C. K. M. Crutzen:
Invisibility and the Meaning of Ambient Intelligence

Abstract:

A vision of future daily life is explored in Ambient Intelligence (AmI). It contains the assumption that intelligent technology should disappear into our environment to bring humans an easy and entertaining life. The mental, physical, methodical invisibility of AmI will have an effect on the relation between design and use activities of both users and designers. Especially the ethics discussions of AmI, privacy, identity and security are moved into the foreground. However in the process of using AmI, it will go beyond these themes. The infiltration of AmI will cause the construction of new meanings of privacy, identity and security because the "visible" acting of people will be preceded, accompanied and followed by the invisible and visible acting of the AmI technology and their producers.

A question in this paper is: How is it possible to create critical transformative rooms in which doubting will be possible under the circumstances that autonomous 'intelligent agents' surround humans? Are humans in danger to become just objects of artificial intelligent conversations? Probably the relation between mental, physical, methodical invisibility and visibility of AmI could give answers.

Agenda

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Questions

With the theme Ambient Intelligence (AmI) industry, designers and scientists explore a vision of future daily life - a vision of humans being accompanied and surrounded by computerised devices, intelligent interfaces, wireless networking technology and software agents. These technologies are planned to be embedded in everyday objects: mobile phones, cars, roads, furniture, doors, walls, household tools, animals, clothes and even food. Computing resources and computing services will be present anywhere and interconnected anytime.

The characteristics of AmI in many promotional publications are that smart objects will make our whole lives relaxed and enjoyable (Philips Research 2003). AmI will be *"capable of meeting needs"*, anticipating and responding intelligently to spoken or gestured wishes and desires without conscious mediation, and even these could result in systems that are capable of engaging in an *"intelligent dialogue"* (Punie 2003, p.5).

What underlies the assumption that Ambient Intelligence, by disappearing into our environment, will bring humans both an easy and entertaining life? Is it true that by pushing computers into the background, embodied virtuality will make individuals more aware of the people on the other ends of their computer links (Weiser 1991)? Are users permitted to doubt the ready-made acting of the artificial intelligent products within a forced success? Belongs doubting to the attitude of the makers? Is doubt possible if the makers produce invisibilities for the users?

Discussing the activities "design" and "use" and how they are related to the invisible and visible aspects of AmI technology could lead to the discovery and articulation of the meaning of diversity in the discourses of AmI: diversity in design, in use and in the interaction between design and use; between the invisible and the visible.

Interpretation and represen-tation of invisible and visible interaction

Interaction between humans and artificial actors is a mutual presentation of actions. Worlds of possible interaction can be constructed by repeated mutual presentation and interpretation. The presentation of actions arranges a meaning construction process between the involved actors. Human actors can experience other actors as "actable" if these actors present themselves in a way, which is interpretable out of their own experiences.[1] That does not mean that this is the intended interpretation because each actor has an own individual horizon of experiences, expectations and concern. When humans act, they interpret also the results of their action and the actions of others. Not only the actual behaviour but also the actions, which are not executed in the interaction; actions in deficient mode (Figal 2000, p.81, p.144), are presentable and interpretable because these absent actions influence the interpretation process.[2] Artificial actors interpret the presented acting through their imbedded models and the data input they can get. Humans are actable for artificial actors if the designers have foreseen the actual actions of humans.

Interaction worlds are not without conflict. There are a lot of encoding and decoding processes going on in the course of time because human and artificial actors are historically involved in different inter-action worlds. Translations and replacements of artificial devices do not need to fit smoothly into the world in which they are made ready for. A closed readiness is an ideal, which is not feasible because in the interaction situation the acting itself is ad-hoc and therefore cannot be predicted.

According to Jacques Derrida the meaning of what is represented depends on and is influenced in the process of representation by that, what is not represented. Each representation is in that concept always one pole of a duality where the "not represented" is the other pole. Although there is an absence of the other pole in form and structure of the representation, the absentee is always present by means of the binary opposition.

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[1] Stuart Hall calls this discourses "meaningful" if actors can interpret the executed acting (Hall 1980).

[2] The absent acting is often the interaction, which causes doubts. It is in conflict with expectations.

Design and use

Design and use are often opposites, activities in different worlds: a world of makers, and a world of users and consumers, with the products as the exclusive links between these worlds. Design is practised as making a product for a remote world, whose interactions can be modelled from a distance and without being experienced. Making ready-made acting is seen as new and innovative whether or not the process of the making is a routine process of applying obvious methods and routines. The products as the carriers of the designer's expectations and experiences could conflict in the world of users if the ready-made acting of these products is not related to the expectations and experiences of the users. The physical invisible part of AmI technology could make this kind of products not actable, because the users cannot give their own interpretation of the full range of ready-made actions of these products.

Also the symbolic meaning of design and use establish their opposition: design is active and virtuous and use is passive and not creative. Designers see themselves and are seen as makers of a better future and working in a straightforward line of progress, following the ideal of making products that cause no disturbances for and fit completely within the expectations of the users. Good design is defined as making a product for users that should not create disharmony or doubt in the life of the users. The concept of user friendliness is based on this notion of non-problematic interaction and security of interaction in AmI-technology.

Usercentredness is set equal to non-activity of the user and activity of the technology: *"… which means technology that can think on its own and react to (or possibly even predict) individual needs so people don't have to work to use it"* (Philips Sustainability Report 2002). Designers create an artificial play in which they have given the active and leading role to the artificial subjects. Users are ready-made sources of data for the technology in their environment. By interpreting usercentredness in this way, the active explicit participation of users is lost. In architectural concepts for AmI, for instance from (Piva et al. 2005), the user is reduced to an observable object placed in a feedback loop that, in the opinion of the designers, converges to an optimal intelligent environment with an action/communication oriented smart space function in order to influence the user.

AmI reinforces the design and use dualism because the design of Ambient Intelligence is such that the use will be fixed to prevent in the interaction between artificial devices unpredictable conflicts of values and not solvable situations. Although knowing that use and design are interpreted oppositional includes at the same time that they are intertwined and basically interactive. In a reconstruction of the meaning of design it means involvement in the meaning construction process; design is a projection into the future and making use of past experiences. Using technologies by humans is always designing how to use the ready-made actions of the interaction environment. This use-design interaction is situated and person and culture depended.

Design and use is a dialogic play between the mental, methodical and physical invisibilities and visibilities, which preconstitute our representations and the interpretations of the acting of other human and artificial players in the interaction itself. Invisible and visible representations and interpretations of actions will influence the way human actors will and can act in the future. An off/on switch for this technology will not be the appropriate instrument to make the invisible visible again or visa versa. It will cause an irritating flickering and more likely stabilise the invisible and visible as excluding positions.

Invisibility

The word "invisibility" represents everything, which humans cannot or can only partly perceive by their senses: hearing, seeing, touching, smelling and tasting. Not perceiving means that critical thinking about the processes around us is obstructed. The interactivity of technology design and use is handicapped, because humans have to create their own work-arounds. The invisible should therefore have the possibility to be visible again. Invisibility could mean that people will not perceive enough triggers for critical thinking on the offered ready-made acting. The implemented data procedures and the used sensors predestine the visibility of artificial actors. The visibility of artificial actors is limited within the technical constraints of the construction. Their invisibility is unlimited.

Mental invisibility

Domesticated artificial products are taken for granted, when they are thought of as a natural part of our daily life, when they become a part of our routines (Punie 2003, p.64). In our interactions with things, tools and technologies they become obvious. Their evident and continuous availability causes

their disappearance in the complexity of our environment. In repeated presentations and interpretations of artificial products human actors develop a mental invisibility towards the artificial actors and its ready-made acting. Humans integrate the ready-made technological acting in their routine acting and accept this without reflection. They are thrown forward into their own pre-understandings in every act of interpretation and representation, and into the pre-understandings the artefacts are accompanied with, constructed in experiences of a lot of other actors.

Mental invisibility is the outcome of an integration process on the part of human actors and is a pre-condition for the stabilisation of use and the domestication of the technology. Weiser sees this disappearance as the ideal quality of *"most profound technologies. ... They weave themselves into the fabric of everyday life until they are indistinguishable from it."* (Weiser 1991). Dewey called these unreflective responses and actions *"fixed habits"*, *"routines"*: *"They have a fixed hold upon us, instead of our having a free hold upon things. ... Habits are reduced to routine ways of acting, or degenerated into ways of action to which we are enslaved just in the degree in which intelligence is disconnected from them. ... Such routines put an end to the flexibility of acting of the individual."* (Dewey 1916, chapter 4: Education as Growth).

Routines are frozen habits of actors. They are executed without thinking and arise by repeated and established acting, which could be forced by the regulations and frames of the interaction worlds or by humans themselves by not doubting and questioning their own interpretations and representations and those of other actors. Routine acting with an ICT-tool means intractability; the technical is not present anymore. The critical attitude has been lost in the ongoing experiences with the tool; the meaning of it is frozen and not questioned anymore. It could hardly make a contribution to doubting anymore and eventually transforming the interaction pattern of the human actor. Mental invisibility limits our interactivity with other human and artificial actors. It freezes the interaction patron with the specific tool, but also the meaning to other available objects in our environment and the interaction humans could be involved in.

Under the aspect of "use" as an integration of ready-made technological actions in human activity, based on experiences, humans are always in a process of gaining a certain status of mental invisibility. This status has a risk, to be frozen in a frame;

in a limited scale of possible actions in specific situations.

Although if human behaviour could not be based partially on individual or collective routine and habits, then life became no longer liveable. Human actors would be forced at each moment to decide about everything. Faced with the amount and complexity of those decisions they would not be able to act anymore. Humans would place themselves in a complete isolation and conflict, where they cannot accept and adapt even the most obvious interpretations and representations of other human actors. They would be in the stress of constantly redesigning their environment. *"Imagine breaking down the distinction between the producers and the consumers of knowledge: we all come to learn what we all need to know. Clearly such an ideal is unworkable in those terms as soon as we need to know more than the barest basics about the world and ourselves. It is impossible that we could all come to learn for ourselves what we would have to know for our cars to run, our bread to be baked, our illnesses to be cured, our roofs to keep the rain out, our currency to be stable, and our airplanes to fly."* (Scheman 1993, p.208).

According to Heidegger reliability[3] and usability are connected, they could not exist without each other. But he also noticed that tools are used up and weared down. They become "normal" – mental invisible (Heidegger 1926, S. 28). Reliability can be preserved, if the interpretation and representation of acting in an interaction world contains negotiation that is possible between actors. It can develop only if human and artificial actors can act in a critical transformative room[4], where mutual actability can develop. By means of acting, future mutual acting should be negotiable. Although there will always exist a throwness, from which the individual actor

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[3] Heidegger called this kind of reliability "Verläßlichkeit". He used it with two meanings: leavable and trustworthy (reliable) (Heidegger 1936, p.28-29). The presence of all diversities of use between these extremes makes a tool reliable and the use of it situated. See also (Capurro 1988) (Inwood 1999, p.210-211).

[4] Critical transformative rooms are characterized as those interaction worlds, where actions of questioning and doubt are present, which have the potential to change habits and routines, where the "change of change" has a differentiated potential (Crutzen 2003, Crutzen 2006a, Crutzen 2006b).

can not extract itself and, very often, does not want to, because all actors are exposed in this room to themselves and other actors. Within interaction, reliability can remain "visible" only if the process of repeated and established acting can be interrupted. The mutual presentation and interpreting of actions should not be a smooth process. Meaning should be constructed by the possibility of doubt again and again in the interaction itself. The decision, how the interaction is interpreted and which actions are presented, belongs into the area of the design, to the realisation of possible behaviour. According to Heidegger that design belongs substantially to the throwness of being. Designing does not have to do anything with behaviour according an invented plan. Beings have always designed themselves by their own experiences and will always be "creative". Beings understand themselves always from possibilities (Heidegger 1926, p.145-146).

Mental invisibility is not only negative. In our daily life a lot of things and tools are mental invisible. Humans need to have a lot of obviousness in their living world to handle daily life. In that precise way we love our tools, because adaptation was accompanied with putting in a lot of effort to make it work. Humans have to do that adaptation. According to Saffo there is scarcity of good tools that can adjust themselves to the users. It is the transformative process of the users *"to adapt all but the most awkward of gizmos"* (Saffo 1996, p.64). According to Beyer and Holtzblatt people are adaptable and resourceful creatures – they invent a thousand work-arounds and quick fixes to problems, and then forget that they invented the work-around. The details of everyday work become second nature and invisible. *"The users cannot say what they really do because it is unconscious – they do not reflect on it and cannot describe it."* (Beyer 1993). Emergency situations with an impact on peoples' physical and psychological well-being could imply "*that a service or tool that assists people should be easy for the person to use, should not require much thinking or complicated actions, and should be easily and readily accessible*" (Kostakos 2004).

But humans are not always in emergency situations. Domestication of AmI technology and its social embedding without questioning is already easily forced by jumping on the bandwagon of some fundamental fears, individual or collective, such as the present loss of security and safety because of terrorism. Mental invisibility can be seen as precondition for acceptance, the stabilisation of use and the domestication of technology but it should not be a final fixed state of the human actors in a commu-

nity. According to Punie the domestication of technology goes not necessarily harmonious, linear or complete. It is always "*a struggle between the user and technology, where the user aims to tame, gain control, shape or ascribe meaning to the technological artefact. It is not a sign of resistance to a specific technology but rather of an active acceptance process.*" (Punie 2003). If doubt is a necessary precondition for changing the pattern of interaction itself then we should think about how to provoke doubt-creating situations[5] that lead to some reflection on changing the meaning of "leavability" of our technical intelligent environments.

Methodical invisibility

The assumptions of the makers are embedded at forehand in the ready-made acting of the artificial product. The interpretation and representation work has been done partly before the product is ready-made and the actions of the artificial actor take place. The way an artificial actor can interpret and represent, depends not only on the activity from the user but also on the ready-made acting, which is constructed. In software and hardware products the fear for doubt (in the meaning of insecurity) is imbedded and transferred into the interaction worlds where they are part of. The most dominant ideas in software engineering are the production of unambiguous software with mastered complexity. Based on these same ideas of controlling complexity and reducing ambiguity within software, software engineers master the complexity and ambiguity of the real world. Abstraction activities, a fundament of most modelling methods, such as generalisation, classification, specialisation, division and separation, are seen as unavoidable to project dynamic world processes into ready-to-hand modelling structures and producing read-made acting.

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[5] Heidegger gives several examples of how doubt can appear and the obvious "ready-to-hand" tools will be "present-at-hand" again: when a tool does not function as expected, when the familiar tool is not available, and when the tool is blocking the intended goal. In this last case the tool is obstinate, it does not loose its readiness, but in the interaction itself we change its meaning. For a definition of "present at hand" and "ready to hand" see (Heidegger 1926, §15, §16), "http://www.lancs.ac.uk/depts/philosophy/awaymave/405/glossary.htm" [2nd April 2005] and (Svanæs 1999, p. 45-46) (Dourish 1999, p.12) (Dourish 2001, p.106-110) (Crutzen 2003).

ICT professionals are mostly not designing but using established methods and theories. They focus on security, non-ambiguity and are afraid of the complex and the unpredictable. This methodical invisibility of the representation of ready-made interaction is based on the planned cooperation between software and hardware. It could close the design options of users; design activities in the frame of the pregiven understanding. By the use of expert languages and methods within the closed interaction world of makers, the dominance of design over use, is established. This dominance discloses and mostly prevents the act of discovery of the users by the designer[6] and acts of discovery on the part of the users. Design is focused on generalised and classified users. Users are turned into resources that can be used by makers in the process of making IT-products. Users do not have room for starting their own designing processes. Those who do not fit in regimen classes are seen as dissidents.

Although pregiven meanings of designers are not the final meanings. These methodical invisibilities have on the contrary the potential to create doubt and this could be the starting process of changing the meaning of the ready-made interaction. Users are the experts to escape out of rigid planned interaction; they determine usability in their interaction world. In that way methodical invisibility can be lead to "*playful exploration and engagement*" (Sengers, 2005).[7]

However is this change of meaning still possible? Users are getting in a phase where they are afraid of changing their habits because this could disturb the surrounding pre-planned so called intelligent acting. Our society is forcing us using specific tools, because a lot of other tools have disappeared; they did not fit in the digital lifestyle of our society. Are we still allowed to have doubt and is doubt not

becoming the intruder, which hinders us to exploit the opportunities, which are not intended by the designers. It is still true that tools challenge us to interact with our environments; challenging us to exploit opportunities? Are we still in the position to create an interactive environment if we are not skilled computer scientists?

These questions indicate, that it is getting more and more impossible to overcome the methodical invisibility, imbedded in the tools, and create interactive solutions that are technically possible (Svanæs, p.15). This methodical invisibility shapes and limits the interaction spaces in which users can design and irrevocable will make solutions unimaginable in spite of the makeability of it. This is even more true as this methodical invisibility is a mental invisibility on behalf of the makers of artificial products. The makers are frozen in the structures of modelling methods that are embedded in their software developing tools.

Physical Invisibility

Many distributed devices are hidden in our environment. A continuous process of miniaturisation of mechatronic systems and components will it make impossible to recognize them. Not feeling their presence, not seeing their full (inter-)action options, but only some designer-intended fractional output, makes it impossible to understand the complete arsenal of their possible representations. The embedding of Ambient Intelligence in daily aesthetical objects or in the trusted normal house infrastructure is like a wolf in sheep's clothing, pretending that this technology is harmless. AmI creates an invisible and comprehensive surveillance network, covering an unprecedented part of our public and private environment which activities are physical invisible: *"The old sayings that 'the walls have ears' and 'if these walls could talk' have become the disturbing reality. The world is filled with all-knowing, all-reporting things.*" (Bohn 2001, Lucky 1999). According to Schmidt, the relationship to computer systems will change from "*explicit interaction that requires always a kind of dialog between the user and a particular system or computer, ... to implicit interaction.*" (Schmidt 2004, p.162, p.166).

Implicit interaction is not a symmetrical dialog. Currently we can still avoid and leave this implicit technical environment. However the growing acceptance of not sensible intelligence is a process of a collective force that is mostly independent of our free will. Physical disappearance of computers results in our whole surrounding being a potential

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[6] Steve Woolgar tells us about the opinion on users of a company which develops a PC: "The user's character, capacity and possible future actions are structured and defined in relation to the machine. ... This never guarantees that some users will not find unexpected and uninvited uses for the machine. But such behavior will be categorized as bizarre, foreign, perhaps typical of mere users." (Woolgar 1991, p.89).

[7] In sociology studies of technology there are given a lot of examples, which proves that users escape from the pregiven meaning of technological products, e.g. (Oudshoorn 2003).

computer interface. Our physical body representations and movements might be unconsciously the cause of actions and interactions in our technological environment. Technology resides in the periphery of our attention; actors continuously whispering in our background, observing our daily behaviour. People become the objects of the ongoing conversations of artificial agents that are providing us with services, without demanding a conscious effort on our behalf or without involving us in their interactivities.[8] The assumption that physical invisibility will irrevocable lead to mental invisibility is a stubborn misunderstanding. Not seeing this technology could be counterproductive; humans could get used to the effects of physical invisible technology, but at the moment the tool acts outside the range of our expectations, it then will just frighten us because we cannot control it.

Petersen thinks that the technology should reveal at least what the system has to offer in order to motivate users to relate the possibilities of the technology to their actual needs, dreams and wishes. "*For this purpose, domestic technologies should be remarkable rather than unremarkable.*" (Petersen 2004, p.1446). However on the other hand the acceptance of physical invisibility is mostly the outcome of a long process of little changes; the changes have become mentally invisible. Through the many interactions with actable technology rules and structures have arisen under the influence of the automation, without interpreting these structures and rules as a product of automation anymore. Ina Wagner calls this disembedding; space is separated from place and social relations, lifted out from local contexts. Social interaction is transformed into systemic relations. The involvement of artificial tools implies that the individual and collective interactions are dissociated from what can be *"communicated, clarified and negotiable"* (Wagner 1994, p.24-26). In our trust building towards tools we are forced to interact with unknown human and artificial actors. Physical invisibility is the alibi for the acceptance of mental and methodical invisibility. Doubt can only arise if humans can build instruments of vision.

Deconstruction as a working process between the visible and invisible

Using and designing is a working process of human actors, makers and users. According to Susan Leigh Star *"Work is the link between the visible and the invisible. Visibles are not automatically organized in pregiven abstractions. Someone does the ordering, someone living in a visible world."* In her opinion it is not always necessary to *"restore the visible"*. By not forgetting the work you can always make the invisibles visible again (Star 1991). Restoring the past is in most cases of technology adaptation impossible. Not every working process, its representation or conception has the property of reversibility. So remembering the working process could be a base for creating doubt in most cases. Narratives of the designing and producing process can give users insights in the decisions and the rational of these decisions. A deconstructive analysing of our past *"calls us to the act of remembering, wonder, and praise, and in that to a remembering relation to what we have forgotten rather than to the descriptions of what we have forgotten calls us at least to remember our forgetting"* (Faulconer 1998).

Oppositions such as "design-use" and "invisible-visible" and their connection, can function as sources of remembering. They are constructed as a weave of differences and distances, traceable throughout the discourse of our experiences with technology. By examining the seams, gaps and contradictions it is possible to disclose their hidden meaning. It uncovers the obvious meaning construction in our acting and how it has been established. Identifying the positive valued term, reversing and displacing the dependent term from its negative position could create a dialogue between the terms in which the difference within the term and the differences between the terms are valued again. It keeps the interaction between opposites in play (Coyne 1995, p.104).

Deconstruction could lead to a revaluation of differences. Coyne says that difference reveals further difference; it facilitates a *"limitless discovery"* in contrast of the identification of sameness that closes off discussion (Coyne 1995, p.195). Giving more appreciation to the differences of phenomena in methods for design and modelling could be a source for finding balanced methods. According to Suchman the appreciation of difference itself can become a source of solidarity and agenda for social change (Suchman 1991). Bansler and Bødker discovered,

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[8] Hallnäs calls this "calm technology" (Hallnäs 2001, p.202-203)

how system experienced designers handle modelling methods. Instead of following the rules and the procedures of the method in extension they only select a limited part of these formalisms in their modelling activities. They adapt these at their own objectives and incorporate these in their own design methods (Bansler 1993, p.189). According to Wakkary design methods will never be able to present the complexity and situatedness of interaction. He recommends that design methods should dynamically interact with changing contexts (Wakkary 2005, p.76). This claim needs a technical environment in which the consumers of products can construct their own meaning by changing the structure, the form and the functionality of the technology.

A promising architectural approach is the concept of a *"gadget world"*. People configure use and aggregate complex collections of interacting artefacts. The everyday environment is a collection of objects with which people can associate in ad-hoc dynamic ways. In this approach more complex artefact behaviour can emerge from interactions among more elementary artefacts. According to Mavrommati this approach can scale both *"upwards" (towards the assembly of more complex objects, i.e. from objects to rooms, up to buildings, cities and so on) and "downwards" (towards the decomposition of given gadgets into smaller parts, i.e. towards the concept of "smart dust").* In taking this approach people are active shapers of their environment, not simple consumers of technology (Mavrommati 2002).

Schmidt argues for the possibility of choice between implicit and explicit interfacing: *"The human actor should know … why the system has reacted as it reacted."* (Schmidt 2004). We need more technology, which actively promotes moments of reflection and mental rest in a more and more rapidly changing environment, as opposition to the calm technology, which fits without conflicts to our environment. Hallnäs calls it *"slow technology"*, which gives humans the opportunity to learn how it works, to understand why it works, the way it works, to apply it, to see what it is, to find out the consequences of using it (Hallnäs 2001, p.202-203).

Doubt

Enabling doubt is a pretentious and delicate action. It could lead to the desperation of a continuous process of doubting. Doubting as a fixed routine will create a frozenness of not acting. Continuous doubting will lead to "obstinate" tools that will become an

obstacle to actability. Creating and supporting critical transformative environments is balancing in the actual interaction between the frozenness of the established acting and the frozenness facing too much insecurity. The implementation of the possibility of doubt into technology caused by the makers' incompetence, prejudice and uncertainness – represented as a fear for differences – has made the room for actability smaller and smaller during the last decades. User interaction, fenced in between forced routine and despair is shrunken to only an on-off switch. Even the option to use this switch could be ruled out by the very infiltration of intelligent technology in our daily environment.

And if we remain competent to control our private lives, who will be in control of the artificial products in public spaces? Who will have the power to switch a button there? In promoting the goodness and godliness of AmI, Computer Science and industry have not abandoned their overvaluation of objectivity, hierarchical structures and predetermined actions; values which ignore the beauty of ambiguity and spontaneous action and the claims for choosing and coupling our own support tools. They have only veiled it. Is AmI not a repetition of the old artificial intelligence dream of creating human-like machines? The differences between the human and the artificial are made invisible in many papers by writing only of actors or agents and not making it clear if it is an artificial agent that is meant, or a human actor, or an embedded model of a human actor. Artificial agents are constructed and made to appear as if they have emotions and empathy.

In the process of a critical domestication of AmI technology, users should feel not only the comfort of being permanently cared for, but also the pain of giving away intimacy. We should feel that danger, but in feeling it should not be clueless. The critical transformative room that stands between the consumer and AmI should include a diversity of options to influence the behaviour, use and design of the technology. The on-off switch is only one end of a rich spectrum of intervention tools. Designers and researchers feel this pain, too, but they compensate for this by the hard to beat satisfaction of building a technology. The core of their attraction to this lies in "I can make it", "It is possible" and "It works". It is the technically possible and makeable that always gets the upper hand. Who wants to belong to the non-designers? (Sloterdijk 2001, p. 357).

Reliability

Ethical aspects of technology are always person-dependent, culture-dependent and situation-dependent (Friedewald 2006). People, culture and situations will change under the influence of AmI technology. In that process the meaning of privacy and security will change, too. Within the ethics discussions of AmI, privacy, identity and security are moved into the foreground. Valuable themes; because in every computer application privacy and security are in danger to be violated. However in the process of using AmI, it will go beyond these themes. If the infiltration of AmI in our daily live will continue then the relation between humans and ICT will change drastically.

New meanings of privacy, identity and security will be constructed because the "visible" acting of people will be preceded, accompanied and followed with the invisible and visible acting of the AmI technology and their producers: "*In an online mode, the user is (sometimes) conscious of the need to make a deliberate decision with regard to appropriate levels of privacy and security. Such will not necessarily (or even likely) be the case in the instance of Ambient Intelligence. Indeed, an individual may not even be aware that he is in a space embedded with AmI. While there are important differences between the cyber world accessed via the fingertips and the hands-free AmI world, some of the work done with regard to online privacy, security, identity, etc. will also be relevant to AmI researchers, regulatory authorities and policy-makers.*" (Friedewald 2006, p.178, p.226).

The goal of AmI designers and industry is giving people comfort and harmony, solving the problems in their daily live. Success and goodness of AmI, not the failure, will be the danger of technology (Jonas 1987, p.44). The benefits of this technology will force for instance privacy in the background of people. It is for people not pleasant, to control always the own personal data flow. It will diminish the feeling of comfort that AmI is supposed to deliver. AmI could blow up the fragile balance between privacy and security; become an opposition in which security will blocking out privacy. People will lose their ability to handle the world without digital surrogates of themselves constructed in an ongoing inexorable process of demanding preconditions for acting, embedded in a network of artificial agents who will mediate our interactions.

According to Marx not only physical borders such as walls and clothing will lose their function of separa-

tion but also social, spatial, temporal and cultural borders will disappear and will be replaced by intelligent and autonomous input and output devices. Our environment will lose its otherness and as a whole will tend to become almost entirely "us" rather than the "other" (Bohn 2001, Marx 2001, Araya 1995). We will allow artificial agents to understand us with their built-in classifications and separations. In that process we could lose the otherness of ourselves and other humans. The other human will disappear and humans will only look in a representation of their own artificial "face", a shadow of a generalised us, specialised by their interaction.

The invisibility of the human other will force to use this partly visible artificial surrogate of ourselves. AmI could by its attraction of comfort, force us into a process, where the individuals will converge to their surrogate self. Where we lose the other as source for doubting our acting. An interaction process with the AmI technology will absorb people. According to Cohen the link between "*intelligibility and sensibility*" of humans is "*the one-for-the-other, the I suffering for the suffering of the other, of moral sensibility. ... Computers, in a word, are by themselves incapable of putting themselves into one another's shoes, incapable of inter-subject substitution, of the caring for one another which is at the core of ethics, and as such at the root of the very humanity of the human.*" (Cohen 2000, p.33).

Can AmI offer users a critical room of diversity between privacy and security, between the invisible and the visible? Is it possible to create an awareness of the AmI designers and consumers that doubt is necessary to create awareness that the benefits of AmI will change the meaning of privacy? *"... the big challenge in a future world of Ambient Intelligence will be not to harm this diversity, which is at the core of an open society.*" (Friedewald 2006, p.126). Openness can only be a value if the individual and the society are able to create borders. Doubt is a necessity for escaping this converging process, redesigning borders and openings. AmI technology can only be "reliable" if we could "sense" more how the invisible is constructed. Constructed in AmI technology by using and designing our own critical transformative rooms, in which we can see the "other human". The Information Society can only be reliable if it is capable to construct, connect and nourish these rooms where doubting the promises of AmI is a habit. Being aware of the redesign of borders is a necessary act for creating diversity in interaction rooms — where people and society can choose how the invisible and visible can interact, where they can change their status, where the

invisibility could be deconstructed.

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