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THE SMART HOUSE AS A GENDERED SOCIO-TECHNICAL CONSTRUCTION

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1. INTRODUCTION - WHY STUDY THE HOME OF THE FUTURE?

In this article I intend to illuminate how innovation processes can be gendered. By choosing one example - the smart house - I will investigate how gender is taken into consideration in the design of the technological home of the future.

Everyday life and the home have been important arenas for feminist research and feminist politics, but technology has not been of crucial interest (Cronberg & Sangregorio 1983, Cronberg 1987, Gullestad 1987). In the 1980s, popular technology-based scenarios pointed to the home as an important field for change (Gorz 1981, Toffler 1981). The agent of change was information technology. But is change focused when it comes to gender relations and the sexual division of labor in the home? The home is traditionally women's domain. Technology is traditionally a masculine domain. Consequently technological change in the home will be gendered. How is this reflected in the development of the smart home as a socio-technical construction?

It is a widely held popular belief that new technologies in the home have rationalized housework so that housework no longer is a source of inequality between the sexes. Time budget studies show us another picture (Vanek 1974, 1978, Boalt 1983, Cowan 1983, Hagelskjær 1986). A considerable amount of time is still spent doing housework, and housework is still an important source of inequality between men and women (Berg 1988, Nyberg 1990). These two aspects were central to my study of the smart house. Were there any "time-saving" appliances in the making? Is the sexual division of housework reflected in the design of the house?

The popular technology-based scenarios about the "new" everyday life perceive technology as an agent of change and a source of "progress" in modern society. Critical studies of technology has opposed this view by focusing on the degradation of work, increased political and social control, pollution, and unemployment. These are important aspects of technological change, but the political implications of these studies have left a feeling of political pessimism. Feminist studies of technology focusing on impacts of technology have often nourished such feelings. It has proved difficult to find "progress" when looking at impacts of technology on gender relations or women's lives (Lie et. al. 1988, Zimmerman 1986).

This pessimism may stem from the kind of theoretical approaches used in these studies. Technology was often described as a static independent variable which "had impacts" on social relations. Few questions were asked about what technology meant. The background of this project was closer reflections on the role value conflicts plays in the explanation of the housework - technology paradox[1]. One of the most interesting aspects of this field of research is the encounter in domestic technology between technology as a masculine domain and the home as a feminine domain (Berg 1989). Can a focus on conflicting values between design and use of household appliances give us a clue to understanding more of the development of domestic technology as a gendered process?

There is very little theorizing about gender and innovation in the literature on the sociology of technology (Wajcman 1991). Inspiration may be gained from feminist studies of science. Social studies of science suggest that masculine values, masculine domination, and masculine practices constitute an important part of science, or the social construction of scientific facts (Harding 1986, 1991, Tuana 1989). But what is true for science is not necessarily true for technology. The construction of facts and artifacts may differ, and it is still an open question how feminist studies of science and technology may mutually benefit from each other.

It is the shaping of the home of the future and the importance of gender in the innovation processes, which is my concern here. My study concentrates on one specific version of the home of the future - the smart house - because it:

- has information technology as its main focus. IT is regarded as **the** new technology.
- resembles the popular scenarios from the 1980s. Scenarios that presented new technologies as gender neutral.
- has reached the stage of prototyping involving many of the big international electronic corporations in the pre production phase.

In sum, the smart house seems to be a house which is beyond the stage of ideologically unbridled scenario thinking. It emerges as a serious first phase IT home in the making.

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[1] The housework - technology paradox refers to the debate about why so much time is spent on housework in modern households, in spite of the massive introduction of new technologies in the home (Vanek 1974, Cowan 1983, Berg 1988, Nyberg 1990).

In terms of gender this house is interesting because the scenarios of the smart house renders an astonishing lack of concern about gender (Berg 1991). IT was said to bring about radical changes in your future home - but the changes did not include gender relations. Implicitly technology is perceived as gender neutral. This is a fairly common phenomenon in debates about technology (Cockburn 1983, 1985, Lie et. al. 1988, Sørensen & Berg 1987), but IT in the home is not just any technology in terms of gender. These technologically based scenarios are concerned with the home and everyday life - what is this if it is not women's traditional domain?

This chapter is based on data from the project "From the Home Computer to the Computer Home"[2]. Information was gathered through "the snowball method", collecting bits and pieces of information from different sources. The lack of empirical and theoretical social research on gender and innovation, particularly on the smart house, made it reasonable to use an exploratory approach[3]. I have collected information in different ways; mainly by interviewing designers and producers, and analyzing advertisements and other kinds of written material systematically. I have visited the three North-American test houses which are my main source of information[4].

To study gender empirically in connection with the design process of the smart house, I chose to formulate three main questions which could give me a clue to the relationship between gender and technology in this respect. These questions have their background in the sexual division of work:

1.   First, I wanted to know what the actual appliances "in the making" were. Scenarios are not always to be trusted as a guide to the future. I wanted to find out what lies behind the concept of "smart houses" in terms of a description of artefacts.

2.   I wanted to find out what kind of household activities the new artefacts or appliances were meant for. Were housework taken into consideration during the design process?

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[3] The literature about the smart houses is mainly concerned with the functions of the appliances in technical terms (Heimer 1991, Miles 1988).

3.   I wanted information about the consumers whom the designers and producers saw as their target group. For whom were they making the new home?

These three questions are addressed in various ways to describe and discuss how innovation processes can be gendered. The aim of this chapter is to show how the smart house is a gendered socio-technical construction.

2. THE HOUSE OF THE FUTURE AS PROTOTYPES

2.1 A description of the houses in the making

The technological home of the future denotes a variety of terms like computerhome, intelligent home, home automation or smart house. Here I will describe three US prototypes of the smart house[5]. Two of the houses are laboratory houses, which Honeywell and National Association of Home Builders (NAHB) finance. The third house is a commercial show case named Xanadu owned by private investors.

The Honeywell House

Honeywell is a multinational corporation. The company produces control systems and services, the home being one of several markets. They have produced control appliances used in more than 60 million one-family houses in the US. Honeywell's main products are thermostats, air cleaners, burglar - alarms and fire alarms.

These products are included in the Honeywell House, and in addition they are developing integration systems. Integration means that products and services are tied together through one central programmable communication network inside the house. Honeywell wants to develop a flexible package that can be adjusted to individual homes, according to different life situations and life styles. Honeywell has been interested in home automation since 1979. The first laboratory house was built in natural surroundings in a residential area, but it proved too difficult to test and change the

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[5] The North-American houses were chosen because in 1987 they were the houses I knew about. Later I have learned that there are several smart houses being built in different European countries (one on joint account in the EEC), in Japan and in the US. Information about these European houses have been difficult to find, and it has also proved difficult to get permission to visit them for research purposes.

infrastructure of the house on such a location. The present test house is therefore built inside a laboratory.

The present Honeywell House is built life-size to be a full scale copy of an average American detached house. "Home Automation Test Laboratory" is a large R&D-project in "Honeywell Corporate Systems Development Division". The test laboratory consists of a house (Honeywell House) and two environmental test chambers. The six room house is the test site for prototypes of home automation products and integrated house control systems. The walls are "open" to simplify the engineers' work. The house looks like any ordinary house. No fancy details suggest that this is the home of the future. The R&D team says this is done on purpose because Honeywell will present home automation as nothing out of the ordinary. Only the control panel reveals that this is a somewhat special house. The control panel is designed for central control of all electronic systems in the house.

The interior of the house is decorated as "ordinary" as possible. The house is sometimes used to test out specific technologies on consumers. People from the neighborhood area are invited to the house to use the new equipment. To make the test situation as natural as possible, say the producers, it is important that the test house resembles an ordinary home. They have not fully achieved this, because the small details and decorations that make a house into a home, are missing.

NAHB Smart House System

The National Association of Home Builders (NAHB) is an association of producers and suppliers of different products for the home. NAHB has about 150000 members which makes them an organization to take into account when it comes to the fight over standards for inhouse networks. It has its own National Research Foundation which fostered the idea about the development of a smart house. In 1986 they decided to intensify their R&D efforts on the smart house, and they reorganized their research. Smart house R&D was made an independent business, "The Smart House Development Venture Inc" (SHDVI).

The demonstration house is located in a large long distance truck, which makes it possible to move the house around to different places. Viewed from the outside, this house does not look like a house at all. Most of all it

resembles a large caravan. The R&D work takes place in a building nearby. There you can also see a miniature model of the house.

The house consists of an entrance hall, a kitchen, living-room and a bedroom. The rooms are placed one after the other, and half of each room is built in natural size. The rooms are said to cover ordinary functions in an ordinary house.

The main focus in the NAHB Smart House System is on the communication network. The whole infrastructure of the home is going to be changed, they say. The cable system integrates all kinds of power, independent of the source of energy. They have joined the battle over standards for signal transmission in networks made for homes.

Xanadu

From the outside, Xanadu looks different from almost any house. Xanadu is located in Orlando, Florida, in the same area as the Epcot center. It is owned by private investors and is used as a show-case for different suppliers which may display and demonstrate their products there. Unlike the two other houses, Xanadu represents architectural innovations.

The difference from ordinary houses in the shape of this house, is supposed to symbolize difference in thinking about the infrastructure of the house. One of its founding fathers, the architect Roy Mason, invented the term architronics, which means the integration of information technology and the building's structure in the design of the building (Mason 1983). Xanadu has a central control unit which integrates different appliances. The control unit is described in terms analog to the human brain, emphasizing differences in function between the left and the right hemisphere of the brain.The interior of the house seems unfinished, it has no comprehensive style. The applications stand alone without blending into a futuristic unity as promised in the brochures. In the two smart houses already described, the networks are applicable to the existing structure of buildings. In Xanadu the net is integrated in the structure of the building itself, and is thought mainly as a possibility for new houses.

2.2. New appliances or what?

Here I will concentrate on the "new" technologies that are found in the smart houses as existing prototypes. I have not included the appliances they were talking about in more futuristic terms.

Technologies in the Honeywell House

Substantial to the Honeywell smart house concept is the integration and central programming of diversified control and regulation systems. The main R&D efforts are directed towards the development of such systems which comprise indoor air quality, motion detectors, temperature and environmental control in different zones, remote registration of outdoor temperature and air humidity, combined heating- and cooling systems, light regulation, advanced security control, service/diagnose equipment, voice recognition and voice information. A video security system watches the main entrance and shows who the visitors are on a TV-screen. A fire detection system discovers smoke and alerts the inhabitants through a TV-screen. The system can tell where the smoke stems from, and instruct people what to do about it. The light regulation system can adjust light according to where people stay, and is automatically activated if the security alarm sounds.

To reduce the consumption of energy, much attention was being paid to switching lights on and off. Automated light switches were seen as an important means for energy saving. Honeywell had put much effort in the motion activated light control system, but they were not very happy with it. When testing this system, they had invited several people to the test house for dinner to see how the system would function in a "natural" situation. When the guests entered the dining-room, the lights went on, and they settled around the table. They were all sitting without moving much, and then suddenly the lights went out! The lights were activated by motion, so the hosts had to ask their guests to flap their arms to turn on the lights again. Today they find voice activation a more interesting development, along with infrared remote control.

To sum up, the technologies in the Honeywell version of the home of the future are turned to light and heat regulation and alarm and security control. In this smart house, technologies that have to do with housework are noteworthy wanting.

Technologies in NAHB's smart house

In 1988, NAHB concentrated their R&D efforts on the development of the multi cable system. In today's home we have different cables for different types of power or energy. The smart house cable will make all sources of power available in the same cable and in every power-point. The microwave oven, the washing machine, the home computer and the telephone may all be plugged into the same power-point. This demands appliances which are designed to fit the cable system. Only appliances equipped with the correct micro chip will receive power from the cable system. Signals from the micro chip in the appliances will be sanctioned by the chip in the control unite.

This means that standardization is important. The ones who win the standardization battle will have a great advantage in the future production of networks and new appliances. SHDVI does not see the development of new appliances as their task. They present ideas about a future where domestic technology is adjusted to the new network. The washing machine can signal on the TV-screen when the washing is finished and it is time to move it to the tumble dryer. The vacuum cleaner can be programmed to stop when someone is at the door or when the telephone is ringing. When the temperature in the micro-wave oven shows that dinner is almost ready, it can signal to the hot-plate to warm the soup and the stereo to provide the right background music for the meal.

When appliances are displayed in the smart house, they are familiar technologies aimed at integration. It is noteworthy that the technological changes forecasted in these examples, are a long way from being consciously concerned with routine housework. In addition to the integration of the inhouse appliances, the net is also connected to outside communication nets. It is planned for work like telework, telebanking, teleshopping, as such services are made available to private households. The NAHB's main concern is the battle over standardization.

Technologies in Xanadu

The house has many different rooms with traditional functions, like kitchen, bedroom, bathroom etc. In every room appliances are presented that represent innovations according to the designers. In the book about the house, the new appliances are presented in a "high-tech" style, and to a certain extent this is accomplished in the house. Xanadu is presented as a

house you can talk to, a house which answers in different voices, a house where every room can be adjusted to changing moods, a house which is servant, adviser and friend to each individual member of the household. Behind this is Xanadu's house brain. The housebrain controls all functions in the home. The technologies in Xanadu are in general the same as in the two smart houses already described, but they are special in some ways. The applications in Xanadu comprise more activities than in the other two houses. But the applications are not prototypes, only ideas about and descriptions of what is future possibilities.

Dreaming about integration

The first question concerned the appliances in the home of the future. The list of what we found as testable prototypes of appliances is not very extensive nor impressive. I have not included what they were talking about as possibilities for the future, only what I have seen as prototypes.

It was **energy control**; heating and light on and off, **safety control**; security, burglar alarms and fire alarms, **communication**; messaging and information. I have made a distinction between the communication which goes on inside the house and communication with the outside world which was mainly by use of telephone or telematics, **entertainment**; television, CD-player, VCR, and computer games, and then there was **environmental control**; temperature and air pollution. None of these technologies on the list are radically different from existing technologies (Miles 1988). All of them are available on the market, but the main point is that they are not integrated. The new thing about the smart houses is the integration of different appliances to one central local network, or what is called small area network (SAN), homebus, domotique, or housebrain.

The dream is integration and thus centralized control and regulation of all functions in the home. Technically speaking, integration of different applications in the home into one central network is something new. Today, many different companies and organizations carry out R&D projects on home networks. The battle over standards is important for all the big electronic firms. Integration is the core technology of the smart home as a socio-technical construction.

3. HOUSEWORK AND TECHNOLOGY IN THE SMART HOUSE

What does housework mean in relation to the technologies discussed in the previous paragraph? The work or the activities they are concerned with can be either women's traditional work and/or men's traditional work. Housework is the most time consuming task in the home, and it is still mainly women's unpaid work. To study closer what kind of work is made relevant by the designers of the smart house, will give us a clue to the understanding how innovation processes can be gendered. First I will study whether housework at all plays a role in the development of the smart house. Then I will look closer at the way they think about housework in more general terms, their body of knowledge about housework. Finally I will discuss how housework makes its mark on the development of the smart house as a gendered socio-technical construction.

The house will do the job for you

For Honeywell the main idea about the smart house is that "it does more things for you, the way you would like to have them done, than today's houses", to quote the R&D manager. This means that the overall purpose of the smart house is to help the owner of the house so that he "no longer will have to think about how things are done". All he has to mind is "whether the technologies are simple to use, increase comfort, are pleasant, and affordable". This does not mention housework in any way, but one could imagine that technical solutions that increase comfort could relate to housework somehow. When asked about the advantages of the smart house, the following words were used; Comfort, security, convenience, energy saving, and entertainment. The order of the characteristics mentioned, indicate the ranking of the response they expect in the market. Housework is still not mentioned.

When asked about any disadvantages in the smart house the way it was designed, housework was not mentioned either. They pointed out that the main problem with the smart house would be a new kind of vulnerability, the "housebreak". The word indicates the problems that will arise if the house network breaks down or is tampered with. When all appliances are integrated in one network, a failure in the network will bring down the whole system.
It is strange to notice that housework is not mentioned when we are talking about "a house that will do the job for you". When speaking about "job" one would think it obvious in one way or the other to touch upon the actual

work that is done in a house. But housework is not a part of the job that the smart house will do for you.

This becomes even more striking when the R&D manager continues to tell about how their smart house is different from Japanese home automation. According to him, Japanese systems are designed to leave the finishing of job to be manual. The explanation is that the Japanese culture is extremely service-minded. In Japanese households it is women who render men services. Even when it is technologically possible to eliminate it, the Japanese do not want to change this service relationship. The Americans, on the other hand, in line with American culture try to optimize the use of technology by full automation of as many activities as possible. When pointing out this, they did not see the paradox of their own lack of concern with housework.

The same tendency is found at the NAHB. They present their main idea about the smart house as "a house which will take care of me". This implies that the house will do "anything you want to be done in your home today - and in the future". A general idea like this can concern housework. When asking for more details, we were told that first you have to develop a communication network to modernize the basic infra structure of the house. At the same time the network will act as an invitation to suppliers of domestic technology to intensify their product development with the new network in mind. Housework was not mentioned in connection with this either.

When asked to go thoroughly into what it means that a house will "do the job for you", they pointed out as important that the house will be more comfortable, safer, and easy to live in. Other advantages were better communication with the surrounding world, a great saving on energy, and better entertainment. Housework is still not mentioned. When describing what users of the smart house possibly would like the house to do for them, they had not thought about time-consuming activities like housework. Housework has no place in the general idea of what a smart house is, even though the ideas are vague enough to include the actual work that is done in a home.

Xanadu was a bit different. Integration and the development of a house network is also important here, but in addition their general, more scenario-like, idea of the smart house comprise thoughts about housework as well.

The title page in the book on Xanadu has a picture of a robot serving mother breakfast. The text accompanying the picture reads: "We are **not** replacing Mommy with a robot. We **are** presenting ideas on how to design, build, and use a home in new ways that can reduce drudgery while increasing comfort, convenience, and security" (p.1). Housework is not mentioned explicitly, but it is easy to interpret it as a part of the drudgery that will be reduced. The robot serving mother breakfast is a technical solution to one task which is housework.

When examining in more detail the way Xanadu is presented, we find that housework is mentioned in very vague terms. Housework is touched upon now and then, but never directly. Family life is often mentioned, and the house is described as a place where people can live happily together. "What is really futuristic about an architronic house like Xanadu, ... is not the way it looks, but the way it **works**. In this sense, the house of the future will be more like the houses of the past than like houses today."(p.43). The house is supposed to work to give the family better opportunity to spend time together, but it does not say anything about how you can save time to be more together with your family.

The message about Xanadu and future family life is double. On one hand they show that women as mothers and housewives play an important role in the home. On the other hand we are left in dimness whether it is women's work they aim at when the house will help to reduce drudgery. The ambiguity in the presentation of housework will be explored in more detail in the next paragraph.

Basic knowledge about housework

During the interviews we asked detailed questions about housework. When appointments for interviews were made, we said explicitly that housework would be the main focus of the interview. Nevertheless, they were still very surprised of being asked about it and answered in very general terms about housework. NAHB said that housework was not their concern. They left it to the white goods producers. At Honeywell they said they had paid some attention to housework. When asked to exemplify what kinds of housework, they gave examples like the automatic light switch. They saw it as a facilitation of housework, because it would enable a housewife to enter a room with her hands full of wet clothes without having to put them down to turn on the light.

In Xanadu the robutler was one example of a housework appliance. It was said to be an application that would serve you drinks, but in fact the glasses had to be filled before they could be served and placed on the right spot for the robutler to get them. By help of remote control, the robutler then could serve the drinks, but the remote control had to be operated by a person. First of all, serving drinks is a very marginal part of housework. Secondly, it is interesting to note that the technical solution requires manual work preparations.

This underlines the double character of their concern about housework. The ambiguity can be further exemplified by two quotations from Xanadu. When reflecting on what goes on in a home, the following is emphasized: "Today home is often little more than a place to sleep, eat a meal or two, and store possessions." (p.16). I suppose very few housewives would come up with such a description of a home. As a general description of what takes place in a home, it is misleading (Cowan 1983). Knowledge about housework seems to be rather scanty, which the following statement underscore: "Once household chores were regarded as inescapable duties - like tending animals or crops on a farm. But today they are more often resented as impositions that everyone in the family would like to avoid. As a result, a host of new household appliances are appearing that require less time and physical effort to do unpleasant jobs" (p.19). Housework is here seen as something unpleasant to avoid. And the time-saving technologies already exist, they say. When examples of technologies that can save one from housework are mentioned, focus is not on the most time consuming activities: "Familiar examples include the toilet-bowl cleaner that fits inside the tank, the in-sink garbage disposal, trash compactor, etc." (s.20). Again marginal household tasks are mentioned.

In general, we learned from the interviews that very few had given housework serious consideration. They had not reflected on the meaning housework could have for their own work with the design of the house of the future.

"Important" technical solutions

In connection with brochures and information about the smart house, housewives sometimes are pictured with new technologies. She smiles happily along her computer in the kitchen. But very few of the new technologies described in the brochures are actually in the making or existing as prototypes.

In Xanadu several new domestic technologies are described. By closer examination we see that these either are aimed at marginal parts of housework or conceived of as future possibilities. For example, Xanadu had plans for a closet to make the washing-machine superfluous. This idea is also found in the GABe self-cleaning house (GABe, 1983). Vapor is distributed inside the closet during the night to clean the clothes. A separate washing machine is not needed because clothes are cleaned where they are, inside the closet. This cleaning-cupboard does not exist as a prototype in Xanadu, it is merely a thought. They had made a control panel for it though, but it did not work.

Another interesting technical solution is the gourmet autochef. It looks interesting, but apart from its fancy looks, the gourmet autochef does nothing except to suggest a menu for the dinner party. The housewife is still responsible for planning, shopping, cooking, and all the rest of the work in connection with the meal. Actually the gourmet autochef is nothing but a computer program.

When looking at the technical content of the smart house in relation to housework, we can see that this is a "technology push" development process. It is directed by what is seen as interesting problems from the point of information technology, not from the perspective of housework.

Women's work is neglected

From the description of technical prototypes and knowledge about housework, we can say that the smart house will not be concerned with any substantial part of women's unpaid work in the home. Women's work is neglected. The innovation process is gendered in terms of what is **left out** of the smart house as a socio-technical construction.

The question is whether this is because the smart house is still in an early phase of development. The study of the development of the smart house till now clearly indicates that a reorganization of priorities is needed to change the course of action. A potential market for time-saving domestic technologies, can not be realized by following the existing trends. User-participation in the design process can be a possible solution to the demand for radical innovations in the field of domestic technologies. This will be discussed in the next paragraph.

4.WOMEN AS A RELEVANT SOCIAL GROUP FOR THE DESIGN OF THE SMART HOUSE

Women could be a relevant social group in the development of the smart house in at least two ways. They may be seen as an innovative resource for the designers and as a target group for the marketing of the new house. Women possess important skills for and knowledge about the home, and this is a source for information in the design process. One could also expect women to be a central group for the marketing of the smart house, as the home is still women's traditional domain.

When the user is a consumer

Often when the "user - producer" relationship is discussed, it refers to a relation where the user's skill or competence constitutes an important factor in the development of a new technology. The user's competence is based on experience, knowledge and skills related to a specific task. In a similar way women's experience with housework can constitute an important innovative resource for the development of home oriented information technology.

When asked about the relevance of users in the design process, the producers said they found it an interesting idea. Their interest is inevitable, because they are supposed to design a product that will correspond to consumer needs and demands. This is the only way to sell a product. In spite of this, we could only find one example of contact with potential users. It was the testing of the motion activated light switch with Honeywell.

Women's knowledge about housework is not employed as an innovative resource in the development of the smart house as a socio-technical construction. Knowledge about housework is not used at all in the design process.

Who is going to buy the new house?

A very general "everyone" seems to be the producers answer to this question. NAHB was most specific as they had decided to concentrate on one-family houses. It proved difficult to find out whom the designers were making the smart house for. We found that the originators had very vague pictures of the potential consumers. By studying in more detail whom they

are talking about when they describe the possibilities of the smart house, we can find a clue to whom they intend this house for.

Honeywell see the user of the smart house as identical with the man in the household. Their main idea about the house is that the owner of the house no longer will have to think about "how things are done", but this does not include women's work. Their ranking of the motifs they expect to find in the market are connected to male activities. When pressed on the issue of target consumer groups, they see the technically interested male as their most important consumer.

In Xanadu the consumer was difficult to identify. When the user is discussed, it is in connection with certain new appliances. Housework is mentioned as a possible source for demand in the market. As we have seen before, examples like the robutler is the technical solution to this demand. The ambiguity found when discussing housework is also present when it comes to the consumer in Xanadu.

When we asked about the consumer, we were on several occasions told identical stories about individuals that had built and equipped their houses with new technologies. One example they gave us was a story about a Norwegian living in Texas who had built his own private smart house. He was an engineer. One specific thing about this house which he now is trying to sell for 10 million dollars, fascinated the storytellers. He had made a light system that made the lights dim along the corridor when, for example, children went to their rooms to sleep. He was the kind of user the producers liked and talked about, one who would really be fascinated by such electronic or technological artifacts. That he had tried to sell his house without success did not seem to moderate their enthusiasm. It is the technology, the way artifacts function in technical terms, that catches the attention of the designers. A fascination for the technology as such, is what the designers tell about. Implicitly in this is the consumer as a technically interested man. The person they talked about appeared very similar to the stereotype of the computer hacker.

Women as relevant social group in terms of their absence

Women were not seen as a target consumer group. The gender issue is ignored by the lack of conscious attention paid to the consumers, the people who are actually going to work and live in these houses. Implicit in this is an understanding of men as their target consumer group. More precisely, the

vague consumer group they think of is men fascinated by information technology. They have forgotten that the home is women's traditional domain. I think one of the problems the marketing of the smart home will face, is the fact that women have some say when it comes to changes in the home. Today it will only appeal to a limited group of technologically interested men.

The purpose of studying how women are conceived of as a relevant social group, was to learn how the innovation process may be gendered. Women and men may both at different stages in the development process "negotiate" about technology. When the target group of the smart house is technically interested men, this is an expression of how gender can be made relevant in the innovation process. Women's absence as an important group, is an indication of the masculine character of the innovation process.

5. THE SOCIO-TECHNICAL CONSTRUCTION OF THE SMART HOUSE AS A GENDERED INNOVATION PROCESS

The smart house is one of several attempts to create the technological home of the future. By studying the design of three smart house prototypes, I have tried to illuminate how innovation processes can be gendered. I chose the smart house because it resembles the scenarios from the 1980s that presented home oriented IT as gender neutral. The technological home of the future is important with regard to gender relations. The shaping of the future through technology as an element in social action, may either contribute to a change in or the preservation of already existing social relations like the sexual division of labor. Therefore, to understand the gendering of a technology before it reaches the users is of vital importance for an understanding of how users interact with the technology.

The flexibility of the technology - intentions and impacts may not correspond

By investigating the smart house as a socio-technical construction, I have shown that technical solutions are not designed to change gender relations. A single example like this study of the smart house, can give us valuable information about how innovation processes can be gendered. In this study, we have looked at the content of the smart house in terms of new technologies, the kinds of work they correspond to, and whom they make the house for. The smart house is a gendered socio-technical construction in

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terms of lack of support for changes in the sexual division of work as seen in the scenarios the designers present and work with as their basis.

When describing the smart house as a masculine technology, this might lead to political pessimism on behalf of feminism. From the point of technological determinism, the results from my study represent a discouraging startingpoint for change. Deterministic thinking means to see the result of the innovation as a ready-made technology which is put into the home, and then the impacts start. Instead, as I have argued before, it is possible to see technology as a process. Intentions baked into the artifact are not necessarily disposed of in the impacts of the artifact. Technology may be flexible, that means open to different interpretations from different user groups. By focusing on users as a part of the construction of technology, gender becomes more visible. To focus on women's and men's different uses of old and new artifacts, their creativity in spite of the intentions of the designers, can be one way of avoiding the political pessimism inherited from the deterministic impact studies. As the smart house is still only a prototype, we can not study users (yet).

Technological fascination

Integration is the core technology of the smart house. Technological possibilities and problems in connection with integration are the main concerns of the producers. The smart house is a typical case of technology push innovation. What may this fascination with technology in the home mean in terms of gender?

There is a crucial difference between a house and a home. Women have been granted the responsibility of making a house into a home, and home decoration and women's ability of imagination have been described as an important part of the feminine social character (Prokop 1979, Gullestad 1989). As we have seen from the three houses in this study, home decoration and style do not play any role in the development of the smart house. The smart house is not a home (Miles 1990).

The home is an important arena for everyday life. Technology is traditionally seen as a masculine domain and technology can constitute an important part of masculinity (Lie 1991). When focus is on technology in the socio technical construction of the smart house, this can be seen as a masculine approach to the house/home distinction. It is similar to Le Corbusier's "machine for living". The feminine part of the house/home

distinction is not central in the socio-technical construction of the smart house. This underlines the gendered character of the innovation processes studied here.

For techno-freaks and feminists the smart house is a disappointment

Technology in general is often presented as "progress", as a means to achieve freedom from drudgery and to get more free time. Historical studies of housework and domestic technology have shown that there is not a simple correlation between the amount of machines in the home and time spent on housework, but new technologies in the home have lessened the physical burdens of housework (Cowan 1983, Boalt 1983, Hagelskjær 1986). Still, domestic technology is often conceived of as time-saving technology (Vanek 1974, 1978). The expectations of finding some kind of awareness of this among the designers proved wrong. Neither general knowledge about housework nor an interest in housework is found.

Housework is an invisible part of everyday life. At this stage the smart house will not initiate any changes in housework. The different appliances and the integration of them do not affect women's traditional work in the home. The smart house technology is not made to substitute or ease that work. Implicitly the smart house as a socio-technical construction is based on male ideas about the female domain, that is to say the masculine activities in the home. The technology is aimed at other kinds of household activities than traditional housework.

User participation has not played any role in the innovation processes described here. The users' role is rather vague. This vagueness opens up for a more subtle way of defining the ideal consumer. Through focusing on technical solutions and integration, we can see that the technically interested man is their primary target. They have not taken into consideration that the home is women's domain. Through women's absence as a social relevant group in connection with the smart house, we can see that the innovation process can be gendered.

No radical innovations, lack of concern about housework, and technically interested men as target group - do this give reason for optimism or pessimism? For the impatient techno-freak the smart house is a disappointment. The same may be said for women who count on technology to save them from dull and time-consuming housework. For those who fear

that technology takes command, this should be rather reassuring. Not much is going to change, at least not in terms of gender.

LITERATURE

Berg, Anne-Jorunn (1988): "Husarbeid som et trekkspill om teknologi." in Merete Lie m.fl.

Berg, Anne-Jorunn (1989): "Informasjonsteknologi i hjemmet - den nye hjemmefronten" in Sørensen, K og Espeli, T (1989): Ny teknologi - en utfordring for samfunnsforskning, NAVF-NTNF-NORAS, Oslo

Berg, Anne-Jorunn (1991): "He, She, and I.T. - Designing the Technological Home of the Future" in K.Sørensen & A.J.Berg: Technology and Everyday Life: Trajectories and Transformations, Report No 5:Proceedings from a Workshop in Trondheim, May 1990, NAVF, NTNF, NORAS, Oslo

Boalt, Carin (1983): "Tid för hemarbete. Hur lång tid då?" i Brita Åkerman m.fl. Den okända vardagen - om arbetet i hemmen. Akademilitteratur, Stockholm

Cockburn, C (1983): Brothers. Male Dominance and Technological Change, Pluto Press, London

Cockburn (1985): "Caught in the Wheels: The High Cost of Being a Female Cog in the Male Machinery of Engineering" in MacKenzie, Donald and Wajcman, Judy (1985): The Social Shaping of Technology, Milton Keynes, Open University Press

Cowan, Ruth Schwartz (1983): More Work for Mother. The Ironies of Household Technology from the Open Hearth to the Microwave. New York

Cronberg, Tarja og Inga-Lisa Sangregorio (1983): Fagre nye hverdag, Delta, København

Cronberg, T (1987): Teknologi og hverdagsliv, Nyt fra samfundsvidenskaberne, København

GABe, Frances (1983): "The GABe Self-Cleaning House" in Jan Zimmerman The Technological Woman: Interfacing with Tomorrow, Praeger, New York

Gorz, André (1981): Farvel til proletariatet, Politisk Revy, København

Gullestad, Marianne (1987): Kitchen-Table Society, Universitetsforlaget, Oslo

Gullestad, Marianne (1989): Kultur og hverdagsliv Universitetsforlaget, Oslo

Hagelskjær, Elin (1986): Teknologiens Tommeliden. Moderne tider i husholdningen. Aalborg Universitetsforlag

Harding, Sandra (1986): The Science Question in Feminism Cornell University Press, Ithaca

Harding, Sandra (1991): Whose Science? Whose Knowledge? Open University Press, Milton Keynes

Lie, Merete, Berg, A-J, Kaul, H, Kvande, E, Rasmussen, B og Sørensen, K (1988): I menns bilde. Kvinner-teknologi-arbeid, Tapir, Trondheim

Lie, Merete (1991): Technology as Masculinity, SINTEF-IFIM, Trondheim

Mason, Roy (1983): Xanadu. The Computerized Home of Tomorrow and How It Can Be Yours Today! Acropolis Books Ldt.

Miles, Ian (1988): Home Informatics. Information Technology and the Transformation of Everyday Life, Pinter Publishers, London

Miles, Ian (1991): "A Smart House is not a Home?" i K.Sørensen & A.J.Berg

Nyberg, Anita (1990): "Hushallsteknik - modrars moda och mans makt", i Beckman, Svante (ed): Teknokrati, arbete, makt, Carlsons, Stockholm

Sørensen, Knut og Berg, A-J (1987): "Genderization of Technology among Norwegian Engineering Students", Acta Sociologica, 30 (2) 151-171

Toffler, Alvin (1981): Den tredje bølge, Politisk Revy, København

Tuana, Nancy ed. (1989): <u>Feminism and Science</u>, Indiana University Press, Bloomington

Vanek, Joann (1974): "Time Spent in Housework", i <u>Scientific America</u>, Vol.231, No.5, New York

Vanek, Joann (1978): "Housewives as workers" i Ann Stromberg og Shirley Harkess: <u>Women working. Theories and facts in perspective.</u> Palo Alto

Wajcman, Judy (1991): <u>Feminism Confronts Technology</u>, Polity Press, Cambridge

Zimmerman, Jan (1986): <u>Once Upon the Future</u>, Pandora, London