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Kitchen Know-How for Automation
-An ethnographical analysis of kitchen everyday life

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Summary

This thesis consists of an ethnographic investigation of five Swedish household's everyday life in their kitchens during the spring 2001 and an analysis of this context, which for certain can be apt for the development of the smart home services of today. Finally some future opportunities on how to systematise ethnography for design use also are drawn.

The focus of investigation of this thesis is to find out what actual happens in some situations in ordinary kitchens. Specific interest is showed for the articulation work, while most smart appliances of today supports only goal-oriented activity, hence evolved from the ground of the home PC interaction.

The ethnographical investigation is focused on three specific events in a house hold which all are assumed to take place in the families kitchen. The events are: 1) When a family plans and books an amusement activity. 2) When a family plans it's shopping. 3) When a person solves a goal oriented task, for example details about cooking a meal.

Background

Embedded Internet systems in Smart Houses supported by emergent 3G and 4G mobile technologies are in focus in many world wide R&D programmes. A set of smart appliances and communication devices are already in early test phases. One example is the smart refrigerator developed by the company E2 owned by Ericsson and Electrolux. Phillips design team have some early prototypes still on the mock up-phase presented on www.design.philips.com/vof. Another assumed breakthrough concept is the standardised XML-formats for recipes. The automation of the family kitchen is arising.

Solutions

It is fair to say that the first generation of smart appliances have been focused on support of goal directed activities. Examples include support of finding recipes, support for information searching and sharing, or booking of services all mediated through the home PC. In this goal oriented approach it is natural to focus on man-machine interactions, since those activities typically does not involve more than one family member at any time (Frohlich, D., Dray, S., Silverman, A.). However, since this type of interaction mode also reflect the usual human-PC interaction pattern and interaction needs, these new smart appliances also have to compete with the PC (or the emerging 3G hand held communicators) as a application medium. On the other hand, there are some unexplored, but interesting possibilities, of eServices supporting non-goal oriented (articulation work) activities.

A mediator between available goal oriented smart devices in the kitchen or home are what fails the smart home of today, such mediator has to support the articulation work to create a smoother change-over between the goal-oriented smart artefacts.

Pitfalls

The kitchen table manifest a very interesting meeting place for a family. The natural face-to-face setting allows for unstructured but valuable information sharing. Sometimes we have breakdowns of this face-to-face communication as a need of a more goal-oriented activity appears. Breakdowns typically arises when we need to collect more information or when some have to perform a goal oriented activity, such as ordering a service by phone, as a result of the conversation. However, this breakdown also typically means that somebody has to leave the table and hence break the group interactions and concentrate on an individual goal oriented activity. Meanwhile the remaining group typically remains passive during the waiting of the results of the individual activity. In effect, these abrupt turn-takings might result in a distrust of available goal oriented devices.

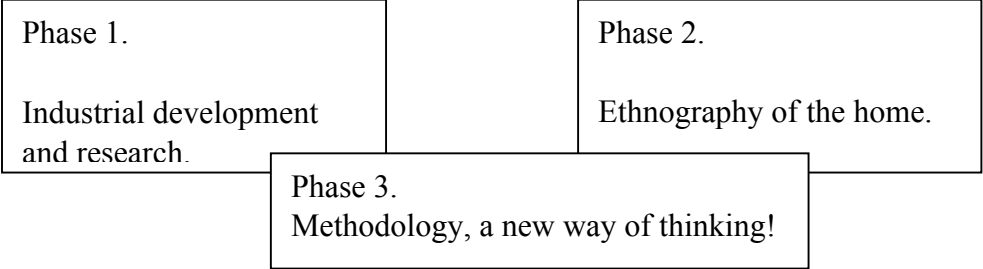
Patterns and frameworks

Pattern is a term borrowed to system development from the architecture where it was founded in the 1970's. In system development it has been in use for a decade already (when the OO-design was adopted in system development). Some works have already been done in the domain of design patterns for home life, (Nässla, H., Carr, D., 2000 or Hughes, J., O'Brien, J., Rodden, T., Rouncefield, M., Viller, S., 2000) but the patterns are always *design* patterns, focused on a *design solution*. Anyway, during field studies no solution is available

(wysiwy¹), the ethnographical patterns presented last in this thesis are not design patterns but ethnographical patterns of everyday life - *for design*.

The focus of investigation of this thesis is to present kitchen work in ethnographical terms to help up the work with the smart home design. Specific interest is showed for the articulation work. The thesis can be scoped into three different phases. First phase is the aim of the smart home industries research and development of today. Second, the ethnographical investigation. The third phase is connected to 1 and 2, a new methodology to treat the pitfalls of the smart home system development.

Fig.1.



In the following section I introduce some scenarios to capture the problematic issue of automation of everyday life tasks. In the end of the thesis an outline of the necessary work to be done is also given.

¹ I.e. "What you see is what you see"

Two Scenarios

I see you guys are baking some bread! Does anyone of you need my assistance?

At a quick glance at Word users it is realistic to say that a main part sometimes have been quite angry about the word assistant (the paper clip-figure) that come up and cause an unnecessary breakdown in the writing workflow. Breakdown in workflow is a common term in work science used to describe interruption in a process of related tasks.

Costelfranchi C., Conte R., (1995). The standing one liner "I see you are writing a letter, do you need help?" is wide known among Word-users. And who needs help when writing a personal letter?

What would happen with that sort of aware knowledge system (a kitchen-assistant) built-in inside for example the fridge? Most probably would it, in the present version, cause the same level of irritation as its cousin today working in our word-processors. With the word-assistant as starting-point it is fair to say that this kind of expert system needs better adjustment to the context to work properly and in a practicable way. Otherwise the kitchen-assistant would easily be counted out, for example, if many people where doing the job together. Thus a modified knowledge system that would know exactly what is going on in the kitchen and have a more discrete attitude than word-processor helpers of today would maybe be more apt to serve our needs in our everyday cooking. (Akkerman, 2000) But do we need that?

Technology for the aware system described above already exists. (Essa, I.A., 2000)

Tastes differ

In Sweden it is common language to talk about the kitchen as 'the heart of the home', and even people from other countries have told that *"of course we sit around the kitchen table, that is (in the kitchen) where the coffee is!"*² A kitchen is as a specific part of a home supposed to reflect the personality of a family. By the style of the furnishing, the wallpapers and all those small insignificant objects in a family home the family show their life-style and their (good) taste. Two households seldom have exactly the same taste of fittings, as well as exactly the same routines. Thus is to be considered when developing kitchen eServices.

The variation of fitting-up is almost endless. Small details are often added or withdrawn from the home environment. Things are bought from different stores and in its entirety the family taste-style and lifestyle are discerned. A successful smart home-system should allow same choices for eServices as the apartment does for fitting-up. To make it clear: If a family decides not to have a sofa in the living room, they are not forced to leave open space for a sofa so that every one can see where a sofa could be placed, if they had bought one. In the same way a smart home-system should let this family choose what services are acquaint for their needs and routines without leaving 'black holes' from services not bought.

² Fieldnote from prestudy.

The aim of the thesis and the focus of investigation

The aim of the thesis is to study the work practice situation in a family kitchen of today. The focus is on social relations and real time communication between members in a family setting. The purpose is to create understanding of the everyday life in kitchen for smart artefact development. The thesis have been scoped into three specific contexts among many potentially interesting possibilities all assumed to be performed in the kitchen. The three scenarios will be observed and investigated to see what actually happens when they are performed. This is a first step to see if the tasks of the scenarios can be supported with smart appliances and smart eServices.

The chosen contexts are:

1. When a family plans and books an amusement activity.
2. When a family plans its weekly menu.
3. When a person solves a goal oriented task, for example details about cooking a meal.

Scenario specific issues

Scenario 1. The smart home industries have created a new branch called the infotainment business, which mainly are aimed towards the kitchen domain. This new business is meant to manage a wide scope of services in which one of them is the booking of amusement activities. Jointly planning and booking an amusement activity is as situation a bit like planning the meal of the week. It is a creative activity based on a face to face communication. The family is about to do something together outside the home and the activity must be discussed and different ideas is analysed by the family together the family members can say whether they like an idea or not. The family need do know about the local cinemas, theatres, and sport events or else.

Issue:

How does a family plan and book an amusement activity?

Scenario 2.

The emerging e-shopping is one of today's 'hypes'. The technology are getting ready to provide a safe way of buying (choose and pay) for the home. This will affect our way of living and shopping, but it is necessary to obtain some values of the old manually way of shopping to entice people in to e-shopping those who are willing to leave a well known area for a unfamiliar one is not in majority. The kitchen is a central and natural place for the family to meet and for the assignment of planning a weekly menu the kitchen as meeting-place is undisputed. To plan a menu of the week or a list of provisions for the shopping, ideas and information is needed, or at least makes the task much easier. It can be meaningful to know what ingredients one already have at home. Other momentous information may be what is served for school meals the actual week, the special price in the local store and the month's budget rates for the food account.

Issue:

How does it work when a family plans their weekly menu?

Scenario 3. Cooking in a modern middle-aged family is today treated like *a must be done task* by the smart home and the fast food branches. But the meal makings have a bigger role than it on a quick glance may seem. It is for many family a way of social community. The practical work is complex and cannot be understood backwards by studying recipes or other instructions. Some times the feel of unsure may cause frequent looks through a cookbook although no recipe is followed. An oven time or degree is checked for a similar dish or a suitable spice for the course is searched for. This causes breakdowns in workflow. When a person stops cooking and starts to study recipe the kitchen won't do the same. And when the person is done studying the recipe, he probably has an ineffective time of turnover to return to the practice of cooking. This scenario gives a lot of possible angels for an observation.

Issue:

How does a person solve an on demand knowledge question for example about cooking?

Methodology

The context, kitchen as field of ethnographic studies

This study about human behaviour in a home kitchen is grounded in the practice work and social situation in the home. In general smart kitchen of today is focused on goal oriented activities. The term goal oriented activity means a task that is performed to achieve a certain goal. Shapiro S.C (1992). This study has the purpose of identifying tasks and situations, which are typical in the kitchen context and, that can be supported with an eService. The social and practical context in an everyday setting of a home is investigated by attending a home when conscript tasks and activities are to be done.

Ethnographic field studies will bring opportunities to investigate the kitchen from a work practice viewpoint. Five different families are selected for the study.

Ethnographic studies of everyday life married to design

The main idea of the thesis is to create an understanding of the everyday life so that smart appliance can be applied where it is needed and not where it disturbs or causes more problems than it solves. Understanding is mediated through a richer picture of the actual work. By extending the work on requirement specification in the development industries the real problems in everyday life are defined. With this study it is possible to point out some artefact developed for unexisting problem, other services it may legitimate. Further ethnography never can be used to see solutions, only problems. What if this understanding of the work practice could be conveyed in a set of ethnographic patterns? Maybe such ethnographic pattern would decrease the gap between ethnography and system modelling? Finally the thesis discusses the role of ethnographic patterns for design as the missing link, in spite of the giant step between ethnography and design patterns which are had to betaken in development today. There is no doubt that the gap between ethnography and system modelling still exist and probably always will. Because in-between them there is a process of creativity.

Pre-studies

Some test-studies have been done to refine the methods and to avoid the worst mistakes during the real studies. The test studies have evolved into the shape that the studies presented in the ethnography part have. The test studies where done as the beginning of (or the heating for) the fieldwork.

An out-cut of kitchens

This ethnography is based on a qualitative study. It is therefore not possible to make any wider generalisations out of its data. The study only gives a 'rough thumbnail' of what can happen in a kitchen during some selected events. The ethnographic study contains mainly unstructured interviews and participatory observations. In some case the observer have taken a more active role in the occurrences. This is for two reasons, first to get a better understanding of the activity, and second because of the social community in which both the observer and the observed take part. It is important to bear in mind during the reading of the

thesis that the data presented here are based only on five different households. Further studies are necessary and would probably evolve the information into a more apt shape.

Recording techniques

In an early phase video-analysis had a role as a methodology in the thesis. Later on after a couple of test-studies (without video) it became obvious that a video camera would be more of a problem than help. In the kitchen it is always a lot of things going on which all are adequate for the study. This causes problems to point the camera. Another problem with the use of video is that it can be hard enough to be invited to different families to study family members in their kitchen, a video camera is not a way to keep it simple. As furthermore reason it can sometimes be difficult to act normal when someone is studying your every move, and the informants as well as the ethnographic collegial know that a video camera shows all. Several cameras, known but hidden, in the room would solve some of the problems but probably not all. George Orwell have described this scenario in his vision of future (1949) called "*1984*". The lack of video in the study affects the work practice study. An interesting focus of the camera could be a focus on a recipe or other knowledge artefact in the case that such are in use. In this study such focuses are less observed but a wider perspective is more important for the analysis. Although, I do recommend the use of video for a more focused pre-study when developing an eService for the kitchen. As a multimedia notebook audiotapes have been used instead of video. These give just a brief memorial flashback and exclude large scale of information. Some interesting parts of the tapes have been transcribed for a deeper analysis.

About ethnographic analysis

By analysing field notes and interviews from various situations an understanding of the environment is created. The field notes can be interpreted in different ways, a clear right answer to issues is therefore not possible neither (I claim) are design solutions created from the ethnographic analyse. By the use of an ethnographic methodology only answers to two questions is given namely: What is going on here? (And) How is a specific task done at this place? The ethnographic methods give us a description of problems that may occur in our selected context and for some situations we can also see what has caused the problem, but a working solution is not possible to get. Simply because it is not possible to observe something that not already exist. The creation of solutions is a creative process. But we can get a little bit closer to a solution, it is conceivable to see in what way the work is to be done, and with the experience from a problem domain we are at least assure that we are working at the right problem. For instance we are able to see that a computer system has problem with understanding a users command, just because the machine is not aware of the context of the user (a knowledge that a personal service person mostly has). This may prevent us from changing the colour of the machines buttons or likely to make the user understand the machine, because the problem was the other way around. (I.e. the colour of the button had nothing to do with the machines understanding of the users context.) To be more specific we have to change methodology.

Prejudices

On the surface kitchen work is a common practice to everyone. But it still consists of practices and behavioural patterns that are not clearly pronounced in everyday life and therefore is this study necessary. It should be obvious that knowledge of the routine situations is essential for the creation of services that will be a part of the context in which the everyday life is taken place.

Ethnography

The aim of the fieldwork, and something about the tools for the practice.

To investigate how a family actually use their kitchen and acts in it, I have chosen to use ethnographic field methods (observations) in five different households, and use interview as supplementary method to enlarge the picture. The focus of the field studies is predefined (see chapter 'Methodology') so when the fieldwork is started I have clearly defined aims for the observation. The observations are done in Sweden and therefore reflect Swedish conditions of behaviour and traditions.

The population

To do field observations in a family home (or a one-person home) is maybe a bit more difficult than perhaps an interview at the dining table in a home or nearly. A field observation requires that the observer is accepted in the area of investigation and it can for the informants sometimes be difficult to act normally at home with a stranger observing ones every move. To work around the problem I decided to do the studies in households I already are acquaint with. To avoid a far to homogenous population which may cause a minor set of routines, behaviour and breakdowns in workflow, which may occur a minor width of the material to analyse. The households are selected from different ages, working conditions, and family circumstances because it is assumable that routines and behaviour differ between ages. Though the study is qualitative and it does only give a restricted selection of examples to suggest a focus to the development of services supplied by the smart kitchen. In this part I point at context, breakdowns, problems and work practice situations which have arise in the five households in with I have taken my field-notes for this study.

Main focus of the scenarios

This fieldwork has a main focus that is valid for all three scenarios. The main focus is: *What actually happens in the situation?* Each scenario and the results of its observations are presented in a more detail later on in the thesis. Though some focus is common for all scenarios and can therefore be meaningful to explain jointly.

The investigations consist of both goal oriented and non-goal oriented scenarios. The work practice situations to be observed differ in the scenes from a co-operative activity to more like one person - one task activity. A fixed focus thorough the observations are what *is (actually) the task*, and how is it carried out? What articulation work is have to be done, and the affect of breakdowns in workflow? Articulation work is a term often used in CSCW R&D-works. This term describes all the tasks that have to be done but not directly aim towards the actual goal of the task. Typical articulation work is to sharpen the knives when making a Waldorf-salad. Schmit K., Bannon L (1992). The purpose with the focus (and the whole fieldwork) is to give a broader context for service-artefacts in kitchen environment. In a human face-to-face interaction the participants have a social and physical context when the interaction begins. Understanding of thus context is essential for the smoothness of the communication. The lack of such broad understanding is a common problem in the interaction between humans and a computer this can be solved by aware computer techniques (Kidd, C. D., Orr, R., Abowd, G., Atkeson, C., Essa, I. A., MacIntyre, B., Mynatt, E., Starner, T.E., Newstetter, W., 2000). This

requires a wide understanding for the context that is meant to be built-in the artefact. A raising trend in system architecture/development is the use of ethnographic techniques to study the context in the environment to see what part of the task that can be automated.

Study 1:

What actually happens when a family discusses a movie, and in some case, book seats on a cinema?

This scenario where assumed to be a kitchen related task

This case showed to be almost impossible to observe. No one in the household I studied did book an amusement activity together form the home. The case that "we have an evening left in our weekly plan! What are we going to do?" was not in accordance to reality. The situation was therefore entirely investigated by unstructured interviews.

Study 2:

What actually happens when a family plan their purchase list?

In an early interview-phase one of my early thoughts come true. No one in my population did plan a weekly menu at the purchase moment, or at any other moment, which lead to a wider formulation of the issue namely a focus on the purchase list instead of a menu that almost no one actually did put up. Anyway this scenario seems to have a lot in common with scenario 1, but the observation describes two totally different practices.

Study 3:

What actually happens when a person solves the task in making a meal?

This issue is different from the other two. Although the first two issues are treating non-goal oriented activities. This final issue regards a goal-oriented task. Most of the smart eServices is at this moment constructed to support goal-oriented activities. I have found it purposeful to have one remaining scenario from the past discourse. Sometimes this scenario has been more of a co-operative work oriented task. Thus the observed issue has turned into a more complex situation with interaction between two persons although the problem is still a goal-oriented task whit the goal of a warm dish.

The fieldwork

The schedule below describes the observations and its connection to the different families and case studies.

- Study 1: *About amusement activities.*
- Study 2: *About planning a purchase list.*
- Study 3: *About tasks in making a meal.*

	Family 1	Family 2	Family 3	Family 4	Family 5
Study 1	Observation 1:1	Observation 2:1	X	Observation 4:1	X
Study 2	Observation 1:2	Observation 2:2	Observation 3:2	Observation 4:2	Observation 5:2
Study 3	Observation 1:3	Observation 2:3	Observation 3:3	Observation 4:3	Observation 5:3

Below a rough picture of the households' is captured concerning constitution and some of their characteristic signs. It is provided for 'flavour'.

Family 1

This household consists of two adults husband and wife both in their fifties and a fifteen year old son who sometimes visits his biological father who lives in another city. The family lives in an apartment in a big villa. They also have other grown up children. The household has a car. The family computer is among other things used for work, entertainment, digital photo, e-mail, information searching and other services such as banking.

Family 2

This young family consists of husband and wife around their thirties, two small sons in pre-school age. The parents are working and studying. The household has a car. The family have a computer not in frequent use, mostly work is done with it.

Family 3

This household have only grown up children (and non of them together). They are both working and high educated. Their age is around 55-65 and they live in a city central flat. One of them works in another town during parts of the week. The household has a car and a computer. The home PC is used for work, e-mail, news-information, and banking.

Family 4

This young couple with no children both studying and under 30, live in a small block-apartment. The household does not have a car. They have a computer, which are used for their studies and for browsing the web and e-mail.

Family 5

The last household consists of a widower over 75. He lives alone in a flat in which he and his former wife lived together for about five years. He has one son and some grandchild. This man does no longer have a car. He does not have a home PC, but is the only person in the study with pure broadband installed in the apartment (and that is not in any use).

Family 6x

This family is not observed. It is selected just for its interesting behaviour in Study 1 and only used for that specific case. And thus not selected as family, but more as phenomenon. The story about them in Study 1 is made from discussions with them before the study actually started. It might be fairer to consider their case more like a story than ethnography. The family consists of a man and a husband (both university graduated) and two sons in their twenties. They have both a car and computers.

In the following part the fieldwork is described and structured in case studies, some concepts are also captured. Focus is on the observed scenarios with their tasks and work practice situation and therefore various households will not be further distinguished and characterised or compared.

Study 1:

What happens when a family discusses a movie, and in some case, book seats on a cinema?

This case showed to be almost impossible to observe. No one in the household I studied did book an amusement activity together from home. The case that "we have an evening left in our weekly plan! What are we going to do?" was not in accordance to the reality. The situation was therefore entirely investigated by unstructured interviews.

One of the interviewed families seldom discusses a movie at home before the time of event. A more likely scene is according to their stories that one of them sees a publicity of the film and his or her interests is caught. Either for his (or her) own interest or because of knowledge of the partners taste of films. But there is often a prerequisite that they both may enjoy the film. When the film has caught an interest from one of them they call each other, in some case (they say) it can be appropriate to fist call the cinema booking machine to certify spare seats for their use. The agreement in the family can as said be done either before or after the booking. Sometimes their calendars are not synchronised and the booking has to be cancelled, but that is an exception from normal, and the booking is uncharged and cease about one hour before the cinema starts if the tickets are still unpaid. Therefore declining is never necessary. Another situation can be that a film is suggested when they both are at home but this seldom leads to a discussion about films. When this family goes to visit the cinema the focus is on a specific film, not just spending their time on any film.

Another couple (family 6x) has a quite different way of going to the cinema. This couple said that they have ceased to visit the same films. If they can only find one film which is interesting for themselves which is showed at the same cinema nearly at the same time they go together to the cinema but then watch different films. This do not prevent them from discussing the films afterwards on the way home, but at that time the discussion does not have to lead to an agreement (they do not have to see the other film). With this way of behaviour it is recommended to book the seats before leaving home. Otherwise one of the movies may be sold out and cause that they both go home without watching a film. This family sometimes book seats in advance, but not always. Probably this is not a common way of cinema behaviour, but still interesting just to show how big the differences between families can be.

Study 2:

What happens when a family plans their purchase list?

In an early interview-phase one of my early thoughts came true. No one in my population did plan a weekly menu at the purchase moment, or at any other moment, which led to a wider formulation of the issue; namely a focus on the purchase list instead of a menu that almost no one actually did put up.

The shopping list

The purchase list is a flexible document. The list items are often sorted in an order, but different owing to the writer. With one item other may follow, and can in turn be connected to further more articles to buy. This makes chains of articles depending on each other; one article can be hard coupled, involved in many different constellations of articles. The list-order can also be based on the orientation of the interior at the local store to avoid going back and forth when shopping. Things can be bought from different stores which makes furthermore variations of list layouts. Writing the list is not always a one mans work it can often be two people writing to the same list. In the writing of lists word shortening is a common way of simplifying the work, those shorted words is best understood of a person to whom they are common, presumably a family member. Symbols are also in use. One household in the study did use the shopping list as an (inter-) active document to enhance the creativity. (Active document is here not mentioned as the software technical term. A.D. describes an artefact used to convey creativity in a work process.) This resulted in a necessity to copy out the list afterwards. Re-writing of the shopping lists where studied also in other households. Rewriting served as a final check where some more articles where added. Some of the studied households had their list on the refrigerator door and during the week they filled it up with articles they missed in the kitchen. I will not go further in at shopping lists as physical artefacts, but that is a work that is probably necessary to be done to understand their use for a home eShopping system.

Vague buying

Many shopping lists are constructed for some articles that are thinkable ingredients in meals that can be of current interest in the near future. In some of the case studies an exact preparation for a number of meals have been done. This has been for special events such as a party or a weekend cottage visit where the possibilities of buying food are limited. Although the ingredients flexibility is known *"if the sauce not takes all of the cream, it can be used to some dessert, if we like³".*

Restrictions

The choice of articles to be bought is often discussed between members of the family and based on the wishes of the family. How the choices are made out and how they can be supported is a subject that can be further investigated. The reasons of choices are easier to

³ From observation 1:2

find out. Some of the households have clearly expressed a policy of buying ecological food, or not buying articles from certain companies. Other reasons for such exclusion of articles could be allergy in the family, a vegetarian lifestyle, diets or (particular for students!) an economic boundary of the food account.

Inspiration from literature

During the planning of purchase list some notions are sometimes taken on the advertisement from the store, favourite cookbooks, or recipe-magazines. This often causes more suggestions of meals and a more exact planning, but seldom is the purchase list notably different from one done without help from cookbooks and such. Cookbook is often used just for inspiration, and then the recipe is not followed exactly but used as a framework for innovation.

Inspiration from other people

In some cases inspiration comes from other peoples suggestions or tips. From a dinner something similar often is made with the dinner as base or prototype. (See Svensson, M., Höök, K., Laaksolahti, J., Waern, A for this phenomenon applied on smart artefacts.) It is common to have separate pieces of papers in side the cookbook as complement to it. Another source of inspiration is the TV-shows about cooking. These TV-shows often lead to an interest for a new dish but the cookbooks are still used to check up on how to do.

Situated shopping

Another way of making the menu of the week is to go to the store and see what provisions there is. This kind of situation based shopping is not to confuse with the 'vague buying' where the articles are bought without a certain purpose. Situated shopping is also a way that one of the families did use to get more of the ecological-marked food. *"If there is any ecological articles I usually buy them, you can always make something out of them."*⁴ It is common in several families to have a list of articles needed in the household and go to the store and supplement the list with ingredients settled in the store. This kind of situation based shopping has affect on the shopping list. One of the households sometimes (among other articles to buy) writes something like *"Dinner for 3 days"*⁵ when making their list before shopping.

Functional menu

During planning of a shopping the study has pointed out several parallel occurrences, some of the families did this when having a cup of coffee and planning the week or just check up on each others events in coming days. *"What are we doing on Friday? Theatre?"*⁶

This also causes successions in the shopping list, different activities makes different foods. Fast food for busy weeks and for intensified training more carbohydrate are needed. *"I'm going in to a more study intensive week heading for the examination, so I just need noodles and quick food (to get energy and save time) I don't have time to do any long time cooking!"*

⁴ From observation 2:2

⁵ From observation 1:2

⁶ From observation 4:2

"-How about having some pasta-salad standing in the refrigerator?"⁷

The basic products

Roughly the shopping list includes two different types of items, first, the basic products and second, the various products. Both take determining roles for the 'vague buying'. The basic products are known as 'must have' for the family, it probably varies a lot between households. But to exemplify with some articles two can be mentioned toilet paper and creme fraiche. One is necessary and the other is often used for almost everything. The various products are harder to analyse, they differ from week to week and are different in the households.

⁷ From observation 4:2

Study 3:

What happens when a person solves a task in making a meal?

This issue is different from the other two. Although the first two issues are treating non-goal oriented (articulation work) activities. This final issue is regarding a goal-oriented task. Most of the smart eServices is at this moment constructed to support goal-oriented activities. I have found it purposeful to have one remaining scenario from the past discourse. Sometimes this scenario has been more of a co-operative work oriented task. Thus the observed issue has turned into a more complex situation with interaction between two people although the problem is still a goal-oriented task. The issue has also been modified since the activity is extremely high at this moment. A lot of sub-tasks are performed and a lot of topics are discussed. The social importance of cooking is in many cases too great for the family to be entirely disregarded.

The dinner making is an eventful happening in a household. It mainly involves a lot of people such as the whole family with children and in some cases even dinner guests participate in the interaction.

Parallel occurrences.

One of the studied households regularly uses the time of cooking for check up each other's engagements for the day and the nearest days. This check can be done every day because of the irregularity of the decided activities. For example: 1) The football coaching which yesterday was planned to happen two days later can have been moved a day back or forth, 2) an important meeting for one of the family members can have been cancelled. This planning is one of the sub-tasks handled during cooking in some of the studied kitchen. The work in the kitchen is sometimes combined with homework studies with the school children. As one person said *"I can easily manage a small glossary exam while slicing vegetables⁸"*. Another very common activity during meal making is radio listening. Almost every household in the study had a radio placed in the kitchen.

The co-ordination of skills

When more than one person cooks a meal the task must be divided between the different people which leads to a shared responsibility for the workflow and one person has his own field of tasks to be co-ordinated with the other. Sometimes one of the involved persons is in charge over the others. This task can revolve between the participants from time to time. This person now how to cook this dish and he (or she) probably has the most experience of doing it. A raised question is if this is the person who also is in a supervision role in the planning of that meal or in the occasion of the food purchase. Anyway, this person is often used like a cookbook or recipe of the dish. The person is often interrupted with questions, which at least sometimes is asked to check up, or just to inform about the status of the work. A main task for the supervisor person is to co-ordinate the whole event. One person in the study tells that he often calls his older brother or sister by the telephone to get tips on what dish to make and

⁸ From observation 1:3

later on how to make it, or to carry out a problematic situation. It can not be ward off that this have a big social importance for the family.

The co-ordination of events

Most observed cooking contained parallel projects, something was fried in a pan, and meanwhile something else was boiled in water, and hence the sauce is not yet mentioned (!). All these kitchen events (or most of them) have to be timed with each other to result in a warm dish. These parallel events and tasks does not mainly make a problem, but if something is missed or forgotten it often effects other tasks and causes a long chain of reorganisation. Not in an obvious sense because this are easily handled by the person or persons that is in the kitchen. A common way of solving the problem is by guesses and assumptions. *"We assume that this has been in the oven for 7 minutes, it should be there for 13 minutes more (the recipe probably said 20')."* Or *"Did anyone count the spoons added in the bowl? Okay we guess this was the third, it can't really matter!"*⁹The difficulty in the reparation work of mistakes can differ in degree; it depends (of course) on the type of obstacle that appears. Mostly the reparation work is done almost without specific notice. One person in the family regularly forgets to enclose the bread bag after having a sandwich.

The different use of recipes

In some observations the recipes regularly have been put aside, this is for many reasons, it can be a will to improvise and give a personal touch or it can be of laziness or lack of utensils. It can also be made by mistake which mostly are reparable. A situation when something is forgotten at the right time often appears. Many of the studied persons did use an earlier meal as inspiration and tried to *"do something like the dish I did last week"*¹⁰. It is common to have favourite specialities. The meals originate from these favourites are often similar to each other but are seldom equal, often they serve as a basic ground for improvisation. E2 has in a study of meals in households in Denmark found that one family often has about 5 or 7 different recipe which is the base in their meal making. To make exactly the same dishes over and over again is not desirable. The variation by the personal touch gives more surprising flavours. Also when some new recipe is followed, which has never been done before, it is usual to do modification in the practice cooking to fit ones ideas (also showed in a telephone interview study by SIFO-SLV.se). Another way of using a recipe is to get 'tips on the way'. To check a certain oven time or degree or proportion of ingredients to get the best result. *'I know perfectly well how to make that sauce, but I do not know the proportion of the ingredients'*¹¹. Recipes are also used to have suggestions of spices for an eatable. An often observed phenomenon is the corrections of printed recipes, this is not a hint that the recipe itself is wrong but some modifications are sometimes incorporated to the cookbook. A recipe is often an 'active document'. It would be of certain interest to pursue a more focused study of the cookbook's role during meal making. Video analysis and participatory observations would for sure bring about some very interesting data fore the kitchen design development.

⁹ From observation 3:3

¹⁰ From observation 3:3

¹¹ From observation 2:3

Unclear results

During one observation the aim of the cooking was changed during the work. "*Are we going to make this a pasta-sauce or a vegetarian risotto?*"¹² No recipe-artefact where in use at that time. But the person later told me that both dishes where common in the family, and the routine of doing them where similar. (Suchman 1987). All dishes produced in the study did not have a clear name. Risotto was less ordinary than "*similar to the' thing' we did yesterday*"¹³. Many favourite dishes, which are self-invented, get names.

¹² From observation 2:3

¹³ From observation 1:3

Analysis

In the nineteenth century the open fireplace was replaced by the iron made stove. The new kitchen artefact had the potential of bringing better health and hygiene to the old rural households. Hygiene was one of the old times biggest problems and caused widespread infant mortality. In spite of the raised standard that the iron made stove would bring about, the big breakthrough of the new kitchen artefact would delay. When the open fireplace left the nineteenth-century's kitchen the source of light was with-taken. The iron stove entered every-mans home not until the problem of light was solved. This took place in the last part of the nineteenth century. The washing machine, the vacuum cleaner and suddenly the microwave oven followed up the revolution of housework. What is the next revolutionary kitchen artefact? At 'www.design.philips.com/vof' some interesting suggestions can bestudied but even with the best of willing it is hard to say "an voice controlled oven" or "having the recipe on a digital screen". This part contains analysis of the fieldwork described in the part "Ethnography".

Analysing this qualitative material gives just a few examples of how the everyday kitchen duties are managed. No general assumptions can be taken for sure. But this analysis does give an outline of what is needed to be done to create knowledge of everyday life as work-domain and what occurrences are needed to be further studied. Until now a very few ethnographical studies have been done in households for system development. The smart home development is merely driven by technology and the possibilities it brings for profit. Enclosed to this is the introduction of solutions built for industry and business enterprise (Nässla, H., Carr, D., 2000). The aim of finding new products will certainly affect the interpretation of the fieldwork. Design companies have always problem to get out of its design context. This brings about a minor set of literature from exactly the same domain, but some works have been done, and other sociological approaches to the study could also be adequate to make out.

Human values.

Automate control and digital information sharing are efficient solutions for the development of industries where productivity over time is the founding value. A household has other values to care, which may imply that the technology developed for industries not necessary fits in the private context. By reading through the fieldwork data it seems obvious that a meal making session or a purchase planning is much a social activity which not necessarily can be replaced with cinemas or other hobbies. To jointly take care of the home with its unique traditional routines may be a part of the joy of living together in a family.

The kitchens winding path.

With-taken all the cases from the fieldwork, it is reasonable to assume that activities in the kitchen differ between households and days. Decisions about the work are often taken and corrected. Every household and each individual have their own routines for their practice. The work in the kitchen is evolved when practised. The work practice evolution contains both the real activity and the evolution of the activity. "The solution to designing is *emergent* rather

than planned because the designers is learning what a 'problem' is about during the design process. Moreover, he is developing new skills for improving his design process" (Gargarian, G., 1996). It is shown in my studies that when a cooking session has begun it is not clear what dish the result will be.

One-size fits all.

Those individual routines mentioned above are what first are spoiled when the kitchen is automated (with rough methods!). One task is meant to be done in one way. Just to make sure that the programmed artefact is not passed over. The fact that no computer can work outside their own program is a bad reason to prohibit collaborating humans to work in that domain. We can know for certain that this is a reason to the phenomenon that new technology is hard to accept. The situation of irregular behaviour often showed in the fieldwork displays the need of thoroughgoing pre-studies before a bigger interference in the domain. Even in workplace situations new technology can be difficult to apply. Assumable it is maybe even harder in the kitchen because of the lack of profession-role? What distinguishes housekeeping from ordinary jobs? If the industry still is inclined to introduce their automation into the smart home it should be an interesting question to pursue.

The kitchen interface.

Although no smart appliances are applied in a kitchen it has a functional interface. (Or even more functional than in the smart kitchen yet provided.) The traditional kitchen interface (here concerned the ordinary electrified kitchen without broadband and microchip facilities) does allow people to collaborate with each other and interact with the artefact in an almost frictionless way. The work is mostly done smoothly and the problems that appear are not too big to be solved. The task is generally fulfilled. The interface that already exists in the kitchen is thus very powerful. But it leaves the kitchen artefact outside the awareness of the broader context. It is not allowed for any kitchen artefact (in this kitchen) to make own decisions and take an active part in the collaboration between the humans in the room. This is also what brings problems to the 'smart kitchen'. When we try to create an aware kitchen that is aware of what is going on around, it can easily result in a kitchen that regularly is fooled by accident. A problem is to design the eServices to fit in this well-known interface. If it can not be done, what is then to be changed? The eService? The behaviour? The interface?

Language games

The communication between people in any of the three case studies a lot of information is provided in spite of the fact that just a little information is given. This can be exemplified with the word shortening when making purchase lists in Study 2, or the 'check up questions' for the co-ordination of skills in Study 3. The interpretation made by the receiver of the information are essential for the work to continue, or according to Wittgenstein (Wittgenstein, L., 1953), for the communication to make sense.

Design of people's behaviour

Forcing people into certain behaviour is not by definition bad for the practice. For example the seat belt-reminder in cars (in Volvo 240 -87) for sure save lives when more or less forces the driver and the passenger to a safer behaviour. The same is valid for the introduction of air bag at the front passenger seat. This will force the users to put the children in the back seat thus as the air bags will cause them more damage in the case of an accident (The front seat with a airbag not engage, still are the most safe place for babies). This is all about a forced behaviour of the users, or to put it in other words; a design of people's behaviour. Thus design of behaviour can be used either to care for the system or to care for the people.

This kind of forcing the users is also in use for computer artefact. It is actually fair to say that with all artefacts some design of the user is essential. It is not possible for a person raised as a 'tabula rasa' to handle a word processor or an ATM. Some level of education is inevitable. Interaction with necessity affects all its participants. This education can be smoothly delivered if incorporated in the context of the artefact.

In the kitchen environment the user design can be used for several purposes. It can be used to make the system work properly, and not being passed over, and it can be used to create routines which are to prefer when practice cooking. As an example: Forcing teenagers to recap the bread-bag when making a sandwich, or for older users, give a reminder when it is time to sharpen the knife (sharpen them without a warning when so is needed, may cause other problems). Or introducing behaviour of using different cutting-boards for chicken and pork would probably increase the hygienic standard in many kitchens more than any antibacterial-cleaning agent would.

Ethnographic patterns of everyday life for design

After analysing data from the fieldwork some methodological questions have been impossible to ward off. They are presented in this last chapter. Thus these thoughts can take a role of a next step or future opportunities to continue the work in a more academic discourse.

Ethnographic studies of everyday life married to design

What if the ethnographic analyse can be structured into pattern language like the UML-language without direct point out design solutions? Maybe would this decrease the gap between design and the context to which the artefact are aimed, without direct interference in the design work? This part of the thesis endeavour to bring the pattern discourse deeper into the ethnographic science but still connected to the system development. Work has been done with a similar approach but it always leads to design patterns (or design solutions). (Hughes, J., O'Brien, J., Rodden, T., Rouncefield, M., Viller, S 2000). The idea here presented is just to categorise behaviour and routines for better fitting into design solutions to convey a tool for development. An earlier approach has concerned only workplace settings (Erickson, T. 2000) but newer before has this approach been applied in the domain of the everyday life. It is to see as an experiment of design methodology. Further studies are necessary and would probably evolve the patterns here described into a more apt shape.

The limit of ethnography

When doing ethnographic fieldwork only available design solutions can be seen. It is not possible to see new solutions in the fieldwork. New solutions requires creativity, this is not mediated through ethnomethodology. This is described by Crampton Smith and Tabor as follows: "*Like all artists-designer disciplines in the industrial and electronic ages, it must constantly reinvent itself to respond to changing situations and sensibilities. The interaction designer needs to break rules and to overturn precedents, as well as be able to follow them*". (Crampton Smith, G., Tabor, P., 1996). Therefore can an ethnographic method, which leave the creative design process outside be useful. Some things just don't mix.

Follow rules.

Design patterns are rules for making design or at least recommendations for design. Several rules can sometimes interfere with each other so the designer have to take the final decisions of the modelling. As mentioned before inventions within the former restriction of design do not make any new pioneering results. But not at least, sometimes rules and restrictions can have a positive influence on the design process. *Look for "Freedom in restrictions and Confidence Building" in The Art of Design (Gargarian, G., 1996).*

To match up with the OO-architecture and the iterative design cycles (Brooks, F.P., 1998) and the recycling of objects (i.e. the design patterns for software development see for instance (Larman, C., 1998) it can be useful to work with patterns also in ethnography. Anyway, thus during field studies no solution is available (wysiwy), the ethnographical patterns presented in this thesis are not design patterns but ethnographical patterns of everyday life - *for design*.

The ethnographical patterns

This is a suggestion on usage of the ethnographical work. Tree main-patterns are drawn up and subordinate to these are the sub-patterns. The relation between main-patterns and sub-patterns are just like the noun 'table' and 'bedside table', 'school desk' or 'dining table' (c.f. the world of ideas and the real world by Plato). Actually sub-patterns are items under the main-pattern (headline). An allegory of OO-modelling can serve as explanation to the patterns for everyday life. In OO-language all objects extracts from a type object named 'object'. You can say that all activity extracts from the 'object' acting (fig. 1).

The feeling of domestic (pattern 1)

In a home there are several small details (A guess is such things as 1, physical objects; from heirlooms to the favourite pair of slippers and maybe also scents 2, routines and traditions) which all jointly makes a feeling of home for the families. In a wider angel this can be adopted to the family life style, for example behaviours that family members have in common. The design pattern "*Design for Temporary beauty*" is described as follows: "*The problem the pattern seeks to address is that of the aesthetic tailorability of domestic technologies in the same fashion and often with the same motivation as other aspects of the domestic environment so that 'a house' becomes 'a home' or 'a car' becomes 'chitty chitty bang bang', 'the silver beast' or whatever.*" (Hughes, J., O'Brien, J., Rodden, T., Rouncefield, M., Viller, S., 2000)

Sub-pattern 1

The restrictions of buying are one thing that characterises a family lifestyle.

From the fieldwork Study 2:

Pattern 1: The feeling of domestic.

The restrictions when buying may be one thing, which makes this pattern. A standpoint for ecological food, or an allergy can perhaps strengthen the feeling of domestic.

From the fieldwork Study 3:

Pattern 1: The feeling of domestic

It seems right to mention this pattern for study 3 as well. The routines and behaviour connected with the meal making are for sure one of the things that we associate with the feeling of domestic.

The rough behaviour (pattern 2)

Some tasks are solved without routines or rules. This can be valid inside the community of a family. Its situation of practice can differ from time to time. Further more this pattern can also be valid for the different usage between different families. This pattern is quite the opposite to pattern number 3 (the uniform routines, se below). But the world of observation is not simple

enough to categorise in rough and uniform. Depending on the context a situation can shift between the two patterns. Something that in a small scale acts like a 'rough behaviour' might have uniformity when observing it from a broader view.

Sub-pattern 2

Parallel occurrences during meal making are something that sometimes causes a rough behaviour.

From the fieldwork Study 2:

Pattern 2: Rough behaviour.

Between the families the level of details differ when planning a purchase list. This can also differ from one occasion to another. The vague buying also point to a situation which is difficult to get the hang of to make a functional pattern.

From the fieldwork Study 1:

Pattern 2: Rough behaviour

The situation of booking seats in a cinema as described in Study 1 is not homogenous among different families. A family's routines also differ from one time to another depending on the situation. With a more wide focus it is maybe possible to see the bigger context and find regular routines in a family's behaviour.

From the fieldwork Study 3:

Pattern 2: The rough behaviour

There are different levels of using and following recipe, some always use them during meal making, others have them on the bedside table.

The uniform routines (pattern 3)

Other tasks are (contrary Pattern 2) mainly hard directed by routines, habits and customs. Like the second pattern it can be valid both inside the family domain and between different families.

Sub-pattern 3

Some sub-patterns to pattern number 3 can easily be pointed out from the observations:

- Situated shopping

The unprepared shopping event with an incomplete shopping list.

- The basic products

Some basic products are bought to always have at home in an ordinary manner.

- The co-ordination of skills and events

When several people are making a meal together one of them often gets a supervising role (this is not necessary the same person each time!)

From the fieldwork Study 2:

Pattern 3: The uniform routines

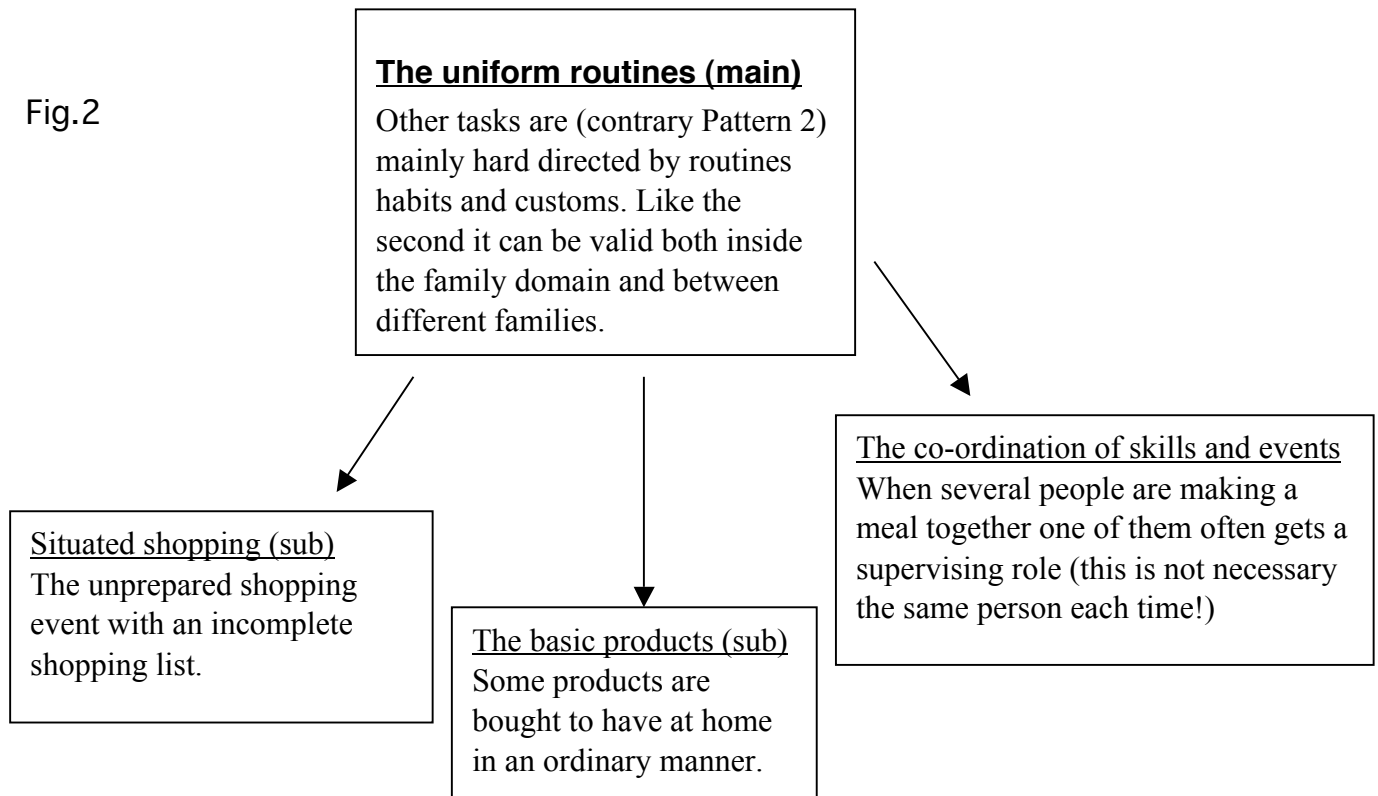
The basic product seems to follow all households. The line of argument "if we have this and that, we can make various meals, which we know we like" is a common way of buying. And so is the custom of completion with smaller purchases.

From the fieldwork Study 3:

Pattern 3: The uniform routines

The behaviour of having one person supervising the meal making when several persons are involved seems to be general in households. One way of the recipe usage is also spread among households, namely to check up for hints in the meal making. This can be done at different times but the task itself is the same.

Fig.2



Combined patterns

Some situations are best described by a combination of two (or more) patterns.

Pattern 2: The rough behaviour can sometimes create a feeling of domestic (pattern 1). It is realistic to use the patterns as choices of aspects for analysing or understanding a situation of

practice. It is free for everyone to select through which pattern something is to be analysed in each specific case. I will clear pronounce that I do not attend to bind one situation to one pattern. As well as different people interpret the world in different ways also ethnography has to remain that way. The pattern-model just seeks to address the problem of understanding in a design community.

The usage of a pattern language

Pattern language, as term does not automatically point to its usage. The ethnographical patterns presented above are created as tools for discussion in smart home system development. With a common language the system architect and the ethnographer or requirement engineer are more intelligible to each other. A pattern can be mentioned as a term with a large amount of knowledge inside. As with the UML-language different companies and working-teams can create their own patterns in accordance to their design domain and their target population.

Conclusions

When acting around the kitchen environment the social setting has shown as an important part of the practice. Between the tasks the articulation work is served as glue to keep the work in its entirety. Cutting up an activity into small tasks tends to leave the articulation work behind and hence split the work situation. This will affect the work in a considerable way so that the people involved may not feel comfortable in their role.

This is important to consider while interpreting the work practice for automation of kitchen. Whatever new solutions the industry are launching the consumers need of smooth change in between them (i.e. the articulation work) will resist until solved. This may not only require a creative wholeness of a smart house system, but also a standard of LAN-protocol and XML-malls and such to create a compability between different solutions so that they are able to work together. E2 has set up a framework for such standardisation.

Some future work still has to be done for the industry and I claim that this would have the highest priority in advance of the requirement studies for a new product. The branch still lacks knowledge of the context it tries to modify.

Next Step:

- Do video studies of the practice usage of recipes and cookbooks during meal making.
- Study of the articulation work in the kitchen.
- Do further investigations of the social conscripts of the kitchen and some sociological approaches.
- Enlarge the entire picture of the kitchen domain for example with a study of garbage sorting for the environment.
- Investigate the role of WAP-technology for amusement activity, and the social networking used when planning and booking an activity from outside the home.
- Investigate how ethnographical patterns of everyday life can match up the design work (c.f. below).

Reflections

This thesis has been made in the frame of the MDA program at Blekinge Institute of Technology (<http://mda.bth.se>). It is my bachelor work and the work has been done in Stockholm and Ronneby during the spring semester 2001. In the beginning of the work it was meant to be done at the smart kitchen company E2 (www.e2-home.com). For both known and unknown reasons this has not become and after a time of discussing, I in joint with my supervisors decided to do the study without interference from any company. This caused a rewriting of the focus in the middle of April, which of course affected the whole work and its time plan. The beginning work at E2 captured a clear picture of where the smart home businesses are aimed today and the focus of its home service development (see Study 1).

The field of investigation (the kitchen) is an undiscovered area for ethnographic work. A very few works have been done and it was hard to find literature to support the fieldwork. Some sociological approaches are possibly apt to do, but I wanted to keep the work practice viewpoint for this study.

For comments regarding this work or questions on further work, please do not hesitate to contact me by the address: jesper.brolin@danviksport.se.

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Related links

Some web-recourses related to the work are presented here. All of them are not refereed in the thesis some have been provided to help up a future work or a further analysis.

All links are valid at 2001-06-13. This thesis will be available for download somewhere at:
<http://www.bth.se/bibliotek/>

Philips design department	www.design.philips.com/vof
E2-home	www.e2-home.com
Electrolux	www.electrolux.se
Swedish National Food Administration	www.slv.se
MDA at Blekinge Institute of Technology	mda.bth.se
Swedish Institute of Computer Science	www.sics.se
Georgia Institute of Technology GVU Center	www.cc.gatech.edu
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