# Get your organisation together
video-mediated communication in an informal setting.

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Master Thesis IA7400
VT 1999

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## Abstract

Videoconferencing is a way to make people meet regardless of the geographical distance between them. In recent years, it has become possible to use the Internet as a carrier for communication of this type. This has opened up new opportunities to use computers that already are connected to the Internet as vehicles for video-mediated communication. In this Master thesis, we have explored some possibilities to use video-mediated communication in an organisational setting – where the purpose was to support awareness and informal, social interaction between geographically dispersed locations. An ethnographical study was conducted at an IT-research institute, focusing on the institute's member's behaviour around and assumptions of an implemented videoconference prototype. The users testified that, albeit they found it interesting, the prototype was too weak in mediating interaction in a completely natural way. Some issues of privacy and integrity matters were also hampering the user's will to accept the system. The result of this study points out some social and technological factors that are important to acknowledge when designing future video-mediated communication systems dedicated to support awareness and informal communication.

## Abstrakt

Videokonferenser är ett sätt för människor att mötas oavsett geografiskt avstånd. Det har på senare tid blivit möjligt att använda Internet som medium för denna typ av kommunikation, vilket har skapat potential för att använda uppkopplade datorer till videoförmedlad kommunikation. Vi har i denna uppsats utforskat möjligheterna att använda videoförmedlad kommunikation för att stödja medvetenhet och informell kommunikation mellan två geografiskt åtskilda lokaliteter. Studien gjordes på ett IT-forskningsinstitut, där organisationsmedlemmarnas förhållningssätt och åsikter runt en videokonferensprototyp studerades med hjälp av en etnografisk metod. Användarna ansåg att prototypen var intressant, men dock för svag för att kunna möjliggöra interaktion på ett naturligt sätt. En del spörsmål relaterade till personlig integritet hämmade vidare användarnas benägenhet att acceptera prototypen. Studiens resultat visar på några sociala och tekniska faktorer som bör beaktas vid utformning av framtida videosystem som skall stödja medvetenhet och informell kommunikation.

# Acknowledgements

During our work with this thesis we have had the rewarding opportunity to consult a variety of people, all of who have willingly helped us to maintain our orientation in the dwindling writing-up process. First of all we would like to express our humble gratitude to Per Dahlberg, who has supervised us and guided us through structures and dispositions. Our warmest thank also goes to the members of the *Etno-group*, and especially then to Magnus Bergquist and Nina Lundberg, who have been given us invaluable support and feedback throughout the creation of our thesis. We would also like to take a bow in front of Karl-Petter Åkesson for all the help when rigging and configuring the VCR-prototype, as well as for his help in our search for relevant literature.

We also send our thanks to the employees at the Viktoria Institute for allowing us to use them as guinea pigs, and for letting us decorate their lunchroom with cables, cameras, microphones and other equipment needed to make our work possible. And finally, we would like to thank the Norwegians for letting us in on the VCR project.

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# 1 Introduction

Video-mediated communication (VMC), and particularly the concept of video conferencing, is a phenomenon which has been available since the 60s (Bly, Harrison, Irwin, 1993), even though it is only recently the use of this medium has become more wide spread. A videoconference is a meeting or a conversation, where the participants can see and hear each other simultaneously through audio and video communication (Läärä, 1995). Usually, some distance separates the participants, where the range can span from adjacent offices in the same building to sites located on different continents. The notion behind the technology is to support encounters between people, regardless of their actual geographical location. The technical equipment needed to make such meetings possible has been quite expensive, which is one reason that many video-conferencing systems have been built in central studio rooms that can be booked by interested users in advance. Consider a video meeting that is planned to be held between two persons, where one is located in Oslo, whereas the other one is located in Göteborg. In order for them to achieve a successful encounter, they must first of all decide a time for a meeting. Secondly, they must book facilities on both locations that are able to create the videoconference, and thirdly, each person has to transfer to the place where this facility is located. This suggests that there has been a high degree of planning and cost[1] involved in conducting a video meeting, with the result that meetings conducted so far have had a formal, structured nature. Partly in effort to keep the cost down, partly to fit the participants schedules.

During the later part of the 90s, the technology in this field has evolved tremendously, with falling prices as a result. It is now possible to use personal computers to create video meetings, using the Internet to transfer sound and image. The required hardware and software have become inexpensive enough to be affordable by any organisation or company interested in the technology. When it becomes easy for users with normal computer literacy to create connections through video links, an opportunity arise to study a new interesting phenomenon: In what ways video conferences are able to support awareness and informal communication in a workplace where collaborating groups are separated geographically.

## 1.1 Informal interaction, awareness and VMC

A typical example of an informal meeting is when two office workers meet at the coffee machine or in the hallway, and where they get the opportunity to interact and spontaneously exchange experiences in their current work. Another variant is when you seek out a colleague in his workplace, without prior appointment, to ask a question you know this person is able to answer for you. To be able to do these things, you must first become aware of your social environment. How this awareness is created can vary a lot, but the basic signals that helps in this creation are visual signals (e.g. when you pass an office and notices your colleague in it) and audible signals

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[1] Both in the sense of money and in the sense of personal effort.

(e.g. when you here someone talking in the corridor). Awareness is in this way a prelude to informal interaction. Management research has recently begun to acknowledge the potential value of this informal interaction, both in its value for creating a positive atmosphere in work settings, as for its value to help individuals in their everyday work. Studies have shown that informal, ad hoc meetings in a work place have positive effect on the overall work result (Whittaker, Frolich, Daly-Jones, 1994). It is yet difficult to prove in figures and percentages exactly what it is that produces this beneficial effect. In other words: The phenomenon is intangible.

The awareness individuals have about their organisational environment, and the possibilities they have to create informal meetings, have been limited to their immediate physical surrounding. Or so the case has been until now. Today, VMC-technology gives a relatively inexpensive mean to connect two (or more) dispersed locations. Let us say that two departments in an organisation – which are geographically separated and where some degree of collaboration occurs – are being connected through a video link. Let us furthermore say that the connection is placed in an area that is likely to promote informal encounters, e.g. in each department's coffee room. A person, who enters the coffee room at one site, can see and hear people present at the other site – and vice versa. If this is done, a "window" or an extended "virtual coffee room" has been created, which might enable informal communication and collaboration between the two departments.

## 1.2 The Virtual Coffee Room

The project *The Virtual Coffee Room* (VCR) is originally a joint-venture between Institutt for Informatikk (IFI) in Oslo, Norway and the Viktoria Institute in Göteborg, Sweden. The purpose of the project is to study how modern audio-, video-, and Internet-technology can be used to support informal communication and collaboration in dispersed workplace settings. To be able to study this, the coffee room in Oslo and the lunchroom in Göteborg have been equipped with a computer, a camera, microphones, and a screen[2] (see picture 1). Sound and moving images are then being transmitted from one location to the other over the Internet. In Göteborg the received image is displayed on a 33" television screen, whilst in Norway, the received image is projected on a white wall. In this way, the two places are getting connected and made ready to facilitate whatever communication the inhabitants at both sites decides to convey through the medium.



**Picture 1:** The VCR-prototype at the Viktoria Institute.

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[2] See Appendix A for a more detailed list of the equipment used.

The research in Norway has primarily concentrated on the technical aspects of the VCR. The Norwegian team have configured the hardware and developed the software needed to run the Virtual Coffee Room, and are furthermore responsible for future technical developments. The Viktoria Institute on the other hand, is more interested in finding and developing new use of the technology. Our study and work has therefore been demarcated to a more social context. We want to study how members in a specific organisation are interacting socially, how they feel about the notion of using the VCR, and how they are acting in a VCR-prototype. Our ambition is that the results of the study should help us to better understand how to design a VCR in a specific environment. The goal is to gain more knowledge of what implications organisational, cultural, social, and personal factors have on the VCR design work in order to create an acceptable system[3].

## 1.3 Related work

Dourish, Adler, Bellotti, and Henderson (1996) has done some studies of settings where analogous video mediation was used to support work collaboration, and where they had the chance to study the participant's use of it for a longer period of time. Rather than to look at the comparisons between video and the "real world", they chose to look at video as part of the real world, and how people organise everyday, "real world" activities around it. Two main points were put forward which purpose was to reinforce rather than undermine the argument that media spaces should be seen as augmenting, not replacing, other forms of encounter. These two points were *continuous connections,* i.e. constantly open communication channels, and *the role of these connections,* i.e. the connections didn't just connect people but did also link spaces and thus created a new social space.

Tools and applications for supporting informal interactions and opportunistic communication have been studied by Isaac *et al,* who reports on several projects: One of the projects regarded a *Desktop video conferencing prototype*, which purpose is rather much as its name implies it to be. Another project was called *Montage*, where the goal was (amongst others) to support the process of finding an opportune time for people to interact. The backdrop was that people wanted help with finding colleagues who were not in their office, or to have the ability to leave digital notes to set up future contacts. These applications have that in common that they are bound to the computer's desktop, which restrains the interaction to the participant's offices.

But people don't sit still in their offices all day long. Instead they tend to leave their offices from time to time during their workday to solve different things. Belotti and Bly (1996) calls this phenomena *local mobility*, and they claim that the reasons for such behaviour is the need to use shared resources and the need to communicate with others. The awareness and knowledge of other's work that can be gleaned from being locally mobile, is furthermore considered as important for both group cohesiveness as for the individual's ability to conduct work.

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[3] "Acceptable system" in the sense of "acceptable to its intended users."

When the physical distance grows between collaborating people, they start to lose track of their colleagues, and therefore actually lose some of their awareness. Narine, Leganchuk and Mantei (1999) studied a system called Postcard that displayed low-resolution video pictures on the user's workstations of widely dispersed co-workers. Participants in the study used Postcards as an opportunity to communicate with their dispersed colleagues, and that Postcards contributed to increase the familiarity between them. Anecdotes of more personal expressions via Postcards corroborated that users felt quite comfortable to interact with the others through Postcard, but Narine *et al.* have no evidence that it was the application in itself that solely fostered this familiarity.

## 1.4 Purpose of study

In this thesis, we seek to study how a system for video-mediation should be designed in a specific location in order to support awareness, informal communication, and collaboration where the participants are dispersed geographically. We will try to find out what factors, both technical and social, that should be considered in this setting when designing the system. Our question at issue will thus be framed by a certain element of case study, i.e., we chose to conduct our study with the following question as a guiding star:

***How do cultural, social and technological factors affect the design and implementation of a VMC-system, which purpose is to support collaborative interaction in an informal environment?***

We will start by presenting the theoretical framework that we will use in this thesis (section 2), and then continue with a description of how research was conducted in our study (section 3). In section 4, we will present the result of the study, followed by a discussion of the findings and their implications in section 5. Finally, we will conclude the thesis in section 6.

# 2  Theoretical framework

We will support our study on three corner stones: Awareness, informal communication and media space/place (fig 1). The following sections will explain these concepts in detail.
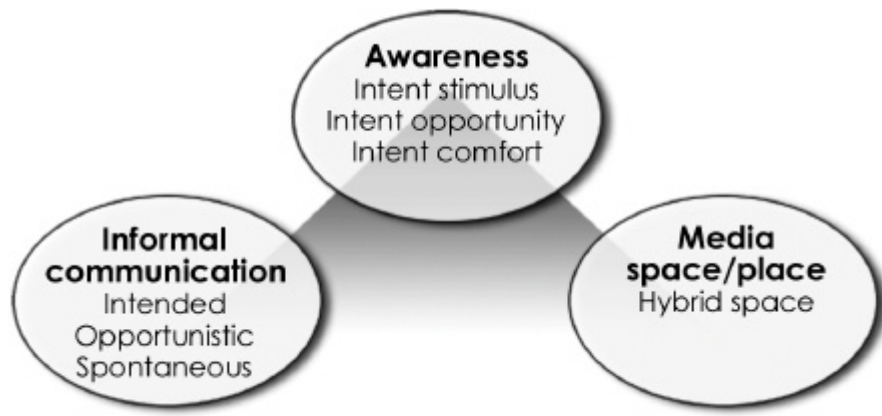


*(Figure created by the authors)*

**Figure 1:** The theoretical framework

## *2.1  Awareness*

A central theme in the literature regarding video-mediated communication and collaboration is the term *awareness.* This term can be divided into two categories, *formal* and *informal awareness.* A definition of the term *formal awareness* is yet to be found, and we will not proceed with our search for one either. The term doesn't seem to be that relevant to our work and we therefore have chosen not to delve any deeper into it. Since the VCR-project deals with in what way VMC might support *informal* ways to interact and communicate, the notion of *formal* awareness is of limited importance to our work.

### 2.1.1  Informal awareness

Greenberg (1996) proposes a definition of the term *informal awareness* as of one's general sense of who is around and what others are up to. Narine *et al.* (1999) present another definition of what they call *collaboration awareness* that they divide into three parts:



- Intent stimulus
- Intent opportunity
- Intent comfort

In the remainder of this thesis, we chose to include both definitions when discussing awareness. We do this because we find collaborative awareness to be a special case of informal awareness. Collaborative awareness is simply informal awareness taking place in a collaborative setting.

### 2.1.2   Intent stimulus

An intent stimulus is any event that trigger an intent to communicate, e.g. when someone is walking down the hall and happen to see a colleague being available in their office for conversation, or when one hear a colleague talking in the corridor outside one's office door. In the case of our system, intent stimulus is facilitated through the VCR. When one sees a colleague in Norway taking a coffee break one can get the same intent stimuli one get when walking into the lunchroom. This intent stimulus is otherwise difficult to maintain when the parties involved are getting separated, e.g. because of travelling, relocation or due to extreme lack of time for getting together.

### 2.1.3   Intent opportunity

This is the probability of making a communication contact once the intent to communicate is formulated. Or in other words: The probability of getting in touch with the people with who I wish to communicate. In what way this communication is accomplished is not so important in this context. The intent opportunity is high when people are co-located, since physical proximity give rise to many opportunities to communicate. Electronic mail is a way to increase the intent opportunity in the case where people are located in distributed organisations. Here the opportunity to communicate is always presents, but this asynchronous medium lacks the spontaneity and immediacy of synchronous communication. Still, it provides an opportunity to establish a contact with someone one wants to communicate with.

### 2.1.4   Intent comfort

Can be explained as the sense of the social acceptability of making the communication contact, i.e. in what way it is considered natural and appropriate to initiate the contact. When people are co-located, they cannot help but having contacts in the hallway or the lunchroom, all of which makes the contact more natural and less intrusive. When people are not co-located, those easily enacted contacts go away and there is more of a social barrier for making the contact. In addition, there is less shared information to use as conversational starters.

### 2.1.5   Awareness in practice

Awareness is considered to be an important part to make collaborative work successful. Belotti *et al.* (1996) studied a technical design-consulting firm, in which people spent most of their time away from their desks during work. One reason for this absence was generally the need to consult other persons in the vicinity. Another less inconspicuous reason was rooted in the notion of being aware of other people and their work. People could sometimes be seen wandering about, apparently with no particular motive. In this way, useful information was gleaned passively just by coming in close proximity to others, e.g. conversations could be overheard and people could be seen working together (intent stimulus). Employees did often engage themselves in things they passively became aware of, usually by offering feedback or helping out in some ongoing activity. Awareness of someone's current work-focus provided a natural entry to a discussion (intent comfort). An essential part to make spontaneous communication possible such as this, was the visual and auditory accessibility to people in the proximity (intent opportunity). People who worked close to each other

learned a great deal about one another's activities and were more likely to interact informally as a result.

## *2.2 Formal and informal communication*

### 2.2.1    Formal communication

An organisation is usually structured in one way or another, be it in a tall hierarchical structure or in a flatter, more organic structure. Disregarding which structure, certain formal relationships will arise from the pattern of responsibilities defined in the organisation (Mullins, 1993). Formal communication can be seen as the communication that flows through the lines in an organisation chart (see fig 2).
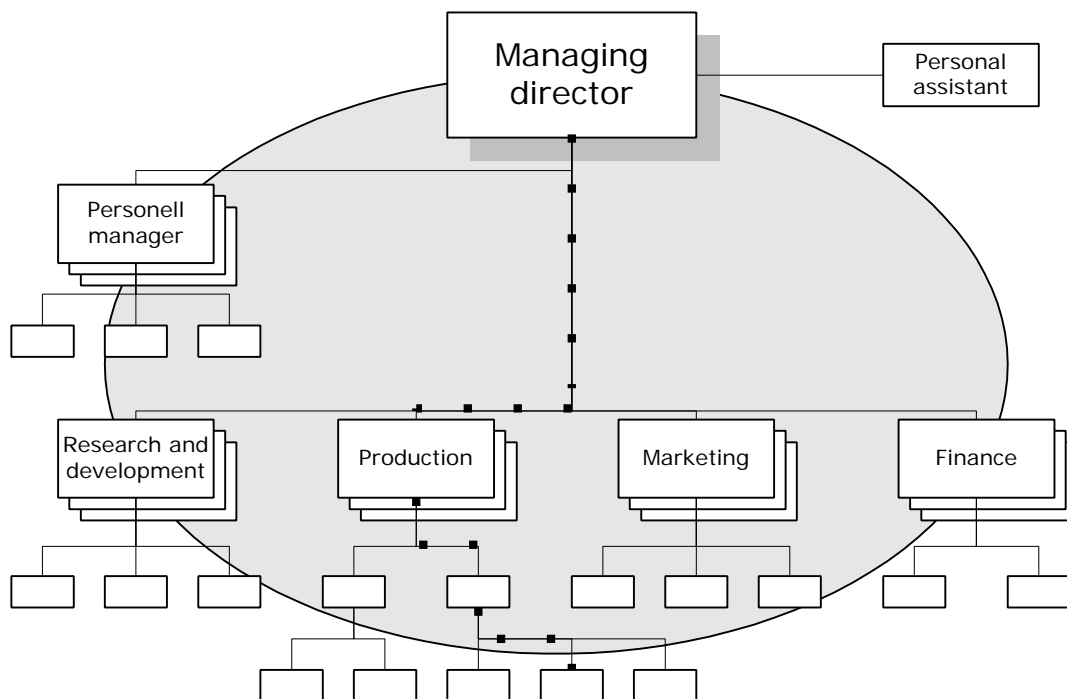


**Figure 2:**  Formal communication channels          *(Figure created by the authors based on Mullins, 1993)*

Here the communication flows in a channel-like fashion vertically down through the structure, for example when the managing director communicates with managers, section leaders, supervisors and other employees. The director will usually not address employees on the operational levels directly, instead the managers of each function or process will be informed and then obliged to relay the information down the structure to the persons it affects. The same applies the other way around. If a production worker, say, for some reason wishes to discuss an issue with an authority on a higher level in the structure, it is deemed appropriate that he or she uses the defined communication channels by first contacting the production supervisor about the matter. The supervisor will then in turn act as a courier and forward the message to

the next person in the authority chain, a process that will repeat itself until the message reaches the intended receiver. Formal communication is in other words verbal or written interaction between people, which is held in a certain manner and through certain communication channels that are fixed by certain rules.

### 2.2.2    Informal communication

On the opposite of formal communication we have *informal communication*. This type of interaction is not restricted to certain explicit rules or communication channels. Instead this is the way we interact with colleagues, friends and family on everyday basis, where the only restraining rules are those depicted by social norms. When talking about video-mediated collaboration, the concept of informal communication is a central theme. Several research studies have shown that most workplace interactions occur spontaneously for short periods of time, which implies a somewhat informal manner. Isaacs *et al.* (1997) uses a taxonomy proposed by Kraut *et al.* (1990) of interpersonal communication which divides this phenomenon into four types of interaction:

- *Scheduled interaction (formal)*
- *Intended interaction (informal)*
- *Opportunistic interaction (informal)*
- *Spontaneous interaction (informal)*

The first one, *Scheduled interaction*, is the type of interaction that characterises the *formal* meeting e.g. a formal staff meeting. Those meetings have usually been preceded by some sort of arrangement, e.g. attendees have been called to the meeting by the organisers, or they have in some other way been notified when and where the meeting should take place. There have been a lot of research conducted about this type of interaction, but since the majority of workplace interactions are *informal,* we chose to focus on intended, opportunistic and spontaneous interaction.

A typical example of *Intended interaction*, is when a person deliberately seeks out another person to discuss on a specific topic. Notable here is that there is no pre-arranged plan between the participants to initiate the conversation (otherwise it would have been a scheduled interaction).

The best way to explain *Opportunistic interaction*, and the informal communication within it, is perhaps with an example: Imagine walking down a corridor and suddenly running into a colleague. When seeing him/her you remember that you have an important (or maybe not so important) topic to discuss or a question to ask. Most likely, you will take this *opportunity* to settle this matter.

*Spontaneous interaction* occurs when two people happen to see each other and get into a conversation on a topic not prepared by either person. When walking into the coffee room at the office, one sometimes start talking to whoever that might already

be present in the room, just to have a chat. One greet each other and start talking about the weather, the present workload or whatever topic that springs to mind.

### 2.2.3   Properties of informal communication

Informal communication in a workplace has several properties attached to it. The communication is generally occurring on a *frequent* basis, office workers spend 25% to 70% (Isaacs *et al.*, 1997) of their time in face-to-face conversations with others. These conversations are furthermore *brief* and *unscheduled* in their nature, i.e. they generally last only for a few minutes and there have not been any prior arrangements or plans before the conversations take place. This type of interaction is also heavily *dependent on physical proximity*. The likelihood of informal interaction between co-workers is high when they are located close to each other. In a distributed setting, where the co-workers are not in physical proximity of each other, the possibilities to engage in and maintain informal communication are usually restricted to telephone contact. However, communication through telephone lacks one important element, namely the visual cue. In addition to this, the telephone does only support intended interaction (where a person deliberately seeks out another person). It does not assist opportunistic or spontaneous interaction at all. If these two types of interactions are to be supported in a distributed environment, there is need to bridge the physical void between the participants, both visually and in ways of making contact. This physical void must be replaced with some sort of space or place that is able to create a sense of physical proximity, which leads us to another area of concern: That of media space and the notion of place.

## 2.3 Media space and place



Space is the structure of the world. It is a three-dimensional environment in which objects and events occur, and in which they have relative position and direction (Harrison and Dourish, 1996). We all share the same frame of reference to how the world is spatially organised; up is up and down is down; we now what it means when someone is talking about "in front of" and "in the back". It is this common understanding that makes it possible for us to point to objects, or to refer to things in terms like "the person standing next to the coffee machine". Space is widely used as a model or metaphor in the field of information technology. The desktop metaphor for example, has been extended to a metaphor of desks, offices, hallways and cities. The notion of space used in this manner makes use of our common understanding and familiarity of everyday physical environments.

### 2.3.1   Media space

The VCR-project and its underlying idea springs from the concept of *Media space*, which is elaborated to great extent by Bly *et al.* (1993). They define media space as:

> *"An electronic setting in which groups of people can work together, even when they are not resident in the same place or present at the same time. In a media space, people can create real-time visual and acoustic environments that span physically separate areas. They can also control the recording, accessing and*

*replaying of images and sounds from those environments"* (Bly *et al.*, 1993, Page 30)

In our study, we will concentrate purely on the concept of real-time video-mediation with live interaction between the participants. The asynchronous element in the above definition – control of recording and playback – is deliberately omitted. It is therefore more appropriate to use the more reduced definition presented by Harrison and Dourish (1996):

> *"Media spaces integrate audio, video and computer technology to provide a rich, malleable infrastructure for workgroup communication across time and space."* (Harrison and Dourish, 1996, Page 4)

Harrison and Dourish argues however that, in everyday action, the appropriate behavioural framing (i.e. how you behave according to your physical surroundings) comes not from a sense of space, but from a sense of *place*.

### 2.3.2   Media place

Place is a space which is invested with understanding of behavioural appropriateness and cultural expectations. We are *located* in space, but we *act* in place. Consider the clarifying example of the distinction between a "house" and a "home". A house might keep out the wind and the rain, but a home is where we live.

> *"A conference hall and a theatre share many similar spatial features (such as lighting and orientation); and yet we rarely sing or dance when presenting conference papers, and to do so would be regarded as at least slightly odd (or would need to be explained). We wouldn't describe this behaviour as "out of space"; but it would most certainly be "out of place" "* (Harrison and Dourish, 1996, Page 3)

The users of a media space create a certain place by acting in it. A media place can be of different types. There are media places based on *virtual reality*, where the participants "meet" in computer created areas, and where each participant is represented by an equally computer generated icon or avatar. Newsgroups, Internet mailing lists and web-based chat groups are examples of *space-less places;* i.e. they lack spatial features such as direction and relative position. Yet there is a palpable sense of place inherent in, for example, a newsgroup. Different newsgroups have different conventions regarding appropriate style of language, what is appropriate to ask, how to treat newcomers, and so on. They are like small communities with their own social norms. A third type of media space/place is that of *hybrid spaces,* which definition corresponds quite closely to the basic concept of VMC.

### 2.3.3   Hybrid space

A hybrid space is a combination of a virtual environment and a media space that includes real, physical persons (whereas a pure virtual environment includes a digital representation, an avatar, of each participating person). In other words: VMC could be defined as a way to create a hybrid space since:

(1) The projected images and sounds of the other room – together with the environment they are projected in – creates the virtual environment.

(2) In the projections, the remote people and their environment are represented in the same way they would have been perceived in real life, i.e. they are not avatars or icons.

In this way, two or more people can experience themselves to be in the same space, even though they are not in the same *physical* space. They are acting in a hybrid space containing both virtual and real elements at the same time.

## 2.4 Using the framework

We have presented and defined three theories about awareness, informal communication, and Media space/place. This framework will act as a foundation when we present and categorise our results in section 4, and it will support our arguments in the subsequent discussion in section 5.

Our basic premise is that awareness is a pre-requisite for making informal communication possible. We chose to see the three parts of awareness – intent stimulus, intent opportunity, and intent comfort – as triggering factors to informal communication. Without any intent stimulus, for example, there is hardly any room for opportunistic interaction. And if there is lack of intent comfort, the possibilities to engage in spontaneous interaction are seriously hampered. In the ordinary world, awareness and informal communication takes place in the physical environments we act in. In the case of the VCR, the ambition is to overcome the lack of physical proximity between connected sites. This ambition can be achieved by creating a media space that can harbour the possibilities for awareness and informal communication across the distance.

# 3 Method

The department of Informatics at Göteborg University, and thus the Viktoria Institute, has in recent years changed its research perspective from focusing on information systems issues to issues on information technology (IT) use. Dahlbom (1995) defines this approach to informatics as:

> *"A design oriented study of information technology use with the intention to contribute to the development of both the use and the technology itself."* (Dahlbom, 1995, Page 1)

We have been educated in this approach, and have chosen – more or less wittingly – to conduct our study from this IT-use perspective. This is also reflected in our choice of research method. Our interest is to understand how technology is used, not only in a technical sense but also from a more social point-of-view, which makes the method we have chosen a very reasonable choice. Since the technology is used in a variety of different social settings, the use of it also varies. Thus, it becomes hard to discuss in general terms of how technology use is characterised. We are therefore more inclined to concentrate our work on how to design and implement technology so it becomes useful and accepted in a specific setting.

## 3.1 The setting

The study was made over a few months in the spring of 1999 and consisted of observations and interviews, mainly with the employees at the Viktoria Institute. We did also choose to use the discussions taking place at random occasions as an input to our material. There were also some considerable collaboration made with the researchers at IFI and also some collaboration with an IT-consultant firm situated in Göteborg.

### 3.1.1 The Viktoria Institute

The best way to give a brief description of Viktoria, is perhaps to present their own definition that is published at the Viktoria Institute's web site (http://www.viktoria.org/, 1999-04-09):

> *"The Viktoria Institute was founded in august 1997 by the business community of West Sweden to do research and development in applied information technology in cooperation with industry, public organizations, and academic institutions. The aim of the Viktoria Institute is to ensure that research results are quickly applied, come to practical use and contribute to the development of new products, services, business, and enterprise.*
>
> *The Viktoria Institute is owned jointly by the West-Swedish IT Association, Göteborg University, and Chalmers University of Technology. All research at the Viktoria Institute is done in close collaboration with the member organizations, with active participation from company personnel in the research projects, and often at the company sites of the involved organizations."*

The organisation consists – at the time of writing – of four research groups: Mobile Informatics, PLAY, IT & Organization, and Interactive Learning[4]. These people are located on three different floors: Mobile Informatics and PLAY share the top floor, while IT & Organization and Interactive Learning resides on each of the two floors below. There are approximately 50 people altogether involved in the work at the Viktoria Institute[5], including administrative personnel.

## 3.2 Finding a method

As the VCR-project progressed, the technology within it developed. The initial set of assumptions changed with the technology and at some point in time we discovered that our initial intent, to adopt an action-research or action-case (Braa and Vidgen, 1997) approach to conduct our study, became more and more unrealistic. A basic condition when doing research with these research methods, is that you have some sort of application or technology to implement and test in some sort of environment. Since the VCR technology/application have been, and still is, to much extent a non-working project, we have not been able to test and study its effect on our research environment. At least not in a manner that we would have deemed appropriate.

When re-examining the project and the possible ways to make a master thesis out of it we came across another school of research methods – ethnography. Since then we have actually changed the hole idea of this thesis, from being an evaluation of a specific type of technology for VMC to a study of related work, the needs and wants of an organisation and the problems associated with this type of technology. If we where to begin our study today with the knowledge of ethnography we have gained during our journey, we probably would have chosen the ethnographic approach from the beginning since the results from such a study are, at least in the case of our project, much more relevant.

## 3.3 Ethnography Vs other methods

This thesis is about a system for collaboration and the way such a system might be designed. In this case, the design takes its starting point in how the organisation, in which the system is to be implemented, is working and functioning in its daily activities. An ethnographic approach is preferable when one wants to gather information of this type in an organisation.

According to Hughes, King, Rodden and Andersen (1994), ethnography has in recent years become an important method regarding the collection of system requirement data or the collection of data to facilitate the design of a system; especially systems made to support group collaboration. When designing these kinds of systems it is often the fact that the design work devotes itself to what the system is supposed to do,

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[4] Read more about the research groups at http://www.viktoria.informatik.gu.se/

[5] The reason for this roughly estimated number is that there are a constantly changing number of people involved in the institute's activities. Most of the activities are project based, where people sometimes participates on a short-time basis to perform certain task.

not in what environment it is supposed to function. One reason that many of these system development projects fail is that there has not been enough attention paid to the social context of work (Blomberg *et al.* 1993, Hughes *et al.*, 1994). To study the way people act, interact and collaborate in the environment where the system is to be implemented becomes crucial when the system is supposed to support the way people interact and collaborate in that same environment (Suchman, 1995).

The ethnographic approach provides an alternative methodology for designers to use which gives them access to people's everyday practices as members of a social group. Traditional methods have a tendency to focus on giving *designers* a clear picture of what they are about to engineer instead of focusing on what the *users need* (Hughes *et al.,* 1994). The main interest in these methods is to deliver a solid document – sometimes almost resembling a blueprint – containing facts about the (presumed) needs of the organisation and its systems. These methods have an analytic approach with the ambition to deconstruct the work activities into ever more finely grained components, leading to some kind of understandable and tangible "truth" about the environment. This deconstruction sometimes removes the essential "real world" features. Features that make the work practices meaningful within a socially organised setting.

### 3.3.1    Ethnographic tools

The main tools in an ethnographic study are observations and interviews, which are used in conjunction with each other. The interviews give the fieldworker an opportunity to gain insight into how the employees perceive their organisation. By observing the same organisation the fieldworker can make notes of things that is not brought forward by the interviews. The one reason is that – and this is a basic assumption in the ethnographic research community – what people say that they are doing is not always what they actually do. Since we have put some effort in creating a meaningful interview questionnaire, this effort will be explained in some detail later in this section.

A third way of collecting information about an organisation is by discussions. This is also a part of the ethnographic method, although Blomberg *et al.* (1993) talks about interviews of a more unstructured and informal nature. The interviews that Blomberg *et al.* refers to should take place in the initial stage of the fieldwork. In our case, we chose to refer to these interviews as discussions since they where neither structured nor planned in any way at all. Nor can our discussions be demarcated in time. They have been taking place through out the whole process of writing this thesis.
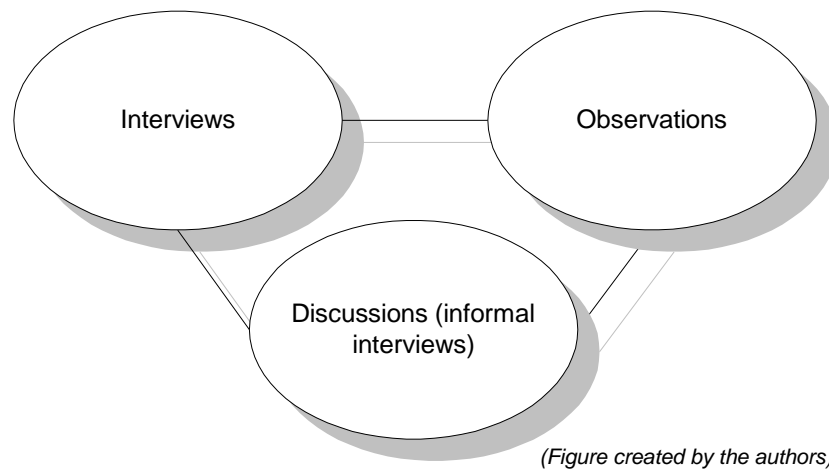
*(Figure created by the authors)*

**Figure 4:** Ethnographic tools

### 3.3.2   Ethnographic styles

Before we examine different styles of ethnography we must note that the styles presented below are by no means mutually exclusive ways of using ethnography in design work. Some of them could be harnessed together and the differences between them should be seen as differences of emphasis rather then sharp demarcations. This part of our thesis is based on the work of Hughes *et al.* (1994).

The ethnographic approach within design work can be divided into four groups of research styles:
- *Concurrent ethnography*
- *Quick and dirty ethnography*
- *Evaluative ethnography*
- *Re-examination of previous studies*

*Concurrent ethnography* is perhaps the most commonly used style of ethnography when dealing with design questions. It is a sequenced process in which the ethnographic investigation of a domain precedes the design development of a system. This method is often used when the design is made in a prototyping fashion. Debriefing sessions and iterative prototyping complement the ethnographic studies, and sometimes the whole process, i.e., fieldwork → debriefing → prototyping, is iterated.

*Quick and dirty ethnography* is a short summarised version of ethnography. The use of ethnographic study in this category not only seeks relevant information as quickly as possible but also accepts at the outset the impossibility of gathering a complete and detailed understanding of the setting at hand. The focus is rather to gather enough information that can become an adequate foundation for future design work. The method is capable of providing much valuable knowledge of the way work is socially organised in a relatively large-scale work setting and in a relatively short space of

time. The setting in which we conducted our study is not that large, but the relatively short time span we had to our disposal had the effect that the task seemed to grow.

*Evaluative ethnography* is a somewhat more focused variant of quick and dirty ethnography but with the intention to evaluate designs already made, or design requirements already proposed. This method can be useful in tweaking existing systems and/or to inform the design of the next generation of systems. Our project has the intention to come up with some design implications based in part on how the VCR-system is working today.

*Re-examination of previous studies* is just what it says: By re-examining earlier ethnographic studies one can get useful information to put in a preliminary design report. This method is a cost-effective and timesaving way of gaining a brief insight into organisations, if one for some reason hasn't got the time or the money to conduct such a study on one's own.

It is a bit difficult to put our study in some sort of ethnographic line or branch. Our study does qualify as a quick and dirty ethnographic study (regarding the time span of our project and the relatively modest amount of interviews and observations made). It also has some elements of evaluative ethnography (regarding the evaluation of the VCR-system and the fact that our study eventually will lead to some design implication). Since we have been doing some re-examination of earlier studies, i.e. reading a lot of articles concerning the subject, we could say that this also has affected the results from our study. However, the method we have used is still ethnography, though not in any of its pure forms accounted for earlier in this section. This is not desired either; the styles presented are to be seen as complements to each other.

### 3.3.3 Drawbacks with ethnography

There are yet some difficulties with ethnography. One obstacle is the problem of scale. Ethnography has mainly been used in relatively small and confined environments, such as control rooms and micro interactional contexts (Hughes *et al.* 1994). These settings are ideal for the lone fieldworker who gets an opportunity to study a small number of individuals with a relatively small number of tasks to perform. When the size of the setting grows, the fieldworker's task becomes more difficult, and scaling the setting to an organisational level or to processes distributed in time and space would surely make the most experienced ethnographer shiver with anxiety.

Time is another problem. When doing an ethnographic study in a social context it is not unusual that the study stretches a couple of years (Hughes *et al.* 1994) which, when it comes to software engineering, is an hopelessly impossible time span. The speed of the technology development around us, and especially in the computer business, makes product grow old in just a few months. A project that span a whole year might turn up with a product that already is old.

A third problem has to do with presenting the result of ethnography in a form that makes sense to those designing the system (Blomberg *et al.* 1993, Hughes *et al.*,

1994). Many software engineers see ethnography as too much an unsystematic method. The results are often presented in a discursive form and the design options are not clearly stated and do not attend sufficiently to engineering needs.

## 3.4 Our use of Ethnography

As said earlier, the most frequently used tools in ethnography are interviews and observations. The interview is a powerful method to acquire understanding of how an individual perceives his or her world (McCracken, 1988). It is helpful in revealing underlying norms and rules that are the foundation in that individual's conception of the world. Observations are usually used in connection with interviews. A lot of information can be gleaned just in watching how people act in different situations. Especially in such cases when the studied individuals are unaware of or have difficulties in expressing why they are doing certain things.

### 3.4.1 Interviews

When constructing the interviews, we turned to McCracken and his book The Long Interview for inspiration and help. The first thing we did was to make a cultural review, i.e. a recapitulation of what we had experienced in the organisation so far. Here we asked ourselves questions such as "what exactly are we are looking for?", "what is connected to what?" and "how should we ask questions about it without being directive and leading?". This produced a list of categories and relationships that became the basis of the upcoming question formulation. Another purpose with the cultural review was to establish a distance to the object or culture under study. With "distance" we mean the ability to look on familiar things with the eyes of an outsider. This clearer understanding of one's vision of the culture under study permits a critical distance from it. The result of this first step was in other words a set of headlines that would act as a framework for the creation of the actual interview-questions. The headlines identified were

- *Opening questions*
- *Questions related to organisational culture*
- *Questions regarding informal communication*
- *Questions related to VMC*
- *Questions about integrity and privacy*

*Opening questions.* These are simple questions which aims at making the respondent feel safe and comfortable. One way to achieve this is to start the interview by asking biographical questions, e.g. name, age, occupation, role in organisation, employed since, and similar.

*Questions related to organisational culture.* In our cultural review, we found that the culture of the Viktoria Institute is an important key in understanding how to design for VMC in this organisation. For this reason we wanted to elicit information on what respondents perceived as important characteristics of behaviour in the organisation. The questions were furthermore asked to gain information on what the respondent felt

about the organisation on an individual basis, on a group basis, and on a corporate level as a whole.

*Questions regarding informal communication.* The main purpose here was to get insight into the respondents' view of how people were interacting and communicating, both on group level and on corporate level. The ambition here was to gather data on factors that must be supported by a VMC in order to be useful for the organisation.

*Questions related to VMC.* Here we asked for specific expectations or wants that the respondent felt important for making a VMC successful.

*Questions about integrity and privacy.* These type of questions were asked in order to understand what the respondents felt about having a VCR-protoype located in their normal lunch room.

Interested readers can turn to Appendix B for the complete questionnaire used in the interviews.

The actual interviews consisted of five short sessions with people from the different research teams at the Viktoria Institute: Two of them were from IT & Organisation, one from Interactive Learning, one from Mobile Informatics and one from PLAY. Three of the respondents were women, two of them men, and the average age of this small party was 29. The interviews were made one at a time with only the interviewee and us present. Each interview lasted between 20 – 30 minutes depending of how talkative the actual respondent was. The interviews were recorded with a mini-disc player/recorder to allow us to concentrate wholly on the discourse[6]. The testimonies were then transcribed in detail as a preparation for the coming analysis work.

The parts of the interviews that we have found suitable to use in this thesis, i.e. the short citations found every now and then through out the running text, have been translated from Swedish to English. These citations have also been marked with *. Some can argue that there might be a problem associated with the translation of spoken language since one run the risk of losing vital linguistic information in the process. However, we don't believe that this is a problem in our situation. We were not that interested in *how* people said things; rather we focused on *what* they were saying. The risk of losing this information in such a process is not very high.

### 3.4.2   Observations
People have a tendency to get blind to the environment around them and of the way things are being done in their work place. By observing one gets the opportunity to gather information or gain insights that might slip through in an interview. As said earlier: What people do and what they say they do is not always the same thing.

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[6] The authors are of that type of the human species who can't write and listen effectively at the same time.

The observations have been made with an ad hoc approach since we were employees at the Viktoria Institute, and were therefore able to study the organisation and its members on a daily basis. The observations were focused around the individual and organisational use of the technology in the VCR-project. The situation of us being staff employees, i.e. not researchers or candidates for the doctorate, proved to be quite useful since it gave us the opportunity to participate in almost all the daily activities without actually becoming part of the research community. Thus, we were able to conduct our observations as very visible and very large flies-on-the-wall. Even though we became good friends with the researchers (and still are) we managed to take an outsider's point-of-view, which can be difficult if one gets to involved in the daily routines.

### 3.4.3    VCR and observations

Our initial intent was to conduct a pure evaluation study of the VCR-prototype. The plan was to combine Oslo and Göteborg in a media space, which should be up and running at all times, day and night. We should then under a longer period of time study how people at both sites acted and communicated through the VCR. Unfortunately, this plan didn't work out. Due to technical problems and to a somewhat leisurely attitude hanging over the technical part of the project, we didn't manage to get the prototype functional for a full-scale implementation. Instead we were forced to make our VCR-related observations during altogether seven test runs, taking place over a time span of four weeks. The amount of time that the VCR was operational in each test differed. The shortest test was only one hour long, while the longest took place over two full days.

### 3.4.4    Discussions (or informal interviews)

One can't spend whole days at a research setting like ours without talking to others and certainly not when one is an employee at the same setting. This has to do with the concepts of *intent opportunity* and *intent comfort* mentioned in the theoretical framework earlier in this thesis. The opportunity and comfort led to some very fruitful discussions around the topics of awareness and informal communication since a lot of research in the same area is being conducted at the Viktoria Institute. As it turned out these discussions also gave us a good picture of the social life and activities at the Viktoria Institute.

We have also had the opportunity to discuss the VMC-concept with an IT-consultant firm, and in what ways it might support their daily activities. Last but certainly not least we have had both formal and informal meetings with our colleagues in Norway. But since they are more interested in the technical aspects of the project, our discussions with them have mainly regarded problems with the technology. These discussions have been rewarding in the sense of us gaining insight into the hardware constituting the project. This is something we otherwise wouldn't have been too familiar with.

## 3.5 WebNot

When initiating the study, we were searching for some kind of electronic tool, an electronic diary or something similar, to put our daily notes in. It should be a web-based application so that we could reach it from wherever we were whenever there was a need to take notes. After a brief and fruitless search for a tool like this, we decided to build our own. As a 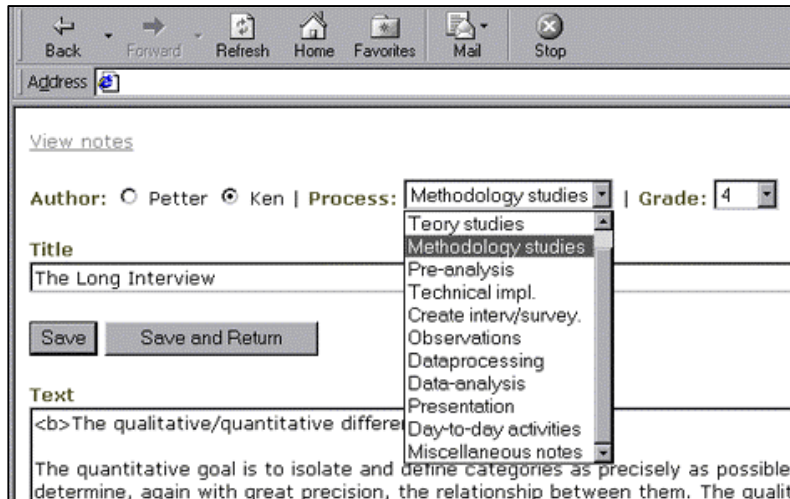foundation we used a PostGres[7] database where every note would be stored. The database was then connected to the web (www), since this would allow convenient interaction independent of which computer was used. This was achieved by creating a number of PERL CGI-scripts, which handled the interaction between the database and the user.



**Figure 3:** WebNot

It took us about 2 days to create the tool, and we decided to call it WebNot. The tool can be said to be in its first prototype phase, and we intend to leave it there. No further development will be made (at least not by us), since it has played out its part when our work with this master thesis is done. As a prototype it has served us extraordinary well.

WebNot has been a great help throughout the whole process of our work. For every article read there has been a short summary written in the diary just to keep track of what we have read, who read it and what that person thought about the article. The diary can handle all sorts of notes; e.g. article reviews, the basis for the interviews (questions we want to have answered), observational notes and technical information about VCR related technology. Every note has its own prearranged class or type of note, just to keep the notes apart from each other. Even though the use of the diary did fade during the last couple of weeks, it proved to be a very useful tool when we wanted to look back and read about some early ad hoc observation or perhaps verify the initial impression of an article.

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[7] PostGres is a freeware database that is proportionately easy to use and it has the basic functions needed to for simple database programming. It can be downloaded from www.postgresql.org

# 4 Results

In this section we present the results and findings we have made through our use of the ethnographic method accounted for earlier. In order to give insight why certain factors influence the design of a VMC in a specific work setting, there is need to first describe how people in this setting are co-operating. After that, we will use the theoretical framework accounted for in section 2 to highlight our findings regarding factors and perceived problems along with VMC.

We have chosen to make the participants in our study anonymous and therefore we have replaced their real names with names borrowed from a popular American TV-show – Seinfeld. The citations though, are not taken from this TV-show; they are solely taken from our interviews with people at the Viktoria Institute.

## *4.1 The Viktoria Institute*

The Viktoria Institute is a young organisation in two different aspects. It was founded in late summer 1997, and the median age of the employees is fairly low: 28 years. It is explicitly stated that the organisation should be flexible, innovative and in the forefront of the evolution in its business area. To achieve this, the involved people must preferably have a "young spirit" and an ability to think in new ways whenever needed. The Viktoria Institute strives to be a fresh, alert and flat organisation, where the decisions are made swiftly by the people concerned. As an effect of this underlying notion, there is a desire to minimise the number of organisational rules and policies just to avoid hampering the wanted flexibility. All this implies a rather informal way of conducting everyday tasks, where direct communication and interaction amongst employees are requisite.

The Institute is divided into four research groups, each with its own specific field of concern. The following sections will describe them briefly.

### 4.1.1  Mobile Informatics

Mobile Informatics is concerned with the use of IT in mobile settings. The main purpose is to generate, explore and design innovative ways of using IT in mobile environments. The primary setting where the research is applied is usually organisational, but interest is invested in other settings such as leisure and travelling as well. Mobile Informatics research is often interdisciplinary, where social scientists and computer scientists work closely together with engineers and system users. As in most other organisations – and this goes for the whole Viktoria Institute – the members of this group travels a lot and is therefore constantly searching for new ways to communicate and collaborate with the other team members as well as people outside the team.

The group consists of a core of eleven people working on eight concurrent projects, where work is usually conducted in pairs or in threesomes. The different constellations are generally aware of the work in other projects, but the everyday work in each project is rather independent and self-governed.

### 4.1.2 PLAY

The PLAY group differs from the other groups, as its approach to research is more practical than theoretical. This group is building its reputation on small but nevertheless useful gadgets that makes creative use of current information technology. They have also gained some reputation in their research community since they have had several papers, posters and presentations accepted and published at various conferences.

The work in the group is mainly done in pairs and the entire group's six inhabitants are participating in several different projects in different constellations. They also collaborate in writing papers and there is a constant activity of interaction between the group members. This group has less collaboration with the business community compared to the others. The members of the PLAY group work in project teams that changes every time a project is finished.

### 4.1.3 IT & Organisation

With 17 people on board this makes it the largest group at the Viktoria Institute. This group also features the largest amount of foreign researchers with people from Germany and Italy as guest researchers. There are also some people attached to this group with backgrounds in other disciplines, e.g. Commercial law, Computer linguistics, Economics and Ethnography. Its main concern is strategic use of IT in various organisational settings, the mutual impact of change and IT, and the co-ordination of work. Because of the organisational point-of-view adopted by this group, most of their projects are conducted in close collaboration with the business community.

This group has a lesser cohesiveness than the others do, mainly due to the fact that it is a rather new group (despite its size). The members work in projects together with two to four other group members. Although the members of this group resides closely together on the same floor (the possibilities for physical proximity, and thus awareness, are rich in this organisation) the different project constellations are poorly informed about other projects running in their neighbourhood.

### 4.1.4 Interactive Learning

This is also a rather small group with its crew of seven people. This group's main concern is to focus on aspects of the sustainable process of learning, which can be supported, evaluated and maintained with information technology.

The group share office with the department of Informatics, a collaboration partner to the Viktoria Institute, which belongs to the University of Göteborg. Interactive Learning is separated from the other groups, both on floor-level as in an organisational sense. The work inside the group is however done in close proximity to each other, apart from one member that is working just outside the city of Göteborg. The group's cohesiveness is rather high, since the members feel confident in what they do and that their work results are getting well received by sponsors.

## 4.2 Awareness at the Viktoria Institute

*"I think its sad that we have to have the doors locked around here, but that's the way it is...but if we are supposed to be open and like, 'welcome in!', we can't keep the doors locked at all times." ∗*

Even though the Viktoria Institute is supposedly an open organisation, i.e., it should welcome any one being interested in its work or being interested in participating in its work, there are a few palpable doors that only the employees are able to pass through. These doors have been locked due to security reasons; there is a lot of valuable equipment[8] spread out over the different floors. The closed doors have the effect that the different floors, and thus the different groups, are disunited, not only from the outside world but also from each other. This reduces the overall awareness between the members of the Viktoria Institute. Even if the members can move freely between the different floors – they have access cards to get in and out – the pure fact that the doors are locked do put some restraints on their will to do so. For a visitor, it sometimes can be quite difficult to get in contact with someone inside the institute, provided you are not connected to the Internet. If you are, it is a completely different story, which we will come to in section 4.2.2.

### 4.2.1   Awareness – the basis for communication

The need for awareness is high in this organisation since it is this mechanism that, in certain aspects, keeps the Viktoria Institute together. It is the awareness of one's surroundings that makes the communication possible within the organisation.

At the institute there is a high demand for swift and easily initiated communication and interaction, both within the institute and with the outside world. When the awareness is high the opportunities for communication is too. This speedy communication is an effect of the organisation having a very social spirit but also because of the research area in which the institute is active. Doing IT-research puts heavy demands on the participant's ability to adapt to their ever-changing environment.

The institute being a flat organisation also adds to the need for fast and easily initiated communication. The members of the institute are in constant need of each other's comments and help, and they frequently turn to people outside the organisation for help and inspiration. They are also involved in several research-projects together with other research-facilities, something that makes them communicate with people located in other countries as well. By using different awareness tools they manage to build small electronic communities within the Viktoria Institute's community.

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[8] Computers, printers, mechanical tools and other things bought to be part of some project.

## 4.2.2 Tools for awareness

Important factors that contribute to the awareness of the individual member's surroundings are the electronic tools they use in their daily work. ICQ[9] is a much-used application for synchronous communication, as well as asynchronous, and it has grown to be one of the most used applications for this purpose. It has even superseded the old fashioned phone-call to some extent.

The employees at the Viktoria Institute is heavily dependent on the LAN[10] being available, not only to get hold of the shared network resources but also when in comes to the awareness facilitated by it. When the network is down some awareness is lost, i.e. the awareness the employees get from the awareness applications running on the network, leaving them with the awareness they get from just hearing and seeing others passing by their office. The awareness that the members obtain this way is quite limited though. Since everyone spend most of their time in their offices, the corridor often is a quiet and quite boring place to look at or listening to.

During our study we had one major power failure in the building which put the employees to the test. When the network broke down, not only did everyone lose their main working tool and perhaps all that they had done since they last saved their work, they also lost some of their sense of what the others were up to. The use of awareness enhancing applications has grown to be a very important tool in Viktoria Institute's daily work. These tools can make up for the lack of physical proximity, thus enabling them to get intent stimuli even when they are not co-located.



**Picture 2:** The doors at the Viktoria Institute are used to signal availability.

The members not only use workstations hooked up to the LAN to keep them informed about their neighbourhood. The door to each office also works as an awareness-device, although this sometimes is more of a way of telling others about one's current need for communication than letting others finding out by themselves (picture 2):

*Jerry: Kramer's door is closed…does anyone know if he is here?*
*George: Does it really matter? Even if he was here, I think the closed door means he doesn't want to be disturbed anyway…*

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[9] Visit http://www.icq.com to learn more about this application.

[10] Local Area Network. The network and the computers connected to it, which resides in the building at Viktoriagatan 13. LAN is an established abbreviation for these kinds of smaller networks.

### 4.2.3 Physical proximity

The tools mentioned above are mostly used, be it an electronic or a more physical fashion, to keep in touch with one's own group. Even though one has the opportunity to keep in touch with members of the other teams, this is not always an obvious thing to do. The lack of physical proximity amongst the research groups becomes apparent when listening to one of the respondents:

> *"…When we were separated, that now, some of us are situated…well, PLAY are situated to the left on the 7<sup>th</sup> floor and Mobile Informatics to the right, and we are down here* [on the 6<sup>th</sup> floor] *and Interactive Learning on the 5<sup>th</sup>. There won't be any good interaction between us then. We really could use some sort of smart tool for this…"* *

Even though the organisation is clustered together on a relatively small area, the members are having some problems communicating across group borders. The intent stimuli is not so well developed between the groups, i.e. the signal to communicate is somewhat weaker when one is visiting an other area of the building which is not part of the group area one belongs to. This is also reflected in the use of the awareness applications.

The fact that they do not communicate across groups borders as much as they perhaps ought to, might have to do with the fact that the groups have been separated in space, thus diminishing the physical proximity. It might also be due to the fact that the number of members in each group is growing fast, thus making it hard to keep in contact with everyone. It is enough trouble keeping your fellow group members whereabouts under your control. The separation was a direct effect of the fast growing number of employees at the institute. There was simply not room for all of them at the same floor.

All of the respondents were aware that physical proximity is an important factor needed to facilitate awareness, even though they did not use these exact words when reasoning about these phenomena. Being available as well as having the possibility to get speedy replies to questions asked are very important to the members. Although these factors has little to do with physical proximity; you could be available and free for answering questions even if you are situated on the other side of the earth, they are nevertheless important factors which enhances the awareness of one's surroundings.

### 4.2.4 Awareness in general

The kind of awareness cultivated in a setting like the Viktoria Institute, is one that the members are very aware of, so to speak. People in this particular organisation – and this might be a drawback with our study – are generally very aware of new gadgets and applications that are released into the IT-market. Awareness enhancing applications is one of the things that gain extra attention from the members. They are constantly trying new ways to communicate and interact, thus increasing the awareness

about their surroundings. It must also be said that awareness and awareness-devices is a major focus of interest in at least one of the research groups[11].

As stated in the theoretical framework (section 2.1.3), intent opportunity is the probability of making a communication contact once the intent to communicate is formulated. At the Viktoria Institute, there are lots of ways to communicate: Mail, Phone, Fax, ICQ, VCR, face-to-face (by visiting another office) and even putting post-it notes on each other's computer screens. This makes it highly probable that the communication intent actually will result in a conversation (orally or electronically). The setting being relatively small will eventually lead to that one sooner or later will bump into the person to whom the communication was initially intended. The people at the Viktoria Institute are a very mobile species and this can sometimes make it hard to find the people you wish to address in their offices. Just strolling around at the facility is sometimes a better way of finding the person you are looking for than trying to contact him or her in their office. An application or device to help one get a good picture of who's where in the facility is yet to be invented[12].

Another important factor is the social acceptance of initiating a conversation. This is known as the intent comfort of the organisation. As earlier stated, this setting is supposed to be an open and aboveboard organisation, which is also reflected in its way of dealing with questions and queries. Almost everyone we did interview or talk to agreed upon that it is allowed to initiate a conversation with anyone at anytime and anywhere, but still there is some resistance when one crosses the imaginary borders of one's own group.

## 4.3 Informal communication at the Viktoria Institute

### 4.3.1  Intended interaction

The ambition at the Viktoria Institute is to be a smooth organisation where the information flows between the organisational members with ease. For this reason, it is considered important to have access to people with different skills and knowledge in one's immediate surrounding. One of the respondents put it this way:

> *"Yes, communication is very important around here. Well, I mean, regarding exchange of information as I use to say. One interacts with others in different ways. If one needs to get hold of a philosopher, one should be able to get that. If an economist is needed, then you should be able to get that. If a legal adviser is needed, or an informaticist, well then you can find these people here." ***

The daily work is to great extent dependent of physical proximity, especially in those groups where the members share responsibility for what is done. In PLAY for instance, most of the prototyping work and article writing are carried out in teams. In-

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[11] See the PLAY-group's homepage, http://www.viktoria.informatik.gu.se/groups/play/ to learn about the "Hummingbird".

[12] The mentioned "Hummingbird" could qualify as such a device.

dividual projects where the responsibility resides on a single person are quite few. It is therefore essential for group members to be able to consult with others, without having to put extensive effort in order to find them. One of the reasons that the PLAY-members see themselves belonging to a well-functioning group, is that they really *do* work together. They do this not only in the sense of sharing workloads, but also in a spatial sense. The group resides in one of the wings on one floor, where the group member's offices are adjacent to each other. The close proximity affords and supports intended interaction, since the group members easily can locate each other for discussing work matters or getting help with some problem.

### 4.3.2   Opportunistic interaction

The corridors and hallways at the Viktoria Institute are important places where a lot of matters regarding everyday work are settled. People interact when they pass by each other's offices, or when they meet in the hallway. Intent stimuli of this sort leads to situations that best can be described as "seize the moment" situations. The interaction is in these situations rather unplanned for, but there is yet some sort of subliminal planning taking place since people are aware of the high probability of meeting certain people in the area. In this way one is able to postpone all efforts towards intended interaction, because of the knowledge that sooner or later during the day the opportunity to confer with a person will arise. The matters settled in this fashion are usually characterised by not being urgent. In the following example of opportunistic interaction, Peter is passing by the mailroom where Elaine is sorting incoming mail:

> *P: Ah, Elaine! Can you help me out with a thing?*
> *E: Why, sure. What is it?*
> *P: We are going to have a meeting at three o' clock, and we would like to*
> *have coffee and some cinnamon buns or some sort of cookies with it.*
> *E: For how many…?*
> *P: Ah, well, yes…I think we are going to be ten persons attending…*
> *E: Ok, I will fix that.*
> *P: Great! Thanks. *

Here Peter is preparing for a meeting to be held later in the day. He would like to treat the meeting participants on coffee, and knows that he can get help with this from the amanuensis working that day. Since the amanuensis generally are quite mobile during their workday, Peter doesn't bother trying to find them, he knows that he will encounter them soon enough anyway.

### 4.3.3   Spontaneous interaction

The places where people engage themselves in conversations without further preamble or intent, at least at the Viktoria Institute, are usually in lunchrooms, smoking ar-

eas[13], and in areas of shared resources such as the mail and printer room. These places are informal by nature; i.e. there is an implicit social code saying that it is quite okay to approach people when seeing them there. The most common places where spontaneous interaction occurs are in the institute's two lunchrooms. It is a custom at the Viktoria Institute to eat lunch and have coffee breaks together at fairly specific times each day. The events or conversations that arise during these sessions are usually quite mundane, but the topics are nevertheless often unplanned and unpredictable. The function of spontaneous interaction in this context seems to be purely social in an informal sense. The interaction can range from everything between short narratives of the participants' activities over the weekend, to full-blown discussions about, e.g. politics, yesterday's TV-programs, and not forgetting the important topic about the current weather. This type of discussion does dominate the interaction in the lunchrooms, but we also observed that conversations sometimes change from personal and mundane patterns to concern more specific work matters. An example of this is the following conversation where Newman enters the lunchroom, gets himself a cup of coffee and starts talking to Jerry, who is eating lunch:

> *N: Hello, how is life?*
> *J: Well, as good as it gets. We are toiling with our master thesis as usual.*
> *N: Ah, right. How's it going, will you be finished with it on time?*
> *J: Yes, there is no reason not to. But you can never know.*
> *N: Hmm. When I was working on my thesis, I...\**

Here Newman continues by telling an anecdote regarding his work with his own master thesis, and he concludes the story with some general advice on writing and planning such work.

Informal communication in the shape of spontaneous interaction is a common – and sometimes crucial – method for disseminating information in the studied organisation. This is something that sometimes is being seen as problematic. The negative aspect of this way of spreading relevant information is that it is an inefficient and uncertain way, especially when it comes to information that is of common interest or otherwise important for the daily activities. One effect of the Viktoria Institute's intention of being a flat and decentralised organisation is that there are no formal communication channels in traditional meaning. Information that is of interest to the whole organisation is instead spread through email lists or sometimes web pages. Usually, when someone comes across some piece of news, or has a statement to share that is deemed interesting for the greater part of the organisation, then this information is conveyed through an email list that includes all employees. One of the notions behind this behaviour is to avoid any occurrence of "information gate keeping", i.e. persons that act as omnipotent owners of specific information and who decides what information should be available to others or not. But an email list is a poor tool when

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[13] The smoking population at Viktoria often visits the different balconies in the building for a cigarette and some idle talk. Many of those short but important breaks do result in discussions about articles, theses and current research projects.

it comes to spreading information that is *not* of general interest, and most of all, not everything that can be of interest for a single person or group of people is sent to them through email. There is also some considerable personal cost in composing and sending emails to colleagues whenever one comes across something that might be interesting to others. It is this type of information that is often mediated in the form of spontaneous interaction. People meet in the common areas of the organisation and discuss on different work related topics, which at the same time give them knowledge of what has happened or what has been said earlier about these topics. The obvious drawback with this informal information dissemination is that if you didn't had the chance to be in the right spot when the discussion was held, then you didn't get any knowledge of the things that were said:

> *"...Not everyone has had knowledge of what is currently going on. You didn't get the information because you were not present in the corridor..."* *

This is particularly a problem when it comes to information that you otherwise would be unaware of. It shouldn't get confused with situations where you know what type of information you need, and where or from whom you might retain it (see intended interaction, 4.3.1).

## 4.4 Media space and place at the Viktoria Institute

Even though we didn't get the opportunity to run the VCR-prototype in full scale, we could still make some observations during the test runs made at different occasions. The pure fact that the VCR-equipment was introduced in the lunchroom did generate various reactions from the people populating that place. The presence of the VCR, even though it at most times was not operational, made people curious and interested of what it was supposed to do. As earlier stated, the population at the Viktoria Institute are an eager bunch when it comes to discuss and analyse phenomena in the information technology field. Their reactions could therefore be somewhat technical-friendly biased, but nevertheless useful from an observational point of view. The whole idea of having the lunchroom turned into a media space is generally accepted as suitable. The lunchroom is considered a place where it is socially acceptable to engage in the
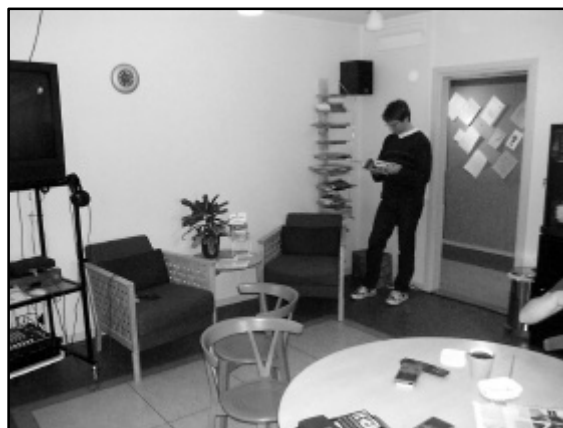


**Picture 3:** The media place at the Viktoria Institute. The VCR-prototype to the left captures the greater part of the space in its camera, as well as the protoype shows the activities at the other site in Oslo.

kind of interaction a VCR is supposed to support. In fact, most of the interviewed persons explicitly expressed interest in the idea of an extended lunchroom, i.e. that the opposite lunchroom should be displayed in such way that it gives the impression of being a natural part of the existing lunchroom. Several of the respondents said that it would be quite neat if it was possible to create an illusion of a continuous dinner table, i.e. that the table at one site was "connected" to the projected image of the table from the opposite site.

### 4.4.1    Media space Vs Media place

A media space must preferably become a media place, i.e. the hybrid space that is created through the VCR-prototype must feel natural in the sense of communication and interaction. Participating people are located in the media space, but this media space must become a place that is meaningful to use for both parties.

> *"It will be as a third room [the hybrid space]...so it's very important that every- one have been allowed to form their own opinion of what type of room this is. Why is there a camera present? What is achieved with this? What is being im- proved by this?" ***

An utterance like this indicates that it is important to get sanction from the people who will be affected by the VCR-prototype. Their lunchroom will be blessed (or cursed) with a new element, which is not a natural part of the room, and hence it needs to be abundantly clear what its purpose and function are. In section 4.4.5 we will present more detailed findings pertaining personal integrity and privacy matters.

We found evidence of some incredulity regarding the matter of creating a functional place out of a media space.

> *"One will perhaps not use it as much for communication, for spoken communi- cation. Perhaps more to [obtain] a feeling of awareness. It doesn't feel right...it is like talking to a television-set...I don't think – even if you can hear each other, be able to say hi and so on – that it will be that many meetings..." ***

Even if the purpose is to connect two sites and create a gate or a window between them, there is a palpable difference between real face to face interaction and the inter- action taking place in the VCR. Both social and technical factors interfere when communicating through VCR, often in conjunction with each other. One of the major problems is the quality of sound. While observing, we noticed that it was much more crucial that the sound was of high quality, rather than the transmitted image. If it was difficult to hear what the other party was saying, the whole communication effort did eventually fail. With access only to the visual part of the VCR, there were perhaps ample of possibilities for intent stimulus. But since the intent opportunity in such a case becomes rather low, it is difficult to put any type of interaction into practice. All one sees is a bunch of people in a muted television-set.

### 4.4.2    The importance of sound

Other problems related to sound quality is *sound delay* and *echoing*. The audio/video signals are conveyed over the Internet, usually with quite good quality. Yet there is frequent problems with sound delays, which generally occurs when there is high traf- fic of data on the Net. The sound delays can be compared with the delays that some- times occurs in telephone calls to foreign countries, or in some mobile phone calls. Even though these delays are of minor magnitude in the VCR, it is enough to create a slight confusion during the interactions. The confusion becomes apparent in moments of conversational turn taking, i.e. when a person at one site finishes a sentence and waits for the response from the other site. When there is a delay, it takes approxi- mately 0,5 – 1 second before the receiving person(s) hear the words after that the

talking person has uttered them. The sender might experience the quietness from the receiving side during this short delay, as if the receivers have problems in hearing or understanding the sender's message. The sender can then feel impelled to elaborate or explain his message further, which often results in the sender starts talking again at the same time as the receivers start to respond to the initial message. When both parties hear that they are talking in each other mouths, the usual reaction is to stop talking, and then trying to speak again in the silent interval that follows. If the communicating parties are unable to synchronise their conversation again, the communication will soon break down because of the difficulties to maintain it delay-free and natural.

Still, microphones have to be used to captures audible events in each lunchroom, which then are transmitted from one site to the other. Echoing is a phenomenon that occurs when the microphones at a site send back the sound from the other site. In this way, a sender can here his or her own words spoken at the other site, and considering the delay that can arise, sometimes one or two seconds after the words actually have been uttered. This is not nearly as hampering for the communication as the delay phenomenon discussed above, but people yet find it quite irritating. Especially when it is a lot of other activities in the room.

### 4.4.3   Media place and awareness

The VCR proved to be an excellent tool to convey intent stimulus. The screen that displayed the other site was perceived as a window, through which you could see and become aware of what was happening on the other side. When people entered the lunchroom in Oslo, the movement and sound this incurred notified people in Göteborg of their presence. Attention was drawn to the VCR in order to see who was entering and what they were up to. Not all these occasions of intent stimulus led to any further interaction, but the main thing here is that the people at both sites now had a shared media place where they did become aware of each other.

The purpose with VCR is to give people the opportunity to interact with each other regardless of their physical location. The system is equipped with microphones and a camera, which apart from enabling intent stimulus also gives a mean to initiate communication. Thus the degree of intent opportunity is rather high. During our tests, we found that people were more prone to enter into communication if they already knew the person or persons at the other end. This is perhaps not very surprising since the same behaviour applies in ordinary face to face situations. It is rather seldom that one starts talking to complete strangers when entering a lunchroom or similar. Our findings on this matter show that this phenomenon is slightly amplified when it comes to the VCR. The users experienced it to be a bit awkward and unnatural to initiate interaction through the medium. A respondent expressed certain scepticism regarding this:

> *"For me it is not...I haven't experienced it as a way to increase [awareness]...but...no, I don't want it...it takes a hell of a time to get used to it, that you feel content with being on TV."* *

Thus it seemed that the intent comfort of initiating communication was somewhat divided. At the one hand, there were the same social rules that applied for communication initiation as in ordinary face to face situations. If you entered the media place

and found a colleague having lunch at the other site, you knew that it was okay to approach him or her in the same way you usually would have done in a lunchroom. On the other hand, it didn't feel quite as natural to initiate such contact over a medium that one wasn't accustomed to. This even though you did know the person or persons on beforehand.

### 4.4.4 Media place and informal communication

One of the authors took part in an observation that demonstrates the VCR's ability to support intended interaction in a novel way. At one occasion, when the VCR had been up and running for a whole day, Kramer wanted to ask Ken a question regarding some matter. Kramer, who was located in Oslo, was aware of the fact that the authors' office in Göteborg was just in earshot from the lunchroom where the VCR resided. He then simply walked into the lunchroom in Oslo and yelled out for Ken. First Ken became bemused of hearing a voice from the lunchroom that he just had been the last one to leave, but it soon dawned to him what was happening, and he went out to answer the call. The interaction that followed was brief and to the point, where Kramer got answer to his question while Ken took the opportunity to sneak himself another cup of coffee[14]. The equivalence to this example in a physically co-located environment would be if a person called for another person from an adjacent or near by area, and the called person bothered to answer. With the VCR, the same effect was achieved despite the distance of 300 kilometres between the involved persons.

At the very first test run with the VCR-equipment, we were blessed to do an observation that can be filed under the opportunistic interaction category. During this day, a Norwegian colleague from Oslo visited the Viktoria Institute. When he entered the lunchroom at one occasion, another Norwegian colleague at the Oslo-site spotted him and serendipitously[15] addressed him on a matter she needed to get resolved.



**Picture 4:** The spontaneous interaction that is common in the lunchroom is also extended to the media place.

The most common way of interacting through the VCR – that we observed – was of the type of spontaneous interaction (picture 4). This might be explained of the sheer fact that we had chosen to station the VCR-equipment in the lunchrooms.

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[14] A lot of coffee was consumed by the authors during the work with this thesis.

[15] This is by far the most elaborate English word we have encountered. "Serendipity" means "the ability to discover something by fortunate coincidence". As you can see, the word is quite useful.

Most of the interactions in the lunchroom are by nature of this type (see section 4.3.3).

An interesting finding that was disclosed in the interviews, was that there is an explicit demand that a conversation over the VCR should be mediated in a way as good as any ordinary face to face conversation. Overall, in our more informal discussions with people at the Viktoria Institute, we saw that it is considered important that the VCR feels as natural as possible. A concrete example is that people reacted negatively to the lack of eye-to-eye contact that initially occurred in the system. This was due to the fact of the cameras' placement, i.e., in Göteborg the people experienced their counterparts in Oslo as looking slightly upwards. The reason for this was that Oslo was looking at the projected image of Göteborg, and the camera that in turn captured them was placed below this image. When people in Oslo were standing close to the camera, they appeared in Göteborg as they were looking at a spot above the camera instead of looking directly into it.
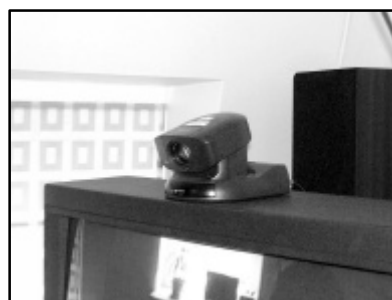
## 4.4.5   Media place and Integrity matters

To deploy something like the VCR in people's work place, will irrevocably cause an intrusion in their everyday (professional) life. Even though the system is there to support their opportunities to communicate, it also stirs up emotions and anxiety regarding personal privacy. All the respondents expressed feelings of uneasiness to some extent, uneasiness that springs from the anxiety of being watched or supervised. It seems to be especially frightening if one site is able to see the other without being seen itself.

> *"You are standing in the kitchen...and as if [the persons at the other site is saying] 'what the hell! He's having another cup of coffee' - they might think at the other end. They might be sitting there and doing statistics over people having coffee...and afterwards they are presenting this for someone saying: 'Look here, Kramer has been having ten cups of coffee...does he do anything else, does he work here or what?'" ***

When we asked the respondents what expectations and wishes they had on the VCR-prototype, two of them found it very important to be assured that they couldn't be watched without them knowing it. This finding was also corroborated when we talked to other people throughout the organisation. During one of the tests we did shut down the connection, leaving the television set turned on showing a black screen. Shortly after that, a group of people entered the lunchroom for a coffee break whilst engaged in spontaneous interaction. When they realised that the



**Figure 5:** The camera is "surveying" the media place, something that might make people uneasy.

television was turned on, although it was blank, they felt insecure and anxious that their conversation had been overheard:

> *"...At one occasion, the screen was completely blank and we were discussing something concerning – I don't remember what it was but it was probably*

*something having to do with sex – and it was as if aha! They can understand us! They are online!"[16] ∗*

Another common theme is the unwillingness to be in front of a camera. The camera in itself is associated with surveillance and supervision. It can feel discomforting to eat lunch when you know you are "on TV", when someone in a different place can see you. Some employees at the Viktoria Institute were even reluctant to enter the lunchroom if they saw the VCR-prototype being active. Other employees were more accepting of the system, which seems to stem from the fact that they had prior knowledge of the concept as a whole. One interview respondent believed it to be impossible to circumvent the intrusion of privacy in any application of this sort. People were also more inclined to accept a VCR in the lunchroom, since this place was a space which one could choose to be in or not, i.e. you were not forced to enter the area in order to conduct your everyday work tasks. The lunchroom is also a space where you can not choose the people who you want to find there anyway. One respondent regarded the lunchroom as a common area where one could find people eating at one time, as well as finding it empty at other times. It was of no importance to him if the people in the room were sitting at the table, or if they were otherwise present through the VCR.

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[16] It was perhaps fear of this sort that led someone to turn off the VCR-system on several occasions during the test runs. Unfortunately we didn't manage to find out which person, or persons, who did this. It would have been invaluable information to hear exactly what impelled them to shut things down.

# 5 Discussion

This chapter will be used to discuss our findings in this project. We will also use this chapter to bring forward some of the discussions we have had with the members of the Viktoria Institute. Since the VCR-project have raised a lot of questions concerning the design of the system, the social aspects of using it and to what extent we could have done things differently (regarding the project as a whole), we chose to divide this chapter into these topics: Technical design implications/suggestions, social design implications/suggestions, and shortcomings with the study.

## 5.1 Technical design implications/suggestions

### 5.1.1 Ever-present VCR, or activated when needed?

One feature that will be implemented by the Norwegians is the motion sensors. These sensors are supposed to turn the system on and off depending on if there is any activity in the two connected facilities. The main reason for this is to save bandwidth. Turning the system off when no one is using it seems pretty logical. Yet, we have some objections to this. First of all, the system is supposed to support awareness and one major part of this notion is intent stimulus (see paragraph 2.1.2). If the system is inactive when one sits down in the lunchroom, how can one expect to get signals of intent stimulus? Awareness has much to do with what is going on in one's surroundings, and turning the system off is just like turning your eyes and ears off.

Secondly, when the sensor actually triggers the system, the effect is that you suddenly are facing people, just as if they where materialised right in front of you. This is an effect of the Norwegian design principle that the system should connect only when there are people present at both sites. But if the users don't get any advance notice of people entering the lunchroom at the other location, they will not have the possibility to prepare for interaction in a natural way. Furthermore, they will not have a chance to avoid someone they might not even want to meet. Overall, it feels quite unnatural not to receive any signals or cues that someone is entering the media place.

The author's opinion is that the system preferably should be active at all time, regardless of the activity (or non-activity) in the media place. Not only because it is the best way to support awareness, but also because it is an important element to make people feel secure when using the lunchroom. As discussed in paragraph 4.4.5 regarding integrity matters, people feel insecure when they can not be certain if they are being seen or overheard. An inactive system does not convey any signals at all, but the problem here is that you do not know for certain if this is the case at the other site. With an ever-active system, you get visual as well as audible information of the current state in the media place.

If there is no possibility to let the system stay active at all times, a compromise could be to close the visual channel and leave the sound channel open when one or both lunchrooms are unused. In this way bandwidth for visual data are used only when needed, while the sound creates some sense of awareness that can give pre-hand in-

formation when people are about to enter the media place.[17] This can be compared to hearing footsteps and voices in the corridor approaching the lunchroom.

### 5.1.2   Quality of sound and image

Our findings did show that the quality of sound was an important factor in getting the VCR functional, at least from a user's point of view (see paragraph 4.4.2). This corroborates our own initial belief that the availability of sound is of greater importance than the availability of vision. We consider the visual part of the VCR as a complement to sound when it comes to enabling interaction, i.e., it makes the interaction richer, but it is not actually necessary to make the conversation flowing. This argument applies well when talking about already initiated interaction, when communication is in progress. On the other hand, access to vision in the media place is of great importance for creating awareness, especially when conveying signals of intent stimulus. Without intent stimulus, there is no chance of opportunistic or spontaneous interaction in the media place. Hence, we find it essential to use cameras, but there is no need to overwork one self in getting the best picture quality the market can offer. It will suffice to get good enough picture quality to create the means for the awareness needed.

Since the audio part of the VCR is determinant for the interaction, great effort must be put into the creation of high sound quality. First of all, the microphones used must – apart from being of adequate quality – be organised in a way so that they cover the area where the media space should be. In addition, and in order to reduce the occurrence of echoing, the microphones must be organised to pick up as little sound from the loudspeakers as possible. Thus, amongst the microphones used, there should be at least one with a cardioid polar pattern, and one microphone with hypercardioid polar pattern.[18] The former microphone's purpose is to cover the greater part of the media space area, and it should be mounted some distance away from the loudspeakers. The latter microphone is useful for reduce the echoing effect (see section 4.4.2) since it can be directed away from the loudspeakers, only registering sound activities occurring in a limited space in front of it.

### 5.1.3   Ease of use

Needless to say, the users must find the VCR-system easy to use. The system must furthermore be regarded as a meaningful tool to use. The intent behind the design of the VCR-prototype was to make it as transparent as possible, i.e. the users should not need to be bothered with how to operate the system from a technical point of view. We think it is utterly important that the system can operate on its own, since there

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[17] Visual data are very bandwidth consuming, compared to audio data. When both visual and audio data are transmitted, with best possible quality, the VCR uses a bandwidth of approximately 700kBit per second. Leaving the visual data out and only transmitting sound will leave the system to only use around 15-30 kBit per second.

[18] Cardioid polar pattern: The microphone's ability to register sound in a wide range around it. Hypercardioid polar pattern: The microphone has the ability to focus on specific spots, i.e. it only registers sounds from a certain area.

usually is a certain threshold amongst people to learn to operate new gadgets. Especially so if the system is technically advanced and complex. The VCR-system consists of different gear that is not that very simple to handle for a layman (video cameras, sound mixer and sound compressors and so on). The pure sight of the multitude of relays, buttons and switches can be quite deterrent for a presumed user (picture 6). For those reasons, effort must be made to minimise the need for the user to interact with the technical part of the system. To achieve this, one requires some skill in how to connect a computer with sound mixers, compressors, video cameras and so on. It is possible to arrange the connections in a way that leaves the users with only a few levers to operate, e.g. the sound volume control and the remote control to the television set.

**Picture 6:** Relays, buttons, and switches that handles the audio in the VCR

## 5.2 Social design implications/suggestions

### 5.2.1 The VCR as a natural part of the room

Apart from paying attention to technical aspects of ease of use, attention must be paid to the social ease of use of a media place. The present version of the VCR has some flaws regarding sound transmission (4.4.2), which is a problem that sometimes makes social interaction difficult. If the involved users experience it to be too awkward or hampering to interact through the VCR, they will not use it. Thus we argue that the present version of the system, although it is quite capable to support awareness, lacks somewhat in its effort to support informal communication. However, we do believe that this particular problem will be solved in the near future, since the technical evolution in the Internet field undoubtedly will bring forward more efficient ways of transmitting data of this type. This will eventually satisfy the high demand discussed in paragraph 4.4.4, that the system must facilitate interaction that can be equalled to ordinary face to face interaction.

When we observed that people at the Viktoria Institute found it important for the system to simulate eye contact (4.4.4), we experimented to some extent to achieve this. The first and rather obvious thing for us to do was to position the camera on top of the television set we were using in Göteborg. This was enough to give the impression that people in Göteborg was looking directly at the people in Oslo. In Oslo on the other hand, the image from Göteborg was projected on a white wall, which consequently made the image quite large. The combination of this large image and a rather small lunchroom forced the people in that area to stand rather close to the cam-

era, and hence it became apparent that they didn't look into the camera or – in other words – into the eyes of the persons they interacted with. It is therefore important to consider how the camera should be placed to eliminate such a problem.

Related to this is what and how much of a room the distant site can see from their view. When placing a VCR in a room, it should preferably be placed so the beholders at the other site can see as much of the room as possible. If this is not feasible, the equipment should be placed to cover that part of the room where people resides at most times. It is also preferable that entrances to the room are included in the camera's field of view. We believe that this will enhance the watching site's awareness of the other site. Seeing people walking by in the corridor outside the room, or seeing who is entering, is in our opinion important and it helps out when trying to make the VCR feel natural.



**Picture 7:** A monitor displaying what is shown at the other site might prevent the anxiety of being in front of the camera.

As discussed in paragraph 4.4.5 about integrity matters, there was some anxiety amongst people to be in front of a camera. A way to reduce such apprehension can be to introduce a small monitor, which displays the image of the room that is sent to the remote site (picture 7). This gives the users the opportunity to see if they are in the camera's field of view and how they look according to the other side[19], something that can be comforting to know and thus make the users more inclined to act in the media place.

### 5.2.2   The importance of familiarity

In paragraph 4.4.3, we discussed the finding that people seemed to be more inclined to interact over the VCR if they had some prior relation to the people they interacted with. We think it is rather important to acknowledge the fact that people do not generally engage in conversations with persons they don't know. When exposed to a VCR, this behaviour becomes even more apparent due to the cause that the users are not accustomed to interact in this way. We find it very likely that people will be restrictive to initiate contact to other unknown people they see in the media place, at least until they feel more comfortable acting in the VCR. With this in mind, it is interesting to ponder upon in what situations it is appropriate to implement a VCR.

First of all, we strongly believe that there should exist a natural link between the presumed locations that shall be connected through a VCR. There should preferably be some collaboration, or need of collaboration, amongst the sites on beforehand. Without this incentive, the risk is high that the VCR will be regarded more or less as a useless toy. Secondly, if there is incentive enough for co-operation through the system, i.e. the two locations will benefit of being connected, there might be a good idea

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[19] An interesting side issue here, is to what extent people's vanity does affect their willingness to be captured on camera.

to give the involved people a chance to meet in reality before they start using the VCR. Especially so if the participants don't know each other, but also in cases where prior collaboration has occurred through telephone and mail/email. To meet and do things together in real life is an unequalled way when it comes to get to know each other, and it creates a foundation for future interaction in the media place.

Prior to our work with this thesis, we visited our colleagues in Oslo to discuss matters regarding the VCR-project. When the discussions were done, we continued with more informal activities that took place at various downtown restaurants and bars. The opportunity those activities gave us to see, feel and form opinions about others, were quite invaluable in creating a feeling of social comfort. It was also of great value to be able to visit the other site and get a sense of the environment that was surrounding the VCR in that location. The knowledge that is brought with activities such as these, will come to pass in future use of the media place, since they helps curb the estrangement that otherwise can be a potential impediment for interaction. Even though it is not necessary to engage one self in bar and restaurant activities as we did, it is nevertheless, and in our opinion, meaningful to have some type of ice-breaking activities included in the design plan.

### 5.2.3 The VCR is not a substitute

A notion that we have encountered several times during this project, is the common misunderstanding that a system like the VCR is a substitute for meetings in real life. This is not, and it has never been, the purpose with this system. Earlier research in the same area has argued the same (see section 2). The VCR is supposed to be a complement to the usual ways of communication and interaction over distance, and as the system is working today it can never be a substitute for the real thing. The technology used in the VCR has got some flaws that limit the use of the system. The sound is transmitted in mono only and one could certainly improve its quality (see section 5.1.2). The cameras could be exchanged for better ones and the way the received image is projected could be improved with better projectors or television-sets. But even if these things were taken care of, there would still be plenty of things to improve; The spatial feeling perceived by the receiving end and the spatial feeling transmitted by the sending side are other examples.

We think that in some time in the near future, the technology might be developed enough so that it is able to handle these improvements, regarding the sound and picture quality. Yet, in the end, the VCR should still be regarded as the next best thing. The meetings between people in real life can never be replaced by a media place.

### 5.2.4 Maybe we are barking up the wrong tree?

Due to the limitations of the technology, people have to adapt to the system and behave in certain ways to cope with the flaws in it. This is just what happens in a formal videoconference meeting, as it is described in section 1. These meetings have to be structured in some way, not only because it is a formal meeting with an agenda, but also because the technology have trouble coping with the problems mentioned in paragraph 5.2.3. The participants have to request permission to speak and when they

get it they have to speak into the microphone. The intention with the VCR was to give its users an opportunity to interact spontaneously with each other through this system but it is hard to obtain this spontaneity when the technology can't provide the tools for it.

This raises some new questions: Maybe this technology is best suited in a more formal situation? And maybe it is too early to use it under more informal circumstances? Videoconferences have been used for several years now, although the underlying technology is not the same as the one used in the VCR-system (regarding the use of the Internet as a medium for transmitting the signals). It might just be that this is the only way to use this system if one want to gain anything from it. The risk is otherwise that the system turns out to be nothing more than a toy for someone to play with occasionally, which, to some degree, was the case with our system. If one looks to the market for these kinds of products – videoconferencing equipment, that is – there are lots of systems marketed by different vendors (http://www.videoconference.com/, 1999-04-21). If there weren't a market for them, there wouldn't be any products, which tells us that these systems are being used in professional environments. The market for systems supporting informal interaction and communication is virtually nil. The products that you do find in this segment mainly consist of small desktop systems aimed at the domestic market.

## 5.3 Shortcomings with the study

Due to the fact that there hasn't been an obvious reason for the people at the Viktoria Institute, or IFI, to initiate communication or interaction through the VCR-system (see section 4.4.3), there hasn't been any real use for the system. Although there are some projects running that incorporates both the Viktoria Institute and IFI, the collaboration between them haven't been to such an extent that the VCR-system could work as a complement to the ordinary ways of collaborating, e.g. face-to-face meetings and telephone contacts. The project therefore lacked an incentive for the participating individuals to use the system, which in the end left the system with little or no use to the organisations. Still, the system has been used but mostly because the members saw it as a fun gadget and cool way of using new technology, instead of a tool for social interaction between friends and colleagues. The system gained some considerable interest during the initial stage of this project, but that soon faded away. Thus, the system hasn't been used for its intended purpose to the extent that we were hoping for.

As mentioned in section 4.2.4, the Viktoria Institute is a very "IT friendly" organisation. New techniques and technologies are constantly brought into the organisation and almost everyone seems to have great patience with things or applications that do not work properly. Because the major part of the staff are more or less skilled in programming and systems development they can at least understand why and tolerate that things aren't working. This might render the results to be of limited relevance to interested readers outside this particular organisation.

Another drawback with our study is that we haven't been able to produce any numbers or figures that could support our conclusions. These will instead be based on the findings we have done with our ethnographic method, thus letting us draw our conclusions from the observations and interviews we have made. While lacking positivistic data (something that often is needed to prove one's findings and to have the thesis accepted in a wider research community) the results still make sense and will probably not be totally out of context.

# 6 Conclusion

## 6.1 Our findings

The organisation in our study is characterised by an open and informal atmosphere amongst its members. The social comfort is high and much of the interaction is spontaneous and opportunistic. If a VMC-system should be able to support this, it must (1) be fine grained enough to mediate interaction in an equal way as ordinary interaction, and (2) become accepted and incorporated in the culture it will serve. The VCR-system we used as a vehicle in our study proved to be technically inferior to fulfil the first condition. The technology couldn't mediate interaction in a completely natural way, which it must be able to do if the organisation should have any real use of it. The second condition requires a proper approach in the design phase, where emphasis should be put on cultural issues and people's way of interacting in order to understand *what* exactly a VMC-system must support.

We started our thesis by posing the following research question: *How do cultural, social and technological factors affect the design and implementation of a VMC-system, which purpose is to support collaborative interaction in an informal environment?* At the Viktoria institute, our study have shown us that:

*The system must be a natural part of the room it is residing in.* Social norms that prevail in a specific area affect the design of the system. The underlying design principles of the system must be aligned with those norms. This means that the hosting space should be the determinant for how a VCR should be configured, and not the possibilities the technology in itself might be able to bestow upon the area.

*The system must mediate interaction in a natural way.* A VCR must be able to accurately and in a timely fashion convey all the cues that are essential for natural interaction. The most important cues are speech and eye-to-eye contact, but it is also of great weight that the system can mediate more sublimate signals as body language and tone of voice in a similar way as in face-to-face conversation.

*The system must be accepted by its users.* The users of a VCR can never be forced to use the system. This is because a VCR is supposed to support informal ways of interaction, and a user can never be forced to act informally against his or her will. It is therefore very important that the users are allowed to take part in the creation of the media place, which can help dealing with issues as integrity concern and intrusion of privacy. The VCR must be perceived as a practicable tool that the users would like to use.

*The system should be constantly active.* If the system should be used for making the users aware of each other, the awareness facilitated through the system should be continuous.

*The system must be easy to use.* The VCR must be transparent in the sense that it doesn't require constant attendance or special skills from the users.

## 6.2 Reflections

The study we have accounted for was conducted at the Viktoria Institute, and the result of it reflects the specific norms, i.e. the ways of being, that resides there. It is these norms that ultimately decide if a VMC-system is a meaningful or inappropriate tool for the organisation to use. If a VMC should be implemented in another setting, it would be important to analyse the social and cultural factors there to decide on a relevant design approach (which in some cases even might be to abandon the whole idea of a VMC-system). But before this, a substantial question to ask is if there is any need for awareness and interaction between the people that are supposed to become connected. And if there is a need, are the connected place's cultures and social norms compatible with each other? If this were the case, it would be possible to create a media place that can mediate awareness and informal communication despite the physical distance between the participants.

## 6.3 Future work

When we were almost finished with this thesis we learned that one of the research groups (Mobile Informatics) was planning to move out of the building. This group had grown quickly and was therefore in need of a larger office area. Since this group is very well integrated in the Viktoria Institute and since its members already have become friends with the other researchers at the institute, this would be an ideal setting to further study the use of the VCR-system and the VMC-concept in general. The way this group collaborates with the other groups could actually result in a need for a system like the VCR.

If the system is implemented in the setting described above, thus facilitating a connection between the Viktoria Institute and the relocated Mobile Informatics group, we think it could serve as a very good instrument for awareness and informal communication. As for future work or a future master thesis, this might be an interesting situation to study. A research setting like that has a lot of the (presumed) necessary conditions and incentives that our project lacked. It might also be possible to study the effect such a system has on an organisation over a longer period of time. If the system is set-up between these to sites we are sure that it will be used quiet extensively, which eventually – and hopefully – will lead to the system being a natural part of the members' ways to communicate and interact.

Another theme for future work might be to test the VCR-system in an organisation that is not so used to these kinds of technologies. In almost every organisation there are cross-departmental and cross-functional collaboration going on. What use could for example an auto-repair shop and its corresponding sales department have of a system like the VCR? There are a lot of other situations in which we can see suitable use for the system. Since one of us has a former career as a printmaker at a newspaper, we can see several ways in which such an organisation might have use of a system like the VCR. Running a VMC-system between the printmakers and the printing

house – or between the journalists and the printmakers – could prove to be very use-ful. Newspapers are also generally very keen on information technology that could help them to quicker produce better newspapers, so it might be that they are willing to participate in a study like this.

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# Appendix

## Appendix A

Below is a list of the equipment that constitutes the VCR-prototype. Please note that the stated equipment and prices only refers to *one* site in the media place, namely the one at the Viktoria Institute.

| Equipment | Manufacturer | Model | Price (SEK) |
|---|---|---|---|
| Amplifier | Rotel | RA-935BX | 2 295 |
| Loudspeakers | QLN | Qubic 111 | 1 950 |
| Sound mixer | Behringer | EURORACK MX 1602A | 1 995 |
| Sound compressor | Alesis | COMPRESSOR 3630 | 1 495 |
| Microphones * 2 | AKG | C 1000 s | 3 800 |
| Television-set | SABA | M8505SLT | 7 500 |
| Computer | CompuTime | P II 450 MHz, 128 Mb RAM | 20 490 |
| Video-card | Bitfield |  | 13 000 |
|  |  | Total SEK: | 52 525 |
|  |  | Total USD: | $6 035 |
|  |  | Exchange Rate: 8.7025 (1999-05-28) | |

## *Appendix B*

This is the questionnaire we used when conducting our interviews. It has been translated from Swedish to English.


### Opening questions
Name:
Age:
Background/Education:
Employed since/Started work at Viktoria:
In which group:


### Questions related to organisational culture
Why did you apply to Viktoria?
Could you describe your daily work? What do you do?
Could you describe your group's daily work? What do you do?
Could you describe Viktoria's daily work? What do you do?
Could you mention something you find positive with the Viktoria Institute?
Could you mention something you find negative with the Viktoria Institute?

What do you think an outsider view's you/your group/the Viktoria Institute?


### Questions regarding informal communication
Regarding the communication amongst the members in your group, how do you think it is working and how would you characterise it?
Regarding the communication between the different research groups, how do you think it is working and how would you characterise it?


### Questions related to VMC
Concerning the VMC technology, what expectations do you have on it?
Do you have any special wishes concerning the VCR?
At this stage, do you think you can give any examples of positive and negative effects that you might see coming when implementing such technology?
Have you been exposed to any variants of video-conferencing equipment, besides the VCR-system?
What impressions did that leave on you?


### Questions about integrity and privacy
What is your spontaneous reaction to the thought of having the lunchroom hooked up to another lunchroom on a permanent basis?