

CO-ORDINATING ARTEFACTS & ACTIONS IN ORDER TO RUN A TAXI BUSINESS



Bachelor Thesis on the MDA programme
Department of Human Work Science and Media Technology
Blekinge Institute of Technology
Spring 2004

Student: Kleanthis Anastasiadis
Personal nr: 770517-7333

Supervisors: Philippe Rouchy
Berthel Sutter
Björn Stille

Index of Contents

1	INTRODUCTION	3
2	THE COMPANY	3
3	UNLESS AND UNINTERESTING.....	4
4	THE METHODS	5
4.1	Ethnography	5
4.2	Participatory designed (limited)	6
5	THE TOOLS	7
5.1	Field notes/Paper and Pen	7
5.2	Video	7
6	THE WORKPLACE.....	8
6.1	The Managers	10
6.2	The Operators	10
6.2.1	The booking program	11
6.3	Special Transport	13
6.3.1	The Shared Booking Program.....	13
6.4	The Dispatchers	14
6.4.1	Dispatching Taxis: The Use of Technology	14
7	THE EQUIPMENT IN THE CARS	20
7.1	The On-Board System.....	21
7.1.1	The Touch Screen Display.....	21
7.1.2	The On-Board Computer	22
7.1.3	The Printer	23
7.1.4	The Taximeter (optional).....	23
7.1.5	The VideoLog	24
8	THE NETWORK	25
8.1	The Data Network.....	25
8.2	The Radio Network.....	26
9	SUGGESTIONS AND REMARKS ON THE DESIGN OF TECHNOLOGY	27
9.1	Remarks on the Personnel	27
9.2	Suggestion	27
9.3	Remarks on the use of the Radio and the Telephone.....	28
9.4	Suggestion	28
9.5	Remarks on the use of the cables.....	28
9.6	Suggestion	28
10	REFERENCES.....	29
11	INTERNET LINKS	29

1 INTRODUCTION

This thesis is about studies of work in relation to design technology. The studies have been made in one of the biggest Taxi companies of Scandinavia; **Taxi Kurir**. The business consists of many different areas. The work in a selected area was observed; the dispatchers area.

The focus of this thesis was the functions of this particular area. The thesis is demonstrating the way this area is working through the point of view of a student of the MDA programme¹. In order to do this a detailed description of the area has been done.

The aim of this study was to understand the dispatchers' work, their interaction with their equipment and finally to contribute to the design of new technology.

2 THE COMPANY

Taxi Kurir is a taxi company that manages a booking central for people, goods and bus transports. The company was started in Stockholm in 1987. It was originally a taxi company that expend its activities in booking travel. In 1990 the company expanded and started to offer its services to private customers as well.

Taxi Kurir is an ambitious taxi group. It is a very competitive taxi company and their business goal has been to offer services all over the country.

The main group, **Taxi Kurir AB**, works with common tasks and projects as product and system development, purchase, quality follow-up and marketing. Every local **Taxi Kurir** company operates its activity according to the same ground concept and is at the same time free to complete its activity with local special services.

Today **Taxi Kurir** operates in 20 cities in Sweden, and since 2000 even in Copenhagen, Denmark. When the company started in 1987 there were 250 taxi cars while today there are around 1600, which 900 are in Stockholm. The company has also other companies such as **Botkyrka Taxi** and **Botkyrka Buss**.

¹ MDA stands for People, Computer Science and Work Studies (Människor, Datateknik och Arbetsliv in Swedish)

3 UNLESS AND UNINTERESTING

This project is the final stage of the MDA programme on the Blekinge Institute of Technology. It is a bachelor thesis which includes Computer Science and Work Studies.

When I first started looking for a workplace where I could do my project I had no clue on what I was interested in doing. I've been given an idea by a one of our lectors, Sara Eriksén, about a taxi business. She told me: "*The way a taxi business works could be an interesting thing to work on*". The idea appealed my interest. While being in Stockholm I started to look for taxi companies.

I first contacted the biggest and oldest of all the taxi companies in the capital city of Sweden but the responsible person was not available and never returned my calls. My second attempt was made on **Taxi Kurir**. I contacted the communication manager and I explained in detail the aim of my project.

During my first meeting with the communication manager, Pia Larsson, who also was my gatekeeper, I presented my project. I explained in detail the purpose of my project, the methods and tools I would use, the time it would take and of course the way that I would publish the information I would collect from the workplace. Pia Larsson thought that it would be very interested and accepted my propose without further thoughts. She welcomed me to the company and introduced me to the personnel of the company.

After a short sightseeing she introduced me to the employee that I would observe. The person that Pia Larsson chose was Mariana. She has been working at **Taxi Kurir** for 11 years, thing that makes her a very experienced employee. Mariana has worked at different posts in the company. She started as a telephone operator and took successively the work of a dispatcher. Today, she is working both as a dispatcher and an operator depending on the amount of calls.

4 THE METHODS

I am mainly using methods of observation and questioning. I consider this approach as ethnographic in nature. This preliminary method consisting to be familiarized with the work environment is subsequently used to make design suggestion in the kind that participatory design is working with.

4.1 Ethnography

Ethnography was the most important method for my project.

“In recent decades ethnography has become a popular approach to social research, along with other kinds of qualitative work” (Hammersley, Atkinson, 1995).

It is a method I used in almost all my previous projects. Through my experience I considered it as a useful method to understand how the company works. Starting from understanding basic things and then even details that are essential. As mentioned in the book: *“in its most characteristic form it involves the ethnographer participating, overtly or covertly, in people’s daily lives for an extended period of time, watching what happens, listening to what is said, asking questions – in fact, collecting whatever data are available to throw light on the issues that are the focus of the research”* (Hammersley, Atkinson, 1995).

While being in **Taxi Kurir** I used ethnography in order to observe and understand the way this specific area I chose was working. I started by simply observing the workplace and following Mariana. I thought it was essential since I had no idea of how a taxi business works. After having collected some data I was able to ask questions and understand the answers.

The collection of data was possible through video recordings, logs, interviews and notes. A short description is following below.

4.2 Participatory designed (limited)

Participatory design (PD) is used in software and hardware design. This means that the client/user is involved in this phase. For this reason it is very important that there is a good communication between the designer and the user. The equal motivation from each side is important in order to succeed with the design and implementation of the new product.

"PD represents an approach towards computer systems design in which people destined to use the system play a critical roll in designing it"(Spinuzzi, 2000: 422).

In my project I didn't have the opportunity to use this method completely since the complexity of the business and its equipment was too difficult to develop more in such a small period of time. The ideal Participatory Design, according to me, would be if I had more time and expertise to collaborate with the personal who developed the booking program. This would give me the opportunity to make a mock-up and possibly a prototype which the users could criticize and form according to their needs.

On the other hand the suggestions I am referring to at the end are complains and suggestions from the dispatchers thing that makes it Participatory Design even if there are no physical design suggestions. If we pass from theory to real world projects there is no guarantee that the designer will be able to come with design ideas especially if the time is short and the company too complex.

5 THE TOOLS

5.1 *Field notes/Paper and Pen*

The most important tool I used was a paper block and a pen. All the data and logging were being documented while I was observing. It was the tool to record essential information but also details that were proven useful during the process. This data was collected from my observations on the workplace where the dispatchers are. It contained information about the work tasks of the dispatchers, the way they worked and the eventual problems they had during their working passes.

“In principle, one should aim to make notes as soon as after the observed action.”
(Hammersley, Atkinson, 1995).

“Content logs are best made as soon as possible because then the researcher’s memory is still fresh, allowing annotations and explications of events that may not be possible later” (Jordan, B. and Henderson, A.).

Also by taking notes (logs) the reflection of what has been observed is being possible (Ely. 1993). This was possible since I had an understanding of the workplace so I could connect the information from my observations with the notes.

5.2 *Video*

An additional tool I used during my workplace studies was a video recorder in order to capture any body language or other kind of movements that might pass unnoticed while I was making fieldnotes. *“Content listings are useful for providing a quick overview of the data corpus, for locating particular sequences and issues, and as a basis for doing full transcripts of particularly interesting segments”* (Jordan, B. and Henderson, A. page 12-13).

Also “video provides optimal data when we are interested in what “really” happened rather than in accounts of what happened” (Jordan, B. and Henderson, A. page 12-13).

Before starting to video record I asked for permission. None of the dispatchers, this was the area that I gave more attention and chose to follow, had anything against the video recordings. All the dispatchers acted as normal and the recordings included real world incidents and facts.

Those recordings were the source of information and details that I would miss otherwise. The video was the complement to my notes and observations. It was the tool for a more complete and correct observation of the dispatchers working area.

6 THE WORKPLACE

The workplace (figure 1) is the office area where the communication center of **Taxi Kurir** is. It consists of several units corresponding to the different task and division of labour in the company.

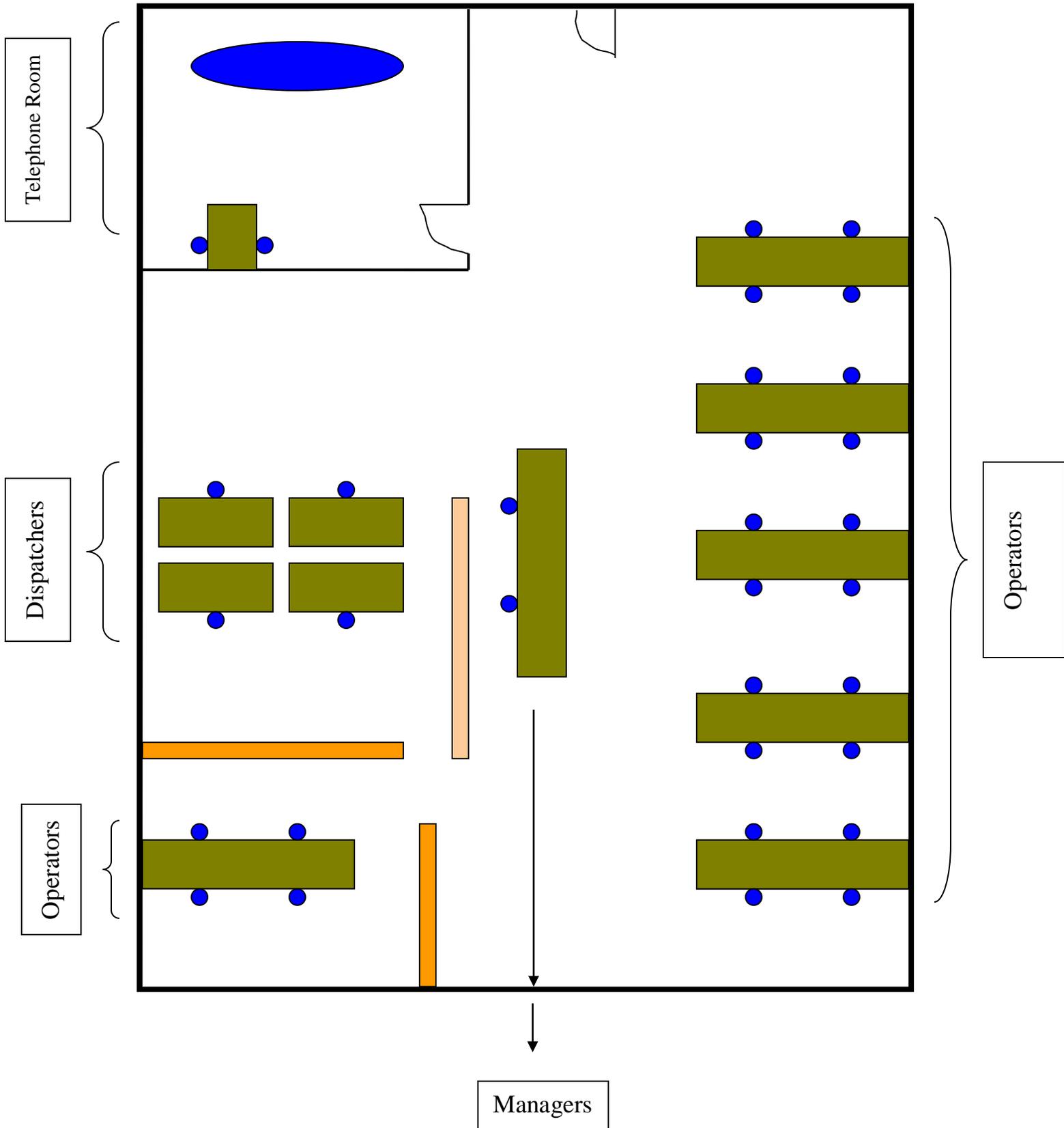
On the right is the operator's side where customer's calls are being received in order to make a booking. Every desk has its own computer where the booking system can be used.

Their duties are more complex since they have to deal with more advanced bookings from companies that have special discounts, receive faxes and also be able to handle special prices. Those vary depending on the special discounts that the companies have. Companies with many employees have a greater account since their employees are plenty and more frequent customers. In the middle there is the desk of the managers. The managers are in charge of this workplace. They check the quantity and quality of the calls. For instance they can check every operator or dispatcher. How many calls he or she has received, how long time the call lasted and how long time the operator or dispatcher has been away of his or hers desk.

On the left of the managers as we look on figure 1, is the dispatcher's side. Mariana works here. This has been the place that interested me most and caught my attention. Moreover it is a 24 hours a day job and it is probably the most advanced post in the workplace.

On the upper left side is the telephone room which the employees can use to make private calls or just take a break from the hectic rush hours and relax for a while in a silent corner.

Figure 1.



6.1 The Managers

The managers are keeping the company running and profitable in the capitalistic sense of the term. For that, they keep track of several aspects of the work in the same time. First they gathered statistics about their benefit (those statistics can be the affectivity of the calls, the answering time etc. Those statistics, which are very popular in telephone departments of the companies, help the company to be more effective).

They also manage the personal. This happens by providing advices, making comments and even supervision to employees. By checking the statistics the manager can see which employee is effective and whose not. This way the manager can give advices or even warn the employee concerned.

The management of the company also include the correct distribution of the personnel (during rush hours even dispatchers answer to booking calls as operators) and they also must be able to give answers to questions that operators or dispatchers don't have the authorization to answer to (for example). This is the reason why most of them have the most working experience from all the employees. There are usually two managers working during office hours. Otherwise there are normally no managers in the workplace. Instead the most experienced dispatcher on place receives the duties of the manager.

Although employees like Mariana who have been working there long enough to have the experience to handle the duties of the managers are being responsible while a manager is not present.

6.2 The Operators

The operators are usually those who have worked the less time in the company. They have the lowest range if we use military terms. Their task is to answer the customer's calls and make the bookings. The tools they use are the telephone with the headset to be able to answer the calls and the computers where the bookings are being made. The booking program they use is called FROGNE². They also use another booking program which also the other taxi companies use for special transports called Färdtjänsten. There is at least one operator at nights during the week. Since the dispatchers have operator skills they can help the other operator or operators during the night by answering calls as operators. Although this almost never happens. On weekends there is a sharp increase since the amount of the customers is greater.

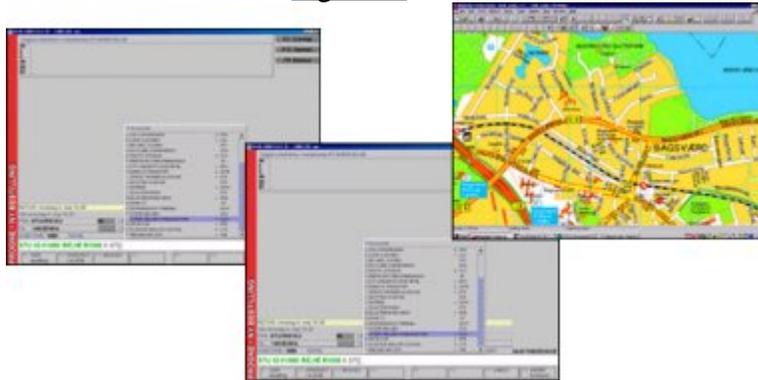
² FROGNE is the name of the Danish company that developed the booking system of **Taxi Kurir**

6.2.1 The booking program

FROGNE is a Danish company which creates solutions for dispatching and fleet management. Some of their customers are parcel services and couriers, security services, police, fire and emergency services, taxi companies as **Taxi Kurir** and many others.

Their software is called *Xpatch*® (Figure 2) and according to the company it is the result of over 30 years of experience.

Figure 2.



for 50 & more cars

UNIX-Version
HP-UNIX
HP-9000



for 50 & less cars

LINUX-Version
LINUX
PC

2.0

The functions and features of this software are the following:

1. booking
 - various input functions
 - advanced booking
 - repeat fares
 - calling line identification
2. master data / registers
 - customers
 - streets
 - fleet
 - drivers
3. statistics
4. autobooking
 - remote call-taking (Taxa-Nu)
 - automated touch tone phone call-taking
 - internet / intranet
5. automatic dispatching
 - dynamic dispatching acc. To taxi rank / sectors with GPS
6. digital map
 - alert function > destination capture for emergencies
 - navigational aid
7. data exchange
 - data export for treatment in other applications
8. extra
 - several companies can be managed with one system

It is the main tool that the operators of **Taxi Kurir** use to make bookings. The program contains information of all the taxi cars of the company, all the registered addresses of Stockholm and the other cities of Sweden where **Taxi Kurir** is available (point 2 above).

Later on in the report I am going to use the name FROGNE instead of *Xpatch*® since this is the way everyone calls it in the workplace.

6.3 Special Transport

Stockholm's county council (Stockholms Läns Landsting, SLL), is through an agreement with the county's municipalities the main responsible for Färdtjänsten in Stockholm's county. Färdtjänsten is a communal service for citizens that can't travel by public transportation or need a special transportation. Färdtjänsten is a complement public traffic form for people who have functional disabilities or people who just can't travel on their own by public transportation. The transportations of Färdtjänsten are being held by personal vehicles or bigger vehicles like mini busses and special adjusted vans. Since Färdtjänsten doesn't own any vehicles they co-operate with taxi companies like **Taxi Kurir**. That is the reason why all companies that co-operate with Färdtjänsten use the same program. Although when it concerns their private customers they have their own booking programs like FROGNE in the case of **Taxi Kurir**.

6.3.1 The Shared Booking Program

The booking program that they use is installed in the databases of Stockholm's county council. They also have a shared telephone exchange which all the taxi companies that co-operate with Färdtjänsten share. When a customer of Färdtjänsten calls, the call might be answered by whomever. The operator makes the booking and inserts the booking into the system. Afterwards the booking is being sent to a random car. This means that an operator of Taxi Kurir might answer the phone but that doesn't guarantee that the booking will be sent to a taxi car of the same company. Since this is a special agreement with the Stockholm's county council the taxi companies don't have the same rules for the Färdtjänsten customers as they have for their own ones. For example the driver of the taxi car is obliged to wait for the Färdtjänsten customer only 5 minutes before and after the booking time. If the customer doesn't show up then the driver have the right to leave. On the other hand if it is a private customer then the driver must wait much longer and in many cases they even call the dispatchers in order to get the telephone number of the customer so they can contact him/her.

The county's primary municipalities investigate the needs of the Färdtjänsten services for every applicant and Färdtjänsten decides for the permission. There are totally 4,5 percent of the county's population that has a Färdtjänsten permission.

6.4 The Dispatchers

The dispatchers are employees who started to work for the company as operators. It is probably the most stressful and complicated workplace. As a result the dispatchers are persons who have worked at the company for a long time or persons who had very good statistics as operators. The listening comprehension, the ability to communicate in several telephone and radio lines, the ability to solve problems and give answers quickly are only a few of the main tasks that a dispatcher should manage. Moreover they are the main users of the technology provided at the workplace. Examples and figures are following below as a demonstration of their complicated work tasks.

6.4.1 Dispatching Taxis: The Use of Technology

The following picture (figure 3) demonstrates the workplace and specifically the part where the dispatchers sit.

Figure 3.



There are four workstations (also shown on figure 1). There are usually 3 employees sitting there during rush hours (usually after 4 or 5pm when the office employees finish for the day). During nights there is at least one dispatcher who has also manager duties since they are the employees who have the most experience comparing to the operators.

The working tasks of the dispatchers are way more advanced than the operators. In order to perform they have a range of tools.

The first tool and probably the most important is the computer (figure 4). It contains the FROGNE booking program (as mentioned above) which is not only for bookings but also for controlling orders, controlling cars, connect to the GPS screen and check on event history. This history is important for many reasons. Some reasons could be theft, physical abuse or assault, tracking etc. Some additional programs used in these computers are the Färdtjänsten booking program, some map-programs (while helping drivers with road descriptions), the company register (to help drivers find companies or addresses where the company is) and other less important websites.

Figure 4.



Another tool they use is the Radio box (demonstrated on figure 5). This tool is used to contact the drivers through radio frequencies. The box consists of:

- The speaker (which is almost always off since the box is connected to the handsfree)
- The volume button
- The red button on the right down side which must be pressed to talk on the radio
- 5 channel buttons which are the following:

Channel 1: This channel is for the flygbustaxi (flight buss taxi) and is used during specific times; between 00:00 and 06:00 during weekdays and on weekends. Otherwise there is an office with personnel that takes care of the orders. Taxi Kurir has a special agreement with a company called Flygbussarna (Flight busses) that offers discount to the customers that travel from their apartments to a bus station of this company (the Arlanda airport is approximately 40 kilometers north of Stockholm and the price of a taxi fare is much more expensive than the bus). Afterwards the customer travels to the airport by bus. Those busses are called Flygbussarna as the company that owes them. When Taxi Kurir is responsible of this channel they answer the calls and send taxi cars to the apartment of the customer.

Channel 2: This channel is called “calling channel” and it is used from the dispatchers to contact the drivers and the contrary. This might happen for various reasons likewise a driver has been delayed without leaving a message to the central, because they have done something against the rules or even because a driver wants to get some information about directions. This channel is used frequently and this is why the phrases and the discussions are quick and short.

Channel 3: This channel is used in case of a server crash or black-out. It is the channel which allows together with channel 4 the manual sharing of orders. Black-outs or server crashes don’t happen so often but when they happen those channels are really useful. This channel is for the orders of the customers from north Stockholm.

Channel 4: Exactly as channel 3 this channel is used to share orders to the taxi drivers. The only difference is that this channel is for the order that come from south Stockholm.

Channel 5: This channel is called the **Alarm channel**. This channel is not used so often but it is very important. The reason is that it is used in case of an emergency. The driver can activate this channel by pushing a little button under the steering wheel. In this case an alarm message is blinking in the FROGNE software in the screens of the dispatchers. In case this happens the dispatchers must leave everything else aside and concentrate on this incident. When this channel is being activated the dispatcher can hear the discussions in the car and even watch what is happening in the car in case the car is equipped with a surveillance camera, VideoLog (figure 14). The dispatcher usually calls the police and gives information about the facts. The advantage is that due to GPS the car can be tracked without problems.

Figure 5.



An additional tools and not less important is the telephone (figure 6). Some of the reasons that this device is being used for is to contact the drivers in case of bad radio connection, receive Färdtjänsten customer calls and register their order through Färdtjänsten booking system, receive customer calls and register through FROGNE (when the dispatcher is working as an operator). The dispatcher has to be connected to those telephone switchboards to receive those calls. This happens by logging in by entering specific codes for every switchboard.

Figure 6.



The dispatchers use a hands free headset. Although it is possible to use both the radio and the telephone through the same device. This is possible by using a switch (figure 7) which is connected both to the radio box and the telephone. The switch has two positions. By switching between those the dispatcher can use either the radio box or the telephone.

Figure 7.



Another useful tool is the GPS screens (figure 8). The dispatchers have access to two GPS screens. On those the selected car that the dispatcher has chosen can be tracked and demonstrated. Despite the fact that they have 2 screens they can only demonstrate one car at the time on both screens.

Figure 8.



The dispatchers have a screen (figure 9) where the flights on Arlanda and Bromma airports are being demonstrated. The dispatchers use this screen only to collect information about flights and send taxi cars to collect customers who have made a pre-order. This screen is connected to Luftfartsverket's (Air control Agency) server.

Figure 9.



Finally they have the flight bus taxi screen (the one in the blue frame, figure 10) which is almost ignored (they delete the orders they collect since they are duplicates) when the other office is open. The operators use this screen during nights and weekends when the other office is closed as mentioned before. This screen is used only when **channel 1** is activated.

Figure 10.



7 THE EQUIPMENT IN THE CARS

In order to communicate with the Taxi Kurir Central and accept fares the taxi cars must have the right equipment. To begin with the cars must have a Global Positioning System (GPS) receiver and transmitter. This is a standard not only for the taxi cars of Taxi Kurir and the rest of the taxi companies but also for the new busses. There are many reasons for the existence of the GPS. The first and main reason was the new law the Swedish government came out with which obliged the taxi companies to have the GPS equipment in all their cars. Some additional reasons were the more effective service that the companies could provide to the customers and the better control the Central could have over the cars.

The following equipment is also bought from the Danish company FROGNE. Some of the following products are optional but they are available in order to help or provide further security to the driver. Since they are tools that give a hand to the driver they are optional and the owner of the taxi car can decide if he wants to buy them.

There is an installation central owned by taxi Kurir where authorized personnel from FROGNE works. It is the place where the equipment is being installed and also a service central where drivers can solve eventual problems with their hardware. This central has also a telephone line which offers technical support by phone. The taxi drivers can call to this line in order to get advice or suggestion about eventual problems. In case the problem is too complicated they advice the drivers to come to the central so an authorized employee can solve it.

7.1 The On-Board System

All the equipment that is installed on the board of the car is called the On-board system. This On board system consists of a range of products like the touch screen display, the on-board computer, the printer, the taximeter and the videoLog (optional).

7.1.1 The Touch Screen Display

The touch screen display (Figure 11) is menu operated via softkeys by a direct push on the screen. The display is the control and output unit of the on-board system. Its free designable touch screen surface in connection with the on-board computer's modular principle, allows customer-tailored solutions without compromises.

A magnetic- and chip card reader, integrated in the display's housing, facilitate on-line credit card transactions, cash card transactions, the use of own customer cards, driver cards and so on.

A built-in infrared port enables fast and easy software updates.

Figure 11.



Technical specifications

Touch screen - 5.6-inch display
Integrated magnetic- / chip card reader
Graphic menu-operated interface
Resolution - 320 x 240 pixels
Integrated graphics controller (for fast response time)
Scroll- and zoom functions
Adjustable backlight
Interfaces: CAN-bus; Infrared port
Power supply: 9 - 16 V
Operating temperature: -25 - +55 °C
Size: (h x l x d) 16 x 170 x 129 mm

7.1.2 The On-Board Computer

The on-board computer (figures 12a and 12b) is the core component of the on-board system. Along with the data display, they are building a client / server architecture.

The on-board computer combines the multitude of functions of the various devices in a nowadays taxi. All components of the on-board system are connected via a CAN-bus³, which allows high transmission reliability as well as an easy fitting.

Modular Principle

The computer's modular principle enables you to obtain a solution that meets your specific wishes and requirements. It's open and flexible structure guarantees compatibility to future developments.

Figure 12a.



Figure 12b.



Technical specifications

32-bit industrial processor
Up to 64-MB memory
Docking station
Signal processor for speech processing
Interfaces: CAN-bus; RS-485 (-or- RS-323); Infrared port (via display); PCMCIA
Power supply: 9 - 16 V
Operating temperature: -25 - +55 °C
Error management system
Size: folded up (h x l x d) 90 x 170 x 245 mm; pulled out 45 x 345 x 245 mm

optional SYSTEM COMPONENTS

Mobile radio (Land Mobile Radio, TETRA)
GSM GPRS - module
GPS - module (-or- DGPS)
CD ROM drives

³ CAN-bus [Controller Area Network]

CAN is a serial bus system especially suited for networking "intelligent" devices as well as sensors and actuators within a system. One of the outstanding features of the CAN protocol is its high transmission reliability and its high speed real-time capability. Today, CAN is in use in most of the European passenger cars.

7.1.3 The Printer

Another part of the standard equipment is the mobile Thermo High-Speed Printer (figure 13). Print credit card receipts or fare data, noiseless in a matter of seconds. The printer uses today's thermo-paper and needs therefore no ink ribbons. Its line-dot method guarantees a long lifetime by reducing the number of mechanical movements. The paper roll is sheltered in the housing.

Figure 13.



Technical specifications

32-bit processor / 1 MB memory

Resolution: 200 dpi -or- 432 dots/line

Printing speed: 25 - 50 mm/sec.

Font sizes: 15, 17, 20, 30, 34 and 40 characters/line

Fonts: *FROGNE*-font or *OEM*-fonts

Paper roll: thermo paper; 58 mm wide; 45 mm dia

Interfaces: CAN-bus (optional: RS-485, RS-232 or USB)

Power supply: 10 - 16 V

Operating temperature: -25 - + 55 °C

Size: (h x l x d) 52 x 112 x 137 mm

7.1.4 The Taximeter (optional)

The on-board system can be alternatively expanded with our electronic taximeter (figure 14). The taximeter is hundred percent integrated in the system. Its physical device, e.g. memory and calculating device, is embedded in the on-board computer and it is operated via the display. The taximeter display itself allows an easy and flexible fitting. The taximeter allows complex tariff structures with up to 100 different levels. All necessary data can be sent via radio to the central.

This extra taximeter is optional since there is an integrated taximeter in the on-board computer and it is being displayed on the Touch Screen Display.

Figure 14.



Technical specifications

Dimension: 105 x 30 x 12 mm

LED display

Impact-proof

Number of digits: 5 for fare; 2 for tariff

Indicators for operation position: FOR HIRE;
OCCUPIED; FARE

Interface: CAN bus

Operating temperature: -25 - +55 °C

7.1.5 The VideoLog

Another optional tool that can be added to the on-board equipment is the VideoLog camera (figure 15). It provides high resolution images, day and night. It offers live transmission and/or storage to memory. It is available as stand-alone or integrated in the dispatching system [Xpatch](#). It has been a discussion to make the camera surveillance a standard in order to avoid robberies or other incidents. Although no decisions have been made.

Figure 15.



Technical specifications

Size: 52 mm in diameter; length 53 mm

Lens: 2,5 mm (1/4" CCD) approx. 105 gr FOV

Video output: PAL

Integrated infra-red

Memory: approx. 3.000 images (320x240 pixels; 24-bit colour)

EMC: CE, 95/54/EEC, EN61000-4-4, ISO7637-1-3

8 THE NETWORK

Taxi Kurir owns two different networks. The first is the data network and the second is the radio network.

8.1 The Data Network

As mentioned before a data network is needed so the GPS can be used. This network is used for data transfers between the central and the cars. This network is the source from where the FROGNE software collects information.

“When we didn’t have this network and the orders were given through radio a driver could lie about his position just to get a customer. The result was longer waiting time for the customer. Thankfully we don’t have such problems today since the orders are being sent automatically to the cars in the specific area. A car that is not in the area of the customer can’t get the order since the GPS transmitter gives his position.” Mickael Hansen, network responsible at Taxi Kurir. (logs: 29/03/2004 at **Taxi Kurir**)

Today **Taxi Kurir** owes seven data base stations which offer better data communication between the central and the taxi cars. Those base stations cost between 50.000 and 70.000 swedish kronor. The rent is approximately 16.000 for each base station every year. They also pay a small amount of money to the Post and Telestyrelsen which is the Swedish State responsible of the Telecommunications Finally they pay approximately 18.000 swedish kronor to Telia Sonera, the Telecommunications company, for the transfer.

This network exists so the company can provide better service. There are some frameworks that the driver has to follow in order to satisfy the requirements of the company. Despite the fact that there are strictly rules about accepting a fare, the company also offers to the drivers to drive free in the sense of taking customers in the city that haven’t booked a taxi car. On the other hand, while using the data network the offers from other areas cannot be accepted since everything is based on the GPS. This means that a taxi driver who’s somewhere in the city cannot be offered a fare at the north suburbs. This is possible since every taxi car has a GPS transmitter.

This way the system knows that this taxi is outside the area of the customer and skips this taxi car until it finds a taxi car in the same area or at least in the neighbor areas.

8.2 The Radio Network

Except the seven data base stations **Taxi Kurir** has also four radio base Station. Those base stations allow the radio communication between the central and the taxi cars. This is theoretically the most important network since it hardly collapses, like the data network because of power black outs or server problems. This network is used frequently to contact drivers, or for the drivers to get directions in case they can't find an address. More specifically there are 5 radio channels as mentioned before (chapter: Dispatchers).

Todays standard, **Taxi Kurir** is using is the LMR (land mobile radio). they are running their own radio protocol, which is especially designed and optimized for dispatching use. For LMR, they have the pre-mentioned necessary equipment.

9 SUGGESTIONS AND REMARKS ON THE DESIGN OF TECHNOLOGY

During my project on **Taxi Kurir** and while doing ethnographic studies I had the opportunity to identify and recognize some problems on the side of the dispatchers and especially on their equipment. And here, I would like to present my observation and also indicate some of the suggestion that could be adopted when appropriate.

My remarks cover some aspects of work related to the personnel but also technical aspects in relationship to the radio, telephone and cabling in the work place.

9.1 Remarks on the Personnel

According to Mariana there is a need of knowing who is present on the workplace. One of the reasons is when the dispatchers are being contacted from a driver or customer about a booking. The dispatcher almost always needs to talk to the operator who made the booking to get more information. In that case the dispatcher has to search in the room for the operator and many times even leave his/her workplaces to find and talk to the operator.

9.2 Suggestion

The presence of the personnel could be checked with an internal program integrated in the FROGNE booking program. The operators and dispatchers could log in as soon as they open the FROGNE booking program. While being logged in the dispatchers have the ability to check the operators that still work and communicate through the internet as in other popular communication programs like ICQ and MSN. These would make possible the communication without leaving the workplace which in the case of the dispatchers is a major disadvantage. Another advantage of this program could be an extra feature which would register the time when the employee logs in and logs out. This feature could replace the register clock that they employees use today in order to register the time they start and finish.

Although the FROGNE program is a network based program, very advanced and developed with techniques which demand the knowledge of various different programming languages and the expertise of many years in order to identify and solve possible problems.

The booking program is developed by a Danish group thing that didn't make possible the communication and maybe the co-working between the developers group and me in order to develop a more functional version of the program having even the feature mentioned above.

9.3 Remarks on the use of the Radio and the Telephone

The radio equipment the dispatchers use is very old. The radio boxes they use are frequently broken and have been used since the start of the company. Although I was there for a short time period and on specific hours I had the chance to see two boxes out of order. The problem was that the workplace with the broken box could not be fully used. The dispatcher has to ask the other dispatchers for help with the radio communication in case someone tries to contact the dispatcher with the broken radio box.

The telephone is another essential part of the dispatcher's equipment which is not always working properly. As mentioned before the dispatchers use one headset and through a switch they change between telephone and radio. The dispatchers talk frequently to the phone or the radio without having changed the switch. The result is that the customer or driver can't hear them. This problem is being identified fast and it doesn't take more than a couple of seconds for the dispatcher to realize it. Although it is a problem which happens often.

9.4 Suggestion

The Radio could be replaced with newer boxes with more functions and easier usage. Another proposal is the replacement of the headsets with wireless headsets which make possible the communication while the dispatcher is away from the desk. This way even the connection problems could be avoid.

9.5 Remarks on the use of the cables

The cables are another problem of this workplace. There are plenty of cables which lie all around the desks. Although the most important problem is the poorly fitted cables between the headset and the switch. It happens often that the connection of those two cables is bad so the dispatcher can't hear and can't be heard.

9.6 Suggestion

A Solution to the pre-mentioned problem could be the use of wireless equipment like wireless headsets with new technology like Bluetooth. This would offer freedom of movement and also greater flexibility to the dispatcher.

10 REFERENCES

Ely, M., Anzul M., Friedman T., Gardner D. and McCormack Steinmetz A. (1993)
”Kvalitativ forskningsmetodik I praktiken – cirklar inom cirklar”, Studentlitteratur, Lund

Hammersley, M. and Atkinson, P. “*Ethnography: Principles in Practice.*” Routledge, 1995.

Jordan, B. and Henderson, A. ”*Interaction Analysis: Foundations and Practice*”, Palo Alto Research Center, California

11 INTERNET LINKS

<http://www.taxikurir.se>

<http://www.frogne.dk>