

HCI in the So-Called Developing World: What's in it for Everyone

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All around us, information, knowledge, and the use of networked computing continues to revolutionize how we live, work, and play. Although this perspective is obvious to many of us and in danger of becoming hackneyed, important structural changes are indeed occurring. Driven by social, political, economic, and technological factors, these profound changes are having a significant impact on the organization of global society ([3], among others).

This article explores briefly the implications of some of these changes. It argues that human-computer interaction (HCI) and user-centered design (UCD) principles are critical to ensuring that both developed and developing countries are able to meet the challenges posed by these changes and harness the opportunities of globalization and the emergence of an information society.



Globalization and the Information Society

Some scholars refer to this historically significant transformation as the emergence of a global information or knowledge society [22] and argue that it represents a fundamental shift in the underlying techno-economic paradigm of society [13-15, 21]. Collectively, these changes are often taken as indicators of continued and ongoing “globalization.”

However, far too many people only see this term in reference to the interdependence of global markets and the deepening integration of global finance. Although this perspective on globalization, often called “economic” globalization, is valid, numerous other complex interactions at sociological, technological, cultural, and political levels are defining this historic period. Our conception of globalization is much more expansive, including social, political, economic, technological, and cultural implications.

Much of this transformation is facilitated by the increased use and development of global information and communications networks, intangible products and services, and new organizational forms. Even with the meltdown in the DotCom sector, structural transformation is still occurring in underlying business processes and models, stimulating the development of a global information economy.

Globally Distributed Knowledge Work

Through the use of these global information and communications networks, companies are able to take part in globally disarticulated production and distri-

bution processes. This means that the various components of their production and distribution processes no longer must be geographically collocated. In taking advantage of this “world factory” model [29], companies can locate their research and development facilities almost anywhere in the world, and engineers can collaborate across time zones, institutions, and national boundaries to develop the next generation of products and services. Furthermore, production facilities can be located in multiple cities, sharing resources, equipment, and personnel.

Perhaps most important among these developments in the global economy is the increasing importance of distributed knowledge work. Distributed knowledge work refers to economic activities that produce intangible goods and services—that is, digital and capable of being both developed and distributed around the world using these very same information and communications networks without all or any of the participants being geographically collocated. Examples of such services could include financial services, consulting, research, software production, distance learning, and telemedicine. Distributed knowledge work is also essential for managing and coordinating disarticulated production of all kinds of products.

The emergence of these new business models is based, in part, on the continued rapid development of a global information infrastructure (GII) and Web-based collaboration tools that make it easier for groups of people to deepen their levels of cooperation with remote and distributed participants. Internationally, these forms of distributed knowledge



work are covered by the General Agreement on Trade in Services (GATS), an agreement negotiated and implemented within the World Trade Organization (WTO). More than 140 countries (both developed and developing) are signatories to GATS, which promotes development of the global trade in services, now making up 64 percent of the global economy [35]. Already, global trade in services accounts for 60 to 70 percent of production and employment in developed countries, and has been the fastest growing component of world trade for the last 15 years. This focus on distributed knowledge work is increasing after the events of September 11, 2001, and with the worsening of the climate for international travel.

Developed and So-Called “Developing” Countries


In this period of globalization, existing concepts of developed and developing countries are being challenged. Socioeconomic development in this new period requires of countries, organizations, and individuals an increasingly complex collection of skills, competencies, strategies, and knowledge [7], Reich. Some scholars argue that these issues may lead to a new conceptual division in the world, beyond the “developed” and “developing” world distinction that has dominated since the end of colonialism (and certainly beyond the outdated “first,” “second,” and “third” world dis-

tinctions that were the hallmark of the Cold War). If we follow the suggestion of Attali [1], we should now recognize that there are potential “winners and losers” in this coming world order in both “developed” and “developing” countries. What determines these winners and losers is not necessarily whether someone lives in one of the countries represented by the Organization for Economic Cooperation and Development (OECD)—the OECD is often used by economists as a proxy for developed countries and the Group of Eight (G8) industrialized countries (G8) as an even narrower grouping of developed countries, with all others assumed to be the developing countries.

According to the perspective of Attali and others, what determines these winners and losers in this historic period is not whether we live in the G8 or OECD countries, but whether we have the knowledge skills and abilities to add value to

this new kind of global information economy and society. Some scholars call this distinction the “fast” and the “slow,” arguing that people on both sides of this fast and slow divide exist in both the developed and developing countries. Specifically, there are people living in, say, Ann Arbor, Michigan, who have these kinds of “fast” skills, but these skills can also be found among people living in Johannesburg, Dakar, São Paulo, Bangalore, or Kuala Lumpur. In contrast,

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numerous people also live in each of these cities who do not have such skills and may be classified under this scheme as “slow.”

Although I don’t really like the fast/slow metaphor, the new perspective that it promotes has merit. It forces us to realize that these new networks provide opportunities for the fast to consolidate their power around the world and for the so-called “slow”—those who do not have the knowledge, skills, and abilities—to exist in both developed and developing countries.

What is at Stake?

Developing Countries

For so-called developing countries, this transformation is profoundly significant. It represents a challenge to the national development strategies of developing countries while presenting an historic opportunity to harness these new technologies and organizational practices. Developing countries have an opportunity to lessen the impact on their economies of geographical distance and to participate more fully in the global information economy and society through distributed knowledge work and the global trade in services.

These opportunities and challenges are magnified reality, exacerbated by the transformation in the global economy. Given the reduction in international aid, it is even more important for developing countries to now be able to participate in global trade. Luis Fernando Jaramillo, former chair of the Group of 77, representing the world’s poorest countries within the United Nations system, has argued that, “Neither official development assistance, nor technical assistance,

nor credit resource flows, nor any other aspect of international cooperation match the paramount importance and determinant nature that trade has for the developing world.”

However, at the same time, the fundamental nature of global trade is changing drastically. Old strategies for socioeconomic development will no longer work in this period. Even further, the nature of the global economy is becoming increasingly integrated and interdependent through the use of the GII and the emergence of a global information and knowledge-oriented economy. One aspect of this change is the increasing importance of the global trade in services, represented in our community in studies of distributed knowledge work.

Even for small, medium, and micro-sized enterprises (SMMEs) in developing countries, opportunities exist to contribute to globally distributed value chains in the information economy (for instance, through participation in global virtual production teams, scientific laboratories, and distance learning). Nonetheless, at present, developing countries are insufficiently involved in these activities. In order to increase the successful participation of developing countries in the global trade in services, it is important for us to better understand the social and technical factors that support distributed knowledge work between developed and developing countries. It is also important for us to understand the implications for education and learning, especially as we develop distance-independent learning programs to help prepare our students—in both developed and develop-

ing countries—to participate in these kinds of research and production activities.

Developed Countries

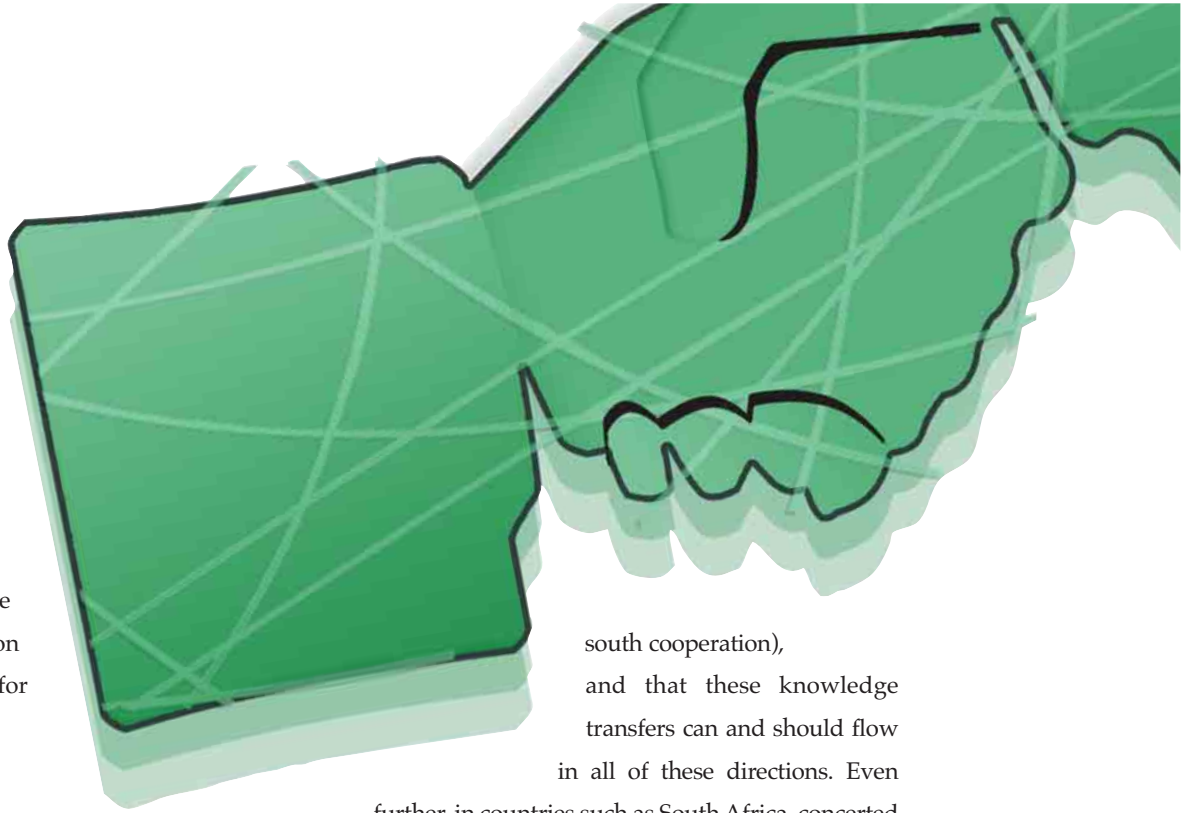
In developed countries, the socioeconomic implications are no less important. Being able to organize their work processes globally, tapping into the knowledge base that exists around the world of local practices, customs, languages, and norms, will have a tremendous impact. Perhaps more important, the ability to develop products and services that are relevant to the multiple cultural perspectives around the world and sensitive to their needs may determine the success of these products and services in exploiting these new markets.

These developments will have two important consequences. Stakeholders in the developed world, meaning the OECD countries, will benefit from socioeconomic development in the developing world in a number of ways, from developing new trading partners and collaborators to lessening the need for development aid, to contributing to a more just global social order. Even further, the so-called developing world will have new opportunities for development in this historical period of globalization and the information society, particularly through distributed knowledge work. However, in order to take advantage of these opportunities and to bring the benefits of globalization and the information society to as many of the world's citizens as possible, the methods and techniques of HCI are important for a number of reasons.

User-Centered Design: The Global Imperative?

Information technology products and services need global markets, not just local ones. In order to support this need, the new mechanisms governing the global trading system reflect a guiding principle called “reciprocal market access.” This principle means that while developed countries will certainly explore market opportunities in the developing world, developing countries have just as much right and *de jure* access to the markets of the developed world for their products and services, including technology products and information services. HCI has a major role to play in making sure that these products and services work for their users.

Some scholars have argued that many of the current metaphors used in computing are culturally biased. Culture has an impact on the way in which people use and experience these technologies [17, 23]. Thus, neglecting cultural factors will create significant barriers to global success. Expanding HCI approaches can help to address these limitations. For example, user-centered design principles can help to ensure that the needs and cultural perspectives of the developing countries are sufficiently taken into consideration. This approach can help us to design interfaces that are culturally relevant, taking into consideration such issues as language, history, religion, and the way people think. Products and services taking UCD principles into account will most likely find broader global markets than those that do not. But beyond this, the global economy will require information technology *per se* to work for global users, because this technology



provides the infrastructure that allows the communication and coordination necessary for disarticulated production.

Examples of Opportunities for the HCI Community

Building Human Capacity for All: Computer-Supported Collaborative Learning

As discussed earlier, in this historical period the knowledge, skills, and abilities required for socioeconomic development are changing rapidly and dramatically and include the need to better understand how to manipulate symbolic knowledge and to work in global virtual teams [7, 23]. This need for human capacity development exists in both developed and developing countries as well.

Together with a number of colleagues, I have been pursuing these themes in work on computer-supported collaborative learning (CSCL) to support geographically distributed human capacity development. Specifically, we have been involved in projects linking us with southern Africa in education [8-10] and other scientific domains [31]. This approach should not be construed in a paternalistic fashion or pursued in such a way that continues colonial or neocolonial practices. Quite the contrary, we should realize that there are important intellectual contributions to be made in many directions (for example, between developed and developing countries, and between developing countries themselves, often referred to as north-south and south-

south cooperation), and that these knowledge transfers can and should flow in all of these directions. Even

further, in countries such as South Africa, concerted efforts must be made to ensure that more African scholars are brought into the HCI pipeline in order to play more meaningful roles in developing and leading this movement. In addition, such an approach will raise the level of awareness of the existing scientific knowledge in developing countries and perhaps lead to increased and more meaningful scientific collaboration.

Successful CSCL will need to draw on the best lessons being learned in computer-mediated communications (CMC) and computer-supported cooperative work (CSCW) from around the world. We must ensure that the sociotechnical issues raised in these communities are considered adequately in our work building these linkages and at building trust and common ground required for such projects [4, 33].

International Scientific Collaboration Model

Although the idea of globally distributed knowledge work is important, it must not remain an abstract concept. Rather, we must explore concrete organizational models that will both facilitate the conduct of distributed knowledge work and encourage the study of distributed knowledge work. One such mechanism is the concept of a “collaboratory,” a blending of the words “collaboration” and “laboratory” [36]. In 1989, Wulf called the collaboratory “[A] center without walls, in

which the nation's researchers can perform their research without regard to physical location—interacting with colleagues, accessing instrumentation, sharing data and computational resources, [and] accessing information in digital libraries.”

The Computer Science and Telecommunications Board of the National Research Council (NRC) further clarified the collaboratory concept in a report titled *National Collaboratories: Applying Information Technology for Scientific Research* [27]. This report also raised awareness within the scientific community about the application and use of the collaboratory concept. However, a collaboratory is more than an elaborate collection of information and communications technologies; it is a new networked organizational form that also includes social processes; collaboration techniques; formal and informal communication; and agreement on norms, principles, values, and rules.

To date, most collaboratories have been applied largely in the sciences (such as physics, upper atmospheric research, and astronomy) with varying degrees of success and failure. Recently, collaboratory models have been applied to additional areas of scientific research such as HIV/AIDS in both national [34] and international [31] contexts. Since the emergence of these collaboratories, a substantial and growing knowledge base has emerged to help us understand their development and application in science and industry [11, 12, 27, 30].

Given that much of this work has been supported by national science bodies in the United States, the focus for providing this collaboratory infrastructure has been largely U.S. researchers and their counterparts in Europe. However, the benefits of the collaboratory approach extend far beyond U.S. and European researchers and even beyond the physical sciences.

The collaboratory model has tremendous potential for improving scientific collaboration between developed and developing countries and between developing countries themselves. Given the distributed nature of collaboratories, it is now possible to include, as active participants, scientists working in developing countries in research projects, providing mentoring and allowing them access to the people,

resources, and facilities based in developed countries, and vice versa. However, in order to take full advantage of the possibilities of this model, we have to extend it beyond the domain of the physical sciences into the social and behavioral sciences, as well as into other areas of socioeconomic activity.

Extending the collaboratory concept to include both social and behavioral research as well as more scientists and practitioners from the developing world could potentially strengthen the concept. Moreover, such an approach provides us with opportunities to learn more about the social and technical factors that support distributed knowledge work between developed and developing countries and can allow greater access to and contribution from the knowledge contained within developing countries. In addition, it may contribute significantly to the socioeconomic development of these countries.

Conclusions

Distributed knowledge work is becoming increasingly important. One manifestation of this type of work, global trade in services, can contribute significantly to socioeconomic growth in developing countries around the world. However, in order for developing countries to participate as partners in globally distributed knowledge work, it is critical that we understand the social and technical factors that support such work, particularly between developed and developing countries.

This understanding may come from increased access to and dissemination of the scientific knowledge being generated in developing countries. Important research is being conducted on the application of information and communications technologies to societal goals in a number of developing countries in Africa, Latin America, and Asia. Harnessing this work and strengthening the research partnerships between developed and developing countries can make another contribution. These tasks call upon the HCI community to adopt a global perspective. We must both share HCI knowledge globally and contribute HCI expertise to the design of the information tools that will enable global integration and development.

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