Automatic for the people

The effects of Smart Surroundings on the autonomy of people

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Abstract

In this thesis I will be evaluating the effects of Smart Surroundings on the autonomy of people. The question I will be answering is the following: “How can Smart Surroundings affect the autonomy of the user, and what factors are relevant when analyzing the effects of Smart Surroundings on the autonomy of the user?” In order to do this I will be analyzing the concepts of Smart Surroundings and autonomy. I will then proceed to construct a framework for analysis and evaluation of effects on autonomy of Smart Surroundings, and apply this to three types of Smart Surroundings. Finally I will give some guidelines for designing autonomy-sensitive Smart Surroundings.

Smart Surroundings refers to a development in information technology aimed at relocating information processing from the computer into the everyday objects that surround us. Smart Surroundings are characterized by being a form of information technology, by being embedded in objects that surround us in everyday life, and by being able to sense and respond to humans in their surroundings. This last characteristic means that Smart Surroundings are able to initiate action, as well as respond to people in a more natural way. As such people are not merely users of Smart Surroundings, but engage in different relations with them.

The concept of autonomy is one which can be split in internal and external autonomy. Internal autonomy is critical higher-order reflection on desires, and as such consists of reasoning. External autonomy is making these desires effective and consists of action. We can identify further aspects of autonomy, such as procedural independence (not being indoctrinated or deceived), control, relevant options for action, and substantive independence (not being dominated or spied on).

Next I will construct a framework for analyzing and evaluating the effects of Smart Surroundings on autonomy, consisting of four steps. The first step is to identify effects that a system can have on internal and external autonomy, which can be recognized as built-in tendencies of Smart Surroundings systems. These effects can be both positive and negative. In the second step these effects are mapped to autonomy-related values, which can be seen as embodied in the Smart Surroundings system. The third step analyzes the relation between human and technology to seen how that impacts people’s autonomy. The fourth step is to evaluate the three previous issues and conclude what the effects of a certain Smart Surroundings are, and whether they are good or bad.

I will apply this framework to three types of Smart Surroundings systems. The first are informant systems, which aim to provide people with information. Their effects can be related to procedural independence, an aspect of internal autonomy. Generally speaking having more

information allows us to make better informed decisions, and thus improves our autonomy. However being given false information may harm our autonomy instead.

The second are servant systems, which carry out tasks that people tell them to do. As such they affect the way we can realize our actions. This can happen in a number of ways, by improving our control and options for action. On the other hand servant systems can also diminish our control as we delegate tasks to them, as well as harm our privacy. In this way servant systems can improve our external autonomy, but may also harm it in certain cases.

The third type of system is associate systems. These systems analyze people's desires based on their behavior, and proceed to make these desires effective. I will argue that this operation is problematic, as desires cannot be distilled merely on the basis of behavior. This problem causes associate systems to deceive people who believe their desires are reflected in the system, and gives these people no control over what the system does. Even if an associate system is capable of recognizing people's desires, they will still make people lose control, and as such be problematic for autonomy.

I will wrap this thesis up with a discussion of Smart Surroundings design that takes autonomy into consideration. This is inspired by the program of Value Sensitive Design, which looks for methodologies to incorporate values into the design of technology. I will argue that the design of Smart Surroundings can take the value of autonomy into account, through reliability of systems and responsibility of designers.

Preface

A preface is a place for clichés and kind words. I want to try to avoid the first while embracing the second. Because of that I will not use an old metaphor about how a project of this magnitude, which takes over a huge chunk of your life, cannot be done without the help of many people. Instead I will use this preface merely to thank those many people who have so kindly provided this help and prevented me from spending more sleepless nights on it than has already been the case.

First of all I want to thank my main supervisor Johnny Søraker. His advice consisted of thoughtful pointers, intelligent talks, and support when I could no longer distinguish my head from other body-parts. He started me off in the right direction, and coached every step I took from there. With his well-analyzed dissections of the things I wrote, always very quickly, I was always able to improve my work. If anything in this thesis does not reflect this, it is because I did not listen to what Johnny said. I forgive you for giving me too much whiskey that one night.

Secondly I want to thank Philip Brey, my second reader. Weaving me into his overly busy schedule he managed to keep me on my toes by forcing me to stay sharp in my formulation, something I easily to let go. Besides he was able to provide me literature on any subject even remotely relevant to my thesis, filling a nice binder to inspire me.

There are many other staff members of the philosophy department in Twente who helped shape me over the course of the program, and in some way impacted this thesis, and who I owe gratitude for that. Particularly I want to thank Peter Paul Verbeek, for letting me use part of hin unpublished work.

I want to turn to all those people at university and outside who took an interest in my thesis, whether I was complaining about it, or trying out a new theory. I have not often talked about the contents of my thesis, as I did not want it to take over every part of my life, but whether you know it or not, you have pushed me to go on with the work and do the best I could.

Finally I want to thank the home front, who have been there for me in every conceivable way. I am afraid I need to turn to a cliché here after all: I could not have done it without you.

The title of this work refers to the wonderful R.E.M. album of the same name, but could also be an applicable quote for those developing Smart Surroundings.

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1. Introduction

According to some views in computer science research [Aarts & Encarnação 2006] we are heading towards a future where we will be surrounded by smart devices. Our everyday tasks can for a large degree be taken over by technology in this future. One icon of this age is the smart fridge, that can tell you when your milk has gone sour. Because of advances in computer hard- and software, information technology surrounding people could be realized in the not too distant future. From there it is not such a big step to connecting your fridge to a network, allowing it to order new milk at a store automatically when you run out. When our everyday appliances turn into objects that can automatically do what we want them to, we speak of Smart Surroundings. This development is set to make everyday life a lot more convenient than it is today.

However our everyday life consists of more than groceries and shopping. Other areas in which Smart Surroundings may be deployed are work, public safety, and healthcare. In this last area devices have been developed that alarm people when they are not taking their medicine on time. Such a technology can potentially prevent people from needing hospitalization, and perhaps even save lives. Smart Surroundings should as such not be dismissed as something that is merely fun and convenient.

There is also a downside to such technologies. What if there is a new brand of milk you want to try out? You have to tell your refrigerator that he is supposed to get something else. What if another brand of milk is discounted? Normally this might be a reason for you to pick it up, but how does your fridge decide upon this? Do you tell it to always pick up discounts? The problem that is at the heart of these questions is to what degree Smart Surroundings will allow people to live life as they want to. People generally don't like being told what to do, especially not if it is by one of their household appliances. Yet this is a threat of Smart Surroundings systems, the fact that they are smart means they are able to act independently from people. This may cause occasions to arise in which your appliances do something you would not have done yourself. These problems related to the degree in which people can live their lives as they want to, are problems of autonomy.

Before we delve deeper into the concept of autonomy, it may be useful to understand it as the freedom and ability to do what you want. Sure we want our fridge to get rid of our bad milk and do our shopping. So on that count we are autonomous, perhaps even to a greater degree than with a "stupid" fridge. But what about the problems we have also seen? The fridge does groceries in a way that may not be like the way we want it done. Smart Surroundings thus has implications for the autonomy of the people that use the devices. These implications are what I will be exploring.

In this thesis I will be discussing the effects that Smart Surroundings have on the autonomy of people. These might be both good, where Smart Surroundings help us to achieve our goals, or bad, whenever Smart Surroundings decide something against our will. In this introductory chapter I will set the scene for the remainder of the thesis. I will first sketch out the questions I will attempt to answer in this thesis. After that I will argue why discussing questions surrounding Smart Surroundings is currently relevant. Finally I will give a description of how the rest of this thesis will be structured.

1.1.Thesis question

My goal in this thesis is to analyze the effects that Smart Surroundings can have on the autonomy of people. Besides that I will be constructing a framework, so that my analysis may be used in future considerations of these issues. This framework should then be a guide for assessing practical design problems that may come up during the actual development of Smart Surroundings systems. This goal has been condensed into the following main thesis question: "How can Smart Surroundings affect the autonomy of the user, and what factors are relevant when analyzing the effects of Smart Surroundings on the autonomy of the user?"

In order to make the answering of this big question more manageable, I have split it up into four sub-questions. Each of these addresses a certain aspect of the main thesis question, making it possible to answer the main question in smaller parts. In the final section of this introduction I will map these sub-questions to chapters in which they will be answered. These sub-questions are as follows:

1. What are Smart Surroundings?
2. What is autonomy, and why is important?
3. How can Smart Surroundings influence a person's autonomy, and how can this be evaluated?
4. How can autonomy-sensitive Smart Surroundings systems be designed?

The thesis question presupposes that Smart Surroundings do affect the user's autonomy in some way. As the smart fridge example shows, the user may gain or lose autonomy in some form. How and to what extent this works is the subject of my thesis. In the works of Brey [2005] and Tavani [2006] the claim that Smart Surroundings has effects on autonomy has also been made. I want to make clear that these effects might be both positive and negative. To what extent either is the case is something that will be worked out as I work towards the answer on my thesis question.

1.2.Importance of research

Do people already have smart fridges in their homes? For the most part not. So why is this question relevant now? To answer this question it is useful to turn to Greenfield's work [Greenfield 2006]. In it he gives three reasons for the urgency in dealing with questions concerning Smart Surroundings. First of all a lot of the technologies that are required for creating these smart systems are already being realized today. The small cheap chips and wireless networking that are needed are being produced. While the infrastructure for the actual appliances is not yet in place, the potential is already here. With the technological development happening, we cannot stay behind in thinking about the moral implications of this technology. If there is ever a time to influence in what direction the technology should head, it is now, while there is little set in stone yet. [Greenfield 2006, p. 220].

Secondly, even if it is still off for some time, Greenfield [2006, p. 91] makes the claim that a future with Smart Surroundings is inevitable. Not just because of technological development, but also in order to accommodate changes in society. Some of these include the need for growth in the ICT business, the aging of the population, and the increased desire for security after 9/11. Smart Surroundings promise answers to all these problems, and may perhaps even be the only shot at a solution that we have [Greenfield 2006, p. 101-110]. This means that a future with Smart Surroundings is not just a technological possibility, but may be a societal need. Again, I think this indicates that we need to think about we want to shape the technology in light of these ethical issues, before the technology is already upon us.

Thirdly I believe Smart Surroundings, when they arrive, are set to have such a profound impact on everyday life that is irresponsible to not at least consider some of the consequences they may have. Smart Surroundings will not be there all of a sudden, but some of its ideas and technologies will become part of accepted practice slowly, but steadily. Some of it is already playing a role in our lives right now. As Smart Surroundings are set to enter out lives gradually, it might be hard to find a point of no return. As this is the case it is prudent to think about potential problems in as early a stage as possible. This is also something Greenfield [2006] argues for, by saying that while it may still take a lot of time for Smart Surroundings to become fully embedded in everyday life, the time for action is as soon as possible. And that would be now.

In light of these considerations I think that one of the major issues that is currently being signified as a possible problem with Smart Surroundings is that of the autonomy of the user. Both in the field of technology, as well as philosophy of technology this potential threat is signified [Aarts & Encarnaçao 2006, Greenfield 2006, Brey 2005, Tavani 2006]. As this is one of those relevant ethical issues that needs to be tackled as soon as possible, I think it is a good reason to address it in

this thesis. This way I hope to take one step in the direction of Smart Surroundings in which the moral side has been well thought out.

1.3.Structure

So far the introduction of my thesis has addressed the questions of what I will be doing, and why I am pursuing this research. In this last section I will show how I will be answering my thesis question by talking about the structure of my thesis. My thesis is structured around answering the four sub-questions and using these answer as input into answering the main question. I will go through the different chapters one by one.

Chapter 2 addresses the question “What are Smart Surroundings?” I will address this question in a few different ways. Firstly I will give an overview of the definition of Smart Surroundings. Next I will discuss the technology and vision behind the development of Smart Surroundings. Finally I will give a phenomenologically inspired view of how people relate to these systems.

The theme of chapter 3 is autonomy and its value. In order to analyze the autonomy issues brought up by Smart Surroundings I want to discuss what autonomy means. For this analysis I will consider a number of philosophical views on autonomy and discuss their merits and weaknesses. This analysis will then be used as input into my own view of autonomy. Afterwards I will focus on the question why we value autonomy.

As the third sub-question, “How can Smart Surroundings influence a person’s autonomy, and how can this be evaluated?”, forms the bulk of my thesis, I will spread it out over a number of chapters. In chapter 4 I will make a start by making a framework with which to answer this question. In this chapter I will discuss possible effects on autonomy and construct a framework which can be used to analyze the effects of Smart Surroundings on autonomy. Firstly I will discuss potentially beneficial and harmful issue that influence a person’s autonomy. Next I will discuss how these different effects can be evaluated. I will then use this analysis to form a framework with which to analyze the autonomy effects of Smart Surroundings. Finally I will introduce three different forms of Smart Surroundings, which will be the subject of my investigation.

In chapters 5 through 7 I will analyze each of these three forms of Smart Surroundings, which each affect different aspects of autonomy. Rather than look at distinct technologies, I will turn my attention on more abstract categories within Smart Surroundings. In these chapters I will qualify the effects of autonomy of these categories and discuss how this changes the autonomy of people.

In chapter 8 I will discuss guidelines for the design of Smart Surroundings systems in which considerations of autonomy plays a role. These guidelines can be seen as more applied than the

higher level framework. My analysis in this chapter will be informed by the methodology of Value Sensitive Design.

Finally in chapter 9 I will draw my conclusions and formulate an answer to the thesis question. I will wrap up with a discussion about future research that can be carried out with regards to Smart Surroundings and autonomy.

2. Smart Surroundings

Imagine a world in which every object around us is smart enough to know for itself what we would want it to do. Everything that surrounds us would be connected together to form an integrated network of devices. Many of our day to day tasks would be made easier, or even completely taken over by technology, leaving us free to do other things that interest us. This is the vision of the future sketched by Smart Surroundings. If I were to describe these developments in a single sentence it would be "Smart objects populating everyday life."

The question that this chapter aims to answer is "What are Smart Surroundings?" I will zoom in on Smart Surroundings from a number of different angles. Firstly I will provide a general discussion of what Smart Surroundings are. Secondly I will look at the visions and ideas behind Smart Surroundings. Thirdly I will sketch out the technological developments that make Smart Surroundings possible. This help us get an idea of Smart Surroundings from different angles. Finally I will take a look at the way Smart Surroundings interacts with people, by taking a philosophical look at the relation between man and machine.

2.1.What are Smart Surroundings?

In this section I will work towards a description of the term Smart Surroundings. Firstly I will introduce the term Smart Surroundings and discuss where it comes from. I will them proceed to look at a number of definitions of Smart Surroundings put forward by others. These definitions will be used create a definition of Smart Surroundings that combines the best from these approaches. Finally I will say something about the situations in which we may encounter Smart Surroundings.

Development in Smart Surroundings has not been going on for a very long time, yet other terms for the same kinds of technologies are also being used. In fact the most commonly used term seems to be "Ambient Intelligence". [Brey 2005, Tavani 2006, Aarts & Encarnaçao 2006] Ambient Intelligence extends the naming convention of Artificial Intelligence and has a very similar acronym (AmI, as compared to AI). However the use of the word "intelligence" is something that is problematic. Using the word intelligence may give the false impression that Smart Surroundings create an environment that behaves intelligently in the same way as a human would. Aarts defines this form of intelligence as "specific forms of social interaction", which is aimed adapting to and anticipating the behavior of people involved with the technology [Aarts & Encarnacao 2006, p. 2]. However that is not what we understand intelligence to be in everyday life. I think computers are still rather far away from displaying intelligent behavior, and I believe this will not be developed in time for the movement towards embedding smart devices in everyday life as it is currently

developing. Because of this I think using the term Smart Surroundings gives a better idea of what is currently going on: the development of devices that interact with us in a smart way. I will speak more of the issue of intelligence in Smart Surroundings in chapter 7.

Another termed that has been coined is “Everyware” by Greenfield [2006]. This is a combination of the words everywhere and software, indicating the ubiquity of computing technologies that is central to it. While “Ambient Intelligence” may be a bit too ambitious to my taste, I think “Everyware” lacks something. Namely the fact that, while not intelligent in a human way, these technologies do have some responsive attitude to humans even when a user does not request for an action by the technology. This is contrary to most software people use nowadays, which requires user input to do anything.

Putting these two considerations together I think “Smart Surroundings” is a good third option. While it remains questionable that we can actually call ICT smart, this may just be because we lack the proper terminology to describe non-biological things that seem to act “intelligently”. “Smart” however seems less uniquely related to human reasoning than “intelligent”, so I prefer to use that term. Surroundings also does a good job of describing where we may find these systems, namely all around us. The alliteration is just a bonus.

After arguing for the use of the term Smart Surroundings, I will turn to two definitions of the technology, and work towards a definition of my own. The first definition I will discuss is the one that Aarts and Encarnação give. They say Smart Surroundings refer to “electronic environment that are sensitive and responsive to people.” [Aarts & Encarnação 2006, p. 1] Three things are of interest in this definition. Firstly Smart Surroundings are classified as electronics, which gives us a rough idea of what kind of technology it is. The second is that Smart Surroundings can be found in our environment, meaning they will potentially be found all around us. Thirdly they are sensitive and responsive to people, so they are aware of what users are doing around them and capable of using this in their functioning. This means that Smart Surroundings do not need explicit input (although that can be the case), as the sensitivity to people is found in the devices. People can engage with Smart Surroundings either with or without being conscious of giving input.

The second definition I will consider is given by Greenfield, who says that Smart Surroundings are “information processing embedded in the objects and surfaces of everyday life.” [Greenfield 2006, p. 18] Here we can recognize two themes that are important to a definition of Smart Surroundings. The first is that Smart Surroundings are a form of information processing. Therefore they take current information technology as a starting point for their development. Secondly they are embedded in the things that surround us in everyday life. Rather than sitting at a

desktop or laptop computer, where information processing activity takes place nowadays, Smart Surroundings will be all around us.

We see some overlap in these two definitions, as both mention the type of technology Smart Surroundings belongs to. Aarts and Encarnaçao call it electronics, while Greenfield is a little more specific by calling it information processing. There is a fine line between these two in Smart Surroundings, which we can recognize in the smart fridge. A fridge is traditionally a piece of electronics, but Smart Surroundings adds capabilities to this like networking, which belong in the realm of information processing. Since the novelty Smart Surroundings is found in the information processing part, rather than just the electronics, I am more inclined to call it an information technology. As information processing is what is introduced by the technology, this type of technology should be present in a definition of Smart Surroundings.

The second piece of overlap can be found in the claim both make that Smart Surroundings can be found all around us. Greenfield is more elaborate by saying Smart Surroundings are found in objects in our everyday life, but Aarts and Encarnaçao also define the technology as something that is in our environment. As the word "Surroundings" already suggests, Smart Surroundings are indeed designed to be found all around us. As both definitions suggest, Smart Surroundings' ubiquitous nature is part of what defines it.

However there is also a difference between these two definitions. Aarts and Encarnaçao mention specifically that Smart Surroundings are sensitive and responsive to people, which Greenfield omits. If we look at the way Smart Surroundings is developing, we should note that the fact that Smart Surroundings can respond to people who are not actively interacting with them is a defining aspect. Greenfield points out somewhere else in his book that Smart Surroundings can be triggered unconsciously [Greenfield 2006, pp. 66-67]. So interaction with people who did not initiate it is part of Smart Surroundings, and something that differentiates it from most "stupid" appliances, so it is a third defining aspect of Smart Surroundings.

Altogether the three aspects above show in what ways Smart Surroundings are unique. It is their embedded nature and their "pro-active" response to people that defines these developments. I have summarized these three aspects as follows. Smart Surroundings are:

- A form of electronics, more specifically a form of information technology.
- Embedded into objects that surround us in everyday life.
- Able to sense and respond to humans in their surroundings, whether or not these people have consciously initiated the use of the Smart Surroundings system.

These three characteristics are what define Smart Surroundings. The biggest differences with current information technology are thus their infiltration into everyday life on a greater scale, and an ability to act without conscious input. Both of these are already present in some extent (many household devices already have chips embedded, and the Microsoft Office assistant can pop up even if you did not ask for it), but Smart Surroundings is set to deploy this in everyday life. A fully developed system of Smart Surroundings will be all around us, everywhere we go.

But what does it mean when we say that Smart Surroundings are everywhere around us? Greenfield has summed up a list of situations in which we can expect to run into such technologies. Basically he claims that we can find Smart Surroundings on four different scales. The first is on the scale of an individual person, or his body. One such development is BAN, or Body Area Network, that makes it able to connect devices with a small range. This is aimed at connecting various devices worn on the body. The second is the scale of a single room. We can expect devices in a room to work together to facilitate what the people inside that room need. Thirdly Greenfield speaks of the scale of the building. Processes going on inside one building might be streamlined by using smart electronics networked together. Finally public space can also be a scene for Smart Surroundings. Everything from public transport to getting around can be changed by Smart Surroundings. So when the claim is made that Smart Surroundings can be found everywhere, it means we can come across it in all the things we interact with in our everyday life. [Greenfield 2006, pp. 48-65]

2.2.The vision of Smart Surroundings

The idea of developing Smart Surroundings finds its origins in foundations laid by Weiser [1991] in his concept of Ubiquitous Computing (Ubicomp). The main goal of ubicomp is the “disappearance” of computing technology, characterized as it is today by a device people sit behind, by moving it away from the desktop and into everyday life. According to Weiser and Seely Brown [1998] this could then lead to “calm technology”. The reason for employing calm technology is to convey the multitude of information that becomes available through ICT, but present it in such a way that it does not frustrate the user through some kind of informational overload. Weiser and Seely Brown describe calm technology as something that can inform us from the “periphery” of awareness, shifting to the “center” only as needed. We are aware of the things that are in the periphery, without giving explicit attention to them. An example of this is the noise of a car engine. We do not focus on that noise while driving, but we notice it immediately when the noise is strange and might indicate there is something wrong with the engine [Weiser & Seely Brown 1998].

A user of calm technology should be able to move the awareness of it between the center and periphery. There are two reasons why this would make the technology calm. The first is because we can keep track of more things that are in the periphery of our awareness, than the few things in the center of our attention. This way the technologies are able to be "informing without overburdening." [Weiser & Seely Brown 1998] Secondly, by moving things to the center of our awareness we are able to take control of it [Weiser & Seely Brown 1998]. Imagine we notice a strange noise produced by the engine. We might notice this and use it to figure out what is wrong. For example by illustrating what is wrong with a car engine to an engineer by describing the noise. In this way by putting the engine noise in the center of our attention allows us to use it to solve a problem.

Smart Surroundings takes the idea of calm technology and tries to push it further. It does not just embed computer power in everyday objects, but turns them into "smart" objects. As such these systems are able to take many of the things we would normally be conscious of, and pull them outside of our awareness, into the periphery. This goes for many things that currently still take up all our attention, like doing groceries. Shopping trips require us to actually walk around picking up the products we want to buy, not really something that happens in the back of your mind.

At the same time, Smart Surroundings allows us to take control of more than ever before, by allowing us to pull things into the center of our awareness in ways we never have before. With sensors deployed everywhere, and wireless networking allowing us access to them in many ways, we can get nearly any information we would need. This way we can then focus our attention on anything that might require our focus. Our smart fridge would be able to keep a list of all the products it has purchased for its user all the way back in time, giving the user access to information about that lovely piece of cheese he ate three months ago. Smart Surroundings can be used to access data that is available, to find out just what you want to focus your attention on.

Smart Surroundings takes Weiser's vision of a future of ubiquitous computing even further. The technology is aimed at making it possible to push things in our fringe awareness even further back where we need not worry about them at all. Smart devices are able to take care of themselves even without our intervention, with the intention that things will more often work out even without our focus. On the other hand, Smart Surroundings are also intended to be capable of pulling things into the center of our attention. We will have access to data from a lot of sensors and smart devices should be able to help us sort through the multitude of information so that we can find what is relevant.

2.3.The technology of Smart Surroundings

While the vision of Smart Surroundings defines the big picture, the implementation is found in the technology. This also finds its origins in Ubiquitous Computing [Weiser 1991]. Weiser claims that after the paradigm of the personal computer, there would be a new paradigm, that of Ubicomp. Personal computing is distinguished by there being a single user interacting with a specific “box” that is the technology. So at the same time as the idea of information technology is “hidden” from the user, so must the technology itself “disappear”. Weiser compares this to the disappearance of the electric motor from sight. Nowadays there are little motors in many different appliances, from electric razors to dishwashers, and from video recorders to vacuum cleaners. With none of these machines we focus on the presence of the motor, but rather on the use of the appliance. Similarly we should see Ubiquitous Computing as the disappearance of computing devices from our attention. [Weiser 1991]

Ubicomp itself can be seen as built up of two parts: Embedded Computing and Ubiquitous Communication [Brey 2005]. Embedded Computing, which is also known as Distributed Computing, is the practice of embedding computer chips in objects all around us. As such computing power is not centralized in one unit, but spread all around us. Nowadays chips can be found in all sorts of devices that we find in the home, but Embedded Computing is set to take this even further. As chips become smaller and cheaper, individual items in the supermarket may have tiny chips attached to them. These chips can be used for identification, as in RFID (Radio Frequency IDentification) , but potentially have much greater use when they are used to provide active services.

Over the last decades one of the major occurrences in ICT has been the networking of computers [Find source]. Ubiquitous Communication takes this development one step further by making it possible to connect all objects with embedded computer chips to each other. This means household appliances will be able to communicate with each other. A lot of the devices around my home will be able to synchronize and work together. One of the iconic examples of this use of technology is the smart refrigerator I mentioned before. When we connect it to a supermarket, all sorts of new possibilities open up. These connections should happen wirelessly, as it would require a significantly large amount of wires to connect all the many things that may be embedded with computing power [Brey 2005].

Embedded computing and ubiquitous communication together form Ubiquitous Computing, but Smart Surroundings add something to that, in the form of Intelligent User Interfaces (IUIs) [Brey 2005]. Adding Intelligent User Interfaces to the other two developments actually means three

things. The first is that a person is able to give easy multi-modal input to the device. This means a move away from the standard mouse and keyboard interface seen in most PCs. It would be replaced by input through such techniques as gesture recognition, eye tracking, or voice commands [1]. An important role in IUI's will be played by sensors of various kinds that can pick up many kinds of information about the user and the world. All this means that the user will usually not be confronted with a box in which to input a command, but that he is able to control the devices in a simple and natural way.

Secondly IUIs are able to use information about the people that interact with them. This information can be stored in user profiles that are either provided by the user, or constructed by the technology itself. This profile can consist of facts about the user, such a identity, location, physical properties, medical issues, and more. These profiles can then be used to better aid that particular person, by using this information in the operation of the system. This can be seen as a form of input for Smart Surroundings. The system has information about people that interact with it and takes this into consideration when working to figure out what it should do. At the same time the system can monitor people and check to see if anything out of the ordinary is taking place and respond to this, in case of a medical emergency for example.

Finally IUIs can anticipate actions of people. This means it can let an application carry out a task without explicit input from anyone. For this to work the IUI needs to be aware of what is going on around it, and the context it is in. It has to take in account the user and his actions and combine this with the knowledge it has about the user. For example if a person leaves his house, the IUI may conclude from this that the user will not be requiring the heating system, which leads to the interface turning it off or down. Here we see that the IUI tries to establish the desire of the user (turning down the heater) by looking at his behavior (leaving the house) [Brey 2005]. This idea is not without problems however, and I will address these issues in chapter 7.

Related to the technological developments I want to introduce two terms that can be used when talking about Smart Surroundings technology. Speaking about Smart Surroundings can be very abstract. It can refer to the whole vision of this future of ICT, or specific instances or technologies. In order to organize this a little more I will introduce some extra terminology that I will use throughout this thesis.

The first term I will introduce is *device*. A Smart Surroundings device is one piece of technology, a single artifact, that fits into the whole of Smart Surroundings. This may be a device

1 Weiser himself does not see voice commands playing a role in Ubiquitous Computing, as a room full of people giving voice command would not make for very calm technology. However it plays a role in some other visions, especially when you would be alone [Weiser 1991].

around the home, like a smart fridge, a wearable one, like a smart watch, or any other thing that is outfitted to work according to the ideals of Smart Surroundings. A device is something you could go out in a store and buy, if stores are still in use in the future.

The second term I will use is *system*. A Smart Surroundings system consists of one or more devices working together to perform some kind of task. Often Smart Surroundings devices will need to connect with other devices to be able to function properly and be at their most useful. One might imagine the smart fridge device needs to be linked to a calendar, to see if people will be coming over for dinner, and a supermarket's ordering computer, so it can order products there. These together would then be a smart shopping system. While systems could take place in just one device, they might also use a whole chain. The systems can be seen as a black box for the user, as he is most interested in the task and its result, more so that the actual connections between devices.

In summary Smart Surroundings can be seen as the convergence of a number of trends in information technology. The introduction of small chips embedded in everyday objects, networking these objects together, and making them aware of people and their surroundings. These developments are all required to set off the revolution that Smart Surroundings is promising. It also gives us some idea of how this future will take shape. The interaction that we now have with desktop and laptop computers can be present in every aspect of our everyday lives. We should be able to interact with Smart Surroundings systems in a much more natural manner and they will be able to anticipate what we want to do. I also introduced the distinction between a device, which is one artifact, and a system, which is a network of devices. Yet there is more than just technology that defines Smart Surroundings, so in the next section I will look more at the ideas that went into this view of the future.

2.4.Smart Surroundings and their relation with people

Part of what makes Smart Surroundings different from traditional information technology is the way they relate to people. Smart Surroundings are unique because people can trigger them without having the intention or even being aware of the technology [Greenfield 2006, pp. 66-67]. With most other forms of technology we are required to be actively involved with them in order to get them to do something for us. Not so with Smart Surroundings, which are able to affect us before we are aware of them. Because the way they interact with people is such a defining part of the technology, it should be part of a discussion of what the technology is.

Yet a traditional analysis of users is insufficient, since Smart Surroundings can by definition engage people without them being aware of it. Greenfield [2006, p. 70-71] notes, it is difficult to speak of a "user" of Smart Surroundings, because of its unique interaction with people. As people

may unintentionally trigger Smart Surroundings there is not really a situation of use. So while interaction with people is an essential part of Smart Surroundings, the traditional notion of a user is not enough. For this reason I want to investigate an alternative account of the relations that can exist between a person and a Smart Surroundings system.

Since Smart Surroundings are a form of information technology, I will begin this investigation by comparing Smart Surroundings to traditional information technology with regards to their relations to people. Traditional information technology normally takes shape in the form of a desktop or laptop computer, with which we do interact as a user, consciously engaging in interaction with it. However in information technology we can recognize the role of the technology on the experience of the user in a different way. In a discussion of the roles of the computer Brey [2008] introduces an analysis of phenomenal roles of human-computer relationships. He does this because it is "necessary for an understanding of the significant social, cultural and psychological changes that accompany the digital revolution."

Brey's analysis of phenomenal relations in computers is based on the theory of Don Ihde [Ihde 1990]. Ihde's perspective is useful because he does not speak of a person being a user technology. He differentiates four different relations between humans and technology. Ihde bases his investigation in phenomenology and as such the starting point for him is the relation between the human and his field of experiences, or the world. Technology can impact this relation in a number of different ways, giving rise to the different relations between humans and artifacts. It might not seem straightforward to see how a user might experience technology, without consciously being a user. Ihde provides the tools just for this, but looks at technology in general.

I will expand this phenomenological analysis of computers to Smart Surroundings, because social, cultural, and psychological changes are part of the change that Smart Surroundings bring to their interaction with people. For that reason I want to introduce Brey's analysis into a description of Smart Surroundings as a way to discuss the effects these technologies have on people. While introducing philosophical elements into a description of Smart Surroundings may be undesirable as it can become overly complicated, something is needed to address the way Smart Surroundings affect people. As the analysis of Brey addresses those issues which also play a role in Smart Surroundings, namely the effects they have on the lives of people. In the following section I will show that his ideas can be applied to Smart Surroundings as well as for other technologies.

2.4.1. Alterity relations

The first type of relation a human may have with technology is the alterity relation [Ihde 1990, pp. 97-108]. We speak of an alterity relation when the human has a relation with the technological

artifact itself. The artifact appears to us as an “other” with which we interact. Our experience is thus focused on the device we are working with. One of the prime examples of a technology with which we can have an alterity relation is the computer. The “intelligent” applications of a personal computer can have us interact with the device itself. We can see this in computer games, where we can battle against Artificial Intelligence opponents in many different ways. Or the Office assistant, which can aid us when we have difficulty with a task, but may also lead to frustration, which is perhaps what makes it even more human-like, by popping up at the wrong time.

A point that Ihde stresses is that an alterity relation with technology is different from a relation with another person or even animal. The technology is, what he calls, a “quasi-other”. We feel a relationship with it that is more than just its being an object that we interact with. On the other hand, this relation is not as strong as one we can have with another human being. We can see this with computer games again, where an AI (Artificial Intelligence) player is usually quite “stupid” when compared to a skilled human player.

As the technology with which we have an alterity relation becomes the focus of our attention, we can see it forms a sort of an “opaque” layer between the user and the rest of the world. What is meant by this opacity is that the technology does not allow us access to the world behind it. Like tinted glass, we are confronted with the object itself, instead of what is behind it. The technology is thus not a tool with which to manipulate or analyze the world directly. Instead the world can form a background within which the usefulness of the technology becomes apparent. For example simulation software used in the training of pilots sees the trainee-pilot interacting with the technology itself. However the real importance of this technology becomes apparent when his training is applied in a real aircraft.

The alterity relation may not seem most relevant to Smart Surroundings, as we have seen that the vision of Smart Surroundings wants to pull it away from human awareness, instead of becoming the focal point. Yet there can be devices in which Smart Surrounding systems are a way to interact with the multitude of devices in a smart environment. An example might be an interactive teaching program [Ducatel 2001, p. 7], where the user and the technology have conversations about the subject matter. A less human-like device is the iCat [Philips 2006], which uses human-like expressions to convey information. In these instances we may form relations with the relevant Smart Surroundings systems in which we interact almost as we would with another person.

2.4.2.Embodiment relations

While in alterity relations mean are engaged with technology itself, there are a lot of cases where we are not primarily engaged with the technology, which instead plays another role in that

relationship. One of the archetypical example is a hammer, which we use to drive nails into a wall. In this situation we are much more concerned with the activity of hammering nails, than the hammer itself. We can call these mediating technologies, because the technology is a mediator of the interaction between the human and the world. There are two types of such mediating roles technology can play. The first is the embodiment relation, in which we observe the world through the technology [Ihde 1990, pp. 72-80]. As suggested by its name, in this relationship technology can often be seen as becoming "part of" the body of its user. This means that the technology "broadens the area of sensitivity of their bodies to the world" [Verbeek 2005, p. 125].

Another everyday example of such a technology is glasses. People wear glasses usually not to interact with the glasses themselves, but rather because it improves their visual perception of the world. The glasses changes the sensitivity of a body towards the world, they become part of the way the wearer see the world, and in that sense become a part of the wearer himself. We can engage in an embodiment relation with all our senses. The cane of a blind person for example allows him to extend his tactile feeling, making the cane part of the way he perceives the world.

This is in contrast with the alterity relation, where the artifact draws the attention of the user to itself. Embodiment relations allow the attention of the user to pass through it. Where the alterity relation displays opacity, the embodiment relation has to be transparent to some degree to allow the user access to the world. An embodiment relation can be seen as a window that is not tinted, which allows us to see what is behind it. While this transparency may be physical, like the example of glasses, this is not a necessity, as displayed by the blind man's cane. The technological artifact has to make it possible for the user to sense the world in some way. On the other hand the technology should never display complete transparency, as there would be little point to use a device that does not affect our relation to the world in any way. Glasses with plain glass instead of lenses do not affect their wearer's perception, and can not really be seen as a mediating technology for that reason.

A Smart Surroundings example of an embodiment relation could be smart glasses, that are capable of displaying some kind of Heads Up Display (HUD). Based on the context it would be able to give you information about, for instance, the quickest route to your next class. Greenfield [2006, p. 50] sees a lot of potential in such wearable computers for people who are very mobile in their work and need access to information about the situation, such as emergency workers. Smart Surroundings of this type are destined to become part of the way we experience the world around us by becoming an extension of our bodies, and in this way they will facilitate an embodiment relation.

2.4.3.Hermeneutic relations

Hermeneutic relations are a second mediating relation [Ihde 1990, pp.80-97]. Like embodiment relations, they allow the user to interact with the world through them. The difference with embodiment relations is that this is done through kind of representation of the world, instead of a direct window to the world. Verbeek [2005, p.126] says in hermeneutic relations we perceive the world “by means of” a technology. As such the user needs to focus on the artifact as well, putting it somewhere between embodiment and alterity relation in terms of how the user interacts with them. A person needs to translate the “output” of the device in order to understand what is going on in the world. Ihde calls this a “referential seeing.” You are perceiving the world, but only by means of a reference to the world. We can speak of a sense of translation, where the world is translated by the device into a representation. In order to “read” the technology, a person must then translate back again [Verbeek 2005].

An example of a technology with which a human engages in a hermeneutic relation is a thermometer. When we read a thermometer, we are usually not interested in the thermometer itself, but in the part of the world which it displays: the temperature. However the thermometer does not allow us to sense the temperature, we need to interpret it’s output. This is the process of translation that is necessary for a hermeneutic relation, as the temperature is translated to a number representing it. We need to know the meaning of the number the thermometer is displaying, in order for us to understand what it means in the world.

Smart Surroundings are capable of displaying this form of translation of perception as well. An example of this may be a smart weather station which can perform many of the functions of a thermometer, but may have a more complete picture of weather circumstances. One might imagine it connects to meteorology stations and uses this to display the weather conditions in text, or by suggesting what clothing to wear. Smart Surroundings will be strong at taking information and displaying it in a myriad of ways, allowing the user to access it in his preferred way.

Ihde makes it clear that there is a continuum stretching from embodiment relations on the one hand (technology that becomes part of myself) to alterity relations (technology that is almost another person). This continuum could be said to range from transparent to opaque with regard to how much of the world can be perceived through the technology. Hermeneutic relations can then be found somewhere in the middle, allowing perception of the world, but only by making a step of translation which calls for explicit interaction with the device itself [Ihde 1991].

2.4.4.Background relations

The final relation Ihde identifies, the background relation, is not a part of the continuum mentioned above [Ihde 1990, pp. 108-112]. We have such a relationship with the devices that exhibit some sort of automatic behavior without involvement of people. An example is the central heating system, which makes sure a room stays at the desired temperature without interference. Instead of being a focal point for human experience, background relations are notable for their absence. It is their result that provides some kind of texture to a person's environment.

The way these systems work is through some kind of subscription to it. I have to set the desired temperature of the central heating system, and once that is done, the technology takes care of the rest. In this sense we can be seen to subscribe to the temperature we set, and the technology providing that for us in the background. While the heater is doing its work, it does not call our attention on itself.

As an example I want to turn back to the smart fridge, and its ability to automatically order products when we run out of them. We need to tell the device in some way (explicitly, or perhaps implicitly by having it monitor my behavior) that we want it to buy milk when we run out, but after that, it will take care of it automatically. Background relations need a starting point, but the smarter the technology, the more it can stay in the background without calling attention to itself. I believe one of the prime goals of Smart Surroundings is to move as many tedious everyday tasks to the background as possible, so we can focus on other things. This is what embedding information technology into everyday life is about.

2.4.5.Relating Ihde to Smart Surroundings

Summarizing Ihde's view of technology gives us four ways to look at the relation between human and technology. These four seem to match well with Smart Surroundings applications and the ideas behind the development of these technologies. The background relation allows us to look at Smart Surroundings as something that disappears from our awareness. The relations of mediations on the other hand show the place of Smart Surrounding systems between humans and the world, as its intelligent applications give us a new way to see or access the world.

Ihde's four relations are also in line with Weiser's idea of calm technology. We have seen calm technology which we are able to push into the periphery, but also pull to the center if necessary. Ihde's background relation can be matched to the periphery, in that we sense there is something going on, but it's not in our face and demanding our attention. The periphery also plays a role in the embodiment relation, in which technology is mostly transparent and does not require a lot of dedicated attention.

We begin to find more of a focus on technology itself in the hermeneutic relation, as we need to focus on such a technology in order to use it. However we only focus on the technology to get access to something else, so I think it is safe to say the true center of our attention is directed at whatever information the technology is giving us. Only in alterity relations are we truly focussed on the technology itself.

I will make two final remarks about the link between Ihde and Smart Surroundings. The first thing to note is that this description might make it seem that background relations fit into the spectrum of alterity to embodiment relations. I do not think this is the case. While embodiment and background both might be related to the periphery of our awareness, only embodiment relations can engage in a relation that might also need some interpretation. Background relations are limited to the degree with which they are truly in the background, as they are bound to come to the front at some point, but do not offer access to the world through interpretation.

Secondly, the idea of calm technology gives us some idea as to the amount of different relations we can have. While it may be necessary to have alterity relations, we should never have too many objects vying for the focus of our attention. On the other hand, having only two or three things happening in the background might be a waste of potential, as we can track many more. We can discover the extent to which a technology may be calm by looking at the continuum that goes from embodiment to hermeneutic and finally alterity relations, which stretches in the same way from the need for periphery to focus attention. Besides that we can find the idea of pushing beyond calm technology into devices that take actions out of our hands in the background relation.

2.5.Conclusion

In this chapter I have looked at the first part of my thesis question by discussing Smart Surroundings. The sub-question that was central to this chapter was “What are Smart Surroundings” and I have looked at this technology from a number of sides. Firstly I looked at two definitions that have been given, by Aarts & Encarnação and by Greenfield. From these I took the points that most defined Smart Surroundings, which were:

- A form of electronics, more specifically a form of information technology.
- Embedded into objects that surround us in everyday life.
- Able to sense and respond to humans in their surroundings, whether or not these people have consciously initiated the use of the Smart Surroundings system.

Afterwards I discussed the vision and technology of Smart Surroundings. The vision of Smart Surroundings comes forth from ubiquitous computing, where computing power is embedded in objects all around us. The idea behind this is to make the use of information technology a more

encalming experience. Technologically Smart Surroundings is also has roots in ubiquitous computing, as it consists of embedded computing and ubiquitous networking. However it adds intelligent user interface, which make these devices easy to use, contain user profiles, and able to proactively act on happenings in their environment.

Finally I gave an analysis of the role of people in Smart Surroundings. People interacting with Smart Surroundings can not really be said to be users, as the technologies may be activated unknowingly and unwillingly. As such I introduced four relations between humans and technology that have been put forward by Ihde. They show the way Smart Surroundings allow people to interact with the world, or with themselves. Alternatively the technology can be put in the background, where people are not confronted with the technology very much.

After this discussion of what Smart Surroundings are, I want to turn to the second theme of my thesis: autonomy. In the next chapter I will analyze this concept. I will do so by examining both what autonomy is and why it is believed to be important.

3. The importance of autonomy

After looking at Smart Surroundings in the previous chapter, I will now look at the second of my sub-questions by investigating the concept of autonomy. “What is autonomy and why is it important?” will be the focus. Firstly we need to know what autonomy is, in order to analyze how it may be affected by Smart Surroundings. Secondly we need to be able to explain why we would care about any effects on autonomy. This chapter is aimed at covering those issues by analyzing literature about the concept of autonomy.

My analysis is based upon the writings of a number of philosophers on the concept of autonomy. By comparing these I will work to arrive at a view of autonomy that takes into account the strongest points of these theories. I will start by looking shortly at two older views by Kant and Wolff. After this I will say some more about two more recent views, the first by Dworkin and the second by Oshana.

After clarifying what autonomy is, I want to argue for its importance. There are a number of reasons to value autonomy, and I will look at those. We should have a reason to value autonomy. If we do not, we would not find it important to protect autonomy in a future in which Smart Surroundings systems play a role in our lives.

3.1. What is autonomy?

In the first part of this chapter I will go into the meaning of the term autonomy. The word autonomy is derived from Greek and consists of two parts: “autos” which means self, and “nomos” which means rule or law. Simply put we can say that to be autonomous is to rule yourself. Unfortunately, it is not as simple as that. Philosophically speaking autonomy has a history in which the meaning is more elaborate, but at the heart they all say something about what it means to be self-governing. How this government is to be conducted, and what types of ruling of the self are and are not autonomous, is something that has been debated over time. [Beauchamp 1991, pp. 350-351]

I want to start by looking at a number of visions of autonomy throughout time. I want to focus on some of the changes that have come about over the course of these various theories and see how this influences an understanding of autonomy. In the end I want to come to a conception that gives a good overview of what it is to be autonomous, while appealing to a common sense notion of the term. By that I mean that I do not want my view of autonomy to expect too much of a person. My concept should make sure everyone[2] has the potential to be autonomous. On the other hand I do not

2 While it may seem certain groups of people are not capable of being autonomous, such as those in a coma, I want to argue that potentially these people can still be autonomous. What I mean to say is I do not want autonomy to be something achievable only by an elite few, but is within the grasp of every person.

want it to be too simple to be a self-governing person, meaning that there should be some constraints on what counts as autonomous.

The first account of autonomy I want to go into is that of Immanuel Kant. He speaks of autonomy as following a set of universal laws that everybody would agree to, the categorical imperative. A person has to have the will to follow these rules and then must proceed to actually follow them in order to be autonomous. Following emotions or instincts is not necessarily acting autonomously, as you are not willfully acting on the universal moral rules that you have laid on yourself. Autonomy (and morality) is ruled completely by reason in Kant's view. His view of self-government is one with a very strict self-governance with a very independent nature. Oshana claims that the problem with this is that a person may very well be autonomous while acting on desires. As things we do based on our desires may still be done voluntarily and independently [Beauchamp 1991, pp. 148-149, Oshana 2006, p. 12].

Kant equates autonomy with his view of freedom, which means that you hold yourself only to those things you will yourself. To be free means to prescribe your own laws, although according to reason these laws should be universal moral laws according to Kant [Johnson 2008]. Kantian autonomy is in this way very much based on one individual and seems to allow little room for input from others into your autonomous considerations. I believe freedom and autonomy, while related, are not one and the same, not even with Kant's view of freedom and I will come back to this distinction later. So altogether Kant's autonomy is based on reason, which appeals to respect for universal moral rules, and freedom, that you alone may implore these rules on you.

A second account of autonomy that is on the surface completely different, but has some deeper lying similarities is that of Robert Paul Wolff. His claim is that a person may only be autonomous if he does his own will, without forming an obligation to anybody else. While Wolff does deny the presence of universal moral rules that must be followed, he does agree with Kant that autonomy must come from within a person himself. For Wolff however, acting on desires and emotions is does not conflict with being autonomous. This form of self-government is independent to the degree of not allowing any influences in at all, but less strict about what a person actually allow oneself to do [Dworkin 1988, pp. 4-5].

One of the things we can find in common between these conceptions is the idea that autonomy is related both to the "mind" and the "body". Kant claims that we must both will to follow, and follow universal laws. Wolff says we must do those things we want to do, because we want it. This idea of autonomy both being about your desires (or rather reason in Kant's view) and

your actions is one that is found in more modern conceptions of autonomy as well, and one that will play a large role in my thesis.

Another point these two accounts share is that they view autonomy have prescriptive tendencies in that they prescribe certain rules according to which autonomous persons must live. In both cases you may only see yourself as an authority, which seems to conflict with the myriad of (positive) influences we can recognize in our everyday lives, like that of parents and teachers. If we follow either of these interpretations of autonomy, there are very few people who are autonomous, leaving us with a concept that is not so useful in everyday circumstances. Dworkin [1988, p. 31] argues that autonomy should be largely free of such values dictating how to live your life. There are many walks of life that can be seen as autonomous, and a conception of autonomy should not dictate any one of these.

3.1.1.Freedom and autonomy

Freedom plays an important role in autonomy, as we have seen in Kant's approach, and there have been those who use the term autonomy as an alternative to freedom [Dworkin 1988, pp. 13-14], either in its positive or negative form. However equating the two terms does not do justice to the concept autonomy, and for that reason I want to say something about it here. I believe the key difference is that freedom is a state of affairs. A person is free if he is not prevented from doing something (negative freedom) or if he is empowered to do that thing (positive freedom) [Berlin 1979]. We can see this is that we are generally free to do something (or free from interference to). Even if someone would just say "I am free", we can follow this up with questions like "From what?" or "To do what?". As such there is an object (in the grammatical sense) in relation to which our surroundings are so that we are empowered or not hampered. Freedom is thus exclusively found in a relationship with something else.

Autonomy on the other hand does not need to refer to something else. A person can be just autonomous, not autonomous in relation to something. While one can not be autonomous without any freedom, autonomy is different in the sense that it can stand alone. When we claim a person is autonomous we do this without referring to anything besides that person. We can ask how come this person is autonomous, and answer that with reference to freedoms to and from things, but still the autonomy itself does not need to refer to anything. So while freedom needs an object to be free from or to, this is not the case for autonomy.

The role freedom plays in autonomy is a necessary one, as it allows people to choose for themselves what to do [Dworkin 1988, p. 18]. Freedom is ideally about a person not being interfered with, or even helped to achieve something. Achieving what you want also plays a role in

autonomy, as external autonomy. In this sense being free allows you external autonomy. I will argue that external autonomy is best equated with negative freedom, or formal freedom as it is called by Swift [2006, pp. 55-59]. Autonomy is about you making your desires effective, and does not require people actively supporting you in that. On the other hand people who are interfering with your action, are also interfering with your external autonomy, as they are preventing you from carrying out the actions you want to carry out.

The reason I have chosen to investigate autonomy, rather than freedom is twofold. Firstly because Smart Surroundings in their design present challenges to autonomy, since they have the capability to "take over" from people. Smart Surroundings can make a person live a life which he might not want, touching upon the fundamentals of autonomy. Secondly because autonomy is more closely connected with the way people live their lives, rather than external influences on their lives, which are more the realm of freedom. I wanted to investigate the way Smart Surroundings impact the lives of people more than the circumstances under which they live their lives.

3.1.2.Dworkin's Account

In Dworkin's alternative account of autonomy I want to focus on the split between autonomy in your desires and autonomy in your actions. I will refer to this division as that between "internal" (autonomy of will) and "external" (autonomy of body). Dworkin himself mentions the division between internal and external autonomy at some points, but does not spend a lot of time on it. His main focus is on autonomy as a higher order reflection on your desires, or the internal account. While this is connected to the external account, and you can not really be autonomous in only one of these senses, it makes sense to pull them apart in a discussion of autonomy. This is because people can exhibit one kind of autonomy and not another. An example of someone who is internally autonomous but not externally is someone who is in jail. He can have all desires and thoughts, but he is not able to carry many of them out. On the other hand is someone who has been indoctrinated. He is able to do whatever he wants, however he can not bring himself to think of what he himself wants to.

Dworkin focuses mostly on internal autonomy, so that is where I will begin as well. His claim is that applying critical reflection to our desires is part of what makes a person autonomous. This goes against Wolff's idea that you can do whatever you want to do, as long as it is your own desire. Dworkin's view of autonomy does not allow you to go out and do whatever you want. An autonomous person is not a "slave" to his desires, but someone who critically reflects on what he wants to do.

An example of how reflection on our desires is an essential part of what makes a person autonomous in Dworkin's view is the case of an alcoholic. He has a desire to drink liquor, but just following this desire does not make him autonomous. However if he critically reflects on this desire, he may come to see that the desire itself is undesirable, because it leads to medical and social problems for example. It is this ability to take a step beyond his desires to higher order ones that makes him autonomous.

Now there are some conditions to how you may arrive at your higher order desires. There can be what Dworkin calls "failure[s] of procedural independence" [Dworkin 1988, p. 18]. Roughly speaking we can see a difference between education, where our critical reflection flourishes, and indoctrination, where we might arrive at the same conclusion, but at a cost to our ability to be critically reflective. The problem that indoctrination presents to the autonomy of a person is what we call a problem of "procedural independence". So far Dworkin sees no definitive way to distinguish between what are and what are not such problems, but it is something we must keep in the back of our minds.

There is however more to autonomy than just reflecting on your desires, which is where I come to the external aspect of autonomy. The only thing Dworkin explicitly says about this is that we need to have an ability to "make [the critical reflection on our desires] effective in one's actions…" [Dworkin 1988, p. 17]. Here we note that, similarly to Kant and Wolff, autonomy is also about actions, not just about something that goes on inside your head. While Dworkin does not focus on this aspect, I want to call attention to it, because it seems to me a person can not be autonomous without it.

We can consider the alcoholic again as an example. He has reasoned about his desire to drink and indeed found it to be a bad thing. In order to be autonomous he must then also work towards the fulfillment of his desire to stop drinking. Otherwise he would not be acting in concert with his higher order desires. It seems rather useless to reflect on desires if you are not going to apply the results of this reflection anyway. So only when he makes his higher order desire effective, by attending AA meetings for example can he truly be seen as an autonomous person. This action must then be carried out throughout time, until the higher order desire of quitting drinking is realized, not just by stopping to drink for a day or two.

When someone tries to do what he wants, others might be able to prevent him from achieving his goals. Besides the ability, or strength of character, to make your higher order desires effective, here there is also a need for freedom. If you are being restricted, against your will, by an outside force this means you are not able to make your do what is needed to be autonomous. Thus in order

to do what you want, you again need both the ability and the freedom to do so. We can summarize by noting that for a person to be externally autonomous he has to display the results of the critical reflection on his desires in his actions. Not just for a moment, but throughout time. For this to happen he must also not be held back by others in fulfilling his desires. Governing yourself is not just about "making laws", it is also carrying them out yourself.

One last thing to note about the division between internal and external autonomy is that it does not necessarily reflect how decision making plays out. As such the two should not be seen as temporally separate, because we may act while making up our minds or while we are still reflecting on it. I have focused on this split in autonomy for methodological reasons, because it makes sense to talk about things that affect our internal and external autonomy separately, and also, as I mentioned previously, sometimes people can display internal autonomy without external autonomy and vice versa.

3.1.3.Oshana's account

Dworkin's account says something about how people can be autonomous, but it says nothing about how a person should live their lives. According to Dworkin as long as you reflect on your desires, and act upon this reflection, you are autonomous. This deals with the accusation of prescribing a certain way of living that can be leveled at some of the other conceptions of autonomy we have seen. However Dworkin's way of dealing with these problems is not without issues itself. Oshana accuses Dworkin of having a view of autonomy that does not include enough constraints on an autonomous life. According to her there should be some prescription on how to live autonomously within a definition of autonomy.

To illustrate this, it is best to once more turn to our alcoholic. What if he reflected on his desires and decided that being an alcoholic was what he wanted. Does acting as an alcoholic now make him autonomous? According to Dworkin this is the case. However the idea of an autonomous person dependent on alcohol does not seem to make a lot of sense, as an autonomous person should be independent. The same goes for somebody who wants to be a slave for someone else. He is following his desires, which could have been critically reflected on, but he is not in control of his own life, as he is a slave. Oshana argues that there is more to autonomy than just acting in concert with higher order desires. Her account gets back to some of the perfectionist tendencies that could be found in Kant and Wolff's accounts of autonomy. In this section I will go into her views.

According to Oshana autonomy can be seen as self-governance in the form of taking control of the matters that are "of central importance to human life". Because of this she claims that for a person to be autonomous he must have a social role which allows him autonomy. This status means

that the person is in control of his life and can change it when he wants. She has a number of conditions for a person's life that must apply before he can be called autonomous. These go beyond the theory developed by Dworkin, but do touch on many of the points he also made. The difference is that these constraints do at times prescribe the way an autonomous person should live. The conditions that Oshana presents are as follows:

1 Epistemic competence: Autonomy requires that a person is self-reflective and self-aware. Self-awareness is necessary, because in order to be autonomous you have to recognize yourself and this is needed to be able to reflect on yourself. The ability to be self-reflective is one we already saw in Dworkin's account. To be autonomous one must be able to reflect on one's desires. Epistemic competence is a matter of degree. Some people will be more able to reflect on their actions than others [Oshana 2006, pp. 76-78].

2 Rationality: An autonomous person must be rational in three ways. Firstly he must be "attuned to [his] internal and external environment" [Oshana 2006, p. 78]. Secondly an autonomous person has to be able to make a plan that leads to a desired goal, and be able to execute such a plan. Thirdly he must be able to distinguish between those things that improve from those that harm his autonomy. If these are not present, it will be difficult for a person to reason about his desires and recognize his own autonomy [Oshana 2006, p. 78]. Rationality can also be found in Dworkin's aim for critical reflection [Dworkin 1988].

3 Procedural independence: Another issue we already saw pop up in Dworkin's account of autonomy. In order to be able to make autonomous decisions, your judgment should not be clouded by such things as indoctrination. Oshana's view of procedural independence consists of two factors. The first is that a person's capabilities for critical judgment should not have been "taught" by methods that the person does not agree with. The second factor is that such judgments should not have been undermined by the way they came into being, even if the person would not have a problem with it [Oshana 2006, pp. 78-81].

4 Self-respect: According to Oshana respecting a person means treating them in such a way that their autonomy is not harmed. To respect yourself would then be not to act in ways which may diminish your own autonomy. The foremost issue in self-respect is the feeling that you do not have less value than other people. If you do have this feeling it will influence and likely diminish what you allow yourself to do. This means you are treating yourself less autonomous than someone else. In order to be autonomous you have to allow yourself to be autonomous, and not act in ways that are detrimental to your own autonomy. For this reason self-respect is needed to be autonomous. This idea appears to be closely related to Kant's view that people should be respected because of

their autonomy. Self-respect closes off desires we might have to belittle ourselves from being part of an autonomous lifestyle. Here we notice the more prescriptive character of Oshana's theory as opposed to Dworkin's view [Oshana 2006, pp. 81-83].

5 Control: Control is an essential element of autonomy in Oshana's view. A person can not really be autonomous if other people or instances are deciding for him what to do. Similarly a person cannot be autonomous if someone would have stopped him had he wanted to act in another way as he has done, so he could not really have chosen another option. As such he must actually be able to take control of his life. We can compare this to Dworkin saying you need to be able to make your higher order desires effective. Oshana seems to make this point a lot stronger by claiming that autonomy lessens if there are circumstances beyond our control. Altogether control is necessary not to be dependent on external factors. Autonomous people have the power to be in control of their life as much as possible [Oshana 2006, pp. 83-84].

6 Access to a range of relevant options: If someone is to choose the path he takes in life, he must have a set of options to choose from. Oshana says that the degree of autonomy is related to the "assortment, quantity, and arrangement of options we confront." [Oshana 2006, p. 85] Most important are that a person has options that are central to his life, so which options are relevant are dependent on how a person has chosen to live his life. Some essential options, or types of options, should be open to everyone. These are things like the possibility to develop one's competences, and in that way to grow as an autonomous person. Another options that is normally relevant is the ability to opt out, in case you want to change certain aspects in your life. These options should also realistically be achievable by the person, and of the person's own will. Only by having this range of relevant options can a person truly choose what to do in life, and thus become autonomous [Oshana 2006, pp. 84-86].

7 Substantive independence: The final condition that Oshana presents can be seen as complimentary to procedural independence. Substantive independence means you are free from the influence of others in your actions. An autonomous person should not be held back by the people around him, or even society as a whole. Substantive independence takes a number of shapes, each making sure that a person can live his life without being under control by someone else [Oshana 2006, pp. 86-89].

Dworkin argues against the introduction of substantive independence into autonomy, by claiming it does not allow for values like loyalty and commitment. He argues substantive independence means only you may be in control of your life, with no influences from others. Being committed to someone means they have some control over you, as they can steer you to do

something for them. This form of substantive independence leaves only room for doing what you yourself want, much like in Wolff's view of autonomy. [Dworkin 1988, pp. 23-24] Oshana counters this by not arguing for complete substantive independence, but rather certain forms of it. To this end she distinguishes five ways in which substantive independence should be present for an autonomous person, while keeping issues as commitment and loyalty open.

Firstly the society in which a person lives should provide him with at least a minimal security, both psychological and social, that his autonomy can be protected. Secondly someone should not be limited to only pursue goals that the authorities embrace. Thirdly a person should not be held responsible for the needs of others unless this is the person's role. Fourthly financial independence is needed to ensure that someone is not reliant on others. Finally providing wrong or too little information should not be used to trick a person into doing something. These five points should ensure that a person has enough substantive independence to be autonomous.

The seven conditions presented above show that an autonomous person has to have actual power over his own life, both over himself and over his role in society and the world. As such I think Oshana's view matches quite well with the split between internal and external autonomy that was found in Dworkin's approach. Specifically I think we can say that the first four conditions belong to the realm of internal autonomy, as they deal with psychological states and the reasoning that is needed for autonomy. The last three conditions make up external autonomy, as they are concerned with the ability and freedom one has to make autonomous decisions into effective actions.

With these conditions Oshana tries to avoid the set of problems related to people who willingly sacrifice their autonomy. The example of the alcoholic who has reflected upon his addiction and considers it acceptable runs into problems with this account of autonomy. An alcoholic closes many doors for himself, and in that sense reduces his range of relevant options. Most importantly however, he is not able to take control of his life, which is not offset by the fact that he has no desire to control his life. One might even argue that he has limited self-respect, as he has no trouble seeing himself as an addict.

3.1.4.Conclusion

In this section I will to argue for the use of influences from both Dworkin's and Oshana's theories of autonomy. I will address how I believe these two views can be combined, and why doing so brings out the strengths in both. I will now go through both approaches and discuss what aspects from their theory I will carry over into my conception of autonomy, and why.

From Dworkin's view I want to use the description of autonomy as critical reflection on our desires, and acting on this reflection. It shows the form self-governance takes, by consisting of both deliberation and action, two things which are at the core of autonomy. Without deliberation we would just be slave to our impulses, and without action our autonomy is not expressed. Due to Dworkin's characterization of autonomy we can also speak of two aspects of autonomy, one internal and one external to the autonomous person. While distinct these two are closely related, as both are needed to be autonomous. Because of its basis in a person's desires, Dworkin's approach also allows for many ways to live an autonomous life.

As I have argued before, a critique on Dworkin's account may be found in the fact that it allows too much. The example that a person who desires to give up autonomy, can be autonomous in Dworkin's account is problematic. For that reason I will use Oshana's seven considerations, which actually serves two purposes. Firstly her consideration allow us to set a border around autonomy, making sure people do not consider themselves autonomous when they desire to not be autonomous. This solves the problem of Dworkin's approach by adding some constraints to what people we consider autonomous.

Secondly the seven considerations narrow down Dworkin's two aspects of autonomy a little further. While Oshana does not explicitly endorse the distinction between internal and external autonomy, her considerations can be linked to internal and external autonomy. The considerations epistemic competence, rationality, procedural independence, and self-respect are a part of critical reflection on desires. Control, options for action, and substantive independence on the other hand are related to making these desires effective. Oshana's conditions can thus be used to give a more refined analysis of what parts of autonomy are under investigation.

In this view of autonomy, we should realize that speaking of autonomy is always to a matter of degree. It is possible to be more or less autonomous relative to other people, but also in certain situations compared to others. When we are jailed we are less able to govern ourselves than if we are not, as we have less options for action to choose from.

In summary I want to use a conception of autonomy that at a high level distinguishes internal and external autonomy, as two aspects. The first being critical reflection on desires, the second being making these desires effective in action. Furthermore there are conditions that a person must adhere to in order to be autonomous, rather than just living by his desires. These conditions also provide a more detailed description of what goes on within the two aspects of autonomy.

3.2.Why is autonomy important?

There has to be a reason for us to care about autonomy. Otherwise we would not need to be bothered by Smart Surroundings harming our autonomy. Generally speaking it is seen as a good thing when people are autonomous, but why is that? In this section I will look at some of the reasons why we consider autonomy to be something of value, that is to be increased, or at least not diminished.

3.2.1.Intrinsic value of autonomy

The first way of looking at the value of autonomy is by asking why it is valuable in and of itself. What would we lose if we are not autonomous, even if everything else remains the same? This is the intrinsic value of autonomy. I want to discuss the intrinsic value, because it is not dependent on other values. In other words it is how autonomy is valuable on its own.

Oshana speaks of the intrinsic value of autonomy as the ability to remake ourselves [Oshana 2006, pp. 133-135]. Without our ability to govern ourselves we cannot initiate a change in who we are. She claims that without autonomy we are not able to respond to changes in our environment, by changing ourselves. Dworkin says that the importance of autonomy is found in it giving us the ability to shape our lives and that “The autonomous person gives meaning to his life” (Dworkin 1988, p. 31). We value autonomy because it means people are able to choose and change who they are themselves. To be autonomous means to be able to make your life the way you want it. Part of what makes us an individual, is our ability to form ourselves, to decide for ourselves who we want to be.

Without autonomy we can not be an individual, in the sense that we have power and control over our own lives. While we might all still live our lives differently when we are not autonomous, the essential aspect is that autonomy allows us to change the way we live our lives if we want to. With autonomy we are the managers of our lives, so we do not have to live with what we start out with, if we do not want to. As such it is not so much our way in life that makes us autonomous, but the fact that we have used our capacity to choose and manifest it for ourselves.

All of this might make it sound like autonomy is something absolute, which defines out individuality. I have claimed though that autonomy is a matter of degree. Some people are in control of more aspects of their life than others, and some people are better equipped for critical reflection. This does not mean someone who does not practice philosophy, and might therefore be less strong at critical reflection for instance, can not be an individual. Oshana’s claim that autonomy allows people to change themselves shows how autonomy is a matter of degree. Some people are less able to control the circumstances they are in, meaning they may not be able to change certain

patterns in their lives. As such, issues that diminish autonomy may lock you into more such things, while an increase in autonomy means there factors in your life that you are newly able to change.

While the intrinsic value of autonomy is not dependent on other values, that does not mean there are no other values that trump it. Someone may believe that his duty to his country is more important than his autonomy and proceed to join the army, where you are less free to choose how to live your life than outside it. So while it may be good for you to have as much autonomy as possible, in order to have as much room to change as possible, there are other values which are worthwhile, even if they decrease your autonomy somewhat.

In summary autonomy is important because it allows us to change things in our life that we deem important. As such autonomy is part of what makes us who we are as individuals. It allows us to choose how to be ourselves. Autonomy is a matter of degree however, in that a diminished autonomy does not mean you are not an individual, just that you are less free in defining yourself.

3.2.2.The moral value of autonomy

In this section I want to look at the role autonomy plays in major moral theories. As autonomy is a part of what makes us individual persons, we can relate this to why autonomy is important from an ethical perspective. Autonomy is part of what makes us individuals and respect for individuals is something that is found in major ethical theories. Dworkin notes that "[e]very moral theory has some conception of treating others as equals in certain ways to oneself." [Dworkin 1988, p. 30] However it is phrased, all these theories have some way in which the desires of those who are affected by a decision are weighed in. This can be seen in utilitarianism where everybody's preferences are used in the hedonistic calculus. In Kantianism an individual should not have anything done to him that does not treat him as an end. Behind this seems to be the idea every person should be recognized as an individual of equal value. As said, according to Dworkin autonomy is part of what makes us an individual, so because we are autonomous we should be respected as equals under an ethical theory.

I will illustrate it by using the example of Kant's approach to ethics. Kantian ethics recognizes that an individual should not be treated merely as a means to an end, but always at least to some degree as an end in himself. This is one of the ways in which the idea of an autonomous individual deserving respect is executed within a theory. Yet it seems to find its origin in the idea that the individual is capable of living his own life, that he is indeed an end in himself. This is what the value of autonomy is within ethics, that it allows us to recognize that people are their own governors and as such have a certain ethical value within theories of morality.

Could we not respect people who are not autonomous? Perhaps that is possible, but it would need to be on different grounds. If people are not autonomous, they are not in control of their own lives, so there is no incentive to grant them the opportunity to do as such. Similarly if I am not autonomous it would not be problematic if someone else decides something for me, as I am not capable of deciding myself anyway. Now we may still be required to treat people who are less autonomous well, but this would not be based on the recognition that they, like us, make up their own minds. It is because we can choose our own life that other people's decisions play a role in moral theories.

To summarize, we can say that autonomy is morally important because it allows us to define who we are ourselves. Because of this capacity, people can be seen as individuals worthy of moral respect. In the end our autonomy is part of what makes us able to be who we are, and want to be. That is important for us to realize that we should treat others as equals.

3.2.3.Autonomy as an instrumental value for democracy

While autonomy has an intrinsic value, which shows its importance to people, it is also important in other values we may hold. When we value autonomy as a part of some other value, we call that instrumental value. In these cases autonomy is an instrument to achieve something else. In this final section I will look at the way in which autonomy has instrumental value for democracy.

In order for democracy to work, people have to be able to make up their own minds and come to their own conclusions and actions. Democracy requires deliberation and thus the input of different opinions, in order to function. People must therefore have the space to be autonomous. They must both be allowed to make up their minds through critical reflection, as well as allowed to do what needs to be done to fulfill the desires one has come to. Autonomy is important, as it allows us to function as part of a democracy. As autonomy is instrumental to democracy, one has to value democracy in order to use this form of reasoning. But once democracy is taken to be of value, autonomy is then also valuable.

This reason for valuing autonomy is linked to the idea of privacy. One of the reasons privacy is important is because it allows us to form opinions and try activities away from prying eyes. Privacy accommodates this aspect of autonomy where we can act independently, in the sense described by Oshana as substantive independence. In order to be autonomous people should be allowed to hold ideas and values other than those the government has. That seems to be easier to achieve without these people looking over your shoulder. As such having privacy is helpful for being autonomous, as it allows you substantive independence without having the feeling you are being watched [Rouvroy 2008].

Privacy itself plays a large role in many societal debates surrounding ICT, but it is interesting to see why privacy is important, for this is related to the importance of autonomy. We have seen that one of the reasons we value autonomy is because democracy needs a group of individuals that make up their own minds themselves. This is where privacy comes into the picture: it allows people to develop themselves without being watched and scrutinized. This allows people to do things others might consider unacceptable or strange, but allows for the person to explore "uncharted territory". As Dworkin notes, living an autonomous life can be done in many different ways [Dworkin 1988, p. 31], the specific way in which you live your life should not be open to the public eye.

This means autonomy is important to facilitate a democratic government, as it allows people to deliberate individually and give input into the democratic process. In this sense privacy is important for autonomy, as it allows people to be substantively independent. Autonomy can therefore be seen as a value instrumental to democracy, making it of central importance for western society, which we tend to see as democratic.

In summary, the value of autonomy can be found in a number of different ways, both intrinsically and as an instrument. Intrinsically autonomy is important, for it is something that makes it possible for us to change ourselves if we so desire. This ability to change is part of what makes us individuals. Autonomy is also taken as an important part of ethical theories, as it gives us a reason to respect individuals. This respect is found in all major ethical theories. When we recognize others as autonomous beings who control their own lives, this gives us basis for this respect. We can also recognize the value of autonomy in the role it plays in democracy. Being able to make up your own mind means that people are able to play a part in democratic deliberation.

3.3.Conclusion

In this chapter I have looked at autonomy in order to find out what it means to be autonomous. The question that was central was "What is autonomy and why is it important?" The answer to this question means to give insight in the concept autonomy and why it is worthwhile to consider it in the first place.

First I analyzed the concept of autonomy and how it has been described over time. In earlier writings on autonomy, such as in Kant and Wolff, it is seen as something in which people only count on themselves. Dworkin takes on a different approach, by putting forward a theory of autonomy as critical reflection on desires (internal autonomy), and making these desires effective (external autonomy). His analysis leaves an autonomous life open to more different interpretations than the previous two. Criticism from Oshana is aimed at Dworkin's view, for desiring too little of

an autonomous person. She introduces some stricter conditions, which are aimed at making sure you do not give up autonomy, even if you would desire to do so.

Secondly I addressed the issue of the value of autonomy in this chapter. I discussed both intrinsic and instrumental reasons for valuing autonomy as well as from the perspective of ethics. Autonomy is intrinsically important because it is part of what makes us individuals. The ethical value of autonomy can be found in the fact that all major ethical theories recognize that at some level all people have equal value. The value of autonomy is also reflected in the value of democracy. Democracy relies on the idea that people are capable of shaping their own lives, and as such can contribute their own thoughts into elections and other democratic proceedings.

After analyzing autonomy in this way, and arguing for its importance I will start working towards a framework with which to analyze the effects of autonomy. In the next chapter I will look how autonomy can be affected for better or for worse. This will be based on the understanding of autonomy built up in this chapter.

4. A framework for analyzing effects of Smart Surroundings on autonomy

In this chapter I will be working towards constructing a framework which I will use to analyze the effects of Smart Surroundings on the autonomy of people interacting with them. This way I will start working towards an answer to the question: "How can Smart Surroundings influence a person's autonomy, and how can this be evaluated?". In this chapter I will lay the foundation for answering this question, by describing the various issues that can influence autonomy. These will form a framework that I will then later used to analyze Smart Surroundings systems and further answer the main question of these chapters.

I will begin this chapter by describing those positive and negative effects on both internal and external autonomy that are relevant to my discussion of Smart Surroundings. Next I will discuss how these effects can be evaluated, so we can judge whether an effect is good or bad. In the next part of this chapter I will construct a framework which can be used to analyze the effects of Smart Surroundings systems. Finally I will describe three different types of Smart Surroundings systems that I will apply my framework on in the next three chapters, in order to finish answering the question I start in this chapter.

4.1.Effects on internal autonomy

In this first section about possible effects on autonomy, I want to turn to the internal aspect. As seen in the previous chapter, internal autonomy deals with the way you make up your mind and come to a decision. Issues that affect internal autonomy tend to be related to your reasoning and information that goes into it. With regards to Smart Surroundings information is the most interesting issue. In this section I will first analyze issues that can have a positive effect on internal autonomy, and then proceed to turn to effects that are potentially harmful.

4.1.1.Positive effects

When we are autonomous we critically reflect on our desires in order to make up our minds about what to do. Making up your mind can be seen as a process of decision making, in which we use our reasoning, as critical reflection. In this process information can be helpful, as it allows us to make more informed decision. In order to better understand how this works, I will turn to Searle [2001], who analyzes the process of reasoning. For the argument here it is not necessary to go into it extensively, but I will address the points that are relevant to the question of internal autonomy.

Searle identifies at least two ways in which information can be beneficial in decision making. The first thing he notes is that a reason must be *known* by the person making the decision [Searle

2001, pp. 116-117]. Before a reason can play a role in our deliberation, it has to be available to us. We have to know about it. Imagine that it is raining outside. This can be a reason for me to decide that I will bring an umbrella. That is a decision you might make often in everyday life. But you must see that you cannot make this decision if you do not know that rain is a reason to bring an umbrella. You have to know that an umbrella can keep you dry from rain, in order to decide to bring one when it is raining.

A second condition that a reason must usually fulfill according to Searle is *truth*. If the sun is shining, the fact that it is raining is not a valid reason for me bringing an umbrella [Searle 2001, 99. 136-137]. He does put this into perspective as sometimes a mere belief can be a valid reason. For example if I believe that it might rain later today, it will be perfectly reasonable for me to bring an umbrella. Still, our beliefs need to be formed as well through using information we have of the world.

If we then link this to the concept of autonomy we developed earlier we can note a number of points. We saw that in order for a person to be autonomous he has to be able to make up his mind by critically reflecting on his desires. Such reflection, I think, should be as well informed as possible. As I just argued knowledge and truth are factors in reasoning, and such reflection is a form of reasoning. As such the provision of information to a person has the potential to be able to help him in making up his mind and thus contribute to his autonomy.

The role of information in decision making ties it to internal autonomy. Autonomy is not possible without critical reflection and knowing what is going on around you can aid you in this process. We can conclude that having information provided is helpful in reasoning and thus in critical reflection on desires, and therefore also for the autonomy of a person. Having the right information can help us against being deceived, which is important for autonomy.

4.1.2.Negative effects

Besides things that strengthen our internal autonomy, it can also be diminished. In this section I will turn to these negative effects. The first way in which we can lose autonomy is indoctrination, one of the issues in which Dworkin argues is a failure of procedural independence. In such a case, a person is conditioned so that instead of rationally thinking for himself, he follows a procedure imprinted in his mind. This leads to a problem for a person's autonomy because after being indoctrinated, he is no longer free to make up his mind, a choice has already been made for him. There can be a gray area between education and indoctrination, and Dworkin states it is difficult to clearly distinguish between the two [Dworkin 1988, p. 18]. However roughly speaking we can see education more as the forming of a "toolbox" in your head that you yourself can apply. For a person that has been

indoctrinated, the outcome of his decision has more or less already been decided. It is not just important that a person is happy with the way he lives, as an indoctrinated person may be indoctrinated to be, but that he comes to this way of life through higher order reflection on his preferences. This is what indoctrination takes away, as the ability of a person to critically reflect is pushed aside.

Another way in which someone's autonomy may be decreased is through acts of deception and coercion, another failure of procedural independence. Deception is deliberately providing false information in order to trick a person into doing something you want. Coercion tries to achieve the same, but uses force or threats as its method. According to Dworkin the reasons they diminish a person's autonomy is because while the actions are undertaken by the deceived or coerced person, he is in a sense the instrument of the deceiver or coercer [Dworkin 1988, p. 14]. The victim is not free to make up his own mind, as undesired external pressure is placed upon him. This means the choice of what to do, is no longer his own. He is fooled or forced into having desires that would normally not have been the result of the critical reflection on his own desires.

Another place to recognize the issues of indoctrination and coercion is in paternalism. Paternalism means that an external body, such as a government, is deciding for someone how best to live his life, usually by claiming it is in that person’s best interest, or what the person would really want. Coercion and indoctrination can be used as tools to force this decision on people, if they would normally not accept it. We can see here that when an authority decides for us how to make up our minds, we are not doing it ourselves, and definitely not according to critical reflection on our desires. As autonomy is the ability to decide for ourselves what we want, paternalism is in contradiction with this. Paternalism should not be confused with simply listening to what someone else says. We often willingly obey our parents, teachers, government, the law and so on. I think it would go a little too far to say that your autonomy is diminished every time you take advice or follow the law. The difference with paternalism is that here you have chosen to follow up on what someone tells you, instead of it being forced on you.

These negative effects also show that having information can be beneficial to autonomy, as it may be used to combat cases of deception. After all, if we are able to verify information that we receive, it will be harder for others to feed you false information on purpose. So because deception is detrimental to autonomy, we can recognize the role of information, and specifically access to information, to be able to prevent this negative effect. Information is in this sense both an enabler of positive effects on internal autonomy and a disabler of some negative effects on internal autonomy.

4.2.Effects on external autonomy

In this section I will do the same as I did in the last one, only this time the subject is external autonomy. As explained in the previous chapter, to be externally autonomy is to make your desires effective. Anything that influences a person's ability to do this, is affecting external autonomy. Like in the previous section I will first turn to some positive aspects, and then to negative influences on external autonomy.

4.2.1.Positive effects

Whereas information plays a role in the reasoning that makes up internal autonomy, external autonomy is characterized by action. As such anything that strengthens this action, by making it easier, or even possible to carry it out, can be seen to enhance external autonomy. These things together can be seen as improved control. For example when an inmate is released from prison, he regains control over where he can go, which enhances his external autonomy, as he is now able to make more desires effective.

In the previous chapter I argued that formal freedom plays a role in external autonomy, as interference with making your desires effective diminishes this ability. Brey [2006, p. 160] mentions the relation between freedom, autonomy, and control. Specifically negative freedom, which according to Brey entails control over your environment and thus means you can realize your desires, is important for external autonomy. This also shows control improves external autonomy. Having control means you have negative freedom, and thus you are not suffering from interference in executing your actions.

That control is important for autonomy was already indicated by Oshana, in her conditions for autonomy. Without control we would not be able to make our desires effective, or we would be dependent on contingencies to do so. Such dependence is not in line with autonomy, which is about independence. Control facilitates this independence with regards to action, as being in control means you can carry out actions as you want them. More so, the more things we have under control the more externally autonomous we are, as we are better able to do what we want.

A second condition for external autonomy put forward by Oshana is that people need to have relevant options for action. This is related to the issue of control, as you can only have relevant options is, if you are able to carry them out. Control in this sense means that you are able to pursue a course of action, and have a choice in which course of action you will be pursuing. In this sense having relevant options for action means you can exercise control in various ways. Without choice you do not really have control, as all you can do is work towards a set end. Options for action mean

you are able to influence the goal you are working towards, or the way you get there, in your actions.

These things put together indicate that improved control enables people to be more externally autonomous. With more control over the environment we are better able to express our desires in it through our actions. Anything that helps to give us better control can thus be seen as having a positive effect on autonomy. As information opens more doors for reasoning, control opens new doors. So when we are looking for positive influences on external autonomy, we need to find something that gives us control to make our desires effective in actions.

4.2.2.Negative effects

When we look at influences on external autonomy the counter part to control is dependence. When people become dependent on something, this may limit their external autonomy. When we are dependent on a third party we are not able to exercise our control ourselves. This third party is able to exert control itself, countering the control we ourselves need to have for external autonomy.

Oshana argues for independence in a substantive sense, because it's absence will bind us to other people in ways that restrict our autonomy. One of the aspects of substantive independence is that there is nobody "dominating" [Oshana 2006, p. 86] a person. In such a situation we can not make our own desires effective, as there is someone else forcing us into action, or at least having a strong influence on what we do. When that is the case we can not speak of self-government. Dependency can thus diminish external autonomy, as our action do not reflect our desires, but instead reflects those of someone else.

Depending on someone else does not have to be a problem, but in certain forms it does harm external autonomy. I have presented Oshana's form of substantive independence in the previous chapter, but for now it suffices to say that dependence hurts external autonomy in cases where it does prevent us from making desires effective

Tavani [2004] also addresses the issue of dependence, but not in the form of domination. He wonders what happens when we become so dependent on something we are no longer able to live without it. If we can not, we can be seen being too dependent on this issue. It would diminish our external autonomy as we can not choose to pursue a course of action in which we reject that on which we have become dependent. Where control opens up options for action, this form of dependence may close others. While it does not actively dominate us, as in Oshana's form of dependence, Tavani's appears to be more passive. They can both affect external autonomy in a negative way however, as they both steer a person towards a path they might not have chosen themselves.

Dependence can thus in certain cases be seen as a negative influence on external autonomy, as it lessens the control of a person. When we become dependent on something, it also interferes with our freedom, because it prohibits us from doing certain things. As it interferes with freedom and control, which are constitutive parts of external autonomy, this part of autonomy can also be said to be diminished. As such things that we become dependent upon, even if it is our own fault as may be in Tavani's case, have a negative effect on our external autonomy.

Another issue that may negatively affect external autonomy is privacy problems. We have seen that privacy and autonomy are related in the previous chapter. If we know we are being watched, this influences our behavior, possibly leading us to not do what we would originally want to do. This has been explored in the debate of the Panopticon, as it was put forward by Bentham [1995]. While this may be a good thing, for example when security cameras prevent us from mugging someone, one should be careful that activities that are legal are not also suppressed.

One of Oshana's conditions of substantive independence is that individuals are allowed to do things that are not necessarily embraced by the state. Part of this is that privacy should be available to allow people to do this. Being observed can be seen as a limit to freedom, as it becomes less comfortable to do certain things, which may hold a person back. I believe this is a case of restricting formal liberty, as people are creating situations in which you become inclined not to do what you want to do. This brings the issue of restricting privacy into the domain of restricting autonomy and means it is something I will consider in this thesis.

4.3.Evaluating effects of Smart Surroundings on autonomy

With the previously discussed taxonomy of possible effects on autonomy, I now want to turn to the question of how to evaluate these. We have seen that individual effects on autonomy can be positive or negative, but often two of these effects may be linked together to create more complex effects on autonomy. In this section I will analyze how this works and how effects on autonomy can be combined into larger effects.

An important thing to note is that a Smart Surroundings system may have multiple effects on autonomy. For instance a system that uses information about you to enhance your control over something, for example by providing information about your allergies to a restaurant so they can make a menu of things you can eat, might have you giving up privacy as well. Here we see that on the one hand there is a positive effect on autonomy, while on the other there is a negative. This raises the question of how this is possible.

In order to answer this question we have to take another look at autonomy. Now as I have said autonomy should be seen as a matter of degree. We can recognize some people are more

autonomous than others, such as children who may not have developed full epistemic competence required for autonomy, or inmates who have no control over where they go. This matter of degree is not fully expressed in Dworkin's view. Internal and external autonomy are descriptions of what autonomy is, not how much of it someone has. The degree of autonomy is not expressed in the fact that we critically reflect on our desires, and carry them out, but rather in the ways we are able to do this.

Using Oshana's seven conditions makes it more apparent where this matter of degree comes from [Oshana 2006, p. 76]. We have seen that these represent conditions that a person must adhere to in order to be autonomous. For instance someone has to have relevant options for action, in order to be autonomous. By refining internal and external autonomy with her considerations we can have a more detailed analysis of what is affected by a change in autonomy. For instance when an inmate is freed, his control is improved, and in that way his external autonomy. And as these conditions change, for example by being more or less in control in a situation, so too does the degree of autonomy a person has.

This is where the effects on autonomy come in. They can affect these conditions, and in that way change a person's autonomy. So when for example we are provided information, this makes someone procedurally independent to a greater degree, and in that way it also makes us autonomous to a greater degree. In this way we can map the effects of Smart Surroundings onto conditions for autonomy. I will now do this for the effects I discussed in the previous section:

* Information and deception can be seen as affecting procedural independence. Deception goes against procedural independence, as your reasoning is being adversely affected by someone in a way that is not in your interest. As I argued having access to information is a way to go against deception, and as such is a way to strengthen substantive independence.

* Control is a factor is directly related to one of Oshana's conditions, and as such does not require much explaining. If something gives you more or less control over what you want to do, this aspect of autonomy is directly affected. Dependence on the other hand gives us less control over our actions.

* Options for action is another condition of Oshana that can be more or less directly affected. Something can give or restrict the options we can choose from in setting out a course of action, and then this condition of autonomy is improved or harmed.

* The final effect of privacy is related to the condition of substantive independence. Privacy issues mean that other parties may be able to influence us in ways we ourselves do not desire. As such these issues lead to diminished autonomy.

Two things to note about these mappings: firstly there may be more effects that can be mapped to conditions for autonomy, such as education which aids procedural independence as well as rationality and epistemic competence, but as I will not be investigating these, I will not discuss them here. Secondly we can again recognize the distinction between internal autonomy in the first mapping, and external autonomy in the others.

Now I will turn back to the issue of multiple aspects of autonomy being affected simultaneously. We can now see that there are multiple conditions which can be affected, and one Smart Surroundings system (for instance) may be able to affect a number of these. To come back to my privacy example, we see there may be an increase in control, at the cost of substantive independence. I will speak of *shifts* in autonomy in these situations, as one might imagine some of the substantive independence gets shifted to control. Now multiple aspects may also be affected, but all in either a good or bad way, then I simply speak of increased or decreased autonomy. For there to be a shift, at least one condition must be improved, and at least one must be diminished.

Valuing shifts in autonomy is problematic because one aspect of autonomy is not necessarily better than another. Some people may be inclined to give up some privacy for more control where others may not. Moreover this also depends on the context, of who we give the privacy sensitive information to, and what forms of control we get in return. Because of this context-sensitivity, there is no way to say outright what shifts in autonomy are good and bad. However once the shift has been identified, it does become possible to analyze in what situations such a shift may be good, and in what situations it may be bad.

An intuitive solution might be to take some sort of weighted average of the effects on autonomy for the different aspects. If this comes out positive, we consider the effect positive for autonomy, otherwise we consider it a negative effect. The problem would then of course be how to decide the weights. I want to argue there is no fixed set of weights that can be used in these circumstances. As I said how important the effects on a certain aspect are depends on contextual issues, such as how much a person values a certain effect.

In summary we can translate the various positive effects on internal and external autonomy to effects on aspects of autonomy. These aspects can be seen as the conditions that Oshana has placed on being autonomous, and as such can also be classified as internal and external. The effects a system has on these values, good or bad, can then be translated to an overall effect on autonomy. However there are cases where different aspects are affected in different ways. I have called these cases autonomy shifts, they are more difficult to evaluate, relying on the context to show which aspect of autonomy is more important.

4.4.Constructing a framework

After a taxonomy of effects on autonomy that are relevant for Smart Surroundings, and discussing how to value effects that can be had on autonomy, it is now time to turn to the construction of a framework for analyzing Smart Surroundings' effects on autonomy. In this framework I will map out how to analyze the effects of Smart Surroundings. Unfortunately there is no magic formula to decide in what way Smart Surroundings systems will affect people's autonomy. Smart Surroundings are complicated technologies, and autonomy is a complex concept as well. For that reason I think it would be too simplistic to simply say that a certain system has a certain effect on autonomy. There should be solid reasoning behind such a claim, to avoid having a too deterministic look at the technology.

To this end I will present four considerations that should play a role in an analysis of the autonomy effects of a Smart Surroundings system. These considerations lead to questions or issues which can subsequently be investigated in order to construct an image of what the effects of a specific system will be. So while there is no magic formula, I hope to provide a comprehensive list of considerations that will lead to an analysis of the effects of a system on autonomy. However it will probably be possible to expand or refine these considerations further.

These four considerations should be analyzed step by step, in order to come to a conclusion regarding the autonomy effects of a specific system. The first step flows into the second, and combined with the third they lead to a concluding fourth step. As such walking through the framework in this way should lead to an analysis of the issues that are relevant to autonomy in Smart Surroundings. The taxonomy that has been given in the first part of this chapter is useful as a starting point when going through the steps.

Using this framework would be best applied to Smart Surroundings systems rather than devices. I distinguished these two by noting that a Smart Surroundings system consists of a several devices linked together, where a device is a single artifact. Because the actual operation of a device will to a large extent depend on the system within which it is used, the effects of Smart Surroundings can best be found within systems. It is quite likely that individual devices will not do much until they are networked with others that provide them, for instance, input from sensors or other sources. At the same time one device may be able to do a number of different things based on which other devices it is connected to. For these reasons it makes more sense to analyze the effects of Smart Surroundings at the level of systems rather than devices.

1. With the first consideration I want to turn to the effects that systems have a built-in tendency towards. Brey [forthcoming, pp. 3-6] discusses the fact that technological artifacts are not

neutral, in the sense that an artifact does not prescribe a certain use and thus certain consequences. Artifacts have central uses, which are the accepted uses that are the reason for their production. These central uses may strongly tend to have certain consequences, which can then be seen as "built-in" consequences. To paraphrase one of his examples: a car has driving as a central use, and cars tend to produce greenhouse gasses, making it a built-in consequence.

Brey [forthcoming, p. 4] proceeds to argue that built-in consequences are especially prevalent in those technologies that act without input from a user. This brings us back to Smart Surroundings, which are characterized by their ability to act without input from a user. In this sense we are likely to find embedded values in Smart Surroundings systems. Not all of these will be relevant to discussions of autonomy, but some will be. By looking for these built-in consequences we will be able to identify which kinds of effects on autonomy a certain system may have.

The reason this is an important consideration is because it looks at the way the system under investigation works. The effects on autonomy can only be identified by looking at what consequences are built-into a technology, not just by forming a predetermined judgement about Smart Surroundings as a whole. As such these consequences of the system are an issue that should play a part in an analysis of effects on autonomy.

2. The second consideration that is relevant to assessing the effects of Smart Surroundings on autonomy is that of what aspects of autonomy are affected by the technology. After analyzing the built-in consequences of a technology, I will not turn to see which of these can be linked to which aspects of autonomy. Brey [forthcoming, p. 5] argues that some built-in consequences can be seen as embedded values of technology. These are built-in consequences that people consider to be good or bad, in other words, that are valued by people. For this framework I want to argue that the aspects of autonomy are values, as they are a part of autonomy. We have already seen that autonomy itself is something to be valued, and as these aspects lead to autonomy, they should be valued as well, as long as they have no other negative effects at least. This does not seem to be the case, as issues as control and procedural independence in themselves can be seen as good.

A starting place to analyze this step of the framework might be to look at whether a Smart Surroundings system affects internal autonomy, external autonomy, or both. As Oshana's considerations can be linked to either internal or external autonomy, this means there are considerations that do not need to be investigated when a system does not affect a person's actions for example. Beginning an analysis here can help to show some areas of investigation that need not be taken.

Further refinement should be introduced by analyzing Oshana's considerations. In order to assess autonomy effects of Smart Surroundings one should be able to identify which of her considerations are influenced by built-in consequences of the system. These can then be seen as embedded values as in Brey's discussion. By identifying these values we can find which built-in effects are relevant to autonomy, and which effects are tied to which of Oshana's considerations, which can then be used for evaluating the effects on autonomy of the system. This evaluation will take place in step 4.

This consideration is important because it links the effects identified in step 1 to values that are important for autonomy. A Smart Surroundings system may have many built-in effects, only some of which can be translated to values that are relevant to autonomy. This step of the framework is aimed at filtering the relevant from the not-relevant consequences. As such it is key to analyzing the effect Smart Surroundings have on autonomy.

This consideration also sets some boundaries to your analysis, by possibly limiting the scope of your analysis to internal or external autonomy. If you recognize you are dealing with a system that only affects external autonomy by providing control in some form, it makes no sense to go looking for what kinds of information it may provide. This consideration ensures you do not go searching in the wrong place.

3. The third consideration is the relation people can have to the system according to the relations introduced by Ihde. These four relations are used to analyze how people can experience a Smart Surroundings system. The person who is engaged with the technology also plays a role in the relationship. Because we can not generally speak of a "user" in Smart Surroundings, we can use the four relations that Ihde defined.

One relation that plays a role in the vision of Smart Surroundings is the background relation. The background relation means that people do not have to worry about something, as it gets taken care of automatically. On the other hand it also means that the technology is less easy to be grasped by people, as it does not show itself most of the time. Being aware of these issues may help to identify autonomy issues where a person might lose control because something is hidden from him.

The other three relations, alterity, hermeneutic, and embodiment, all affect the way a person interacts with the technology. Both the technology and a person play a part in this, usually within the bigger context of the world. Looking at what relation is present helps to understand the technology, but also the way the person will experience the system. This way the relation between person and technology can indicate how autonomy effects of a system can be picked up by a person. For example in an alterity relation we will see the technology as another party trying to tell

us something, whereas in an embodiment relation we may more readily accept new information as coming from ourselves.

The reason this is an important part of the analysis is that it allows us to identify in what way people experience a system. By knowing we are dealing with a background relation we know that the system tries not to draw attention to itself. This can be important when dealing with a system where a person wants to know it is running to make sure it is not sharing privacy sensitive data for instance. Knowing the relation a system has to people means we can place it in perspective to these people and see how they interact with them.

4. The fourth consideration is to evaluate the effects on autonomy that have come out of the previous considerations. The first part of this is to analyze which of the effects identified so far are positive and which are negative. This along with the point of identifying which aspects of autonomy are affected will allow us to evaluate the effects on autonomy. If the effects are all positive or negative, this would be the outcome of the analysis.

Evaluating the effects on autonomy becomes more problematic in cases of shifts in autonomy, where different aspects are positively and negatively affected. The first step in such cases would be to identify which aspects of autonomy are improved and which diminished. As I said in my previous section a method may need to be developed for deciding which aspects are more important, or are being affected to a stronger degree in order to figure out whether the shift as a whole is for better or worse.

However if the analysis of the previous steps has been carried out, you should be able to point out where any potential problems for or improvements to autonomy can be found. These can then be analyzed for their own merits, and how they relate to each other, in order to come to a final conclusion. At least one should be able to give an indication to which situation will favor use of a specific Smart Surroundings system, and which will not.

As this is the result of the analysis, and wraps it up, this step should not be left out. It translates the effects and values of the system, as well as the relation it has to people, into an analysis of what a Smart Surroundings system's effects on autonomy are. It gives an evaluation of the system and allows you to put forward under what circumstances a system is good or bad for people's autonomy.

4.5.Types of Smart Surroundings

In this section I will introduce three types of Smart Surroundings that are relevant to my discussion of autonomy effect of such systems. The following three chapters will offer in depth discussions of

their relation to autonomy, so in this section I will give a short introduction on the three types of systems, to show how they stand in relation to each other.

It should be noted that this division in Smart Surroundings systems is made mostly from the perspective of their autonomy effects. It focusses on issues that are interesting for an analysis of autonomy, and will not necessarily work well for other discussions of Smart Surroundings. The three types of systems I identify can largely be classified by the aspects of autonomy they affect. However they also relate to a fundamental activity that can be found to be the basis of each of the systems. I will now present these three types of Smart Surroundings systems.

4.5.1.Informant systems

The first type of Smart Surroundings systems I will discuss are systems that provide the user with information. I will refer to these types of systems as “informants”. These informants can gather information for you, in order to present it to you when you ask for it, or when the system deems it relevant. As such they are proactive only in the gathering and presentation of data, nothing else is done with it on initiative of the technology.

An example to illustrate the role of the informant might be a smart mirror that provides feedback to a person. This mirror [Accenture 2006] allows a person to see what he will look like based on his lifestyle pattern. An unhealthy lifestyle will show an image of the way you will look when you do not change this lifestyle. This type of Smart Surroundings system is aimed at providing people with information. The systems would gather information from a network of Smart Surroundings devices, and present this to the user when it is relevant.

The term informant may suggest a spying attitude, which does not have to be the case, but informant systems may well hide in the background some of the time to not attract more attention than necessary. While it is gathering information, or it is not in a position to provide information, an informant should stay hidden.

4.5.2.Servant systems

The second type of Smart Surroundings systems I will distinguish is that of servants. Servant systems can be characterized as systems that perform tasks for you. This could be a simple household task like making coffee, but also something more elaborate. Essentially you can delegate tasks to servant systems preventing you from having to do them yourself. The smart nature of servant systems is that they should be able to do more easily than a single “stupid” appliance can.

In line with the mirror example I give in the case of informant systems, one might imagine a servant mirror that is connected to a coffee maker. When you get up in the morning you can tell it

you want some coffee, and it will proceed to instruct the coffee maker to do so. This way you can delegate a task to the servant systems.

Servant systems can be seen as the opposite of informant systems, by affecting only the actions of a person. Basically a servant system requires a person to decide what it wants a servant system to do. Rather than provide a person with information, a servant system provides services. These could be many things, depending on what sorts of technologies are actually in place.

4.5.3.Associate systems

The third type of Smart Surroundings system I will identify is a system that tries to work wholly independent from people. Whereas servant systems perform a task you ask of them, these system should require no input to initiate activity. Basically this kind of system needs to take over tasks from a person completely and facilitate both the reasoning about and the execution of a task. This type of system tries to reason about the desires we may have based on our behavior, and conclude from there on what actions to undertake. As these systems are designed to work alongside you, rather than for you, I will call them associate systems.

An example of such an associate system is a smart mirror that recognizes symptoms of stress and recommends that you take a vacation if you look stressed out [Brey 2005, pp. 162-163]. In this case we might view the Smart Surroundings system as a friend who gives us a similar recommendation. However this time it is the technology that gives us advice about how to deal with the situation at hand. We can distinguish between two ways of doing this. In the first the Smart Surroundings system “reasons” about what the user wants and carries out the actions associated with that desire. In the second case Smart Surroundings help the user in making decisions by providing information, or suggesting possible courses of action. Only the first of these can be seen as associate systems, as only they try to make desires of people effective without their involvement.

The important difference between associate an servant systems is that associates attempt to work completely on their own, while servants need an order to go about their task. The initiative is with the “user” of the system in the case of servant systems, while associate systems act wholly independent. The difference is perhaps best illustrated by the example I have given of the different mirrors, where the servant system requires a command, while the associate system acts on your behavior, and distills a sort of implicit command from that.

4.6.Conclusion

In this chapter I discussed some positive and negative effects to both internal and external autonomy. Effects that enhance internal autonomy can be seen as the provision of information that can go into the critical reasoning that makes up internal autonomy. Negative effects can be found in

cases of deception, coercion, and paternalism. Effects on external autonomy influence a person's ability to make his desires effective. Positive influences include the control one has to realize desires and the options to take relevant courses of action. External autonomy may be diminished through dependence and privacy problems.

Secondly I turned to the process of evaluating the effects on Smart Surroundings, especially when multiple effects happen simultaneously. When all effects are good or bad, than this is what we consider the combined effects to be as well. However in cases where at least one effects is good and one is bad, there is a shift in autonomy. Shifts are more difficult to value as they are context dependent.

Next I used this analysis to construct a framework which can be used to analyze such effects in the autonomy of people that Smart Surroundings may have. This frameworks consists of four considerations that are used to analyze Smart Surroundings systems. This analysis will lead to an overview of what autonomy effects a certain system may have, and can then be used to classify these effects as good, bad, or a shift in autonomy.

In the next chapters I will use the considerations of the framework to look at Smart Surroundings systems on a high level. To this end I have identified three types of systems: informant, servant, and associate systems. Informant systems provide a person with information as he requires it. Servant systems instead can be handed tasks to carry out. Associate systems work wholly independently to identify desires of the user and satisfy these. In the next chapter I will analyze informant systems, and the following two deal with servant and associates respectively.

5. Informant systems and autonomy

In this chapter I will begin applying the framework to Smart Surroundings, specifically to informant systems. Doing so I will answer another part of the question I started on in the previous chapter: "How can Smart Surroundings influence a person's autonomy, and how can this be evaluated?" In this chapter I will thus focus on identifying and evaluating effects on autonomy of informant systems. I have defined informant systems in the previous chapter as those Smart Surroundings systems that provide us with information as we need it.

This chapter is structured in line with the framework of the previous chapter. As such I will first analyze the built-in effects we can recognize in informant systems, and what autonomy-related values are embedded. Next I will discuss how the relation to people is important for autonomy issues related to informant systems. This will lead to an evaluation in the final section of this chapter.

This chapter is shorter than the two that follow because I believe there are less influences on autonomy that can be identified in informant systems than in the other two types of Smart Surroundings. That does not mean informant systems are less interesting from an autonomy perspective, since they affect autonomy in quite a different way than servants or associates. For this reason this first of three chapters about Smart Surroundings systems will be less elaborate than the other two.

5.1. Effects and values of informant systems

In this section I will analyze the autonomy-related embedded values of informant systems. In my framework I have argued that these values can be seen as specific built-in consequences of a technology. In the case of informant systems I will analyze the effect of providing information, as this is the central use of an informant system, in the sense that it is its reason for existing. After having explored this effect, I will turn to how we can link this to a value related to autonomy.

When Smart Surroundings are used to provide information, they can basically be seen as a large catalogue of data that is readily available. Because Smart Surroundings consist of, among other things, a very large array of networked objects, it can potentially access information from all the different nodes. Not all information will be accessible to every person, but in some cases it will be interesting for parties to provide as much information as possible, for example giving information about discounts in order to attract customers to a store. In this section I will identify ways in which Smart Surroundings can provide the user with information that can be used to form knowledge or beliefs about the user's environment.

In the case of Smart Surroundings this can take a number of forms. Perhaps the most important one is that informant devices themselves may be able to present the reasons for their use [Greenfield 2006, pp. 237-238]. We have seen that combinations of Smart Surroundings applications are capable of offering functionality to people they might not even be aware of. Perhaps by putting these reasons forward to a person, the technology can make a user of aware of reasons that might otherwise have stayed hidden. This way the systems can inform a person of possibilities he has, but might not know about.

A second way in which Smart Surroundings may bring information to the knowledge of the user is by giving reminders. As many different forms of calendar software are already available, it seems like an opportune application to have in Smart Surroundings. An appointment we made can be a valid reason for us to decide we need to follow it. However we may have forgotten about the appointment for various reasons. A simple reminder message from an informant system may be all we need in order to use it as part of our decision making process. However reminders need not be temporal, you might request a message every time you pass by a book store, keeping you informed of such information.

Smart Surroundings may also aid in a third way, where they are used a lot like we might use the world wide web these days. In this form of providing information we ourselves input a query, and we can let the informant system search for us. One might imagine a location based map system (as current GPS systems, whose personalized location based service definitely show signs of Smart Surroundings already) which can be used to find a restaurant, as is possible in some current GPS equipped cell-phones. In this way informant systems allow us to bring information with us.

The fourth way in which I think Smart Surroundings can help inform a person, is by giving recommendations. We can already see this happening on websites like Amazon and Last.fm, where smart software is used to recommend books and music based on what has recently been looked at or listened. This more closely approaches the intelligent agent approach discussed in the previous section, as the technology explicitly tries to construct the desires of the user. However in these instances the system does not actually make any decisions, other than what to show a person. A personal profile that is part of the Intelligent User Interface can be used for this.

What these points have in common is that they take information that is not known to a person from his environment and present it to him. Other than that they do not initiate any action. This is possible because of the network connecting objects all around. There may be more ways conceivable in which Smart Surroundings can give information to a person about what is happening in his vicinity, but the point should be that something is presented to him that he might not

otherwise know. The decision for what then to do with the information should remain with the person.

I have referenced to the world wide web twice in my discussion of informant systems, so how is this new technology different? I think that to a large extent it is actually similar. The world wide web has been the biggest revolution in ICT in recent years, and I believe its use is far from over with the introduction of Smart Surroundings. The way we interact with information sources like the world wide web, and the information we can find on it will have the potential to expand significantly. Currently we are mostly limited to pc's and laptops when accessing the internet, even with the current move towards mobile devices. Smart Surroundings is the way forward in this regard, as information will become much more accessible, and for that reason can have a larger impact on our everyday lives.

With regards to the content informant systems will give us access to, I think this might see an even larger increase than the accessibility. When every object around us is equipped with sensors and processors, there is bound to be a large amount of data that is gathered. Alongside this the many different wireless networks that can be tapped into, such as the network of a building you are in, or the publicly scannable RFID tags in your immediate surroundings, will mean this information is communicated all around. A network of informant systems may present us with a world wide web that does not just contain information that has been stored online, but can be a reflection of objects in the real world. Smart Surroundings will be able to make nearly everything around us accessible, and make it accessible nearly anywhere.

After analyzing the built-in effect of information providing that is central to informant systems I will now relate this to embedded values that are relevant to autonomy. The first point to notice is that informant systems affect our reasoning, and not our actions. They therefore only affect internal autonomy, which is our ability to use critical reflection to reason about our desires. Informant systems do not give us more control over what we can do, but rather aids us in thinking about what we want to do.

Knowing that informant systems affect internal autonomy, we may now link it to a specific aspect of autonomy. As I argued in the previous chapter, providing information can be seen as improving procedural independence. By having more information available to us, we are better equipped to be making decisions. It also helps us against deception from sources that provide false information, by giving us an opportunity to check other sources. Informant systems thus embody the value of procedural independence and in that sense improve our internal autonomy.

However there are some caveats to the effects of informant systems. As I have compared it to the world wide web, the critique that anyone can put anything on this source of information may also be applied to informant systems. Brey [2005, p. 162] notes that Smart Surroundings may be used to further the interests of a third party, and recommend purchases in their best interest rather than the user's. The system itself does not care about the information it gives you. Informant systems might be used to give false information, or information aimed at manipulating a person.

In cases where the system is not providing information in support of the user's internal autonomy we may even speak of deception, as the system is providing false information in order to get someone to make up their mind in a way they would otherwise not. While the system does not have the intention of deceiving a person, the user is being manipulated through such a system. Deception is problematic for autonomy, as such manipulation interferes with procedural independence [Dworkin 1988, p.18]. Thus the value of procedural independence is not always improved by informant systems. This is based on the information it actually ends up providing. As such the effects of an informant may be negative, if the information it proved is aimed at deception.

In summary informant systems have the built-in effect of providing people with information. This can be translated to the embedded value of procedural independence, because people can use this information to make up their minds. As such informant systems affect internal autonomy. Whether informant systems actually have a positive or negative effect on procedural independence depends on whether or not the information they provide is deceptive or not.

5.2.Informant systems' relations to people

After analyzing the way the value of procedural independence is embedded in informant systems, I will now follow my framework to the next step: discussing the way the relation between person and informant system affects autonomy. There are three relations that I identify as playing a role in informant systems, which are the background relation, embodiment relation, and hermeneutic relation.

The background relation is important in informant systems, because this relation is important for calm technology. It is likely that these systems will try not to attract too much attention until it is necessary, in order to prevent people from being swamped with information [Greenfield 2006, p. 238]. While it is gathering information, or it is not in a position to provide information, an informant should stay hidden, as it does not have a meaningful contribution to the reasoning of a person then. While the background relation does not influence autonomy to a great degree, care should be taken that the technology is not hidden to such a degree that people are not able to get away from it. Both Greenfield [2006], from a technology perspective, and Oshana [2006], from an

autonomy perspective, argue that one should always have a way out. If this is not the case, a person may become stuck to a system he wants to get away from.

Besides being in the background, informant technologies are more inclined to be on the embodiment and hermeneutic side of Ihde's technology relations. An example of an embodiment relation in an informant systems is some kind of heads up display (HUD) for example. A hermeneutic relation on the other hand would be some device we need to read in order to get access to the information, such as with the example of the mirror that can show the effects of your lifestyle. Both embodiment and hermeneutic relations are mediating relations in the sense that they provide some kind of access to information about the world. We reach through these technologies to gain this information. We need to interpret this information to a greater or lesser degree, as seeing a heavier version of yourself in the mirror needs to be interpreted as you having an unhealthy lifestyle.

A potential problem for autonomy caused by informant systems stems from the fact that the information provided by informants is done in a mediating relation. Ihde [1990] investigates the way a mediating technology changes the way we perceive the world. He claims that mediation by technology is never wholly neutral, but is always transformed. Verbeek investigates how such transformation of perception always happens in two ways, an amplification and a reduction [Verbeek 2005, p. 131]. The technology enhances some aspect of perception, but simultaneously diminishes another.

This may affect the autonomy effects of a system, as this transformation might lead to misinterpretation of the information and in that way to being misinformed. Again the autonomy effects of a specific system are dependent on the actual information that it provides, and the operation of the system. The fact that information is mediated by the technology makes this more complicated, as interpretation of people plays a role in the way the information is presented. For this reason we should never blindly accept mediated perception, as the information may well be biased in the way it is being presented. This is why the relation between user and technology should be investigated in order to see how it influences the autonomy effect of a system.

The shifts in the transformation of perception can be larger in hermeneutic than embodiment relations. Hermeneutic relations always involve some kind of translation that needs to be interpreted, while in embodiment relations one may just see a difference in scale for example. However even in an embodiment relation our perception is different than it would be without the technology, and as such some form of interpretation might be needed. I think in informant systems

it will often be necessary to somehow represent complicated sets of data in a simple way, especially if the technology aims to present this information in a calm way.

5.3.Evaluating informant systems

The final step in the framework is to combine the analysis of the embedded values and relations with people and evaluating the effects an informant system can have. In this last section I will take this step. I will look at what conclusions can be drawn with regards to autonomy effects of informant systems based on my analysis so far.

Informant systems are designed to give information, and as we have seen the giving of information can have a positive effect on internal autonomy. Informant systems can make information available in many contexts, and this way they embody the value of procedural independence, which means that people are better able to make up their own minds. They are not being tricked or manipulated, because people can draw their own conclusions on the basis of information they have access to with informant systems. A simple example may be a locational system that can help you find nearby hospitals very quickly. Having this information available at all times makes it easier to make a decision about where to go in case you need medical attention. When the information provided supports the user in making up his mind, then we can see the effects of the system as positive.

Problems may arise for two reasons when informant systems are used. Firstly informant systems may be used to provide deceptive information to people, which leads to problems with procedural independence, because people will now be manipulated into doing things they normally might not. Secondly the mediating nature of informant systems may lead to misinterpretation of the information, which can also lead you to doing things you would not had you been well informed. Procedural independence is harmed in these cases because you are being “tricked” into something, rather than going into it well-advised.

Whether informant systems are good or bad for autonomy can thus be distilled from the information they provide, and how they provide it. As long as the information is true, and presented in a manner that is easy to interpret, procedural independence will generally be improved. In these cases people will be able to use informant systems to support their decision-making and as such their internal autonomy. Informant systems thus have potential to improve autonomy. However this is not a given, and care should always be taken to see if the provided information does not lead to a decrease in internal autonomy instead.

5.4.Conclusion

In this chapter I looked at the ways in which informant systems may affect the autonomy of people. I did so by first analyzing the built-in effects and embedded values of informant systems. Informant systems embody the value of procedural independence by providing information a person can use in his deliberation. However informant systems may also go against the value of procedural independence when they deliberately give false information to a person.

Secondly I discussed the nature of the background, hermeneutic, and embodiment relations informant systems can have to a person and what role this plays in autonomy. I noted that the mediating nature of hermeneutic and embodiment relations can affect autonomy by requiring interpretation of people, which may lead to information coming across in the wrong way, and leading to misinformation.

Finally I looked at how these considerations could be evaluated as good or bad autonomy effects. The accessibility of data can be a positive effect for a person's internal autonomy. However the content of the information should be analyzed as well, as there is possibility for deception through these systems. Another issue may be mediation, which can lead to misinterpretation of the information.

The following chapter will be along the same lines as this one, but aimed at servant instead of informant systems.

6. Servant systems and autonomy

In the previous chapter I have discussed the impact informant systems can have on autonomy and in this chapter I want to perform a similar analysis for servant systems. These systems are aimed at empowering a person, by carrying out tasks for them. The most important role of these systems is that they realize something a person desires, with as little involvement of that person as possible. Contrary to associates however, they will not be reasoning about what it is a person would desire, so there has to be input from the person in that regard. This way I will develop my answer to the question "How can Smart Surroundings influence a person's autonomy, and how can this be evaluated?" further.

As in the previous chapter I will follow the structure of the previously constructed framework. I will identify four effects that are relevant for autonomy-related values: delegation, dependence, options for action, and privacy. Afterwards I will discuss issues that come up when assessing the relations people have with servant systems. Finally I will evaluate the effects of servant systems of autonomy.

6.1. Delegation to servant systems

I will begin this chapter by discussing four built-in effects of servant systems, and the embedded values they can be linked to. In this first section I will discuss the control people can gain, mostly through the delegation of tasks to servant systems. I would like to address Brey's vision of Smart Surroundings and autonomy, specifically the issue of delegation [Brey 2005]. In Brey's discussion of autonomy effects of Smart Surroundings the notion of control he employs does not seem to be the same sense of control that Oshana has. For Oshana control is a single aspect of external autonomy, while Brey uses it as an umbrella term for various aspects of autonomy. Where this is the case I will note this. I will translate Brey's comments to Oshana's condition of control at the end of this chapter.

Brey's comments are aimed at Smart Surroundings in general, not just at servant systems. I will discuss them here because servant systems are the one where the discussion of delegation is most interesting. Informant systems do not take a lot of action, so there is not much to delegate to them. For that reason I want to go deeper into Brey's commentary in this section.

The first way in which Brey sees Smart Surroundings allowing a user to gain more control over his environment is by making the environment more responsive to the user's actions. Once a person has a specific goal, the use of Intelligent User Interfaces should be more likely to put this goal into that person's reach. This meshes with the idea that a user must have the power to realize

the options he wants to execute. We have seen that the environment places certain restrictions on our actions, and if we relieve these restrictions, we can become more autonomous.

The second form of control that Brey identifies is in the information that Smart Surroundings provide. I have discussed this already in the previous chapter about informant systems, and the way information relates to autonomy, so I will say no more about it here.

The final way in which control may be gained is through the delegation of tasks to the system. This way we do not need to worry about them at all, both cognitively and physically. According to Brey this frees people from “tedious routine tasks” [Brey 2005, p. 161]. The control that is gained can be found in the fact that a task is carried out automatically, whenever we desire it to happen. While this may not seem like a big autonomy issue, the fact that a person has the power to have something done automatically can be a big bonus. We can imagine that if a lot of tedious tasks happen automatically we will be able to orchestrate more of them at once than we can now. Additionally the time saved on these tasks can be put to good use to realize more of our desires.

However Brey also notes that there is an irony in this third way in which we gain control through Smart Surroundings. It implies that control is gained by giving it away by delegating it to technology. Once it is delegated as such, you lose control over it in a way as well, since the actual performance of the task is out of your hands. One might say the user can become like the Sorcerer's Apprentice from Goethe’s poem, by delegating his chores he loses control over what is going on around him. Brey identifies four ways in which this loss of control can take place.

The first of these issues occurs when the Smart Surroundings system actually goes against your wishes. As a person’s desires are a rather complicated thing, it is not unimaginable that a servant system might get this wrong at times. This may be a technical problem, when the task that is asked of the system is misunderstood. On the other hand changing desires of the user may also lead to this effect. The user thus needs a way to break the automatic cycle of the system, when the intentions he had when activating it are no longer what he feels.

Secondly, even when the Smart Surroundings system ultimately does what you want it to, there may be a loss of control associated with it. This may be due to the feeling that the device is telling us what to do. Another reason why we may experience a loss of control is because we must somehow “convince” the device to do what we want it to do. Brey notes that this loss of control may be in the extra effort that is used, both physically and psychologically. Gupta states that while Smart Surroundings may require less physical effort, they potentially become “psychologically obtrusive” [Brey 2005, p. 161].

The third way in which servant systems take away control is when third parties might their influence through Smart Surroundings applications made by them or their partners. Smart Surroundings provide a lot of interesting, though potentially morally problematic, business models. Commercial agents will have great interests in steering the desires of users in particular ways. In these cases the user gets less control over what he does, as the company can pressure him into certain courses of action. The model of "silent shopping" which is what is at the heart of automated grocery shopping for example, could easily be abused by stores or companies who force their products to be bought even if the user might want something else.

The final form of loss of control in Smart Surroundings is that third parties may use the systems to take control of people. Generally this will take the form of others using Smart Surroundings technology to gather information about people [Brey 2005]. Since these systems are destined to be everywhere, and you might not even be aware of interacting with one of these systems, it is possible to gather a lot of information about unsuspecting people. As this can be seen as using servant systems to invade the privacy of people, I will be addressing it further on in this chapter, in a seperate section.

Having identified these ways for gaining and losing control, I want to criticize the way Brey speaks about delegation. I do not believe that delegation has to be problematic. Delegating a task does not have to diminish autonomy, as asking someone to do something for me can make it more efficient for me to get things done. If we would choose to never delegate anything, we would be able to achieve less. In a sense we might see delegation in Smart Surroundings working much like a subscription to a magazine. You sign up for it initially, and then the service continues without any interference from you. However if at any point you do not want to receive the magazine anymore, it does require action on your part. Delegation asks you to give up some control, but you are able to make something happen in return.

With regards to the individual points of criticism Brey levels at delegation, the first two deal with situations in which Smart Surroundings reason about a person's desires. As such these do not hold against servant systems, which are only concerned with the execution of a task, not with a person's desires. As such I will discuss these problems in the next chapter where I analyze associate systems, which do integrate reasoning about people's desires with making these desires effective. Now with regards to servant systems they may still fail to achieve to do what you want for some reason, which is an issue I will discuss in the next section about dependence on servant systems.

The third point of criticism is a valid concern as other parties try to force certain actions on us, this seems to be problematic from an autonomy standpoint. However I do not believe it is a

problem of delegation itself, but more an issue of abusing the dependence on servant systems. Since it is a valid concern it is something I will take into account when discussing the values embedded in servant systems. Brey's fourth point of critique will be discussed in the section on privacy, as stated.

After identifying the effect of servant systems, I want to turn to the embedded value we can relate them this. The first thing to note is that the effects of delegation can be related to external autonomy. This makes sense as the domain of servant systems is action. Servant systems do not affect your reasoning about what you want to do, but rather help you execute your desires after you have formed them.

I will argue here that with increased control over the environment and delegation, servant systems embed the value of control. Oshana argues that control is a necessary part of external autonomy. She claims that "autonomy fluctuates according to the number of uncontrollable intrusions in the life of an agent." [Oshana 2006, p. 84] If there are less of such intrusions, by giving a person a greater degree of control over his environment, the autonomy of a person would thus increase. The reason for this is that an autonomous person must be able to realize what he wants to, and to realize these desires, control is required. It is not enough just to have access to relevant options, but pursuing a course of action must be in the hands of the autonomous person himself [Oshana 2006, p. 84]. By giving us more control over our environments, servant systems embody the value of control as well.

Delegation can also be seen as an increase in control by giving you ease of mind with regards to the task at hand, even if you lose some of the hands-on experience. However in the case of delegation this control is embedded in servant systems in a specific way. It provides ease of mind, since tasks get done for us, but it is a form of control in which we must give up more "hands-on" control. For this reason delegation might not always be the best way to get something done, and there may be cases where hands-on control is preferable. However this is dependent on the situation.

I want to go back to the magazine subscription example to illustrate this. When you get a subscription you make sure you get all the issues of the magazine, without you needing to go and buy them somewhere individually. This is a form of control by delegation of a task, so you no longer have to worry about it. On the other hand, when you do go to the store to buy separate issues, you have the control of choosing whether to buy a specific issue. If there is an issue that you do not find interesting, you can skip it. This is a form of hands-on control.

A negative effect on autonomy related values can be found when third parties use servant systems to force you into certain actions. Forcing a person to buy a certain product for example

means he is not able to choose a different product if that is what he wants. This can perhaps be prevented by the development of a more open Smart Surroundings in which one can see the constraints placed on it by certain companies for instance. However if servant systems by design limit people in their choice, then the control a person has is restricted.

6.2.Dependence and servant systems

As the previous section illustrated, delegation to servant technologies is not without problems. One of these problems is that we might become dependent on servant technologies, or even Smart Surroundings in general, a point raised by Tavani [2004]. The question he asks is whether a world with people using Smart Surroundings would be able to respond to a catastrophe, which would wipe out all technologies. This topic is related to autonomy because we lose control in these situations. In this section I will look at this problem as a second effect of servant systems, and analyze how dependence affects autonomy.

That people depending on technology is not something newly introduced with Smart Surroundings. One of the most extreme example would be the life-support systems that space shuttle crews depend on. In this case switching off the technology would literally not allow the crew to survive. But even in many people's daily life technology is something that cannot simply be turned off. We use technology to provide us with things that are essential to us, such as food water and shelter. Here the danger is also that once the technology fails, the people depending on them will suffer.

In the case of Smart Surroundings the workings of the technology may not be such life or death situations. However that same feeling that you are giving part of your life out of your hands may still be there. Servant technologies are designed to take over tasks from you, and if they stop working you will suddenly be confronted by what they were doing and be forced to do it yourself. An example of this can be found in the example of the smart fridge, where your groceries are done by a link between your fridge and the ordering system of a supermarket. If this becomes the standard situation, it may lead to the abolishment of normal stores where people can buy things. But what happens when the system stops functioning? We are no longer able to do any shopping. To this end Tavani is probably right in saying that people are likely to become dependent on Smart Surroundings. And as an autonomous person is supposed to be independent, this may lead to people becoming less autonomous by using servant systems.

The question is whether dependency in technology really leads to autonomy problems. I feel it is unavoidable that we are dependent on some things. We cannot live without breathing or eating, yet it seems a bit much to say that because we are dependent on oxygen and food, our autonomy is

diminished to a problematic degree. While we have no control over these parts of our lives, I think it is too far to go such ends in trying to assert people's autonomy. Yes we are dependent on sustenance and oxygen, but we cannot live without them, and thus cannot be autonomous without them.

Now technology may not be so essential to us as eating and breathing, but as I said to a great extent we already depend on technologies in our everyday life. What is important is that these technologies also open up new possibilities. While the spaceship crew cannot live without technology, we would not even be able to go into space without technology either. In this way technology makes new things possible, but for these possibilities we are then dependent on the technology, as we can only realize the new possibility through this new technology.

Since dependence is again linked to what actions we can and cannot take, we are in the realm of external autonomy on this issue. I have already mentioned that delegation and dependence are linked, in the sense that when we delegate something to a servant system, we depend on that system to a certain degree. As such I want to argue that dependence also affects the value of control. The point Tavani's question raises is that when we depend on a Smart Surroundings system, there is a chance they might fail. Since this potential failure is outside our control, being dependent on a servant system means we lose some control over the task it carries out, when it stops working. How big a problem this is for people's autonomy is something I will discuss later on in this chapter.

6.3.Do servants provide options for action?

In this section I will turn to a third embedded value of servant systems, by analyzing how it might cause us to gain or lose options for action. As servant systems are set to take over aspects of our everyday life, this raises the question of what remains for people. If we no longer need to do many of the tasks we now do, will we be able to maintain a life that is meaningful? Or to translate this question to one relating to Smart Surroundings: will we still have options open to us to live our lives, or will we be stuck sitting on a couch all day while technology lives our lives for us?

For this argument I will turn to the writings of Albert Borgmann who has analyzed the role of technologies in everyday life. He is very critical of the influence of technology in general and of Smart Surroundings specifically. I will contrast this with the view of Peter-Paul Verbeek, who has written a response to Borgmann. Finally I will see how this aspect of the functioning of servant systems can be placed in the context of effects on autonomy.

6.3.1.Borgmann

German/American philosopher Albert Borgmann investigates the effects of technology on everyday life. He speaks about what he calls "hyperintelligence," which is a quite early but rather

comprehensive view of what we now know as Smart Surroundings [Borgmann 1999, pp. 102-109]. His critique builds upon his earlier criticism of technology in general and information technology specifically. He argues that by using technology one's "engagement" with the things one does in everyday life is diminished. This engagement is what makes life valuable, and consists of such things as social and physical interaction around what is being done. His prime example is the move from a family gathering firewood and sitting around a hearth, to the central heating systems with which there is very little interaction. If a central heating system already takes away engagement, we can only begin to imagine the engagement that is taken away by technology that does our shopping for us.

Borgmann specifically criticizes hyperintelligence as well. This criticism rests upon the fact that it is set to diminish our relation to the real world. He claims that the way of interacting with our surroundings will be much less interesting, and thus less valuable, than when we interact without the technologies of hyperintelligence. An example of an early hyper-intelligent technology according to Borgmann is the telephone. While this does not really comply to the idea of Smart Surroundings as the use of ICT in everyday life, we can follow his argument here. Borgmann says the telephone diminishes the contact that would normally be present in a face to face relation. Non-verbal communication is obviously lacking when using the technology, but we also lose the ability of people to immediately help or act in the current situation, other than through words.

The characteristic of Smart Surroundings is the effortlessness that it enables in our interaction with the world, according to Borgmann. He claims the ease to access information about appointments, schedules, and even scholarly research diminishes its value. Especially as when the "knowing" of this knowledge is delegated to technology, and people will lose it when the technology malfunctions. In the end, hyperintelligence will thus lead to a "disconnected, disembodied, and disoriented sort of life." [Borgmann 1992, p. 108]

I believe both Borgmann's criticism of technology in general and of hyperintelligence overlap to a large degree. Both look at the changes that technology enforces in our daily lives, and find that there is a loss of engagement with the world and the people in it. To a large extent this can be seen in the disappearance of effort and involvement with the things we do. I will now address criticism that has been leveled at Borgmann by Verbeek.

6.3.2.A response to Borgmann

Verbeek [2002] responds to Borgmann's ciriticism, by pointing out that the concept of engagement that Borgmann uses is rather one-sided. He notes that Borgmann's use of the term engagement in two ways: when he talks about the pre-technological time engagement is the physical involvement

with people's practices. On the other hand when talking about the loss of engagement nowadays, this is a loss of touch with focal practices, not so much with the effort we put into daily activities. And these do not necessarily mean the same, according to Verbeek's interpretation of Borgmann.

Borgmann claims focal practices are things that give meaningfulness to life. While getting your own firewood can be meaningful, it does not prove the claim that heating your house in any other way is not meaningful, or therefore engaging. In the pre-technological age, getting firewood was not just some kind of intrinsic activity, it had a well-defined goal: heating a house. This notion of utility is absent from focal activity, as in this case the activity itself is the goal.

In a sense we can say that it is not so much the reduction of effort that makes us lose engagement, but a reduction in meaningfulness. This is however not the argument that Borgmann makes. While he shows that technology leads to a reduction in effort (which it is arguably intended to do), he only manages to show that this leads a reduction in effort in an indirect way. So while using cars means people are less likely to go on runs, it does not mean running as a focal practice has to disappear. People who run just for the sake of running, find no alternative in the car. Only those who run with the goal of getting somewhere fast are interested in the technology in cars.

Technology might however lead to a culture or an attitude in which the easy consumption of goods is taken for granted. It is this that Borgmann supposedly criticizes, as this is something that does diminish focal practices. If I become a couch potato who does nothing but watch tv all day, I think you can say the meaningfulness in my life is far to seek. However this is not a direct effect of technology playing a role in our lives.

Verbeek critiques Borgmann on claiming that technology may only diminish meaningful relations with the world. Verbeek argues that CD's have made music much more accessible to the masses. While not as immersive as a concert of a full symphony orchestra would be, it allows a lot more people to get in touch with the focal practice of music. The same goes for cheaper electronic keyboards, which allow people not able to afford a piano, to still make their own music. Even running has been opened up to disable people for example, through prosthetics technology.

Borgmann seems to ignore the possibilities that technology opens up for allowing people to experience focal practices, by just focussing on the negative sides. As Verbeek states, his examples "remove the sting of alienation from Borgmann's theory" [Verbeek 2002, p. 80]. Considering these uses of technology we can see that meaningful alternatives can be a result of employing technology.

This debate leads me to ask two questions: Firstly does Verbeek's argument also hold for Smart Surroundings. Secondly how can we relate the debate between Borgmann and Verbeek to autonomy? In the remainder of this section I will be answering these two questions.

6.3.3.Smart Surroundings and the debate between engagement and non-engagement

Verbeek and Borgmann both start their reasoning from technology in general. While Borgmann levels some critique on Smart Surroundings (or hyperintelligence) specifically, Verbeek comes closes with his discussion of ICT. So to what extent do the ideas that Verbeek puts forward also apply to Smart Surroundings?

Verbeek describes information technology as something that mediates our involvement with reality, rather than replace it [Verbeek, 2002, pp. 81-82]. He distinguishes two types of information technology in which this takes place. Firstly he speaks of information technologies that mediate communication between humans, such as chat or e-mail application. As this human to human communication is not what is important in Smart Surroundings, it does not seem relevant to pursue this line of argument.

So it seems Verbeek's perspective does not fit with the vision of hyperintelligence. However I believe many of his arguments may still be valuable. Firstly Verbeek's claim that information technology helps shape our relationship with reality is true of Smart Surroundings, since it is by its nature embedded in reality. Its purpose is exactly to provide reality with more easily accessible handholds so that it may be manipulated more easily.

Secondly Verbeek's argument is largely aimed at Borgmann's view of technology in general and the idea that it has people lose engagement. As I illustrated, this is a line of thought that Borgmann also employs in his discussion of hyperintelligence. In both arguments he employs the ideas that ease of use is traded for engagement when technology is employed. However again there is no direct link between engagement as effort and engagement as focal practice. As with Verbeek's counter-argument, I think many of the uses of Smart Surroundings applications are to be seen as goal-oriented, rather than intrinsic. Remembering appointments is not an intrinsic value, but the honoring of them is. If you need a tool to remember, there is no real problem of engagement there. It might seem a bit disinterested not to commit the appointment to memory, but on the other hand the fact that you committed the plans to a digital memory can also be seen as valuing an appointment as too important to leave without a digital backup.

Similarly the telephone, while not allowing interaction to the extent that a face to face encounter does, opens up the ability to stay in touch with friends and relatives that are far away. In this way you can remain engaged with those who are not close to you, but who you still want to stay connected to. It would be impossible to stay in touch with a lot of people if you would only allow yourself face to face contact. Making arrangement for meeting people has also become much

simpler with telephones, especially mobile phones, meaning that telephones can actually help set up the fuller experience of a true meeting.

This leads me to conclude that Verbeek's ideas that engagement, as Borgmann employs it, is rather ambiguous can be ported to Borgmann's criticism of hyperintelligence. In this sense we can say that Smart Surroundings can open up ways to enrich lives and to provide alternatives that can be in their own way engaging. In the next section I want to use this point and link it to autonomy.

6.3.4.Autonomy effects and engagement

How does Verbeek's argument that technology is capable of enriching our lives link to our discussion of autonomy? Remember that, according to Oshana, we can consider the constraints that the natural state of the world presents us with as an impediment to autonomy. This is because we are presented with less options for action because of it. In our example of the prehistoric family who wants to heat its living quarters, it has to go for the time consuming option of collecting firewood, even if it does not want this. As such the autonomy of these people is affected by their lack of options for action.

Once more, this does not mean those who needed to get firewood to heat their living spaces were not autonomous. They were probably able to do as they wish within the constraints of what they were forced to do by their circumstances. However the mere presence of these natural considerations means the "maximum" autonomy of people living under them is less. Within the space they have, they are free to move, but more space will accordingly give them more freedom to move.

Technology has the ability to change what is possible. When trains were introduced, people could travel much greater distances in less time (even though eventually most would just travel greater distances). This was an option that was simply not available before the introduction of the train. As such technology has the power to expand the horizons of a person's autonomy. Traveling long distances became a possibility and as such people who wanted to travel were presented with an alternative to horse-drawn movement, for example.

On the other hand technology can introduce new constraints as well. With introductions of even newer and faster means of travel, we also introduced traffic jams, pollution and more dangerous roads. This only goes to indicate how technologies can have unintended results, and can decrease our options to some extent as well. Generally whenever a technology opens a door, it closes another one.

Having recognized the built-in effect of servant systems to potentially close old options for action and introduce new ones, I will now discuss how we can see this as the embedded value of

options for action. Again we can recognize this effect as relating to external autonomy, since we are discussing actions of people that are affected by servant systems.

We have seen that engagement as defined by Borgmann is about being able to have the options for a meaningful life, and as such this whole discussion is already closely tied to the aspect of options for action. Verbeek shows that, despite the criticism leveled by Borgmann, it is possible for technology to provide people with relevant options. Technology does not necessarily diminish engagement, and can actually open up doors to new focal practices. I believe that this is one of the big things that is added to autonomy through the employment of Smart Surroundings. Technology opens up a whole new way of access to focal practices, or options for action. Besides that, it is able to simplify those things that we do not do for intrinsic reasons, but just for utility. This means that technology does not need to take over our life, but can mean we can get access to the life we want to live.

I do not want to say that a person needs technology to get access to relevant options for autonomy. However technology, and especially Smart Surroundings, can provide us with alternatives. This may be just what we need to empower the life we want to live, so in that sense Smart Surroundings has the ability to affect autonomy of a person positively.

In conclusion we can say that servant systems are able both to open and close options for action for people. In line with Verbeek I believe we can say that often new options are made available to replace older ones. While Borgmann would argue these new options are always worse than the old ones, I agree with Verbeek that this does not have to be the case. There are plenty of examples in which servant technologies allow us to engage in new meaningful ways, with new options for action. Smart Surroundings can thus improve external autonomy, by giving us access to more focal practices.

6.4.Privacy and Smart Surroundings

A fourth aspect of the functioning of servant systems can be found in issues surroundings privacy sensitive data of people. As I have illustrated in chapter 3 privacy is important for living an autonomous life in a democracy. However there are problems with privacy and Smart Surroundings. To cut it short, Smart Surroundings want as much information about the user and his surroundings as possible. The more data that is available, the better the service of an application will be. When you walk into a smart restaurant that can give gastronomic recommendations based on what you like, it would be able to give its best advice only when it knows what you enjoyed eating elsewhere. With the many connections that are part of the Smart Surroundings world, it will become difficult to ensure that such data does not fall into the wrong hands.

The discussion on privacy surrounding information technology is very large, and for this reason I have chosen to only give it part of the attention it deserves, as otherwise it would overshadow the discussion on autonomy that is my focus. That said, many of the privacy concerns that are found in information technology could probably be applied to Smart Surroundings, since it is itself a form of information technology. For this reason I will present a short overview of what privacy issues mean for the effects of Smart Surroundings systems on autonomy.

I will quickly recap why privacy is an important issue in autonomy, before addressing concerns related to servant systems. Oshana [2006] argues that autonomous people need to be able to develop themselves independent from the agenda of any authorities. Privacy contributes to people governing themselves, as there is nobody watching over their shoulder. If people lay their hands on privacy sensitive data, this may be used to manipulate someone, which takes away substantive independence.

When summing up the ways of losing control, Brey's [2005] final point is closely linked to why Smart Surroundings can bring along privacy issues. He says that Smart Surroundings can be used by third parties for surveillance and to collect data about the user. This information can be used by these third parties to exercise control, and perhaps more importantly, the user no longer controls who has access to this information. As part of the functioning of Smart Surroundings is that they form profiles of their users, they are bound to have privacy sensitive data available to them. With these systems being present all around us, there is no shortage in human activity they can track.

In order to discuss these privacy issues, I will give a short summary of what we can conceive privacy to be. This is necessary to see in what situations a Smart Surroundings application may actually be intruding on the privacy of its user. There are a number of theories of privacy, but it is beyond the scope of this thesis to go into too much detail. I will therefore shortly address some alternatives and show how they can be applied to the case of Smart Surroundings.

The first traditional theory of privacy is the "control theory" which says that privacy is about controlling information about you. An invasion of privacy occurs when somebody else takes control of information about you. The problem with this theory is that it is practically impossible to control all information about yourself, especially with the great amount of information about yourself you are providing in Smart Surroundings. At the same time you can give information away, but have it remain private. An example of this would be patient records, which are out of your control when the hospital gets them, but should not be made public to just anyone.

Tavani and Moor work to provide an alternative account of privacy, as they note it is possible to have "control but no privacy, and privacy but no control." [Tavani & Moor 2000, p. 379] The two concepts are both important, but they are not the same. As such they work with the "restricted access" theory of privacy, which claims that there are situations in which information is seen as private, and to which not just anyone should have access. They thus distinguish between private and public settings, where information in a public setting is freely accessible, while that which is in a private setting is not. In this restricted access theory privacy is violated whenever someone gets information that they should not, whether or not you are controlling that information or not.

The idea that privacy is about restricted access, but with control for its management, is also the idea of privacy that Brey seems to have in mind when discussing the privacy issues inherent in Smart Surroundings [Brey 2005]. His analysis brings to light a number of things that are inherent to Smart Surroundings and give potential problems with autonomy. Some of these are the ubiquity and invisibility of the technology, that make it possible to let Smart Surroundings infiltrate almost everywhere. At the same time this makes it difficult to keep track of where data is being gathered by the systems, for use in their workings. This is combined with the network connections that are also used by the systems, and it seems that information about anybody would become available anywhere.

In order to restrict access to the information that should be restricted, and allow the user control over managing his privacy, complicated technologies may well be needed. People who get overwhelmed by requests for consent to giving out their information does not fit into the Smart Surroundings ideal of calm technology. At the same time the multitude of contexts within which we have different needs for privacy seems so ambiguous computer technology will have difficulty with it.

Nissenbaum notes another problem with privacy inherent in the use of highly computerized information gathering, like we can say of Smart Surroundings [Nissenbaum 2001]. While there may be things that we do not mind being publicly known about us, when a lot of this information is combined in large databases, entirely new information about us may be found. It is not a given that access to this newly discovered information has the same restrictions as the individual pieces of data used in the analysis. The technology makes it possible for information to be shifted from one context to another in ways previously impossible. The ability of ICT to store and mine vast amounts of data takes away the protection offered by comparably rather memory-limited humans.

We have seen that privacy problems can come up in servant systems that rely on a user profile. Again the effect of servant systems is on external autonomy, since privacy issues are linked

to the value of substantive independence. This is because part of substantive independence is being able to do as we will regardless of what other parties want of us. Having your privacy violated can go against that part of substantive independence and as such external autonomy.

By making it possible for other parties to know things about you through your profile, you may feel less free to do what you would want. An argument for this can be found in Bentham's discussion of the Panopticon, where the idea of being continually watched is used to control a population of, for example, prison inmates. Using servant systems to create a global Panopticon is not supportive of the autonomy of individual people, as they should be able to live their lives as they want, without being continuously watched. If this is not the case, substantive independence is taken away to a large degree [Bentham 1995].

6.5.Relations between people and servant systems

Having analyzed four embedded values of servant systems, I will now proceed to the next step of my framework, and discuss relations that servant systems have with people. As servant systems do a lot of their work without people constantly engaged with them, the background relation is relevant to them. A second relation that plays a role is the alterity relation, as when we are engaged with servant systems, we give them orders in the way we might a human servant. In the remainder of this section I will discuss these two relations with servant systems.

A majority of the time we are engaged, or perhaps not engaged, in a background relation with a servant system, since its goal is to do things without our intervention. We are not involved with its normal operation, only when we want to adjust some setting, or when something goes wrong, will we actually be dealing with the technology itself. Other than that, we will mostly notice what the technology is doing for us. Since the role of the servant is to not bother us, the background relation is important.

What this means for autonomy is something I have already shortly discussed in the previous chapter: Smart Surroundings in the background may be hard to find. Greenfield argues that it may become difficult for a person to find out exactly what kinds of transactions are going on in these systems [Greenfield 2006, p. 135]. Closely related he notes that it may be difficult to find exactly where a problem is located when one does come up, as you are faced with a network of devices, each of which tends to hide exactly what it does [Greenfield 2006, pp. 152-153].

Why is this a problem for autonomy? As Oshana has argued autonomy requires that you can get out of something you have gotten into [Oshana 2006]. Since one of the reasons autonomy is important is to be able to respond to change in your environment, this would not be possible if we get stuck to certain systems, because we have trouble changing what they do. For this reason

servant systems that we engage with in a background relation can lead to problems for autonomy. However when they are well designed we can imagine that servant systems manage to come out of hiding in the case something goes wrong, or when someone needs to be able to control it. This means only those systems which people are in a background relation with at the wrong time can have a negative effect on autonomy.

The second relation that plays a role in servant system is the alterity relation. We can recognize this by seeing that servant systems do things on their own, which is one of the things that characterizes alterity systems. By not needing our attention we can see them as entities in their own right. In this sense we can recognize that delegation to servant systems can be compared to delegating to another person. While there is no immediate effect on autonomy of the alterity relation, it helps us understand the effects of servant system, since it allows us to analyze the role of the system in delegation.

6.6.Evaluating servant systems

In this section I will apply the analysis of the previous sections and turn to an evaluation of what the effects, values, and relations of servant systems mean for autonomy. With regards to servant systems I analyzed four effects and their related values: gains and losses in control, through delegation and dependence, options for action, and the privacy aspect of substantive independence. One thing that can these values have in common is that they affect external autonomy, since servant systems cater to the domain of action. In this section I will evaluate what these mean for a person's autonomy.

The first autonomy related value that has come up with regards to servant systems is that of control. Servant systems have a number of ways in which this control may be affected. The first way is by an improved control over our surroundings. The second effect that affects control is delegation, as delegation is a way to gain control in a specific way. Through delegation we are able to influence more aspects of our life simultaneously, and it can provide us ease of use for our daily life when there are many tasks we need to do. However delegation means you will give up some direct, hands-on control over the execution of a task, as it is essentially being executed by another party. This is where the third form of effects on control comes in, that of dependence. Depending on a servant system means we lose control in a way, since the servant system can fail due to matters we have no influence on. This is part of losing the hand-on control I discussed previously.

The relations we engage in with servant systems also plays a role in these effects on control. Because we engage in an alterity relation we experience servant systems as an entity in itself we are able to delegate things to, something that would not make sense if we experience the technology as

part of ourselves. The background relation we have with servant systems means we might lose track of what is going on if we ever need to interrupt, meaning it may be more difficult for us to take back control we have given up through delegation.

A second autonomy related value that can be identified in servant systems is that of having options for action. We can identify two different effects on this value. The first is the effect associated with Borgmann and Verbeek's discussion on engagement. I argued that servant systems are able to open up more intrinsic, or relevant, options for action, by taking care of actions that we do just to achieve a specific goal. A distinctly negative effect on options for action can be identified when third parties manipulate you through servant systems, by restricting your choice to ones they have prepared for you. This way a system is capable of forcing you into actions that have been selected beforehand by this third party.

The final value we can recognize in servant systems is that of substantive independence. This value is influenced negatively by privacy concerns that come up in Smart Surroundings. Because other parties can be watching you, the condition of not being expected to do things others want of you becomes more difficult to live up to. As servant systems may lead to decreased substantive independence in this way, this is a bad effect on autonomy.

Now that we have seen how individual values are affected, I want to turn to two examples in which two values are affected in a different way. The first is in a case where we delegate a task to a servant system, but through that also come to depend on it. The second is a case in which we gain control over our environment by giving up privacy.

In the first example I will discuss the balance between delegation and dependence. This is an example of a shift in autonomy, as I discussed in chapter 4. This means that multiple aspects of autonomy are affected, at least one positively and at least one negatively. In this example delegation would be the positive effect, and dependence the negative one.

As there are both positive and negative influences on autonomy they should be weighed against each other. It is important to consider the way any individual system works in order to see how the balance between delegation and dependence takes shape. Different servant systems can have a completely different ratio between these issues. Sometimes the dependency may be worth the control we gain through delegation, other times it may not. Generally only a system with potentially huge losses and only small gains would really be problematic. For instance in cases where the failure of a system causes health risks, we might want to stay on top of the system ourselves,

I think the most important part here is that people should be able to choose which way to go for themselves. Therefore any Smart Surroundings system that automates a task needs a way for the user to get back into the loop and change things, or even end the service. In this way a person gets a higher level of control, even if delegation is present. I believe the delegation itself does not need to pose a problem for autonomy, as long as a person retains this higher level of control. In that case the user can get out or modify the service to be in line with the desires he has.

The second example is one in which privacy is balanced against an increase in control over the environment. Again we can speak of a shift in autonomy, as the value of substantive independence is diminished, but control is improved. Brey notes that this is not necessarily a problem, as the trading of privacy for other goods is already accepted practice in many ways [Brey 2005]. Purchases in certain shops may be stored and even linked to an individual, in order to give them personalized discounts. In this way people can alleviate the restrictions in access of their information, in order to get benefits they would not get when keeping this information to themselves.

An illustration of this could be a smart restaurant, where if you share your allergy information, this might allow some system there to take this into consideration when presenting the menu. This way you are share you do not order something you might be allergic to. However the cost of this is that you will have to share information you might not want other people to have.

We have seen that a loss in privacy can be seen as a loss in substantive independence and thus autonomy. At the same time we have seen that the use of Smart Surroundings can help us gain grip on our environment because of the information it has about people and their surroundings. It seems we have some sort of balance here between giving information and keeping information. Both can lead to more autonomy, either through improved control, or by not giving up substantive independence. On the other hand both can also have us lose autonomy by not having as much control, or by giving up some privacy.

This is another case of a shift in autonomy. Smart Surroundings systems might require people to give up information they consider private. They should be able to make this choice, as well as configure to what extent and to what parties information will be given. This is a complicated issue, and one that will require both technical innovation and social ingenuity. After all, privacy is very much a social value and as such it should not be seen as something that requires nothing but a technological fix. In the end people will have to find their own balance between privacy and giving up information, but the tools and social structures to do this should be in place in a Smart Surroundings future.

Again I would like to argue that people themselves will often be the best judge of whether or not they want to give up their privacy. This choice would then need to be incorporated in the design of the systems. However Brey [2005] warns for the fact that people might not have enough information when going into transactions where privacy is traded for control. Openness in the design of the system seems to be of importance here too, as a system needs to give enough information about how it works in order to allow a person to make an autonomous decision.

In summary we have seen there are many effects that servant systems can have on values relating to external autonomy. Some of these are positive while others are negative. These effects can occur in combinations, where some improve autonomy and others diminish it, which I refer to as autonomy shifts.

6.7.Conclusion

In this chapter I analyzed the effects of servant systems on autonomy. I identified three aspects of autonomy that can be affected by four different effects. Firstly servant systems allow people greater control. This can take a number of forms, either by giving increased control over the environment, or by delegating tasks to these systems. On the other hand this can also causes people to become dependent on these systems, in which people lose control over what happens when there are problems with these technologies.

Secondly servant systems can close options for action, as many tasks we do now will be taken over by technology. On the other hand we can argue that new options are introduced as we can do things we now must pass up on as we have to do our everyday tasks.

Thirdly servant systems can have a profile of people, which contains privacy sensitive information. Third parties could use these systems to get access to this data, meaning a person loses autonomy when interacting with these systems. On the other hand when a system knows things about us, it is better equipped to fulfill the tasks we ask of it.

There are two human-technology relations that play a role in servant systems: the alterity relation and the background relation. The alterity relation means we see servant systems as external entities, and makes it possible for us to delegate to them. The background relation may cause servant systems to be hidden when we need to control them, causing potential difficulties for autonomy.

There are three values related to external autonomy that can be affected by servant systems: control, options for action, and substantive independence. Because of this diversity positive and negative effects may occur together. These combined effects of servant systems on people’s autonomy can be qualified as shifts, where a gain in one aspect of external autonomy is offset by a

loss of another aspect of external autonomy. Such shifts are difficult to evaluate, since they depend on the context and personal preferences.

7. Associate systems and autonomy

Having analyzed two of the three types of Smart Surroundings systems in the previous chapters, I will now turn to the last: associate systems. These systems reason about people's desires independently and then proceed to carry them out. Because of this people have no need to step in along the process and can let this system do all the work for them. In this chapter I will be discussing the final part of the question I have been working on for the last three chapters: "How can Smart Surroundings influence a person's autonomy, and how can this be evaluated?", this time applied to associate systems.

I will again start by analyzing the built-in effects and embedded values we can recognize in these systems. Because there are potential autonomy issues to be found in some problems, I will do this twice. First for the way the systems are looking to develop, with the problems that come up. Secondly for the hypothetical system in which these problems do not rear their heads. Afterwards I will discuss how associate systems, both with and without problems, relate to people, and how this affects autonomy. I will wrap up with a discussion of how to evaluate associate system's effects on autonomy.

7.1.Can associate systems recognize our desires?

In the first part of this chapter I will be identifying the effects and values we can find in associate systems, by looking at a flaw in the way they work. With regards to this problem there are two things I will investigate, both based on the question of whether our desires can be identified by an associate system. In the first question I will look at whether this can be done by analyzing people's behavior and profile. If this is the case than associate systems should only need this information to formulate our desires and proceed to act on them. The second question becomes relevant if this approach does not succeed. We can then still ask whether we can make a system that is smart enough to reason like people do, and use that approach to find a person's desires. In this section I will address the first issue, and in the next I will look at the second.

The question of whether we can find a person's desire by looking at his behavior (and possibly a profile of that person) is addressed by Søraker and Brey [2007]. They note that the behaviorist idea that that desires can be inferred from actions alone is entrenched within Smart Surroundings systems. This view is what lies at the core of these technologies: they use sensors and a profile to look at the behavior of a user, and based solely on that they take action that should be in line with what the user wants.

Severe doubt is cast on this way of working by looking at Searle's description of reasoning [Searle 2001]. His claim is that people choose their desires and actions, and there is not sufficient causal relation between the two. Actions do not follow from desires in one fixed way. There is what Searle calls a "gap" in between them [Searle 2001, pp. 61-96]. This gap means that a person has to make a decision about it, and the outcome is not something that can be predicted. Søraker and Brey [2007] say that there may be a number of reasons to undertake apparently similar actions. The same behavior may be outcome to a number of different desires. This makes it impossible to conclude what desire was at the basis of some behavior.

If we see associate systems being based on current information technology we will run into the problem of the gap. As it is not a merely causal phenomenon, the technology will not be able to use reasoning following logical rules to make sense of a person's desires and actions. As such I believe it will be very difficult to create a system that works well based on the idea that it can look at your behavior and from that alone conclude what will be your next step. As long as the idea of the gap between desire and action is not addressed from a technological viewpoint, I believe associate technologies will not be able to reflect the desires and actions of people in the way they promise.

Summarizing we can say that it is problematic for associate systems to reason about your desires merely based on your behavior. Your behavior can point at multiple desires, and it is not causally determined, based on actions of the user, which one it might be.

7.2.Associate system that reason like people

While a technology may not be able to conclude anything about your desires based on your behavior, perhaps it is possible for a system to reason similarly enough to humans that they are still able to inform you of your desires. This is the second part of my analysis of the functioning of associate systems. In this case the system should have knowledge about the world, and use this to come to conclusions in the same way humans do. In this section I will look at ideas from philosophy about Artificial Intelligence (AI) and how they may aid us in the construction of associate systems.

The possibility of a computer reasoning like a human is not without critique. One of the most complete criticisms on this field of computer science is presented by Dreyfus [1992]. His claim is that AI research is based on four assumptions that he argues to be false. In this section I will look mainly at the third assumption, but I will shortly go into the other three to show why they fail.

The first assumption is called the biological assumption, which is the claim that a computers works similarly to the human brain. If this is case we might assume that a digital computer is in fact

capable of acting quite similar to a human, as their inner workings are essentially the same. Dreyfus' critique on this assumption is that the brain does not work as a digital computer, with discrete ones and zeroes as signals, but seems to function more like an analog device [Dreyfus 1992, pp. 159-162].

The second assumption Dreyfus sees in AI research is the psychological assumption. This states that not the brain, but the mind operates like a digital computer, making it justified to use a model of a computer on the mental level in psychology. People like Simon and Minsky proposed during the late 1950s that in time psychological theories would be phrased in terms of computer programs. Dreyfus considers this assumption problematic because it can only be substantiated by empirical data, which has not yet been found. Furthermore the psychological assumption needs to find something between the physical processing of data, and the phenomenological experience we have, as neither of these are what a computer is [Dreyfus 1992, pp. 163-188].

Both of these assumptions show there are problems with traditional views of AI, but this is not as relevant to current Smart Surroundings issues, where the goal is not so much to create human-like intelligence, but to have technologies which are capable of knowing what desires people have based on their behavior. To that extent the fact that it works is more important than whether or not it functions similarly to humans.

The third assumption underlying classical AI is the epistemological assumption. While the two previous assumption claim that humans and computers work similarly on some level, the epistemological assumption makes the less strong claim that intelligent behavior can be formalizable in terms of heuristic rules that a computer can follow. If this is possible we can use it to create systems that can display human intelligence, despite not functioning the same as human brains or minds. I think we can assume that systems that copy human intelligence are in fact capable of providing humans with advice.

Dreyfus sees a major problem with the idea presented here. It assumes that human reasoning can be captured within rules, but in truth humans often respond to things differently in different contexts. An example is that a lot of words are ambiguous. For a computer, that can only follow rules, this is problematic. In order for it to adapt to different contexts, every single context needs to be made into a rule. Next there need to be higher-order rules that are used to determine which context is currently relevant. In order to use these rules, again higher-order rules are required, and so on.

In order to solve this problem, Dreyfus notes that humans makes use here of a procedure discussed by Wittgenstein. Assuming that humans use rules in a similar way to computers, he

argues that the regress of higher-order rules is infinite. Humans however stop applying rules based on the practical demands of the situation they are in. We can call this, as Brey does, the “common sense” of humans [Brey 2001, p. 46]. Humans can appeal to this in any situation to in the end clarify the ambiguity that is at hand.

Computers do not share this common sense, but they need some way to halt the infinite regress as well. However because the computer works only with context-free rules. The computer does not find himself in a situation, it “creates no local context,” [Dreyfus 1992, p. 204] as Dreyfus puts it. As such it can not use the situation as input into the decision when to halt the application of higher-order rules. The way in which a computer stops the application of rule is through some ultimate level at which it just directly responds to the given input. Input into a computer must be determinate and a computer does no interpretation. The bits that it is presented with, are what it applies its rules to. As such there is a fixed level on which the computer can base the application of its rules.

Another form of this problem is called the “frame problem”, by which is meant that AI has difficulty seeing the context, or the frame, of a situation. When humans deal with a problem they know the information that is relevant in a certain context. Imagine we go and make a sandwich, there is only so much information that is relevant, and a lot more that is not. Our knowledge of sandwich making is quite large, knowing for example that a slice of bread does not fall through a plate, or that putting butter on a knife will not cause it to disappear, or that “ opening the refrigerator doesn't cause a nuclear holocaust in the kitchen” [Dennett 1984]. In a sense the frame problem boils down to knowing what to expect.

How exactly humans solve this problem, is far beyond the scope of this paper, but as I said we can refer to it as common sense. For a computer, without common sense, this is a major problem. This is related to Smart Surroundings in such a way that if AI is unable to see what factors are relevant in decision making, it would be hard for it to be able to find my desires in my behavior. It would get lost in the huge amounts of irrelevant facts, because it cannot distinguish them from the relevant ones.

In summary we can say that intelligent human behavior cannot be simulated on computers, as the frame problem has not been solved. Humans appeal to the situation and common sense in order to solve ambiguity. This means they are able to find out what information is relevant from the enormous multitude of information that could apply to certain cases. Computers on the other hand require unambiguous input to base their application of rules on and are incapable of quickly finding

the relevant facts. As such we cannot expect computers to make the same decisions as humans do on such grounds [Dreyfus 1992, pp. 202-205].

The final assumption that Dreyfus addresses is the ontological assumption. We have seen that a computer needs determinate input and the ontological assumption says that the world is structured so that it is possible to present itself to a computer in the form of such input. If this is the case, then we might be able to construct a system of rules that covers every possible ambiguity and context, however comprehensive it would be. With such a set of rules it might still be possible to emulate the human reasoning process, even though humans would arrive at the decisions in a decidedly different way. The main argument that Dreyfus seems to hold against this assumption is that facts in the world are relative to humans. For example a chair is only a chair because people can sit on them. Thus the existence of the chair is not something in a vacuum, but rather part of the human context. For this reason Dreyfus does not believe the ontological assumption to hold, as the very existence of facts seems to be based on context and thus it would be problematic to present the world to the computer without any context. [Dreyfus 1992, pp. 206-224]

7.3.Embedded values of associate systems

After looking at the technological problems of creating an associate system, I now want to discuss what this means for built-in effects and embedded values. In general we can conclude from Dreyfus and Søraker and Brey that Smart Surroundings are not equipped to extract the desires of humans based on their behavior and environment. Because humans may undertake similar actions based on the different desires, it is unlikely that a Smart Surroundings system can gather a person's desires and work with them. Related to this is the frame problem which says that Artificial Intelligence is not equipped to deal with the multitude of irrelevant facts in the background as it cannot use "common sense" to distinguish important from unimportant matters. This means that the built-in consequence of associate systems are that they may falsely conclude what our desires are and act on them.

The point where it seems to go wrong is the fact that these systems try to bypass people altogether. I mentioned the gap that Searle uses to indicate that a person has to make a choice between a desire and a related course of action, and that it is not something that is purely causal. These fully automatic forms of Smart Surroundings try to work around this by trying to recreate the reasoning a human would perform, but this does not appear to work, as we have seen. Associate systems in this way affect both internal and external autonomy. They take over the forming of desires, and the action that should be undertaken to fulfill these desires.

Related to both internal and external autonomy being affected, there are two distinct values that I will argue are negatively affected by associate systems. The first value that is harmed is that of control. Because the technology does not know your desires, as it can not cross Searle's gap, nor can it address the frame problem adequately, you have no control over what action it will undertake. As I said the argument supporting associate systems seems to be that the systems will represent you and your desires and actions, and in this way tries make you more autonomous. As we see now, this reasoning is flawed as associate systems have trouble actually distilling your desires from your behavior. Therefore their actions might be something you do not want as well as something you do. For this reason associate systems will be problematic for autonomy. There is no saying whether these systems actually perform the actions you want, and as such you do not know if you are losing or gaining control.

The second affected value is that of procedural independence. You can see the built-in effect of associate systems as a form of deception. Brey [2005, p. 162] argues that the use of Smart Surroundings systems might be problematic since they might make us believe we actually want what the technology presents as our desires. People might think these systems will aid them in their everyday life, while in fact their desires need not be what the technology acts on. I believe Brey is thinking mostly about associate systems when he makes this claim, as they are the ones most involved with acting on desires. The deception is found in the fact that these systems in fact do not know your desires with certainty, and as such may falsely make you believe that they are doing what you want.

In the end I think we can say that due to technological issues, associate systems are not likely to be successfully deployed soon. I have looked at two forms of criticism on the way these systems are supposed to work. Since the technology has difficulties identified above, I believe we can discount improvements, or even shifts, to autonomy based on the criticisms of Dreyfus and Søraker and Brey.

After discussing these problems with the effects and embedded values of associate systems, I now want to turn to the case where associate systems do in fact function properly and manage to carry out the actual desires of people.

7.4.Fundamental problems with associate systems

With the problems with the technology of associate systems, and the accompanying autonomy issues, behind us, I want to take another look at associate systems. In this section I want to go into a "what if" scenario. If technological developments make it possible to construct computers that can work with ambiguous contexts and that can cross Searle's gap, they might become able to recognize

people's desires and make them effective. In this scenario the question of whether or not this diminishes a person's autonomy is still a relevant one, perhaps even more so, as it is no longer a technical issue, but one that touches upon the question of what autonomy is itself.

As in this section I am assuming that associate systems will be functioning properly, the critique of the previous section does not affect its operation, but rather these systems do indeed find a person's desires and carry them out. As such I will turn to the effects a system functioning like that will have on that person's autonomy.

Let us first look at what the problem might be in the case of associate systems. Since they operate as independently from people as possible, they can be seen to do work you would otherwise do yourself. This might be classified as a case of delegation, as Brey [2005] does, where something you would normally do yourself, is instead done by someone else. Now delegation is something that happens without Smart Surroundings, and in many cases, I do not believe delegation has to be bad for a person's autonomy per se, which is something I have discussed before.

To Brey [2005] delegation to Smart Surroundings is a problem, because we give up control over our activity. I have argued that in the case of servant systems this need not be a deal-breaker. However I agree with Brey that in the case of associate systems, delegation becomes more problematic. This is because there is a difference between what we normally delegate to people and what associate Smart Surroundings try to take out of our hands. When we delegate something, we want someone else to carry out a task we want to get done. Basically we have a desire that we express, and we make it effective by letting someone else do it. Associate systems try to figure out by themselves what it is you might want, and that seems to be where the problem is. There is no task that is being delegated. This might well get out of hand and lead associate systems to try to get you to delegate your everyday life to them. Since Smart Surroundings are set to connect so many things, I think there will be a problem when the person using them is not part of what is going on with the fulfillment of his desires. At some point the technology may take over so much, that you are no longer in control of what is going on in your own life. So when we imagine associate systems that no longer have trouble figuring out what you would want, we still find problematic issues with autonomy.

Because associate system will try to take over much more than just a task or two, there is the danger of them just leading you on without your involvement. The fact that the things that you want to happen still happen does not matter anymore in such a case, as autonomy is not about being happy, it is about being in control of your own happiness [Oshana 2006]. While associate systems might suggest that they leave people in control, I think the scale in which they take over from

people, and the fact that they can take over more than just delegated tasks, makes it in fact a technology that might fulfill your desires, but not in a way that leaves you autonomous.

In regards to this hypothetical form of associate systems we can still say that the value of control is still harmed by the built-in consequences of the system. The problem is that people still do not have control over decisions made by this kind of technology, decisions that affect their daily life. This might lead to a scenario where Smart Surroundings take over your own life from you. While they do have a correct image of your desires, they still do not leave you in control of your life.

7.5.Relations between people and associate systems

Besides the built-in consequences and embedded values, I will discuss the relations that associate systems have to people, in order to see how this affects those people's autonomy. In the case of associate systems we can recognize alterity relations as playing a large role. The smart mirror that books a holiday for you can be seen as another person, or perhaps another version of yourself, as it is realizing your desires. In either case the technology can be interacted with as someone outside of yourself, rather than something you interpret or embody.

Interestingly part of the problems with associate systems can perhaps be found in the fact that associate systems tend to be in an alterity relation with people. It is for this reason they might best be seen as an external party, rather than a part of you, as would be the case in an embodiment relation. Since we can see associate systems as another party, it makes it seem like someone else is deciding and controlling our life for us. This is the case in both the hypothetical and more realistic case of developments. In both the fact that "something else" is taking control over our lives is what makes us lose control ourselves.

Perhaps if there would be a way to bring some of the ideas behind associate systems into an embodiment relation, we would find ourselves still in control of our desires and their execution, because the technology is part of us. How this would be realized technologically is beyond the scope of this thesis, but might require direct brain-computer interfaces. And of course the problem of how a computer might make sense of human desires is one that would still require solving. Yet it goes to show that there may be potential for successful associate systems after all, just not in the way in which the current vision of Smart Surroundings seems to conceive them.

7.6.Evaluating associate systems

After analyzing the embedded values of associate systems, as well as the way alterity relations with these systems affect our autonomy, I will now evaluate the way associate systems affect people's autonomy. As we have seen throughout this chapter severe problems for autonomy can be identified

in the built-in consequences of these systems. This holds whether you take their problems with distilling desires from behavior into account, or you do not.

As I have argued, we can recognize effects on both internal and external autonomy in associate systems. I will address these concerns separately, starting with internal autonomy. Associate system, in their problems of distilling people's desires from their behavior lead to situations in which systems carry out what they claim are people's desires, while this may not be the case. I have argued this can be seen as a case of deception, and deception harms procedural independence. Associate systems may trick us into doing things we would not want to do without the system. As such we do not critically reflect on our desires, they are fed to us by the system. Because of these problems with procedural independence, a loss in internal autonomy follows from this effect.

With regards to external autonomy I have identified a loss of control in associate systems. Because associate systems go straight from our desires to acting on them, without involvement from people, there is no chance for them to have their say. Since associate systems are not guaranteed to know our true desires, they may end up doing things we would never want. Here the fact that we are not involved ourselves truly becomes problematic, as there is no way in which we can control the system if something does go wrong. This means for associate systems autonomy is diminished by means of a loss of control as well.

As we have seen this second problem does not go away when we assume the problem of distilling desires is not an issue. The system still completely passes a person by, even though they now carry out his desires properly. Delegation becomes problematic here, because people are not just delegating specific tasks to a technology, but rather the technology can take over everything, without a person being able to decide what. The notion of control however is different from just seeing your desires fulfilled, it also means you play a role in fulfilling them. Self-governance requires you to play a part in it yourself. Because associate systems can best be seen as having an alterity relation to people, they should be seen as external entities, and not part of ourselves. This way a loss of control, and thus of autonomy, will likely be present in associate systems of this type.

In conclusion we can say that generally the effects on autonomy of associate systems are bad. There are multiple ways in which autonomy can be diminished, and there is no real improvement to compensate. While in a different design there might still be room for these systems in an autonomous life, currently I do not see this happening. As such the good influences on autonomy are to be found in servant and informant systems, rather than associate systems.

7.7.Conclusion

In this chapter I have analyzed the last of the three categories of Smart Surroundings I will be discussing: associate systems. I defined associate systems as those Smart Surroundings systems that try to figure out the desires of a person based on his behavior, and then proceeds to make these desires effective. The goal of this chapter has been to look at ways in which associate systems can impact the autonomy of people.

In order to analyze the effects on autonomy of associate systems I have identified a technical problem that affects people's autonomy. This problem can be described as the question whether Smart Surroundings are capable of finding a person's desires in their behavior. Søraker and Brey criticize this possibility by claiming it is based on behaviorism. Searle criticizes this old view of relating desires to actions causally. Another critique comes from Dreyfus, who argues against the claim that rules of reasoning can be formalized into a computer program. He debunks this assumption by saying human reasoning is very dependent on contexts that a computer cannot understand.

Because of these problems, associate systems are not able to actually figure out a person's desires and act on them. This causes harm to two values related to autonomy: control and procedural independence. Control is lost because people have no say in which desires get carried out and in what way. Procedural independence is harmed because people may believe that these systems really do represent what they want, and get the feeling the technology knows better than they do. This can be seen as deception, as due to the technical problems illustrated above, associate systems may be wrong about your desires.

In order to find out if associate systems may do better when the technical problem would not be an issue, I have looked at this scenario as well. However I still see a fundamental problem here. Associate systems take over a great deal of your life, more than just the delegation of tasks. It is possible the technology will more or less start living your life for you.

Finally the relations these systems have with people are mostly alterity relations, meaning they are experienced as external entities. As such we cannot argue that they are part of us, and we give up control to something outside ourselves. For these reason I believe that associate systems, whether they are able to distill people's desires from behavior, will be problematic for autonomy.

8. Design guidelines for autonomy-sensitive Smart Surroundings

After analyzing three different classes of Smart Surroundings systems with the framework I constructed, I will wrap up with a discussion of autonomy-sensitive design of Smart Surroundings. With the importance of autonomy, and the effects that Smart Surroundings are bound to have on it, it seems prudent to develop systems that have the autonomy of people interacting with these systems in mind. The central question of this chapter is: " How can autonomy-sensitive Smart Surroundings systems be designed?" In this chapter I will take steps to creating some guidelines which may be used as a way towards design of Smart Surroundings systems that consider the autonomy of the user.

Firstly I will discuss Value-Sensitive Design, which is the idea of designing technology with certain values in mind, and link this to the design of autonomy-sensitive Smart Surroundings. Next I will develop some conditions I consider necessary for any guidelines with regards to the design of such systems. After this I will argue that autonomy-sensitive design can be based on two principles: reliability of the system and responsibility of the designer.

8.1. Value sensitive design for Smart Surroundings

I will start this chapter with a short discussion of value-sensitive design in order to answer the question what value sensitive-design is and what it can mean for autonomy and Smart Surroundings.

Value-sensitive design (VSD) is a multidisciplinary design methodology which aims to include the idea of values in the design process [Brey forthcoming, p. 12]. The theory behind this is partially built on the idea of values embedded in technology that was used as part of my framework. VSD attempts to find methods for designers which allows them to incorporate the values, primarily ethical values, of stakeholders into their work. VSD tries to balance two issues: the values and interests of the stakeholders, and values that can be considered independently from the stakeholders. This balance might lead to dilemma's and is as of yet unresolved, but Brey notes that in practice it will generally not lead to problems.

The methodology of VSD can be split in three branches of investigation: conceptual, empirical, and technical. Conceptual investigation analyzes the values that play a role as well as how they affect the stakeholders, and how different values affect each other. Empirical investigation is aimed at the context of people involved with the technology, by analyzing issues like the behavior and values of the stakeholders. Technical investigation is done to analyze the properties and effects

of artifacts, and how these affect the values of stakeholders. Some of the elements from these investigations have played a role throughout my thesis, but in VSD these issues are part of the design methods.

I will argue that VSD can be applied to the case of autonomy in Smart Surroundings. We have seen throughout my thesis that the value of autonomy can be affected either in a positive or negative way. For this reason autonomy is an important value to consider in VSD when applied to Smart Surroundings. If autonomy was either positively or negatively affected by all Smart Surroundings systems, or not even affected at all, there would be no point in analyzing this value, since the presence of the technology determines the effect. However because there are different effects on autonomy possible, there is room to optimize the autonomy effects of Smart Surroundings. There is a challenge for VSD to try and find a design method for Smart Surroundings where the positive effects on autonomy are maximized, while negative effects on autonomy are minimized. In the remainder of this chapter I will take some steps in this direction.

8.2.Conditions for the design guidelines

Following this discussion of Value-Sensitive Design I want to turn to some pointers for designers of Smart Surroundings systems that attempt to improve autonomy as much a possible, by articulating some guidelines for such design. This is to make sure that the design guidelines does in the end satisfy what is needed of the,.

Firstly and most importantly these guidelines should respect the autonomy of people. While this might seem like an obvious place to start, it would be disappointing to have guidelines that do not put autonomy first. This is after all their goal. There may be even more important guidelines we can set for the design of Smart Surroundings, but I am focussed on autonomy and as such this should be the priority.

In order to accommodate this the guidelines should incorporate the considerations about autonomy I have articulated in this thesis. It would be too much to ask to have every designer have in-depth knowledge of autonomy, so these guidelines should ensure that autonomy is considered by applying them.

Secondly the guidelines should respect the “user” of the Smart Surroundings system. After all autonomy is something that belongs to a person. Now autonomy can be approached from two angles: as critical reflection on desires that are to be made effective, and as a set of constraints that ensure you retain control over your own decisions. Both of these should be reflected in the framework.

With regards to desires, the guidelines should respect the personal aspect of autonomy. We have seen that in trade-offs with regards to a person's autonomy can be made, where not everybody would have the same desires or carry out the same actions. For example access to one's information (privacy) may be exchanged for a surrounding that knows more about you and better fits your interests, and it should be up to persons to choose which way they want to go. The guidelines should make sure people have a role in deciding for themselves how to deal with shifts in autonomy autonomy.

On the other hand, we have seen that autonomy does have its limits. As such, if a Smart Surroundings system diminishes autonomy, without any way of improving it in a different way, this should be condemned within the guidelines. The guidelines should note the diminished autonomy in the design of those Smart Surroundings systems that place a person in a situation where he becomes completely dependent on the system. As I will put autonomy first in these guidelines, Oshana's critique on Dworkin's approach should be reflected for the reasons she puts them forward. People will have a central role in the framework, but only insofar as they do not give up autonomy in a way in which they cannot get it back.

Thirdly the guidelines should respect the visions of Smart Surroundings, for as far as this is possible within the previous two constraints. While autonomy and the user are more important than making nice Smart Surroundings applications per se, I believe there is still enough space to design such systems. The guidelines should try not to restrict technological development further than is necessary to ensure the maximum potential of autonomy. I have after all been able to give a positive look at some possible approaches within Smart Surroundings in the previous chapters.

The importance of this last constraint is that it helps to prevent us from going too far. In this thesis I want to call for autonomy-sensitive design of Smart Surroundings devices and systems, so to that end I would still like to see as much possibility within the technology and vision as possible. I think Smart Surroundings systems can have a lot of potential, but their design does need to take into account the people that will interact with them as well. In the end constructing guidelines for designing Smart Surroundings would be almost useless if it does not allow for the design of Smart Surroundings.

8.3.Design guidelines for autonomy-sensitive Smart Surroundings

The previous four chapters have created and applied a framework for analyzing autonomy effects of Smart Surroundings. I will now finish off with some design guidelines informed by that framework. These guidelines are less abstract than the framework and are for that reason more prescriptive. As said the goal of this thesis has been to aid the development of autonomy-friendly Smart

Surroundings and this is also reflected in the guidelines, which are perhaps closest to the actual creation of these technologies.

I want to base my guidelines on two issues raised by Verbeek [2008]: reliability of technology and responsibility of designers. Both of these are essential parts of the design of a new technology, as they are present at the inception of it. Reliability is something that is put into the technology at the design phase, as the decision to make a technology not just work, but work reliably should be made then. The responsibility of the designers also plays a role during this phase, as they will be hard pressed to have an impact on the technology once it in the hands of users.

8.3.1.Reliability

Turning first to reliability, I have noted in the framework that effects of Smart Surroundings system works may impact autonomy. Specifically improperly working systems may have a negative impact on autonomy, as the user is not able to control that which is not expected. Reliability can also be recognized in the ability for a person to opt out of the technology. If we know we can get away from a system if we would want to, we have something to hold on to and rely on.

A designer who wants to design a Smart Surroundings system would do well to consider this. Fail-safes should be in place to ensure people retain control if needed, and the system does not automatically continue malfunctioning. Greenfield raises the point that "[Smart Surroundings] must default to harmlessness" [Greenfield 2006, p. 235], a point that makes a system more reliable for those involved with it. They can rest in the knowledge that whatever happens, there is a way to get out of an undesired situation.

A system that is reliable is also one that does what it claims it does. For Smart Surroundings this may be difficult to achieve as unpredictable things may come up in the networking of different devices. What is more important perhaps is that designers do not make assumptions about people's desires. As we have seen in the critique on associate systems, Smart Surroundings can not be relied upon to reason about people's desires. For this reason the designers should be aware that it is they who are deciding what desires people may have. It would be best to make this explicit, as people can then know what sorts of desires may be fulfilled by the system, and they can themselves then choose whether or not a system fulfills their needs.

Since the behavior of Smart Surroundings devices in a network is unpredictable, how can designers tell people how their systems will work? Greenfield [2006, pp. 237-238] notes that the systems themselves may be able to do this. As protocols are formed for the interaction of Smart Surroundings devices, this could also be used to communicate to people just what two connected

devices will do. This way the concept of Smart Surroundings itself is used to show how devices will operate together.

A final aspect to reliability is being able to rely on the fact that a system will not merely decrease autonomy. Shifts in autonomy do not need to be a problem if a person agrees with them, and for this knowledge of the system is needed, but just a decrease does not make for reliable systems. While autonomy may sometimes be sacrificed for another value, this should not be the standard form of Smart Surroundings systems.

8.3.2.Responsibility

The second issue of responsibility is perhaps more complicated. Verbeek points out that people interacting with technology may well be able to make it do things that the designers never intended [Verbeek forthcoming]. This may be specifically prevalent in the highly networked world of Smart Surroundings where the connection and interaction of devices may lead to systems that nobody ever imagined. Designers will mostly work on devices, perhaps in specific systems, without thinking about the many possibilities that the device may also have. Still I believe it important that designers take their responsibility as they are usually the last people to fundamentally impact the way a device will work.

One way in which the responsibility of designers may manifest itself is that Smart Surroundings may best be seen as an "open" technology. This is in relation to a point Oshana makes about substantive independence. She argues that an individual should be able to pursue values, interests and goals that may be different than those who have influence over her [Oshana 2006, p 87]. At the same time we remember that Dworkin [1988] argued that there are many ways to live an autonomous life. In the case of technology in general, and one that invades daily life specifically, I think this is what we are worrying about here.

I have identified a number of shifts in autonomy that can be the effects of Smart Surroundings developments. These shifts in autonomy are complicated to evaluate, as I have argued that whether people would approve of them or not may be dependent on values that they personally hold, and these do not have to be the same for everybody. As such it is the responsibility of the designer to take this flexibility into account. You might even say it is the responsibility of the designer to not try to be responsible for the autonomy issues that people themselves need to work out.

How would open technology work? Well imagine a technology like a tv. It is not in the hands of the creator of the tv to decide the content that a person watches. Of course this is up to networks, but there can be a very large selection of programs, leaving plenty of choice for anyone. An even better example is the internet, where pretty much anybody can add their own content. This way the

technology itself does not limit you to certain views or ideas. I think that this is what must be searched for in the development of Smart Surroundings as well.

This way the responsibility of a designer extends beyond his workplace, while taking into account the fickle nature of people interacting with the technology as well. The elaborate vision of Smart Surroundings is probably not easy to design for, as it allows for so many connections and use situations. Leaving it open, but in a responsible way, would perhaps be one of the most autonomy-friendly forms of design. It gives people input in the way the technology works and can be used.

8.4.Conclusion

In this chapter I have used my analysis of autonomy effects on Smart Surroundings to set up some guidelines for the design of Smart Surroundings systems. As autonomy is important for people and Smart Surroundings are bound to affects autonomy, being able to design autonomy-sensitive Smart Surroundings is also important.

Firstly I discussed the concept of Value-Sensitive Design as a design methodology that aims to use the values of stakeholders in the design of technology. I argued that such a methodology could well be developed regarding autonomy issues in Smart Surroundings. The reason for this is that autonomy can both be improved or diminished through Smart Surroundings, and as such there is room for optimization of the effects on this value.

In this chapter I have set up some conditions for design guidelines pertaining to autonomy effects of Smart Surroundings. Firstly they should respect the autonomy of people, as that is what autonomy-sensitive design is about. Secondly they should respect the user, as autonomy is a personal affair. Thirdly the guidelines should respect the vision of Smart Surroundings, as that is what should be designed in the first place.

Finally I have formulated some design rules for autonomy-sensitive design of Smart Surroundings systems. They have been built up around the reliability of the system and the responsibility of the designer. The reliability of the system means that a system should do what it says it does, has a fail-safe built in, and does not merely take away autonomy. The responsibility of designers means that they do not force people into certain patterns, as an autonomous person should be able to choose for themselves how to live. As such Smart Surroundings may best be designed in such a way that people can adapt them to their own desires.

This wraps up my discussion of design guidelines for Smart Surroundings. In the next and final chapter I will draw my conclusions and wrap up my thesis.

9. Conclusion

In this final part of my thesis I will look back, summarize my findings, and formulate an answer to my thesis question. I will begin with another look at my thesis question, which was: “How can Smart Surroundings affect the autonomy of the user, and what factors are relevant when analyzing the effects of Smart Surroundings on the autonomy of the user?” Throughout my thesis I addressed the various issues related to this question, by investigating the relevant concepts, forming them into a framework and using this framework as a tool for analysis. I will now go through my thesis chapter by chapter and summarize the points I made in each.

In the second chapter I discussed what Smart Surroundings are. I concluded there are three characteristics which define Smart Surroundings: it is a form of electronics, embedded in objects, and able to interact with people proactively. I also discussed the way people interact with these systems, as Smart Surroundings can be triggered unintentionally, leading to a situation in which we do not recognize a user as such. Because this is a defining feature of Smart Surroundings, I introduced an alternative in the form of Ihde’s four relations between humans and technology.

The third chapter tackled the second relevant concept, that of autonomy. I investigated autonomy by comparing a number of different conceptions that have been put forward. I focussed mostly on two alternatives. One was by Dworkin, who sees autonomy as critical reflection on desires (internal autonomy), that then proceed to be made effective (external autonomy). The downside of this view is that it allows for behavior in which a person is seen as autonomous as long as he follows his desires, even if there are autonomy problems in his lifestyle. Oshana presents an alternative with constraints on how one can live autonomously. I argued her view solved some of the problems in Dworkin’s conception of autonomy, and presented a combination of the two as a solution.

In the fourth chapter I discussed possible effects of Smart Surroundings on internal and external autonomy. I then discussed how to evaluate these effects and discussed autonomy shifts. Shifts in autonomy happen when one aspect of autonomy is improved while another aspect is diminished. I used this analysis to formulate a framework in which I argued that four considerations should be analyzed in order to describe the effect of a Smart Surroundings system on autonomy. These considerations were the built-in effects of a Smart Surroundings system, the autonomy-related values affected by the system, the relation between people and the system, and finally an evaluation of the effects on autonomy. Finally I introduced three types of Smart Surroundings each of which I discussed in a separate chapter.

The first type of Smart Surroundings I identified were informant systems which are aimed at providing people with information, in order to aid them in their critical reflection on desires. As these systems provide information they can strengthen internal autonomy. However people should be wary of the facts that the information may be deceptive, or open to misinterpretation, which may diminish autonomy to some degree.

The second type of Smart Surroundings systems I discussed were servant systems, which carry out tasks that we set out for them. I identified four aspects of their functioning related to autonomy effects. Firstly servant systems allow us to gain control, largely because we can delegate tasks to them. Secondly we can become dependent on these systems, meaning we can no longer live without them. Thirdly Smart Surroundings systems may take away some tasks from us, closing options for action, but they may open new options for action at the same time. Fourthly servant systems can cause privacy issues, but often this will be a trade-off for a more personalized service. Because of the various positive and negative effects of servant systems, they are often associated with shifts in autonomy.

The third type of Smart Surroundings I analyzed were associate systems. These systems reason about the desires of the user based on his behavior, and make these effective without involvement of the user. The problem with these systems is that there is not sufficient causal connection between behavior and desires, thus these systems cannot conclude what the desires of people are without error. This problem means that associate systems can be deceptive and make people lose control, since people think these systems know what they want, while the do not. However even if the systems would be able to recognize a person's desires, they would still take away control from people. For these reasons I believe associate systems mostly decrease a person's autonomy.

After this discussion of autonomy effects found in Smart Surroundings systems, I turned to a discussion of Value-Sensitive Design and a set of design guidelines in order to aid the autonomy-sensitive design of such systems. I presented three conditions that such guidelines should adhere to: respect for autonomy, respect for the user, and respect for Smart Surroundings. In line with this I developed some guidelines based on two principles: reliability of the system and responsibility of the engineer.

Coming back to my thesis question, the long answer is of course this entire thesis. In shorter form I would say that Smart Surroundings may affect autonomy in different ways, either positively, negatively, or both to a certain degree. This third category of shifts in autonomy is the most complex, as context-dependent aspects may play a role in valuing such shifts. Factors that affect

autonomy may be found in the way the system interacts with people, its built-in effects, and embedded values. All in all Smart Surroundings can both improve and harm autonomy, and as such it is a value that should be considered in their design. These effects have the potential to be optimized for a maximum autonomy gain and minimum autonomy loss. There are surely many problems that need to be overcome in such design, but the possibility of improvement is something that may give hope.

After this discussion on Smart Surroundings, I feel there is still a lot that can be said about it. I believe Smart Surroundings are a very interesting technological development, of which we are now at a point in time where we can still impact the direction in which it heads. With this thesis I have mostly tried to give an overview of how autonomy may be affected, but there is plenty more to say about these issues. For instance investigation on a less abstract and more technical level may show some more interesting points about autonomy effects of Smart Surroundings systems. At the same time empirical research of people's actual experiences with these systems may say more about how this affects questions of autonomy. Finally I believe there is more room for design guidelines, especially from the perspective of designers themselves. Hopefully all these investigations will find a starting point in my thesis. Philosophically I think the role of technology in person's autonomy is something that may be investigated more thoroughly, both on an abstract level, and with regards to specific technologies.

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