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Abstract

Purpose – The purpose of this paper is to explore and engage with connections between the evolving technology of the Internet of Things (IoT) and notions of convenience. In particular, the concept of alpha convenience is introduced in order to articulate the broad scope of Internet "any-everything" connectivity, here called "alpha convenience."

Design/methodology/approach – The recommendations of Constructive Technology Assessment are followed in order to evaluate technology before implementation. The seven value drivers articulated by Fleisch (2010) are utilized in order to envision-specific aspects.

Findings – Three critical aspects relating to alpha convenience are identified and discussed: gossiping technology, personalization and the disempowered smartphone user. It is argued that extreme forms of convenience shift traditional areas of human agency onto technology. It is also noted that alpha convenience tends to develop as ubiquitous feature of future society, making it difficult, if not impossible, to opt out.

Research limitations/implications – The paper focusses on one powerful concept, although the IoT is merely one of several terms used to deliberate the role of next-generation information technology and society. Notable competitors include semantic web, ubiquitous computing, pervasive computing and ambient intelligence.

Social implications – The IoT is predicted to be an intrusive feature into everyday life and the paper identifies important aspects.

Originality/value – This is the first critical discussion of the IoT and convenience. The paper aims at conceptual innovation. Overall, there is a substantial lack of critical scrutiny of the emerging ideas of the IoT.

Keywords Personalization, Convenience, Ubiquitous computing, Internet of Things, Alpha convenience, Silent gossip

Paper type Conceptual paper

1. Introduction

The Disney/Pixar movie *Wall-E* (2008) presents a future scenario with people permanently docked into mobile entertainment modules. Everything in their lives is handled by computers. Clearly, this is convenience gone too far. But when, really, is it too much for our own good?

In this paper we highlight a number of vital issues that tend to be ignored in the dominant technological discussions related to the vision of Internet of Things (IoT). Although "convenience" as a concept is not excessively highlighted in texts on the IoT, it holds a paradigmatic status. There is an implicit idea that our things can be made to serve us much better. Dohr *et al.* (2010, p. 804) argue that the IoT is a development of the previous notions of ubiquitous computing, pervasive computing and ambient intelligence. Here, there is a vital development as the earlier familiar "dimensions of the common internet – from anytime, anyplace connectivity for anyone – are supplemented by the dimension anything."

The metaphor is taken further by Sundmaeker *et al.* (2010, p. 44) informing us that: "The IoT allows people and things to be connected anytime, anyplace, with anything

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and anyone, ideally using Any path/network and Any service." Such visions of "any-everything" connectivity, hereafter termed alpha convenience, constitute powerful formulations of convenient technology. These are also seductive visions: who would not want ever-present super smart tools making all aspects of life easier? Still, we should ask: are there limits to how convenient things can become? How distant is the vision of alpha convenience to that of *Wall-E*? Does alpha convenience imply that computers will move in and take over essential human and social skills? At which points do we become so dependent on our personal information technology that we cannot function without it?

Discussions on the IoT usually seem to treat convenience as something unproblematic in the sense that it is always beneficial (e.g. Thompson, 2005; Sundmaeker *et al.*, 2010). In other words, if we can identify areas of human action where we can alleviate and create more efficiency, then there are no problems in producing such technology. One argument against this position is that all personal developments involve effort, friction and overcoming difficulties. When we stop struggling with certain tasks, we eventually stagnate in those areas. Taken to its extreme, supplying convenience makes work into something that machines, not humans, do.

The aim with this paper is to introduce the concept and critical perspective of alpha convenience, outlining critical issues that need to be considered and scrutinized. In the current text, we will first introduce the theoretical context of Constructive Technology Assessment (CTA) – a proactive approach to evaluating technology before implementation. Following this, we will touch upon the concept of IoT and other associated terms. We will also review earlier critical reflections. After a presentation of seven value drivers articulated by Fleisch (2010), the paper will continue with a discussion on three fundamental aspects of alpha convenience. The concluding discussion is concerned with the possibilities of opting out of alpha convenience.

2. CTA

CTA should be understood as a proactive approach in contrast to conventional Technology Assessment (TA) (Genus, 2006; Rip *et al.*, 1995; Schot, 1992; Schot and Rip, 1996). While TA deals with retrospective assessments of technology, CTA attempts strategic intervention. Although the impact of technology cannot be fully foreseen, some trends and consequences can be anticipated. Such foresight is valuable in both public debate, which potentially could guide implementation (Rip, 2001), and policy formulations, which determine the path for future directions. The underpinning idea is that the implications are too broad for technological development to be left solely in the hands of technologists. Technologist are commonly concerned with the production of functional devices, which nevertheless, as a by-product, construct societal instruments and, indeed, contribute to future societal states, hence, the need for the engagement from social scientists.

There are two ways in which the project of engaging with IoT is considerably easier than with most cases of CTA. First, many involved technological researchers are overtly creating social scenarios. This simplifies the task of social sciences, as there is less need to start from scratch in speculating the implied social agendas involved. Second, mobile internet technology has received a breakthrough in recent years. It is therefore easily understandable to a large public. Furthermore, many citizens are concerned about issues of usability and are therefore likely to become readily engaged. Alpha convenience is an issue of substantial societal significance and critical discussions should involve and generate adequate public response.

3. The IoT and similar concepts

The IoT, probably coined in 1999 (Ashton, 2009) was initially little more than an adoption of ubiquitous computing to the technology of the internet. With time, this notion has been considerably broadened. The original interpretation referred to the opportunity to identify objects with radio tags or barcodes. This enabled an aggregation of internet catalogues allowing one to see where any individual object is situated. Although that remains the core meaning of the IoT, as discussed later in the paper, the concept has since been expanded to include both the opportunities of technological development and parallel visions brought forward through other concepts.

In the simplest terms, the IoT seems to envisage a society where all members have access to a full-fledged Internet environment populated by self-configuring, self-managing, smart technology anytime and anywhere (e.g. see Atzori *et al.*, 2010; Vermesan *et al.*, 2011). Implicitly, the driving force for this expansive technology is to facilitate practices, increasing convenience. As defined by Sundmaeker *et al.* (2010, p. 41) "IoT is a dynamic global network infrastructure with self-configuring capabilities based on standard and interoperable communication protocols where physical and virtual 'things' have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network."

Based on an analysis of more than 20,000 related scholarly publications (Olson *et al.*, 2015) we have found that similar concepts have appeared since the second half of 1990s, becoming increasingly relevant in recent years. The most prolific concepts have been semantic web (Berners-Lee *et al.*, 2001), ubiquitous computing (Weiser, 1991, 1993a, b, 1995), and pervasive computing (Satyanarayanan, 2001). Other concepts have also been suggested, outlining similar scenarios, such as ambient intelligence (Zelkha and Epstein, 1998), smart environment (e.g. Augusto *et al.*, 2010), and ubiquitous web (Billsus *et al.*, 2002). These concepts refer to a multitude of ideas that in different ways renegotiate affordances of social structure and activity. Each of these terms has its own specificity. Some terms, such as real world internet (e.g. Position Paper: Gluhak *et al.*, 2009), Digital Living (e.g. Anderson *et al.*, 2002; Anderson and Tracey, 2001), Web of Things (Guinard and Trifa, 2009) and Internet of people (UK Future Internet Strategy Group, 2011) have been around for some time without catching on.

The IoT, focussed in this paper, has been promoted by European policymakers, for instance in the European framework program on the "Future Internet" (e.g. see Lim *et al.*, 2013). As this concept embraces a number of technological visions that were earlier held apart, it becomes easier for the social scientist to form an understanding of where the current technological trajectories are leading society. It also becomes easier to argue for the vital emergence of non-technological perspectives. However, these ideas have met with scant criticism from social scientists. This is quite alarming since technologists are taking on the role of social engineers, thereby bypassing politics, the public sphere and social sciences.

In their promotion of the IoT, the EU policymakers emphasize that "devices and tags can interact with the environment and send the information to other objects through machine to machine communication" (The Council of Europe, 2009, p. 7). In strategic documents (Commision of The European Communities, 2008, 2009) a number of "smart" concepts are suggested:

- seamless connection of devices;
- intelligent cars;
- machine to machine communication;

- smart buildings;
- things-to-person communication;
- thing-to-thing communication; and, etc.

Several applications in this area have already been implemented, such as IoT-Based Smart Rehabilitation System (Fan *et al.*, 2014) and manufacturing service systems (Tao *et al.*, 2014).

Sundmaeker *et al.* (2010) categorizes the "things" in a hierarchy of five domains. At the lowest level, domain 1, there are real world entities or virtual entities that communicate with each other and with infrastructure. At domain 2, things can compete with other things regarding resources and services. They can be equipped with sensors and therefore interact with the environment. Higher up, at domain 3, they can communicate and collaborate with other things and create groups or networks. More power is given to things at domain 4, at which level they are considered autonomous. Here, they can negotiate and adapt to their environment, they can also extract information and patterns from environment. They are expected to be able to learn, take decisions and reason. At the highest level, domain 5, things are capable of self-replication, controlling, creating, managing and even destroying other things.

The current paper builds on a reading of literature surrounding the IoT. There is a heavy technological emphasis within the literature devoted to that concept. Nevertheless, as it has been adopted as the formative concept for the European Union research program "Future Internet," it becomes easier for the social scientist to identify technological agendas connected to concrete political goals. The most central texts for our understanding of the IoT and alpha convenience can be found in this context.

In the IoT, users are seen as socially active in a number of contexts, in various roles and utilizing different tools in various contexts. Crucially, internet technology will be layered with artificial intelligence that serves to support each task with the appropriate set of resources: things. In order to maximize functionality, devices and web applications will be in constant dialogue, in practice fine-tuning personalization and alpha convenience.

4. Earlier critical reflections

The IoT and associated concepts, mentioned above, have met limited criticism. Most scrutiny has been directed toward ubiquitous computing but even this has been surprisingly sparse. The brunt of the literature has been situated in the technological realm, i.e. working to manifest technological visions. The First International Conference on the Internet of Things, held in 2008, was one of the very first attempts to invite papers that addressed "non-technical topics," however, this invitation was met with rather low number of submissions (Jakobs and Williams, 2008). In the same year, van Kranenburg (2008) wrote a general critical discussion of RFID tags connected to ambient intelligence.

The wealth of alternative concepts has not helped the evolution of critical reflection. Instead, criticism has been fragmented, targeting different concepts. In addition, critical perspectives have come from a variety of disciplines and approaches, often without any reference to each other. It is one of the ambitions of this paper to attract attention to this broad topic of investigation. Bohn *et al.* (2003) summarized some of the early critical texts as belonging to three broad categories: vision, effects and man/technology. Typically, then, one of the main criticisms has been that the vision is too vague. This technological concern has been considerably lessened with time and the

articulation of alpha convenience is specific enough to invite critical scrutiny. In mid 2010s, we can clearly see a number of technologies converging as a new form of information architecture surrounding the individual, discussed by Papacharissi (2010) and Turkle (2012). However, reflections on the aggregated social effects of social media, cloud computing, smartphones and heterogeneous computing are still minimal. Although not specifically concerned with the IoT, there is a growing literature on what can be called critical social media studies that is highly relevant for the purpose of this paper (Lovink, 2011; Van Dijck, 2013; Fuchs, 2014). Another vital theme is a criticism of the way technology is turning humans into cyborgs (Araya, 1995). This area of technological criticism is also aimed at other targets beyond that of ubiquitous computing and the IoT (Haraway, 1991; Greenfield, 2003; Lanier, 2010).

Otherwise, the main theme in the critical literature has been the violation of privacy (Araya, 1995; Talbott, 2000a, b, c). These texts raise some general issues of personal integrity. Until recently, it was not possible to discern the future mechanisms of privacy intrusion. The works of Andrejevic (2007), Solove (2007) and, more recently, Bauman and Lyon (2013) mark a turning point in this area. A specific genre of ubiquitous computing research is that of wearable interface, certainly among our most important "things." This focus tends to highlight the potential for surveillance and this discussion has led to articulation of a related concept: sousveillence (Mann *et al.*, 2003) or subveillance (Fuchs, 2011).

In an ambitious attempt to investigate the future of the IoT, Pew Research Center (2014) queried 1,867 experts and stakeholders on diverse viewpoints about the situation in the year 2025. There were broad agreement about widespread beneficial effects during the next decade although there were a number of criticisms as well. In case of the latter, the main emphasis was loss of individual privacy but also concerns about digital divides (the plight of nonusers and developing countries). One problem discussed at some length was that we might see the evolution of so complex networks that many functions may come in conflict with each other.

5. The value drivers of the IoT

The obvious challenge for CTA is that technologists seldom are concerned with larger societal visions. For the current paper, we are indebted to the work of Fleisch (2010), which has served to pinpoint various specific usages of the IoT. In his article, Fleisch (2010) presents seven value drivers that the IoT can contribute to business processes. In the following, we will review these in order to clarify how specific forms of increased convenience can be developed.

5.1 Simplified manual proximity trigger

Smart things can communicate their identification number to other things in their proximity. Fleisch notes that when smart things are moved manually close to each other, this proximity trigger allows instant transactions, payment or validity checks automatically. "It helps them [consumers] to save time, to gain independence via self-serving, and finally to increase their perceived convenience" (Fleisch, 2010, p. 8). From our perspective, this is a crucial element of alpha convenience, as the things are constantly and unobtrusively talking to each other in the background. In his early thinking about ubiquitous computing Weiser (1991) aspired to create technologies that disappeared in the background, weaving themselves into the fabric of everyday life, becoming invisible. This is originally a humanist idea as the computer is in the

background, technology quietly serving the living. However, with the recent development of machine to machine communication this seems to be a vision with some problems. The proximity trigger also tends to shorten the time that humans have for mulling over a decision. This type of convenience reduces a typical process of buying into an instant interaction. The effort of reaching for a wallet and perhaps selecting an appropriate credit card is, for example, taken away from us.

5.2 Automatic proximity trigger

This is a service that can be triggered automatically, without human agency, when two things come into proximity with each other. For instance, when car and key are close enough, the door is unlocked and opened. Similarly, proximity triggers can support people with work instructions, for instance with augmented reality, when they approach different machines on an assembly line. Fleisch (2010) notes that this can "eliminate almost any manual information processing on the shop floor" (p. 9). However, this kind of convenience tends to take memory and evaluation functions away from humans. Moreover, the development of human skills is result of processes of learning through trial and error and convenient technology might allow us to bypass whole segments of the learning process. Processes that usually underpin serendipity and creativity may also be seen to be at risk here. Morozov (2013) scrutinizes numerous attempts of implementing this strategy into the kitchens of restaurants, keeping tabs on chefs adhering to the precise specifications of recipes. "The quest here is to turn the modern kitchen into a temple of modern-day Taylorism, with every task tracked, analyzed, and optimized. […] That cooking thrives on failure and experimentation, that deviating from recipes is what creates culinary innovations and pushes a cuisine forward, is discarded as whimsical and irrelevant" (Morozov, 2013, p. 11). It is, arguably, important to counter tendencies of automatic proximity triggers leading to Taylorism.

5.3 Automatic sensor triggering

With this service, things can sense data from their environment and this triggers various activities. This can alleviate the active work of people in sensing various processes around them. As the sensors (senses) of things can communicate with each other, the IoT "can measure the world in detail at reasonable cost […] serves as a network of sensors for far more senses than those of human beings. And it can do so continually, at a ridiculously high resolution, and across the globe" (Fleisch, 2010, p. 9). The human faculties of sight, hearing, smell, taste and touch may all be inferior to the sensors of our things, particularly if these are connected in large-scale networks and self-monitoring algorithms. Furthermore, this kind of convenience allows us to hand over the caretaking of environments to technology. There is a potential for people to rely less on their own warning systems. For instance, we may be warned when stepping into an area with a statistically high level of crime or when we come into proximity to people who in one way or another are sensed to have criminal history or behavior. In practice we are enticed to rely more on technology than on our own instincts.

5.4 Automatic product security

Fleisch (2010) notes that "all fakes are shallow" (p. 10), i.e., the IoT can be used to keep track of certified products by brands and obstruct all business of counterfeits. Here lies a potential of totally wiping out the black market. As a consequence, the stamp of authenticity is no longer given by experts but by a certain position in the order of

things. We no longer have any choice but to surround ourselves with 100 percent legal products. However, intellectual property rights are extremely difficult to navigate. Will the sensors around me place a restriction on what I may or may not do, for example, by alerting the police if I make my own T-shirt as a parody of a work of art or a major brand logo? Or will we program our "product security things" to be generous and make certain allowances? Can the certification algorithm be manipulated to produces fake authentication by some? Will those with resources and know how (system developers and owners) not be given undue powers as compared to the general public?

5.5 Simple and direct user feedback

The IoT will also supply simple feedback to the user to affirm or reassure us that a certain trigger has been activated. This can be in the form of a beep when swiping a card. The signal has two modes: confirmation or silence. Essentially, this is a machine to human interaction that replaces people-to-people interplay. This can eliminate countless everyday situations where we otherwise would have trivial small talk with a person representing a customer service. It certainly is convenient and effective, but strengthens the contemporary trend of humans having more and more interaction with machines and using devices as an interface in our contact with other people (Turkle, 2012).

5.6 Extensive user feedback

People can receive extensive feedback through a handy device, such as the mobile phone. This leads to "Deep product convenience because individualized information is at hand exactly at the point of decision" (Fleisch, 2010, pp. 13-14).This is an area of the IoT were specific and customized information is assembled and delivered to the user at various locations. Fleisch notes that the mobile phone, as it has developed into a computer of its own, serves as a key innovation. At the same time, we argue that the development of the IoT serves to transfer control from the mobile phone to smart environments. Instead of being our tool, the smartphone can be re-mediated to be a tool for the smart environment.

5.7 Mind changing feedback

Fleisch (2010) is concerned about the huge potential of technology being able to influence the behavior of users, praying that it "will hopefully be used for good" (p. 12). Nevertheless, the IoT can be utilized in multitude of different ways to keep tabs on humans, making people behave in a more "rational" manner. This specific added value will entice individuals to switch off their own moral compass and allow technology to steer behavior according to norms found statistically significant. It is convenient to lazily allow our things to monitor our behavior and make suggestions based on previous conduct or a database of decision-making deemed excellent. Nevertheless, it is a kind of intimate technology, already creeping up on us, which we should carefully evaluate. We have already seen that at times the responsibility for wrong or difficult decisions is re-assigned from human decision makers onto "rational" technical findings. With these new developments, it is imperative that we consider the consequences of transference of "responsibility" for decisions made onto things and devices.

6. Exploring alpha convenience

As becomes evident when reviewing the seven value drivers, creating applications utilizing the IoT is a multifaceted project. There are myriads of opportunities targeting any perceivable aspect of our lives. Technologists typically work in a piecemeal

manner, targeting individual patterns of behavior with the aim of making our daily lives more efficient. However, taken together and as a cumulative global drive powered by the need for technologists to find funding for their particular skills, any area that requires some form of human effort will have a bull's eye painted on it. The possible problems associated with the seven value drivers are summarized in Table I.

From a CTA-perspective, we must question the need to do whatever we can do to reach some ultimate form of "any-everything." It is important to emphasize that although the seven value drivers discussed above outlines a wide range of forthcoming applications, they do not really move into the area of advanced forms of "smart technology," i.e. the IoT combined with artificial intelligence. Such a development implies forms of convenience in which we no longer need to rely on our biological brain. We may not be allowed the choice of "any-brain," but still an option of several artificial super neurological networks. More likely there will be decision-making systems in place that determines the role of different forms of neurological networks. Building on the principles of cybernetics (Wiener, 1961) it is rational and effective for control systems to deal with artificial and biological processes symmetrically. In our attempt to understand the full potential of what the IoT can be developed into we cannot expect that the division between humans and machines remains the same. In the extensive survey performed by Pew Research Center (2014) some experts argue that the IoT in the 2020s will bypass the body and connect directly to the brain and, moreover, to our DNA. With such a development, the neurology of humans will be merged with the IoT.

As humans become surrounded with powerful presences of "any-everything" we seem to confront, in new ways, age-old philosophical questions of what it means to be human. As a species, we have become accustomed to having monopoly on higher forms of intellectual processes. How are we transformed when we rely on the signals of our things rather than the intuitions of our body? Are ever increasing tools for more convenience really what the human body needs? At the core, notions here characterized as alpha convenience, places an emphasis on machine learning rather than human learning.

In the following, we will go deeper into a few critical aspects mentioned in the preceding discussion: gossiping technology, personalization, the disempowered smartphone and the renegotiation of agency.

Value driver	Possible problems
1. Simplified manual proximity trigger	Silent gossip
	Technology appropriates decision-making process of humans
2. Automatic proximity trigger	Appropriation of memory and evaluation functions
	Removal of "trial and error" forms of learning and creativity
3. Automatic sensor triggering	Senses of technology for superior to human "sensing" and instincts
	Caretaking of environments shifted from humans to machines
4. Automatic product security	Authenticity certification shifted from humans to machines
	Ubiquitous brand policing
5. Simple and direct user feedback	Machine to human interaction replaces service-related people-to-people interplay
	Reduces amount of serendipitous meetings between humans
6. Extensive user feedback	Disempowered smartphone owner
7. Mind changing feedback	People rely less on own moral compass and more on statistically significant majority indicators

Table I. A summary of potential problems associated with each of the value drivers

7. Alpha convenience and gossiping technology

Already today, the web is populated by widgets, gadgets and applications that automatically exchange information about users. This is most clearly evident when shopping. The PayPal account or credit card vendor will communicate automatically with the site selling goods. This is, however, only one obvious example. Most of our actions on the web will generate a flurry of gossip between websites and between diverse gadgets. This development is accelerating as applications are becoming "smarter." Many web-based services are now "mashups" that have drawn content from different sources.

Increasingly, the World Wide Web hosts adaptive web resources that recognize each individual user and produce a tailor-made user interface based on previous surfing. The pioneering work in this area was made by Amazon.com, but Facebook and Google are also among the most systematic developers of this kind of functionality. During 2011, the widgets of Facebook gained some notoriety as it was shown that they were "spying" on their users (Cubrilovic, 2011). The revelations by Edward Snowden regarding systematic and large-scale privacy intrusion by the intelligence community have stimulated widespread public concern in this area.

Users tend not to notice that their tools are "quietly translating their actions into bits of information that flow upstream along the same channels and pipes that carry data, images, music, and e-mail" (Andrejevic, 2007, p. 111). Similarly, in her critical discussion of social media, van Dijck (2013) discusses the evolution of a culture of connectivity in which social relations are encoded in technology at the back end of applications, far beyond the control of our privacy settings. The gossip that technology routinely and extensively whispers on all users is therefore in the background, a kind of silent gossip. Although people all through history have been the target of gossip when they have not been around, it is only now that our devices are talking among themselves about us. Furthermore, for "our convenience," we are not privy to what is being said and to whom/what this information is being sent.

With alpha convenience, silent gossip becomes omnipresent. Our web-based gadgets are not only talking to each other, they are also keeping tabs on our movement in daily life, gossiping with a number of devices around us. All this smart activity is performed in order to make our lives easier. With alpha convenience, we are delegating a number of difficult tasks so as to be more effective and focus on, hopefully, more important things. Still, we should reflect on the fact that we are letting go of a number of skills that historically have been quite important for us.

Gossiping technology is a prerequisite for alpha convenience. It is only by attaining intimate knowledge of our preferences, habits, strengths and weaknesses that appropriate and fluent services can be produced. Ideally, these services are so perfectly attuned to who we are that they become natural, invisible and, indeed, silent.

The very phenomenon of technological gossip is in urgent need of social science research. We need to ask questions about what it means for individuals, groups, institutions and societies to be surveilled and supported through gossiping technology. We also need to scrutinize various forms of personalized services that are evolving and it is to this we turn to next.

8. Alpha convenience and personalization

Alpha convenience, as enabled by the sixth and seventh added value of the IoT (above), seems to require that a multitude of computers will recognize each individual and adapt services accordingly. When a person enters a new environment, s/he is instantly

recognized and resources customized. Compared to current practices of mobile internet access, this is a far more elaborate technology. The process is eerily akin to that of users accessing an adaptive webpage such as Amazon.com. The smart room allows "things" connected to the user to communicate with the things of other users as well as permanent and temporal things situated in that environment.

It seems that we will be supplied with personalized adaptive systems that are trained to become familiar with user interests and quickly adapt to changes (Light and Maybury, 2002). This entails a kind of personal servant, which has such intimate knowledge of the user that it can search and filter in his or her stead. This is a powerful idea with resonance in many fields such as Information Retrieval, Text Retrieval Evaluation and Machine Learning. It is also the basic ideology and goal underpinning the semantic web and the search engine of Google.

The emergence of such personalized technology raises questions on how many choices will be afforded the user in customizing experience of a new environment. The availably of options to users is removed or restricted under the banner of "convenience." The user is certainly at a disadvantage when compared with the smart room. Her own things will know her needs, interests, traits and networks intimately and can negotiate appropriate resources with a multitude of other things within the environment. It is probably hard to develop smart and convenient environments without implicitly conceptualizing users as flawed in the management and creation of effective and sophisticated filters for their own information needs. Users generally have too little understanding and access to available information resources to be able to make judgment calls that can compete with the things of alpha convenience.

Basically, the overwhelming amount of available data places humans at emphatic disadvantage. We have simply produced too much data. Left to our own devices, we do not know how to make the best use of it or even to select the most appropriate tools for our needs. This is not a new existential dilemma for mankind. Information overload has been considered as far back as four BCE by Seneca (Weinberger, 2011). Shirky (2010) argues that the modern articulation of information overload is filter failure. Here it is suggested that our social networks can constitute our filtering systems. However, in the IoT, our social networks will also be embedded in technology and, in a sense, manifest themselves as things managed by computers rather than humans.

As discussed below, at least three fundamental problems with automatic personalization have been identified in previous literature (Pariser, 2011; Sunstein, 2007; Turow, 2011). Such discussions have been focussed on web-based personalization. Processes enabled by smart environments are likely to extend these problems.

First, building on the historical interests of the individual may constrict future personal development. Personalization may simply disallow individual growth as our private information technology, for instance in the form of semantic agents, constructs filters based on how we historically have behaved. This is a difficult problem to bypass. Surfing on the internet generates a wealth of information that can be refined and categorized in order to predict future preferences and needs. Even if it is mathematically doable for computers to understand our history, and who we have been, it is something else to diagnose our potential and say who we may become. Arguably, personalization tends to hold us back by reaffirming past identities and filtering out such information that reflect other identities. The problem is particularly pertinent for young people who routinely change identities and need to find evolving maturity through the information accessed. The convenience of the IoT may restrict personal growth.

Second, some technologies are developed with the assumption that each user only holds one identity, while in reality people assume different roles over the course of each day. This is a major complication for those who construct artificial agents with the aim of monitoring and predicting human needs and actions. How can we build things to serve the specific needs of individuals if they keep changing roles all the time? In the matching of complex human beings with artificial agents the problem is perhaps solved by requiring users to be more one-dimensional. As Facebook's founder Mark Zuckerberg claimed, "you have one identity […]. Having two identities for yourself is an example of a lack of integrity" (Kirkpatrick, 2010, p. 199). This statement is understandable within the framework of radical transparency promoted by Facebook. The position makes sense from a technocratic perspective, if we can get people to become less multifaceted, then the work of semantic agents is much facilitated. The main thrust of the social and human sciences tells a different story. We are multifaceted beings and we need that kind of complexity in our lives in order to grow. Alpha convenience may push single identities upon us, making us less complex and more predictable.

Third, information needs are situated, varying according to specific and unique situations in daily life. Personalization systems will have difficulties in recognizing these differences as long as they have limited access to that situational data. Furthermore, the modern development of professionalism has emphasized the value of being able to alternate between different roles. We need to know when to maintain a professional distance, when to take up a leadership role, how to identify relationships when different professions meet and when to select and apply new perspectives. Working in a professional landscape with constantly shifting roles is also vital for personal development. The IoT holds the potential of monitoring our situations and our roles. When positioned in a typical mingling situation, the smart environment can conveniently recommend people for us to meet and rank them according to interest, availability and importance. We may also be given useful personal information harvested from Facebook and similar applications. However, such tools are limited and deceptive as each individual situation is unique and a challenge to the support given by artificial intelligence. If we are to learn to rely heavily on smart tools in professional life, we will probably do away with a number of professional skills.

Again, many questions arise that require further scrutiny. Is this kind of personalization desirable? The trajectory toward alpha convenience is perhaps assumed to be locked, but the decision to build and empower a technology which places humans at a considerable disadvantage in decision making should be one made deliberately. We should ahead of time ask: what would the implications of such personalization be for the individuals in their daily lives and for society as a whole? Who are those setting the agenda related to personalization? Would anyone or group of people be privy to a collective of information that is not available to the rest of the population? It is imperative that we consider the consequences.

9. Alpha convenience and the disempowered smartphone owner

Rainie and Wellman (2012) identify a triple revolution of contemporary societies, consisting of social revolution, internet revolution and mobility revolution. Similar interpretations of modern societies are common in social science. Clearly, several aspects of alpha convenience are already in place. However, while the mobility revolution has made internet access possible for just about anyone at anyplace and anytime, alpha convenience pushes the envelope. It is important to clearly identify the

difference between our current smartphone-based mobility and alpha convenience. Such differences concern the central positioning of artificial intelligence in the development of IoT.

Arguably, something happens in our relationship to tools when they become "smart." We are used to tools that amplify and alleviate our intentions and decisions. In such cases, we maintain control and the tool is a powerful extension of our action. However, as Rheingold (1985) recognized, computers and software should not be seen as ordinary technology but as "tools for thought," our modern medium for thinking and imagining. Building on this notion, what happens when our ubiquitous support structure for thinking evolves to the next level and becomes "smart tools" with artificial intelligence embedded into them? Will these self-managing objects eventually build up an agency removed from the intentions of the human creator (or at least the human user)? This becomes an extreme example of what Callon (1986) and Latour (1992) call actants, objects that express agency.

Smart tools can be seen as something different to ordinary tools. They do not serve us by extending our agency. Rather, they are co-constructing human action. This reframing of what the tool can be is systematically put to work in visions of IoT. Smart technology is constructed to be a kind of mediator of our ordinary life. This is far beyond the traditional meaning of the tool and it constitutes a challenge to social scientists to rethink the relationship between humans and their tools. In comparing contemporary smartphone practices with the visions of alpha convenience we would like to emphasize three aspects.

First, the evolution of smart environments. Users will be recognized by the environment they enter and available resources will be customized according to their perceived personal preferences.

Second, "anything" will be used to access and navigate the internet. In essence, this means that users will not need to take along their own device for internet access, such as a smartphone. Instead, they can make use of whatever device is close by.

Third, the transference of agency from the smartphone (or any other mobile smart device) to the surrounding intelligence constitutes a shift in power from pocket of user to technological environment. In a very real sense, the smartphone owner is disempowered. Our portable devices are appropriated to be more concerned with the input from the smart environment than it is with human owners. Compared to computers, humans are acting in extreme slow-motion. The smartphone that is constantly connected to the IoT will have much more communication (and in common) with other things.

10. Concluding discussion: can we opt out of alpha convenience?

We have discussed several vital problems that tend to be ignored in technological discussions in the extreme forms of convenience that in this paper have been called alpha convenience. We have argued that the relocation of power from the things we carry with us, i.e. smartphones, laptops, pads, etc., to things in an intelligent environment generates a number of significant problems. Most of these are already present in our current highly digital lives, but alpha convenience will tend to introduce new dimensions.

We have argued that the alpha convenience of the IoT pushes the boundaries of convenience much too far. We are presented with convenient technology that does not only help us with physical work. We are also assisted in the way we use our senses and as the technology advances, there are good reasons for investing more trust in the sensors of things rather than our own faculties. Furthermore, we are also supplied

shortcuts that simplify our thinking. In a way, we find this paradoxical, as there is a clear humanist idea underpinning the vision of computers adapting to humans, not the other way around. We are supplied a tantalizing vision of computers unobtrusively humming in the background, ready to attend to our every need. Nevertheless, alpha convenience presupposes a series of renegotiations of the division of labor between humans and machines.

In line with the agenda of CTA, we argue that it is important to discuss the possible consequences of alpha convenience before full implementation. This is particularly pertinent as it, once implemented, does not seem to be a technology that can be avoided by the individual user.

Absence of choice seems to be implicit in the key documents read for this analysis. Already, in the early work of Weiser (1991, 1993a, b) workspaces are emphasized. As a consequence, dealing with the technology becomes a prerequisite for performing work. In the visions of the European Commission (Commision of The European Communities, 2008, 2009) we find this kind of technology integrated into cars and buildings. As ubiquitous technology is built into the hardware of our environment, we can no longer choose non-usage.

While implementation of new technology by necessity comes in stages, there are also dimensions of force involved. In other words, volunteerism also enters the debate. With this fundamental humanist ideal, the agent is seen as an active individual who is free to choose among competing alternatives. IoT is likely to interfere with volunteerism.

The range of "involuntary non-use" has traditionally varied depending on type, form of use and availability of competing technologies. For instance, it may be possible for us to choose not to have a car if we have access to sufficient public transport to work. In addition, dominating technologies such as TV can be avoided, as it is often not necessary for work. ICT is an entirely different extension of social action, as it has become such a dominant element in most workplaces and also tends to renegotiate boundaries between work and leisure. The vision of alpha convenience seems to be one that leaves scarce opportunity to opt out.

This absence of choice is also present on a societal level, as we seem to be faced with a technological trajectory independent of transparent political agendas. On the face of it, this links to ideas of technological determinism in which technology is seen as the cause of social change. However, as Gunkel (2003) argues, empirical studies demonstrate that technological determinism (whether the "hard" or "soft" kind) is inadequate as explanation of the problem and a simplification of a complex situation.

From our perspective, the absence of choice comes from a lack of both early and broad discussions on the appropriate role for technology in society. This paper has aimed to contribute to awareness of the price we pay for alpha convenience. We invite further discussion and research of these issues.

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