2009 and involves UK and Indian universities as well as multi-national industries [[3]]. Our experience so far is that creating opportunities for cross-cultural and interdisciplinary relationships can stimulate synergies both within and across geographies. From this sort of collaboration we expect to leverage the HCI knowledge in several ways. For example, by stimulating novel methods and approaches for co-design with users that are fundamentally different from designers (e.g., neophytes, children, elderly, physically challenged, and illiterate users); by designing interfaces that are adaptable to users' interaction capabilities and context; and by designing expressive, multimodal interfaces (e.g., using gestures, touch, speech) that can enhance the communication between people and people mediated by the system. As a result, we hope to learn how to design for a more inclusive access to digital communication.

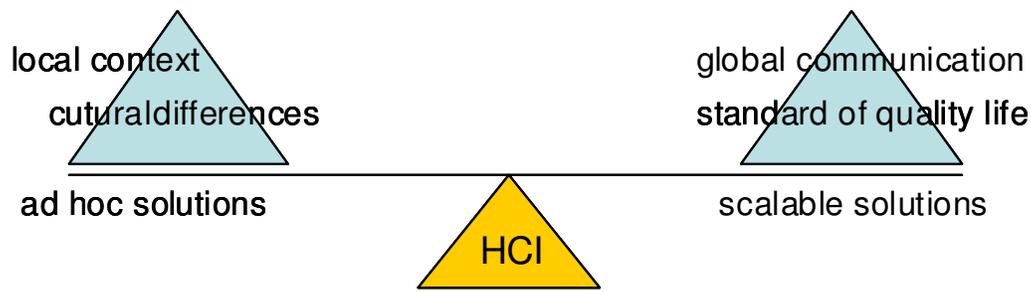


Figure 2: HCI is challenged to find a balance on the continuum between the maintenance of cultural identity (i.e. maintenance of cultural diversity, left pole in the schema) and the leveraging of standard solutions (i.e., definition of conventions for scalability and interoperability, the right pole in the schema).

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