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About the "Idea of Man" in System Design - An enlightened version of the Internet of Things?

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Abstract: This article aims to argue that, as we move into an era of ubiquitous computing, where the traditional Internet evolves to embrace an Internet of Things, it may be beneficial to embed an "Idea of Man" into its systems design. The "Idea of Man" is a holistic philosophical concept that considers what Man is, what Man should be, and how Man lives with others in society. The article provides arguments for the relevance of the Idea of Man in system design in general. I argue that the Idea of Man influences the power relationship between men and computer systems as well as the values that we build into these systems. Furthermore, I argue that programmers' Idea of Man influences the values which embed systems. Finally, I highlight future challenges involved in integrating an Idea of Man into systems. The article is a viewpoint and its arguments are purely deductive. Its contribution is that it shows how the Idea of Man could serve as a foundation for a variety of considerations relating to computer ethics. If we take today's Idea of Man in the Western world, which views men as responsible and mature, able to act rationally, and capable of defining themselves through moral autonomy and freedom of choice, we establish high level guidance for how systems should be built and what an Internet of Things could, or should not, do for us.

1. Introduction

In the early 1990s, a vision was born that deeply influenced the discipline of computer science. Researchers from Xerox Park claimed that computing in the 21st century would become a ubiquitous service resource that would weave itself "into the fabric of everyday life" (Weiser, 1991). 20 years later, we see this vision come true,, thanks to giant technical and scientific leaps in data processing, -storage and -transfer capabilities, miniaturization, material sciences, and energy harvesting. Sensors, identification technologies, video systems, and online tracking and location technology systems constantly observe the environment, detect the people within it, and help those people accomplish tasks. Systems carry out bookings, coordinate dates, open and close doors, make sure we drive "correctly", remind us about important events, tell us to buckle our seatbelts, etc. They carry out private tasks that human beings either performed themselves or had others perform for them in the past. Suddenly, machines are acting as “agents” of human principals in everyday situations. As teachers, guardians, servants, playmates, and private secretaries, they become ”social actors” in a networked environment. Some scholars have started to call this networked environment the Internet of Things (Fleisch and Mattern, 2005).

With the rapid shift from a solely industrial and corporate Internet of Things to a more holistic approach, including everyday personal computing, ethical questions are beginning to arise. To what extent can surveillance be accepted? How much control should be delegated to machines? How much transparency is needed for machine operations? How should content be shared through systems? Designers are encountering an incredibly lengthy list of issues around how systems should behave, be used, and be deployed. Many IT companies are unsure of how to embed all relevant ethical standards into their IT solutions systematically. As a result, these companies are left alone in a trial-and-error game of what’s feasible and acceptable and what’s not, often at the cost of consumer trust and brand equity. Yet, even if companies wanted to build systems to meet ethical expectations, they would face the major challenge of determining which expectations are important. Does sensitivity to privacy drive ethical acceptability?, Security?, Universal usability?, Control? What standards need to be met? What goal are we striving for when we debate what’s ethical and what is not?

In this article, I explore to what extent the philosophical construct of the Idea of Man may promote ethical system design. To date, philosophy seems to have rarely inspired the Internet of Things or even computer science in general. All the more, I believe the reflection to be worthwhile. If we take today’s Idea of Man in the Western world, which views men as responsible and mature (German: “mündig”), able to act rationally, and capable of defining themselves through moral autonomy and freedom of choice (Kant, 1784/1983), we already establish some high level guidance for how systems should be built. At the very least, we create a counterbalance for the only Idea of Man that is currently accepted in computer science, that of the ”Dumbest Assumable User”.

The current article is not intended to “operationalize” the Idea of Man for system design or for the design of the Internet of Things. This task would probably require long-term interdisciplinary effort. Instead, this article introduces the concept of the Idea of Man to the technical community. It shows what the Idea of Man is, how it relates to technology, how important programmers’ Idea of Man is for system design, and what challenges must be overcome to embed an Idea of Man into our work as technology designers.

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2. About the Idea of Man: Definition and Relation to System Design

The Idea of Man is an ambiguous concept that has been debated in philosophy for decades (if not centuries) (Fahrenberg, 2007). As a term, translated from the German "Menschenbild", it may alternatively be referred to as an "Image of Humanity" or "Conception of Humanity". But the best translation for the way the German language conceives of the term may be Idea of Man. According to (Diemer, 1978), "Menschenbild" contains a double meaning: On the one hand, speaking about a "Bild" (=Image, Picture of Man) implies the existence of an effigy of Man. What does he or she look like? On the other hand – and viewed holistically – the term implies an object of aspiration, an ideology or pedagogic idea of what is desired from mankind. What IS Man?

Both conceptions of the term have considerable impact on technological design. Scientists in robotics and software agent development, for example, experiment with humanoid representations of technical systems. These scientists want to create an effigy of Man. Humanoid robots like the Japanese Geminoid[1] or embodied interface avatars are examples of how the idea of human appearance can be translated into technology.

Yet, according to the vision of Ubiquitous Computing, a majority of systems that interact with human beings might not be represented as humanoid artifacts. Instead, they may be integrated into objects and infrastructures, such as the Internet of Things that will surround us in our everyday life. The present essay therefore focuses less on questions of human effigy and more on the question of what role the Idea of Man can play as an ethical concept for technological design in an Internet of Things.

According to Fahrenberg, the Idea of Man (in the sense of "role model") contains the sum of all assumptions and opinions about what human beings by nature are, the way they live in their social and material surroundings, and the values and objectives their lives should embrace (Fahrenberg, 2007). This definition integrates two main dimensions of the Idea of Man that could be significant for technological design: First, the Idea of Man involves assumptions about the nature of mankind, our individual existence, and our individual abilities. These abilities relate in very specific ways to the nature and abilities of computer systems. And second, the Idea of Man comprises assumptions and opinions about social interaction and society at large. How should people live with each other? And when computer systems (such as smart "things") mediate these social interactions, do they become subject to the same assumptions and opinions?

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[1] Geminoid is a man-size robot that is an effigy of his creator Prof. Hiroshi Ishiguro (for more information and pictures see: http://www.irc.atr.jp/Geminoid)

The next two sections will discuss these two dimensions of the Idea of Man and their significance for the design of everyday computing systems.

3. The Idea of Man as opposed to the Nature of a Computer System

The Idea of Man differs between cultures and is subject to change over time. When I refer to the Idea of Man hereafter, I rely on only a single conception, namely the one particular Idea of Man shared by many in Western civilization. In this conception, the medieval Idea of Man, which is marked by a fatalistic belief in destiny and a God-given disparity between men, is supplanted by a humanistic view of an enlightened mankind. In this view, men act rationally and define themselves through moral autonomy and freedom of choice (Kant, 1784/1983). Moreover, the era of postmodernism considers men to be “constructors of their own selves” (Eickelpasch and Rademacher, 2004). Some modern sociologists use metaphors of decline to characterize the postmodernist being, describing individuals as uprooted and “mentally homeless” (Baumann, 1995), even ”released” (Beck, 1986). However, sociology is still based on the notion that all human beings can live a self-determined life. This view of men is regarded as an achievement of our Western civilization and a fundamental prerequisite for democracy.

In a highly automated and networked environment, how will people retain their self-determination, their ability to make decisions for themselves? Could Ubiquitous Computing undermine the autonomy and choices that are said to characterize mankind?

A fundamental step towards answering this key question is to define the power relationship between human beings and computer systems. When we discuss peoples’ power in contrast to computer systems, unfortunately, we frequently encounter an Idea of Man that is subject to a deep uncertainty. When we compare ourselves to computer systems, we tend to question our human skills and capacities: Who makes faster and better decisions? Who do we trust to tell the truth? Who will evolve more rapidly? All too often, we display a latent disposition to trust the power of the machine more than the human subject. But what do such views imply? Do we risk slipping into a perspective that views man as inferior to computer systems and that questions human power and decision-making? If we adopt such a perspective of human inferiority, do we risk entering, as Kant calls it, a stage of “self-inflicted immaturity”? Do we give up the autonomy and freedom of choice that we are so proud of?

In contrast to what many science fiction novels tell us, automation scholars regularly show that the overall superiority of machines is not a given (Sheridan, 2002). Technical systems exist to “assist” (Wandke, 2005) human beings in areas where humans need support. In his acclaimed 1951 essay, Fitts tries to objectify the competence relationship between men and machines for the engineering sci-

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ences (Fitts, 1951). He states that machines outperform humans in terms of fast reaction time, the use of strong power in a soft and precise way, the complete deletion of information, or deductive argumentation. However, men are superior to machines when it comes to improving present processes, judging, or arguing inductively. Despite considerable advancements in computing since the 1950s, this fundamental view of the man-machine relationship still has virtue. Machines may be getting better at making complex decisions, but complexity also adds cost and risk to machine operations.

The tradeoff between these risks and costs and the efficiency of control delegation, this fundamental decision, regarding the distribution of work between men and machines, remains a grey area (Sheridan, 2000). Sheridan, one of the leading automation scholars, describes the control allocation problem between men and machines as "algorithm, alchemy or apostasy" (Sheridan, 2000). Are fully automated airplane cockpits safer than human pilots? Are electronic voting machines better at counting ballots than electoral staff? Do video control systems prevent crime more efficiently than human guards?

It is within this alchemistic grey area of control-allocation decisions that the Idea of Man comes into play. Do we opt for men or for computer systems? Wherever an objectively detectable superiority of people over machines is not a given, the Idea of Man can help people decide whether human beings will be allowed to maintain control. Because system developers, operators, and manufacturers make such "grey-area-decisions" based on some intuition, it is their particular Idea of Man that influences control-allocation decisions in an important way.

4. Social interaction and norms at the human/machine interface

According to Fahrenberg, the Idea of Man is not simply a construct of individuals' identity, ability, and nature; it also relates to individuals' interaction in society and society's conception of how men should treat each other (Fahrenberg, 2007). Hence, the Idea of Man manifests itself in both, behavioral rules of social interaction and values that underlie positive cooperation between humans. Values and behavioral rules define how Man should be.

Today, this idea of how Men should be is undeniably affected by pluralism: in a rapidly changing global society, no value monopoly exists. However, we still share ethical norms that are widely accepted; such norms are reflected, for example, in international agreements like the Universal Declaration of Human Rights of the United Nations.

These values and norms are also meaningful for technical design. When computer systems become social actors, interact with human beings in their everyday lives, and handle tasks for them, people expect them to act like people. Socially developed norms of interaction and behavior are conferred upon machines (Reeves and Nass, 1996). But which norms will help us uphold our Idea of Man in an evolving Internet of Things landscape? Using the term “Value Sensitive Design”, Friedman and Kahn propose a number of ideas that should constitute Man in relation to the machine. These include the right to privacy; the right to be calm when we require it; the right to make autonomous decisions and control our surrounding electronic environment; machines’ accountability for actions made in the name of men or vis-à-vis men; man’s freedom from machine bias and right to be treated impartially by machines; the right to respectful interaction; the ability to trust in the machine; the right to make informed decisions when machines ask us to make them and the right to be the master of our own identity in machine systems (Friedman and Kahn, 2003).

If systems are to become social actors in an Internet of Things that reflect the “Idea of Man” and serve as trustworthy extensions of the self, they must act in a way that is consistent with all of these aspects. Current exemplary discussions about electronic privacy demonstrate what happens when machines ignore our “ideas of them as social actors”: Governments’ surveillance practices are overruled by supreme courts (for example see: (Bundessverfassungsgericht, 2010) and companies need to change technology they just launched (Claburn, 2010). Over 80% of consumers claim that they would stop doing business with a company if they learned about improper data practices (Ernst & Young LLP, 2002) and express their expectations in public hearings, such as the EU’s public consultation processes (Article 29 Working Party, 2005).

5. The impact of the programmer’s Idea of Man

What machines are allowed or forbidden to do, and how they behave towards people, depends on how the machines are programmed. Machine developers therefore have a tremendous influence on the Idea of Man that is embedded in machines.

To ensure the “usability” of a system, developers adapt systems to peoples’ abilities through “physical and cognitive engineering”, a standard stage in system development lifecycles today (Nielsen, 1993, Norman, 2007, Te'eni et al., 2007). The question of how machines treat people and how people deal with machines, however, is an issue that extends beyond the traditional notion of “usability”. On a macro level, system developers make fundamental decisions about the role a machine is allowed to play with regard to people. A system may excel on the physical and cognitive level of engineering, but nevertheless “betray” its users at the back end. For example, privacy policies may ostensibly be in place, while, at the back end, their technical implementation is neither supervised nor permanently adhered to.

Developers choose the values a system lives up to (see above). On a micro level, these decisions are translated into concrete machine actions. On a macro level, the values that Friedmann summarizes could inform developers about key points of system development (Friedman and Kahn, 2003). However, these macro level

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principles must be translated into concrete micro level system design guidelines. To put the Idea of Man into practice, three areas of system design can be differentiated:

First, system designers determine how people interact with machines and influence machine actions (manipulation). Second, they design the way machines treat humans (contact). These two areas are frontend design decisions. Third, engineers determine the way machines act at the back end and to what extent such actions are transparent and subject to influence by users. Figure 2 depicts these interdependencies:

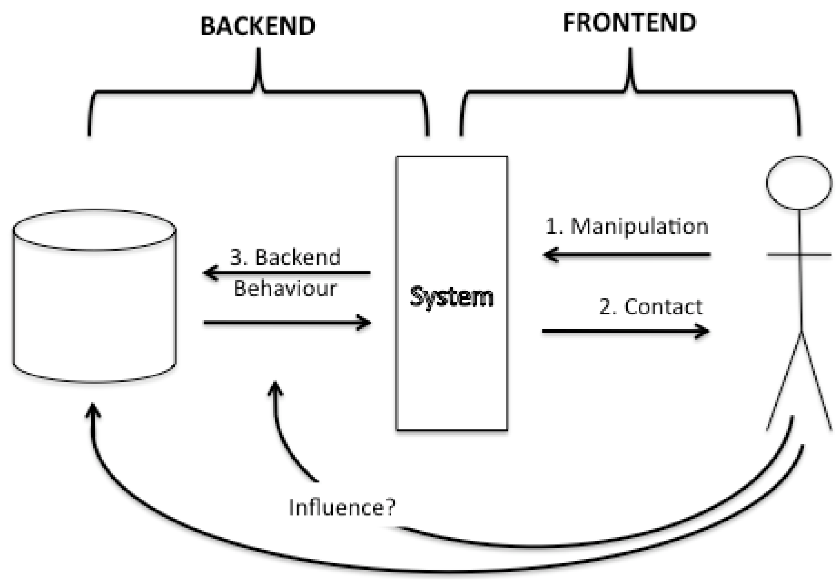

Fig. 1 At the micro level the Idea of Man manifests itself in how programmers design frontend interaction and backend behavior

As an example, consider system control in the context of intelligent cars: On a macro level, we know that being able to exercise control, especially over our possessions, is highly valued. For instance, although car owners enjoy ”intelligent vehicles”, they may still want to control the vehicles’ operation. But can they? Let’s continue the example for the seatbelt warning feature. Law regulates that every vehicle must be equipped with a seatbelt warning system. However, it is the manufacturer or vehicle developer who, on the micro level, determines its concrete design, making decisions, such as: Can drivers manipulate the system by turning off the warning signal? (Manipulation) How does the vehicle (at the frontend) warn its drivers: by means of a drown-out, shrill acoustic signal that forces them to perform the desired action? Or does it discreetly remind them that it would be wiser to fasten their seatbelts the moment they start the engine? (Contact) And finally, how does the vehicle behave at the back end? Will it register and save data about the drivers’ behavior? Will it make that information available to insurance companies in case of an accident? And do drivers have the right to access and delete this information? (Backend Behavior)

This example shows the tremendous impact, a single component of the Idea of Man, namely control, can have on concrete micro decisions in technological design. It also illustrates the broad margin that designers enjoy on the micro level, one that allows them to develop a system in a variety of ways.

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6. The Idea of Man: Steps and challenges for its recognition in system design

A series of interviews with software developers about privacy in technological design produced a provocative result that may be transferable to many social and ethical issues in system design. When asked how data protection is taken into account during prototype development, nearly all interviewees responded with one or more of the following arguments (Lahlou et al., 2005): privacy is an abstract problem; privacy is not an immediate problem; because firewalls and cryptography take care of it, privacy is no problem at all; privacy is not their problem, but one for politicians, lawmakers, or society at large; privacy is simply not part of their project deliverables.

These responses indicate that even privacy, one of the most commonly discussed societal "values" and a fundamental part of our Idea of Man, does not figure into the concerns of technological development. The reason for this lag of consciousness may be that the engineering sciences have been primarily interested in enhancing technical functionality. However, the era of "Functional Computing" may be slowly replaced by (or at least overlap with) an era best described as "Human Centric Computing". Mass market technologies, such as home IT, mobile communications, video games, or navigational systems are key drivers of technological progress today. And since their market success depends on the usability and consumer-friendliness of products, the "human factor" in engineering has gained in importance. "Human Centric Computing" considers how users can manipulate machines and how the contact is designed (Zhang, 2005). Yet, less emphasis has been put on how to respect ethical system behavior systematically when designing backends.

To embrace "Ethical Computing" and the Idea of Man, we must face a number of challenges: First, we need to embrace the Idea of Man and the integration of human values into technology as fundamentally important for the engineering sciences. While a few scientists have tried to raise awareness of ethical issues in computer science for decades (e.g. Weizenbaum, 1977), they are often marginalized. Consequently, we lack knowledge about what constitutes socially acceptable technology. The "Systems Development Life Cycle" and its manifold variations (Kurbel, 2008), as well as the "Human Centric Systems Development Life Cycle" (Te'eni et al., 2007), do not incorporate processes for the consideration of human values or an Idea of Man in machine construction at the micro level. Such processes should be developed. At the same time, reference models, used as blueprints for system concepts, could incorporate mechanisms of "value management". Finally, we need to investigate how modeling languages could systematically consider the immaterial aspect of "value". Some are already taking first steps to develop micro level mechanisms for ethical engineering (i.e. those researchers developing privacy-enhanced technologies). But few of their concepts and approaches are integrated into the teaching of computer and engineering sciences.

Commitment from practitioners of the computer and engineering sciences, however, will ultimately not be enough to craft technology that is more socially compliant. After all, developers in a given company use technology to implement the demands of product management departments (“requirement”). Therefore, management must emphasize socially acceptable technical design. Yet, because companies are driven by profitability, they limit themselves to meeting basic legal regulations in an effort to make the development of systems as cost-effective as possible and maximize the potential use of their technical systems (such as data collection). Companies who take the time to reflect upon different options of system design, with all its varying ethical pros and cons, might boost development costs and restrain the company’s scope of strategic action (Spiekermann and Cranor, 2009). As a result, developers often try to avoid the topic until they are forced to confront it by the market or regulators.

The reaction time of lawmakers, however, is often too slow to affect rapidly developing technical markets. Especially in Europe, there is a latent fear of over-regulation; politicians want to reduce the risk of stifling the innovative spirit of technology markets by limiting ethical regulations. Some experts argue that market mechanisms should be responsible for sanctioning socially incompatible technological designs and rewarding socially compatible ones.

Would economic incentives justify private investment in socially compatible technologies? The development of social networking websites, such as Facebook in recent years, shows that companies have become more aware of their clients’ wishes and expectations. As a result of strong pressure and negative reactions from clients, social network operators now allow clients to adjust privacy settings for their data.

Another possible scenario is that clients, who begin to value sustainable, ethical technological designs, might be willing to pay more for them than for traditional designs. In some cases, such as organic food, consumer markets have developed in this direction. However, it remains unclear, whether markets that are less transparent and more technically complex, like IT services, can become clear enough for clients to understand the added value of socially compliant services. IT services’ operations are prone to information asymmetry, particularly in view of their operating modes and backend functions. Many clients use socially risky services (such as privacy invasive customer loyalty cards), because they lack information about backend practices (Bizer et al., 2006). If transparency increases and more information about common backend operations become available, markets might be forced to change completely.

Even if clients recognize one technology as more value-sensitive than another, they might not pay more to avoid the risk of long-term damages. For example, Internet users do not pay much attention to their privacy on the World Wide Web. They seem to value the short-term advantages of Internet services more than they fear the long-term potential loss of their privacy. People exhibit such lax behaviors because they have difficulty evaluating risks. They often underestimate (discount) long-term risks and overvalue short-term benefits (Acquisti and Grossklags, 2005).

7. Conclusion

Questions about the social impact of technical designs have been asked for many years; as far back as 1980, an intense discussion was held about the potential threat artificial intelligence might pose to human beings. Time and again, governments have launched research programs to analyze the ethical aspects of computerization, while impact assessment studies have addressed the social implications of technology. With the increasing popularity of the Internet of Things and its implications for society the relation of "things" and "people" has to be redefined.

This essay is only a small contribution to the endeavor of making our technical environment more humane. It deals with the specific notion of the Idea of Man and its potential value for the technical design of systems and networked environments, such as an Internet of Things. It shows that the Idea of Man can act on three levels: first, it enables us to reflect upon the power relationship between human beings and machines on a higher level; second, a decomposition of the Idea of Man helps us to identify concrete values that should impact technical design at a macro level; and third, a conscious sharing of an Idea of Man supports the respect of values at a micro level, where developers make daily decisions about how to structure interactions between men and machines.

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