Handbook of Research on Socio-Technical Design and Social Networking Systems

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Prologue
Socio-Technical Implementation

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The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

—Mark Weiser, Scientific American, September 1991

SOCIO-TECHNICAL SYSTEMS IN THE CONTEXT OF UBIQUITOUS COMPUTING, AMBIENT INTELLIGENCE, EMBODIED VIRTUALITY, AND THE INTERNET OF THINGS

In which computer science world do we design and implement our socio-technical systems? About every five or ten years new computer and interaction paradigms are introduced. We had the mainframe computers, the various generations of computers, including the Japanese fifth generation computers, the role of artificial intelligence and the hype of expert systems. Moreover, we had the advent of personal computers, the first hobby and 'garage' computers, leading to companies such as Atari, Apple and Microsoft. Before that, there was already ARPANET (1969) leading to Internet and the TCP/IP protocol suite in the 1970s. Tim Berners-Lee introduction of the World Wide Web and the introduction of graphical web browsers in the early 1990s were other milestones. Moreover, we saw the development of telecommunications networks and the further rise of Internet and World Wide Web use, due to professional and, most of all, non-professional use and users. Embedding computer power in all kinds of appliances, including mobile and other wearable appliances, lead us away from desktop and keyboard and mouse applications. Global and local networks of such computing devices, using sensors (including microphones and cameras) and wireless network technology are an impetus to research on applications such as virtual educational and game communities, virtual workspaces, and virtual meeting facilities. Rather than this technology just allowing people to communicate with each other (in the context of these applications) we now have the possibility to make this mediated communication (more) natural, since the intelligent sensors that are now available allow the mediating of verbal and nonverbal social cues that are known

to be important in human face-to-face or human multi-party interaction.

In the nineties of the previous century Mark Weiser introduced the idea of 'disappearing computers'. In his now famous Scientific American paper (Weiser, 1991) he started the explanation of his ideas by saying: *"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it."* He and his colleagues at Xerox Parc introduced the ideas of ubiquitous computing and 'embodied virtuality', the process of drawing computers out of their electronic shells and into the practical world. In this vision, computers are everywhere and also nowhere: *"Hundreds of computers in a room could seem intimidating at first, just as hundreds of volts coursing through wires in the walls did at one time. But like the wires in the walls, these hundreds of computers will come to be invisible to common awareness. People will simply use them unconsciously to accomplish everyday tasks."*

These views became more accepted in the beginning of this century. We started talking about pervasive and ubiquitous computing, mobile and wearable computing, and the notion of Ambient Intelligence (AmI) was introduced. There is a very well known quotation from an ISTAG report (ISTAG, 2005) that tells us: *"According to the ISTAG vision statement, humans will, in an Ambient Intelligent (AmI) Environment, be surrounded by intelligent interfaces supported by computing and networking technology that is embedded in everyday objects such as furniture, clothes, vehicles, roads and smart materials—even particles of decorative substances like paint. AmI implies a seamless environment of computing, advanced networking technology and specific interfaces. This environment should be aware of the specific characteristics of human presence and personalities; adapt to the needs of users; be capable of responding intelligently to spoken or gestured indications of desire; and even result in systems that are capable of engaging in intelligent dialogue. Ambient Intelligence should also be unobtrusive—interaction should be relaxing and enjoyable for the citizen, and not involve a steep learning curve."*

It is interesting to note that while Weiser contrasted ubiquitous computing with the use of interface agents and, obviously, with the use of personal computers, in this AmI description there is much concern about the interfaces. Clearly, we want 'attentive', 'pro-active', and 'anticipating' environments, and indeed there are many situations where the environment can provide support without having to bother the user with questions or expecting the user to give commands. But there will of course remain situations where the user or inhabitant of a smart environment will need to issue commands and will need results or advice acoustically, visually or in a tactile way to be displayed on devices in the environment. As mentioned in (Nijholt et al., 2004): *"..., most of the research in ambient intelligence does not take into account that people may feel lost in ambient intelligence, may not know who to 'talk' to and may not be able to build some kind of relationship with the anonymous environment that nevertheless supports them, observes them and keeps track of their activities."* For that reason it was argued in (Nijholt, 2004) that humanoids (virtual humans and human-like robotic devices) have a future in AmI environments as personal assistants, butlers and buddies. Maybe, to put it more generally, we want devices and environments that know what we want, like, and feel, and act accordingly.

Weiser also contrasted ubiquitous computing with (immersive) virtual reality: *"Perhaps most diametrically opposed to our vision is the notion of "virtual reality," which attempts to make a world inside the computer. .... Indeed, the opposition between the notion of virtual reality and ubiquitous, invisible computing is so strong that some of us use the term "embodied virtuality" to refer to the process of drawing computers out of their electronic shells. The "virtuality" of computer-readable data—all the different ways in which it can be altered, processed and analyzed—is brought into the physical world."*

Nevertheless, when we look at the development of interest in 3D virtual communities (Nijholt, 2001) in educational or recreational settings, then we can conclude that with the development of worlds

like *There* and *Second Life* 'making a world inside the computer' is even getting more attention than in the nineties of the previous century. Arguably, these are not exactly the worlds Weiser was referring to, but nevertheless they show that computer scientists are not always strong in predicting social use of computers.

In particular wireless and display technologies allow us to have web interfaces everywhere. Web technology allows us to design all kinds of interactive web applications and, moreover, it allows the development of tools that provide non-professional users with the ability to develop their own interactive web applications or to adapt existing applications to their own needs and preferences. Web access, whether it is a computer screen, the surface of a table, a physical robot, or a virtual pet will allow us to communicate using different modalities, providing access and allowing interaction with multimedia content and mediating agents. It also allows us access to mixed and augmented reality environments where we can have individual experiences, for example, recalling something from the past, or where we can meet and have joint activities and experiences with friends, relatives, and family, or with gamers that want to compete or other people that we want to join or that we allow to enter our world and that also are looking for joint entertaining activities. Hence, future everyday life recreational activities can be supported and profit from the convergence of web and ambient intelligence technologies (Nijholt, 2008), provided a human centred social environment is maintained.

With these observations on the convergence of web and ambient intelligence technologies in mind, we can now look at current and future developments in information and computing technology in which we can embed research on socio-technical systems.

Obviously, there are important issues related to the development of standards, such as the UMA (Universal Multimedia Access) initiative and the ongoing FIPA standardization of (multi-)agent technologies. Also, EU initiatives are launched on developing standards for Metaverse, that is, standards for interconnected virtual worlds such as those described in Neil Stephenson's science fiction novel *Snow Crash* and the now existing Second Life. But, more importantly, we can see a convergence of ideas, made possible by nowadays and future (foreseen) technologies, in particular internet, wireless sensors, multimedia, display, and multi-agent technologies (NEM1, 2007; NEM2, 2007). This convergence is about connecting virtual and real worlds, or better, about the integration of virtual (including augmented and mixed-reality) and real worlds, i.e., in such a way that we can experience natural face-to-face interaction, human multi-party interaction, and, of course, interaction with all kinds of synthetic partners, in a seamless perceptual coherence. For this to occur requires a common context, inevitably social, that reduces the likelihood of harmful interactions. Such trust, as created by friendships, groups and social roles and structures in general, gives the predictability critical to social participation. The tight coupling of on the one hand the so-called 'Real World Internet', which is socially embedded, and on the other hand the 'Virtual World Internet', which is evolving its social context, is necessary for them to co-exist. Making this social level intersection work will pose many challenges for designers, but will also allow the many innovations we will see in future socio-technical systems.

REFERENCES

IST Advisory Group (ISTAG) (2005). *Ambient Intelligence: from Vision to Reality*. In Riva, G., Vatalaro, F., Davide, F., Alcañiz, M. (Eds.) Chapter 4 in *Ambient Intelligence*. IOS Press, 45-68.

NEM1 (2007). Vision: "Networked and Electronic Media", European Technology Platform, www.nem-initiative.org, April 2007

NEM2 (2007). Strategic Research Agenda: "Networked and Electronic Media", European Technology Platform, www.nem-initiative.org, June 2007

Nijholt, A. (2001). From virtual environment to virtual community. In: *New Frontiers in Artificial Intelligence*. Joint JSAI 2001 Workshop Post-Proceedings. Terano, T., Nishida, T., Namatame, A., Tsumoto, S., Ohsawa, Y., Washio, T., (Eds.). Lecture Notes in Computer Science. Vol. 2253, Springer Verlag, Tokyo, 2001, 19-26.

Nijholt, A., Rist, T., & Tuijnenbreijer, K. (2004). Lost in ambient intelligence? In Extended abstracts on *Human factors in computing systems (CHI'04)*, Vienna, Austria, 1725-1726.

Nijholt, A. Google Home: Experience, Support and Re-Experience of Social Home Activities. *Information Sciences*. Special Issue on Ambient Intelligence, 178(3), Elsevier, Amsterdam, 2008, 612-630.

Nijholt, A. (2004). Where computers disappear, virtual humans appear. *Computers and Graphics*, 28(4), 465-476.

Weiser, M. (1991). The Computer for the Twenty-First Century. *Scientific American,* September 1991, 94-110.