

# THE HUMAN BEING IN THE 21ST CENTURY

## – Design perspectives on the representation of users in IS development

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### Abstract

*In this theoretical paper we present a research proposal that focus on who we are as humans in the perspective of the designers of the technologies of the 21st century. In the global world of today, we need rich portraits of human beings in order to develop the mono-cultural and mono-dimensional models embedded in the techniques and methods used currently by designers in software companies. We outline the idea of creating rich multimedia portraits of the human user of multimodal technologies and we suggest a possible framework and a tentative methodology for initiating such a research enterprise.*

### Keywords

User representations, HCI methods and techniques, cultural models, designer perspective, multimodal interfaces.

### INTRODUCTION

Approximately 100 years ago, the German photographer August Sander began no less than a “group-portrait” of a whole people<sup>2</sup>. Sander task was to do individual portraits to the new ID cards required of the citizens of the Weimar republic. It was ‘mission impossible’. However, Sander solution was to develop a cost effective technique to represent the human: Instead of individual portraits, he took group portraits, and cut them into individual. But does a cut from a group portrait communicate the same as an individual portrait and what does the portrait, this external representation of the person, say about the inner, complex human being?(Barthes 1983).

In computer applications, designers have long used representations of humans. A recent example of the use of representations of humans, we find in Microsoft OneNote <sup>3</sup> software, where users are represented with portraits photos in usage scenarios know as personas (Mikkelson & Lee, 2000; Nielsen, 2002; Pruitt & Grudin, 2003): On the Danish website Kirsten is a consultant, Søren is an engineer, Kathrine is a student, and she takes notes in English though she is a Danish student. On the German site she is named differently, but the photo and the task is the same. The diversity of skin colours of the people present in the different usage scenarios, shows that the company adresses ”equity issues”. The company applies usage scenarios with embedded representations of users as mono-cultural and function-oriented ideal types. This is a reasonable way to present a complex reality (Clemmensen, 2004), but it also has limitations. Thus we are all on a global scale exposed to descriptions of a limited number of ideal humans that applies technologies in certain ways. However, the typology is embedded in an American culture. This is true even for cultural approaches, e.g. Geert Hofstede’s cultural typologies (Marcus, 2001), which builds on a quantitative analysis of cultural traits at 50.000 IBM employees worldwide, perceived in relation to demographic categorizations. User representations becomes, like the photographic portraits by August Sander, a question of politics.

### The challenge

The challenge lies in the development of more nuanced representations of the complex human in a information- and communication technological (ICT) perspective. Because the reduced descriptions of human is decisive for the designer’s conceptions of the user and eventually governs the development of the user interface (Kumar & Bjørn Andersen 1990). Hence they also influence the user functions designed as part of the systems; they influence the human-computer interaction and the human beings that use the systems (Levinsen, 2003). As such, the designers’ user representations influence our conceptions of what humans are, what computers are and thereby they also influence our imaginations of the future society as a whole (Weizenbaum 1976, Winograd & Flores 1988). Besides, the reduced

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<sup>2</sup> [http://www.artcyclopedia.com/artists/sander\\_august.html](http://www.artcyclopedia.com/artists/sander_august.html), (retrieved January 21, 2004)

<sup>3</sup> Microsoft.com, (retrieved Jan. 21 2004), <http://www.microsoft.com/office/onenote/prodinfo/usage/journalist.msp>

descriptions of human beings do not enable or support the design of a future ICT that is oriented towards the human as an individual user in other contexts than standardised work and mass consumptions.

However, not even the representations of the human being in the traditional Human-Computer Interaction (HCI) techniques and methods contain a complex and nuanced understanding of human beings. In most of the Human Factors representations (Baecker, Grudin, Buxton, & Greenberg, 1995; Dix, Finlay, Abowd, & Beale, 2004; Lindegaard, 1995) it is not the human that is represented, but computer applications with an one-dimensional human being as an appendix (Card, Moran & Newell 1980, Nielsen Jacob 1992, Nielsen, Clemmensen, & Yssing 2002). Even the new interaction design research (Preece et al., 2002), despite conscious and explicit attempts to get around the one-dimensional human, ends with a simplified and rational subject and interaction remains something that takes place in a closed space: within the human head. Because Human Factors as well as Interaction design has its focus on tools, techniques and methods, they do not have a clear understanding of the underlying theories hence they cannot frame the use of tools in the embedded world views.

We suggest that it is complementary understandings of who we design for and what they will do with our design which is missing. We lack complementary methods and techniques to develop complex descriptions of who the users of the future systems will be, and methods and techniques to develop complex user centred designs and test and evaluations (Karat & Karat 2003). Our claim is radical: To develop complementary theories which embed complexity, we need to reflect critically upon the forty years of dominance of rationalistic empirical understanding of the human found in most of the literature and practice within the HCI paradigm in system development.

## THE SCIENTIFIC PROBLEM

### The mental interaction

At the same time that we as humans – on one hand – feel constrained by the design of systems, we also - on the other hand – feel challenged by the design of systems. The children of the 21st century will be the power-users of the future. They are emotionally engaged and have developed new cognitive skills: visual operational thinking and "visual spatial mapping ability" (Nielsen, 2003). They effortlessly navigate deep into the application and transfer to other applications while all the time keeping overview and knowing their way "home". In this we find a challenge for research. The interaction with the computer is mental. The computer interacts directly with the human mental processes: perceptual, emotional, sensual and conceptual. Hence also the sensual, visual and emotional interaction that relies on tacit processes (Nielsen, Christiansen, Clemmensen, & Yssing 2003) and runs above, around and below the verbal and written interaction becomes significant. But how do we create and communicate this knowledge about human use of technology? How do we use these creations to design software and interactive products? It is thus not only the goal directed interaction we need to understand, design and evaluate. Interaction also embeds aesthetics and pleasure (Jordan, 2000), and irrespective of the technological goals, the intentions with "pervasive, ubiquitous and transparent computing" (Weiser, 1998; Weiser & Gold, 1999) are identical: Technologies should be "unobtrusive", i.e. we should not focus on the technology, but on the activity we are currently doing..

### The double complexity

The human of the 21st century does not identify –and cannot be identified from a traditional demographic categorizing of sex, age, profession etc. We take on roles and functions depending on which contexts we enter into and are co-creators of. This is true also in relation to cooperation- and communication technologies. One may play with one's identity in chat rooms; one can cooperate with colleagues via the net and then, a few minutes later, log in and be a student in a virtual master study programme. However, within ICT the representation of the human has been based on a rational ideal: goal oriented, information seeking and task directed (Ericsson & Simon 1984, Levinsen & Ørngreen 2003, Lewis, Nielsen & Yssing 2003). Quantitative segmentations have played a major role, and because computers were developed for standardised work (e.g. text editing) and mass consumption, the human had to become someone who adapts to each new generation of software, instead of the other way round. It still characterizes computer use (except for front users) than the human has to adapt. At the same time, however, ICT is spreading into people's everyday life and into all aspects of life, both in specific personal ways and as general cross-personal globalizing. As a consequence, technologies will have to work in ambient contexts, which are defined by the different ways and areas and different uses. The context becomes *floating*: I am physically present at my office, in my chair, and at the same time I am present on the net, virtual present in Barcelona, walking down the 'Rambla', deep into discussion with a Spanish colleague, sensing the noise from the traffic, the sound of birds and the multicoloured flower-arrangements on the many small shops – and the two students who enter my office and place a book they want to return on my desk...

We suggest that Human-Computer Interaction (HCI) research may contribute to design of future ICT systems by focussing on this double complexity and its mental basis: floating contexts, complex roles and the functions that appear on basis of the interaction with the computer. The challenge for research lies in whether it is possible to conceptualize this complexity and represent it in the methods and techniques for analysis, design, test and evaluation of human-computer interaction. HCI is far more complication than the picture we get from currently applied theories and methods for identification and representation of the human as a user of ICT.

**The research object**

In our understanding, this challenge embeds not one, but three research objects: the representation of the human user embedding a theoretical framework and a way of understanding human complexity, the ICT front applications and their use, and the HCI techniques and methods for developing ICT. We suggest that these are analysed from a theory of complementary positions.

**A SKETCH OF THE METHODOLOGY**

The complex human being, the floating contexts and the mental interaction cannot be described from one single observer position. They may eventually be described and presented in the full nuances by combining many observations from many observer positions. What is needed is a framework for discussing what and who we are, when we talk about the human as a concrete user of a concrete ICT system that has to be designed, developed and implemented. As a framework, we suggest a theory of complementary positions that insists on solid accounts and theoretical explanations of all observer positions in relation to perspective, standpoint and focus. This framework provides the opportunity to relate to the observers influence on the observed (Allen, 1959) and the limitations that our language(s) encounter, when the subject-object distinction cannot be maintained.

Taking a theory of complementary positions as framework necessitates an experimental approach. This allows for the representations of the Human in HCI design methods and design techniques to be tested and developed in iterations during the whole development and use process. As point of departure we have developed the figure below. The model illustrates examples of areas within different types of human representation are needed. They have to be further investigated, both on the level that concerns one technique within one phase of system development, but also on the level of methodological approaches to ICT across the whole development and user cycle.

**HCI design methods and techniques based on an experimental**

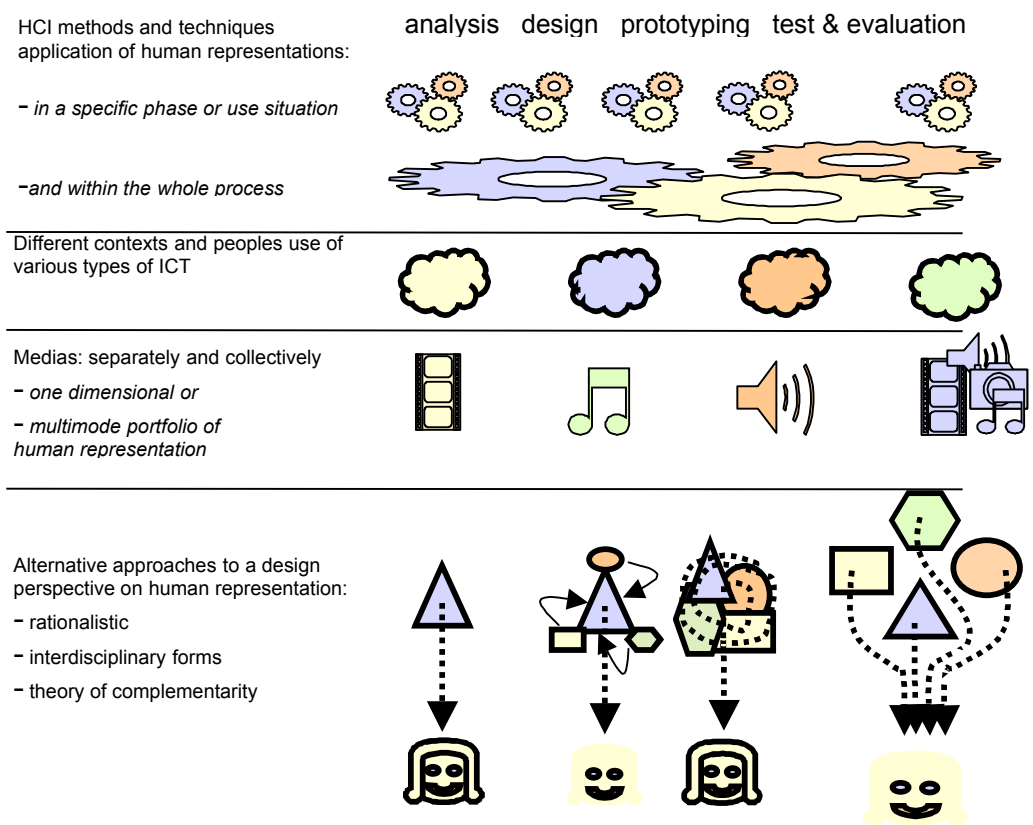


Figure 1. HCI design methods and techniques based on an experimental approach.

## REFERENCES

- Allen, G. (1959). *Heisenberg, W. - Physics and Philosophy*: Unwin Edition.
- Baecker, R., Grudin, J., Buxton, W., & Greenberg, A. (1995). *Readings in Human-Computer Interaction: Toward the year 2000*. California: Morgan Kaufmann Publishers.
- Barthes, R. (1983). *Det lyse kammer*. Copenhagen: Politisk Revy.
- Card, S. K., Moran, T. P., & Newell, A. (1980). The Keystroke-Level Model for User Performance Time with Interactive Systems. *Communications of the ACM*, 23(7), 396-410.
- Clemmensen, T. (2004). Four Approaches to User Modelling - A Qualitative Research Interview Study of HCI Professionals' Practice. *Interacting with Computers, in press*.
- Dix, A., Finlay, J., Abowd, G., & Beale, R. (2004). *Human-Computer Interaction - third edition*: Prentice Hall.
- Ericsson, K. A., & Simon, H. A. (1984). *Protocol Analysis. Verbal reports as data*: Cambridge Massachusetts.
- Jordan, P. W. (2000). *Designing pleasurable products*. London: Taylor & Francis.
- Karat, J., & Karat, C. M. (2003). The evolution of user-centered focus in the human-computer interaction field. *IBM Systems Journal*, 42(4), 532-541.
- Kumar, K., & Bjørn Andersen, N. (1990) A Cross-Cultural-Comparison of IS Designer Values, *Communications of the ACM*, 33(5), 528-538.
- Levinsen, K.T. (2003) *System development influenced by Rituals and Taboos* .Proceeding of HCI International Crete.
- Lindgaard, G. (1995). *Usability testing and system evaluation*. London.
- Marcus, A. (2001). *Cross-Cultural user-Interface Design for Work, Home, Play and on the Way*. Paper presented at the Sigdoc'01, Sante Fe, New Mexico, Usa.
- Mikkelsen, N., & Lee, W. O. (2000, August 14 - 18, 2000). *Incorporating user archetypes into scenarios-based design*. Paper presented at the UPA 2000 - Designing the New Millenium Today, Asheville, North Carolina.
- Nielsen, Jacob (1992). Evaluating the thinking aloud technique for use by computer scientists., *Advances in human-computer interactions* (Vol. 3). Norwood: Ablex Publishing Corp.
- Nielsen, J. (2003). Visual cognition and multimedia artifacts. In O. Danielsen & J. Nielsen & B. Holm-Sørensen (Eds.), *Learning and narrativity in digital media*: Samfundslitteratur.
- Nielsen, J., Christiansen, N., Clemmensen, T., & Yssing, C. (2003). *Mindtape - a Technique in Verbal Protocol Analysis*. Proceedings of HCI International 2003, Crete.
- Nielsen, J., Clemmensen, T., & Yssing, C. (2002). *Getting access to what goes on in people's heads? - Reflections on the think-aloud technique*. Proceedings of the NordiCHI 2002, Århus, Denmark.
- Nielsen, L. (2002). *From user to character*. Paper presented at the Designing Interactive Systems, London.
- Preece, J., Rogers, Y., & Sharp, H. (2002). *Interaction Design: Beyond Human-Computer Interaction*: John Wiley & Sons.
- Pruitt, J., & Grudin, J. (2003). *Personas:Practice and Theory* [pdf file]. Retrieved March 4, 2003, from the World Wide Web: <http://research.microsoft.com/users/jgrudin/>
- Weiser, m. (1998) The Future of Ubiquitous Computing on Campus. *Communications of the ACM*, 41, 41-42.
- Weiser, M., & Gold, J. S. B. (1999) The Origin of Ubiquitous Computing research at PARC in the late 1980s. *IBM Systems Journal*, 38(4), 693-696.
- Weizenbaum, J. (1976) *Computer power and human reason*. San Francisco: Freeman.

Winograd, T., & Flores, F. (1988) *Understanding Computer and Cognition - A new foundation for Design*. N.Y.: Addison-Wesley.

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