Extended Abstract

Homo Informaticus: Equal opportunities for people with disabilities

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Information and Communication Technology (ICT) has become the central access point. More and more interaction with the environment and also with human beings is mediated via ICT. The Human-Computer Interface (HCI) is the entity where users get access to virtual representations of real world processes. HCI thereby separates the interface from the actual activity and makes it an independent adaptable entity. (Miesenberger, 2009) ICT and HCI, facilitated by sensor technology (Wilson, 2005), makes interaction more flexible and independent in two directions, towards the user and towards the environment (Miesenberger et al 2013):

- Any measuring, tracking and representing real world objects, processes, and even other living or human/social beings in abstract models as well as in processing and reasoning for enhanced activities, allows the integration of interaction into HCI and advances the potential of a more adaptable and flexible interaction. For people with disabilities we call this field **eAccessibility**.
- Any progress in sensor technology in measuring, tracking, representing and using individual skills of a person in terms of controlled activities (e.g. with muscle, eye movements, head movement, movements of any part of the body or the body as a whole, electromyography – EMG, electroencephalography – EEG, towards brain Computer Interfaces - BCI) allows better using individual skills for interaction and accessing the standardized HCI, even for the most sever disabled people, where we call this field **Assistive Technologies**.

Progress in sensor technology and the increased flexibility at the HCI for sure has been core enablers for the ICT revolution in general, "at the desktop" as well as in emerging domains like mobile and embedded systems. Almost each application uses the standardized HCI, integrates into it to allow the user to apply existing skills and known concepts of interaction for more and more applications. The same holds even more true for people with disabilities as they, when the standard HCI can be managed, get access to the same systems and services as anybody else: A universal tool for inclusion.

HCI thereby is fundamentally different to traditional "mechanical" interaction. Each "traditional" device tended to provide an own interface. Technical developments tended towards increasing complexity for users as a new interface had to be learned. HCI in contrary stays stable cross tools and applications. This might read with surprise as we live in a world where we experience a faster and faster exchange of ICT gadgets in shorter and shorter time spans. But although we change devices and include more and more application domains, we can take the known concepts of HCI interaction with us, from device to device, from application to application and also away from the desktop and use it in many different situations for many different purposes. If new devices and applications would not integrate into this established user experience, the take up of innovation would be much slower and the resistance in society would grow. Since the invention of the desktop and HCI in the 60ties of last century (Müller-Prove, 2002) we use basically the same interaction concepts: (WIMP – Windows / Icons / Menus / Pointers, SILK – Speech / Images / Language / Knowledge, Touch …) and manipulation techniques (Point&Click, Trag&Drop, Copy&Paste, wip, …) (Miesenberger, 2009). These principles stay stable whatever the acceleration in terms of changing hardware and applications (including "Apps") might be. And even in the days of mobile and embedded computing beyond the desktop developers have learned to support these principles, otherwise users will not follow. Only small and moderate changes, well integrated into existing user experiences meet with acceptance. Stability and standardization of the HCI are therefore key success factors in the ICT revolution.

But at the same time, as outlined, HCI is flexible and adaptable for the individual user. A broad range of alternatives and enhancements in terms of interaction techniques, methodologies and devices has become available allowing individualization and adaptation of the HCI to the needs and preferences of users, the environment, the situation and other characteristics. (e.g. Shneiderman, 2012) Once profiled and optimized for the user, the HCI stays stable, the user can take it with her/him and use it for more and more activities. This is what users expect when changing to the next level of the information society (e.g. "Webx.0", cloud, Internet of Things).

And this makes HCI, when accessibility requirements ("eAccessibility") are taken into account, also the core enabler for enhanced eParticipation and eInclusion of people with disabilities. The key challenge is to interface the HCI and to allow people with disabilities to become active in these virtual representations and via it in real world activities. AT and eAccessibility can focus on this single and stable instance to allow access to more and more diverse systems and service. HCI provides the freedom of selecting the media and mode of interaction what makes it much easier to adapt it to the needs, requirements and preferences of individual users, including those of people with disabilities. The core qualities of ICT/HCI/AT facilitating inclusion are its

a. flexibility and adaptability in terms of media representation and modes of interaction
b. universality in terms of application in almost any aspect of the information society
c. standardization and stability in its basic principles and techniques.

And with this we allow people to reach out to any systems and services, away from the desktop to conquer the Internet of Things (Sundmaeker et al, 2010) or Sservices (Howard & Jones, 2004), where sensor technology provides a virtual representation of the environment (including human beings) and makes it subject to the AT/HCI/ICT mediated interaction. Exploiting this potential of millions and trillions of ("WEBx.0") interconnected objects for a more flexible and adaptable Information Society and a more flexible is the core challenge we face in the domain of eAccessibility and AT today, of course by also addressing related risks of security, privacy and in particular accessibility (e.g. W3C, 2012) seriously. "The Internet of Things (IoT) is a new actualization of subject-object relationships. Me and my surroundings, objects, clothes, mobility, whatever, will have an added component, a digital potentiality that is potentially outside of 'my' control. Every generation builds its own add-ons to the notions of reality, to what it believes are the foundations of the real." [Sundmaeker et al, 2010, p.26]

Whatever the cultural impact and discussion might be, for people with disabilities it is often the first time of independent, self determined and non-mediated interaction with the physical and human/social world. This matches with the changing understanding of disability as it is no longer an individual or medical phenomenon but in particular determined by the way we design our environment – accessible of not accessible. With sensor technology and the Internet of Things the environment become more and more moldable and we get a tool at hand to implement accessibility. The way we design our environment it will impact on the way people with disabilities can interact and participate.

More than any other individual or group, people with disabilities benefit from progress in sensor technology and a more flexible and adaptable interaction via virtual representations which should become accessible through the standardized HCI. Often only a fancy gadget for the average, AT/HCI/ICT provides unique and often first time access for people with disabilities.

This potential of inclusion, participation and enhanced democracy for many users who were so far excluded from many aspects of our society and culture must not be neglected as part of the "homo informaticus". Exploring the potential and cultivating the way of using it needs to be balanced.

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