

IT IN SOCIETY
Autumn 2003

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1. Introduction

1.1 General Information

“IT in society” is a project course that runs during the fourth year of the Master of Science in Information Technology Engineering Program at Uppsala University. The project is the setting of a fictitious enterprise, DoIT, to simulate a real project, where the students work as consultants for the enterprise. Responsible for the course at the University and thereby also the enterprise’s vice-presidents were Mats Daniels and Jenny Persson.

The two hospital units involved in the project are NIVA and Psychosis- and Rehab. NIVA is the Neurological Intensive Care Unit, where people with emergency case of disorders within the nervous system are treated. An example of people treated at NIVA is those diagnosed with aneurysm and wants to undergo surgery. Psychosis- and Rehab are a unit specialised in psychiatric rehabilitation for people diagnosed with Attention Deficit Hyperactivity Disorder or other neuropsychiatric disturbances.

The result of the studies performed by the students, at NIVA and Psychosis- and Rehab, as well as analyses and conclusions were presented in this report.

1.2 Purpose

The purpose of this course is to give students insight in how projects are run and what’s expected of the students when they enter the labour market. Project work is very demanding, it takes skills in co-operating, planning and communication. Without these components a project is sentenced to fail. Communication must arise not just among project members but also between project owners, other experts and of course, users.

The students were to study the units, NIVA and Psychos- and Rehab, at the Academic hospital in Uppsala. The purpose was to gather information and analyse different problem areas to see if a computer based system could support the different units. These systems could for example aid the staff, ease the everyday life of patients or be of use for relatives. One of the purposes with this course is to look into the possibilities of building a prototype. This prototype should be used to present ideas to possible users and also get feedback, through tests with users, for future development. Another purpose with the course was to look for similarities within the different units and if possible give a proposal on how the units can take part of each other’s routines or computer-assistance.

1.3 Method

From the first day the 31 students (see appendix) were divided into five smaller groups, all with individual tasks. Three of the groups worked with NIVA and the remaining groups worked with Psychosis- and Rehab. Each group selected a person that would be responsible for the communication among the groups and between the person’s group and the responsible teachers. These five persons formed a group that basically handled questions as how to co-operate between the groups and can the information in one group be of any use for another group. Further, all groups formed subgroups and divided work among them. In order to co-ordinate work, most of the groups had regular meetings where discussions took place and decisions were made.

After the presentation at midterm a report-group was formed. Once again each group selected a representative that would deal with all the issues concerning the report. The report-group structured the report and composed a model for the groups of what to include in the report and

how to structure the contents. This report is intended for the staff at NIVA and Psychosis- and Rehab.

2. NIVA – Description of care unit

Overview

NIVA is a unit for intensive care of patients with injuries in the central nervous system. The injuries are of different kinds, such as tumours, cerebral haemorrhage and spinal cord injuries. The patients that are placed in this unit are in need of supervision and often in need of respiratory assistance. This particular medical area is rather narrow which results in highly specialised knowledge. (ITIVA report, December 2002)

This unit was established 1986 and the catchments area covers the middle of Sweden, from Karlstad in the west to Östersund in the north. Even Åland is a part of the area. The unit has close cooperation with hospitals within this region and there are also collaborations, mainly concerning research, with intensive care units in Linköping, Luleå, Lund and Stockholm. (ITIVA report, December 2002)

The workforce consists of around 100 employees, counting assistant nurses, nurses and administrative personnel. The nurses are required to have a specialised intensive care education in addition to ordinary nursing school and they work in pairs of two, one assistant nurse and one nurse, who are responsible for two patients. At the unit, there are 20 physicians assigned both neurological surgeons and anaesthetists. A neurological surgeon is available at the unit at all hours but an anaesthetic is only available during daytime. (ITIVA report, December 2002)

The unit has 12 beds, divided in three rooms with three to five beds and there is also an isolation room for patients with some kind of infection. The operation room is located at the same floor, which is favourable in case of emergency. The time that the patients stay at the unit varies depending on the injury and if all beds are taken, the unit cooperates with other ICUs at Akademiska sjukhuset, and vice versa. (ITIVA report, December 2002)

A part of the activity at the unit includes research in the neurological field and there is one room dedicated for this purpose. The major part of the clinical research deals with studying and preventing secondary damage in the central nervous system, which involves testing new therapeutic methods, ways of making diagnosis and research to find ways to predict patient status. The research often involves interns from Uppsala University and financial support is given by grants, scholarships and money from Akademiska Sjukhuset. (ITIVA report, December 2002)

Organisational structure

NIVA is divided into two major departments, treatment and research. The head nurse has the responsibility of controlling the administration and finance of the unit and four other nurses are designated to be responsible for the following areas: Medical Technology, Research, Pharmacy and Education. Further down in the hierarchy the nurses and assisting nurses are found. A physician may grant a nurse special orders called “general ordinations” which gives a nurse more authority over a patient, i.e. the nurse is allowed to introduce certain treatment without having to consult a physician first. The organisational structure is presented in figure 1.

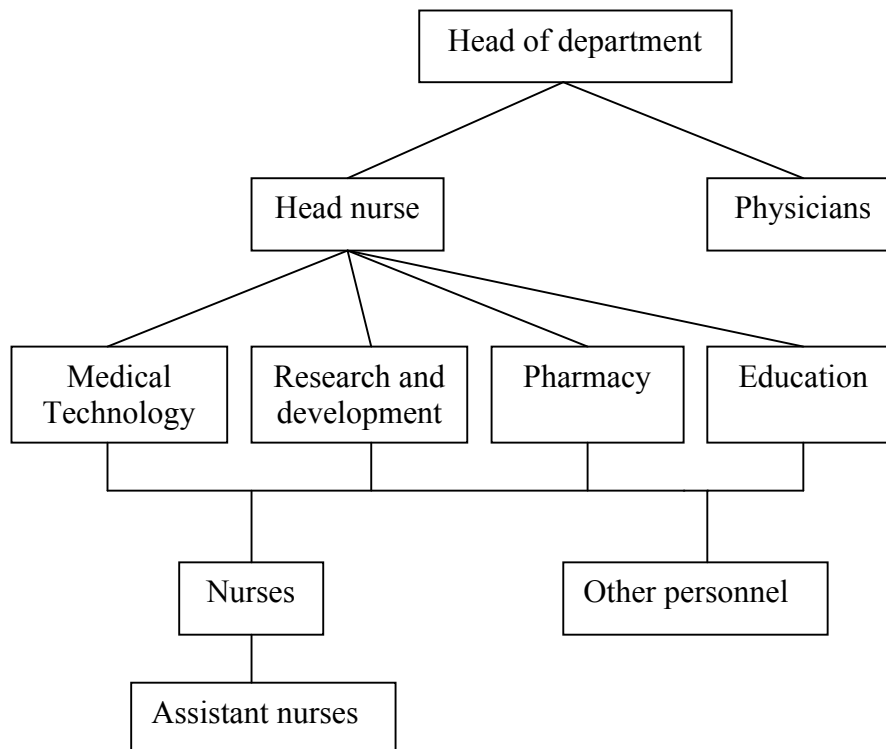


Figure 1 The organisational structure at NIVA.

The projects at NIVA

There have been three projects with the NIVA unit. The first project deals with the relatives situation at NIVA, and the aim here is to facilitate their need for relevant information about the patients condition, without talking to an often busy physician. To solve this, a program accessible in a computer at the hospital has been constructed, in which the relatives can read about the patients conditions. The second project primarily turns to people who know that they have aneurysm and need information about the disease and the choice about undergoing treatment or to live on with the knowledge that the aneurysm can burst anytime. The purpose of this project has been to provide a homepage as a reliable and an easy accessible source of information for these patients. The third project concerns the researchers at NIVA, and a homepage has been constructed for simplify communication between these. This site also facilitates the understanding, for each individual researcher, of what the other researchers has done and is working on at the moment being.

2.1 Information system for relatives at NIVA

2.1.1 Introduction

The staff at NIVA is at the present time discussing how they can improve the communication with relatives to the patients. Today, when a patient arrives at NIVA the relatives are informed of the situation and the near future of the patient. The state of mind of the relatives at this time often reduces their ability to receive and analyse given information. Therefore repetitive information is often needed and could be given to a greater extent, especially after a few days when the patient's situation stabilises and therefore makes the relative more

receptive to information. This could prevent relatives from experiencing a sense of lack of information after a few days at NIVA. The staff at NIVA is aware of this issue. The problem is that continuous communication with the relatives requires a lot of time and since NIVA is an intensive care unit, time is a scarce commodity. Therefore NIVA is faced with a dilemma: shift the time with patients to the time with the relatives, or focus on the care of the patient itself.

To reduce the problem at hand, Dr. Ronne-Engström, chief physician at NIVA, suggested a computerized solution. The idea was to let the relatives communicate with the staff via a computer system and vice versa as a complement to the spoken information. This system is from now on referred to as BOSSEN (*Bra Och Snyggt System Enligt NIVA1*). The project group's goal was to do a survey that would result in a suggestion if such a system would be plausible, and desirable. Furthermore, the group aimed to present a suggestion of wanted features such as system could include.

2.1.1.1 Purpose

The purpose of this project is to try to answer the question if a computerized system is desirable as a complement to today's spoken information between the staff and the relatives to the patients. Furthermore to examine if this computerized system is plausible and explain how it can be implemented.

2.1.1.2 Delimitation

The project group has excluded the possible usage of BOSSEN from computers not within the Uppsala Academic hospital network. This has been done because of the security risks concerning exposure of personal information. Furthermore the system can't be open to external users due to legal limitations.

2.1.2 Method

To figure out if BOSSEN is desirable, plausible and how it should be developed, the project group decided that a survey was needed. How this survey was conducted, its validity and reliability, and problems with the survey are stated below.

2.1.2.1 Survey method

The survey that has been conducted is based on eleven in-depth interviews, which have been performed with a semi-structured interview method. The in-depth interview technique was used since BOSSEN shall be a system that complements human contact. Therefore the information represented in BOSSEN will be sensitive and thus the project group needed personal responses and ideas which explains the use of the in-depth interview technique. The semi-structured interview technique was chosen because all interviews were supposed to include similar information, but still at the same time be able to retract unique information from each interviewed person. Furthermore, the project group has presented their results for Dr. Ronne-Engström, Dr. Daniels, Dr. Persson and three relatives. These people gave feedback that has been taken into account. These final meetings reinforced and improved the result of the project.

Survey group

The survey group consists of three doctors, three nurses, three staff nurses, and two relatives to patients presently at NIVA. The survey group was composed in this order due to the fact that the project group wanted representation from all different working positions at NIVA and

furthermore relatives to patients at NIVA. Additionally all working positions at NIVA is equally represented. Since all positions in the survey group are represented by three employees the risk that these people have ideas and thoughts that deviate from the rest of the staff are reduced. The same goes for relatives to the patients at NIVA. The members of the survey group were selected after consulting with Dr. Ronne-Engström.

Applicability

The applicability of the survey is believed to be high. This since the intended users of BOSSEN is the staff at NIVA and relatives to patients at NIVA. Since the members of the survey group consists of all working positions at NIVA and relatives to patients, at the time present at NIVA, all future users are believed to be represented in this group. Furthermore, the group was selected after consulting with Dr. Ronne-Engström who is acting as head of the NIVA unit and therefore in charge of the development of BOSSEN.

2.1.2.2 The survey

The survey was performed during the period 03/09/29– 03/11/25. All interviews except one were conducted at NIVA, Academic hospital in Uppsala, Sweden. The one interview not held at NIVA took place at Ekonomikum, Uppsala, Sweden 03/10/06.

Conducting the interviews

At every interview the project group had two representatives conducting the interview. If the interview is conducted this way, one interviewer can focus on the interviewee and its response, while the other interviewer can take notes. Another advantage with this working procedure is that it enables the two interviewers to discuss their thoughts and interpretations of the interview afterwards. After a few interviews the project group members have taken previous interviews into account. This has been done to bring forth differences between the interviewees.

Validity and reliability

The reliability of the survey is sufficient seen from the staff's perspective. Due to lack of time the number of interviews conducted with relatives to patients at NIVA can be questioned and thus the reliability of the results from that specific group of the survey. To compensate for this the project group has conducted an additional meeting with three relatives. During this meeting the suggested result was represented and feedback was given. This has been taken into account in the report, the result has been edited accordingly, and thus the reliability of the result from this survey group has been enhanced.

The validity of the result is high. This is because the questionnaires used, were approved by our supervisors and project leaders Dr. Ronne-Engström, Dr. Persson and Dr. Daniels. Furthermore the project group members have a thorough knowledge of the project and its goal, and this also enhances the validity.

2.1.3 Result and Analysis

Many humans are by nature sceptical especially when changes are involved. This was also the case when the interviews were conducted. The contemplated system for relatives was welcomed but the staff was worried that this would imply more time in front of the computer updating information. Staff members' desire was to show information as soft values. This means that there should not be any numerical value; instead explanatory words would represent the numerical value. Another suggestion was to show pictures of the instruments

surrounding the patient's bed and explain the field of application. The most important issue was the possibility to communicate with the relatives via the system. Relatives should be able to write a question to the staff who will give an answer. Staff members were not unanimous in how they would answer the question. Many of them did not support the suggestion of giving written answers, while some of the staff members could imagine themselves using a combination of verbal and written answers, depending on what kind of question was given. Other information that could be of value according to the staff was visiting hours at NIVA, different restaurants and hotels.

Relatives spend a lot of time in the waiting room inactive. Some of them can consider looking at written information regarding the patient they are related to. Relatives in general wanted information regarding people they could talk to, people as priests and psychologists. The relatives also wanted it to be possible to print all information about the patient and its visit and bring it with them when they and the patient leave the hospital.

The natural step for the project group after getting these results was to think of a way to realise the system, taking in to consideration technical solutions and safety aspects. When discussing the technical solutions in this chapter it mainly concerns the architecture of the system. More specifically what the various parts of the system consist of and how they communicate. The project group found three different possible technical solutions. Each one has its pros and cons. Aspects to bear in mind when choosing a solution include safety, usability and administration. The project group came to the conclusion that a web based solution would be most realistic to implement.

2.1.3.1 QS

QS is a computerized system which main objective is to collect data from patients and enable a computerized solution for the journal system in use at NIVA. Furthermore QS monitors patients and notifies the staff if certain measures deviate significantly from the predicted values. Since last summer the implementation of QS has begun at NIVA and is currently used at every second bed. The implementation of QS is planned to continue to further extend the usage of the computerized system at NIVA.

Limitations

The QS system has its limitations to which there may or may not exist solutions. Limitations of major importance to this project are the ability to export data from QS to any other external program/database/server or application, and to import data from some application or external database/server/program into QS.

What is known today is the fact that QS has the ability to export data a certain amount of times per day. That amount has to be predefined however, meaning that a user cannot export data from QS whenever that user feels like doing so. In a communication perspective this is bad because of the fact that communication is limited to specific hours of the day. At least the communication window from staff to relatives in the waiting room is limited this way.

When it comes to importing data into QS little is known today. There is no known way, discovered by the project group, of how to receive data from an external application or an external server and save it into the QS server. This is of course a problem, but the developer of the QS system might have a solution to this problem. However, this possibility is something the project group at present time has no information about.

2.1.3.2 Security and legal aspects

When handling sensitive information, such as patient health status information, one must think twice about who could and should have access to that information. Also one must be aware of the risk of someone intruding and manipulating information.

If all information is handled within a local network that has no or very restricted communication outwards, as it is today in the NIVA local network, then the security risk is almost eliminated. On the other hand, if sensitive information has to be sent to and collected from an external server residing outside the local network, some security aspects have to be kept in mind. The aspects are regarding the access to the external server and its contents. An external server will probably contain other information, but a user from NIVA should only be able to access parts of the server relevant to NIVA. One way of restricting who is allowed to read from and write to the server, or parts of the server, would be to grant only specified IP numbers access. Also, it would be best to keep this server within the hospital's internal network. If not, much greater safety aspects have to be considered. For then someone outside the hospital could hack in and retrieve or manipulate the information, possibly all the way into the QS database. It should be remembered that if using an external server outside NIVA, no matter what kind of server it is, all data sent must be encrypted.

Probably some Internet access should be possible and to minimize safety risks only specific, predefined web pages should be accessible.

In the context of what has been mentioned above, one tempting solution would be to use the QS server as a web server as well. This would however reduce QS to no longer be considered a medical technical product. QS is CE marked and this means that:

- The product should be suited for its purpose of use
- Essential demands are fulfilled, meaning that harmonized European standard will be fulfilled
- The manufacturer shall, depending on what product class the product belongs to, choose between a number of specific methods to validate the product's fulfilment of the requirement.

2.1.3.3 Technical Solutions

After a thorough investigation of today's used computerised system at NIVA and its capabilities, three different technical solutions for the projects purpose were found and their advantages and disadvantages are presented below.

QS based

With the QS based solution the system is implemented entirely within QS and the NIVA network. Therefore all information and communication is handled within QS and its database. This means that the terminal in the waiting room is equipped with the QS software. The QS running on the terminal is then designed in a certain manner, restricting relatives to see only what the administrator admits. A relative logging in with a unique username and password is granted access to a specially configured QS-window. This window should contain general information, such as visiting hours, specific information concerning the corresponding patient which is submitted and updated by the NIVA staff, and a communication part which allows the relative to communicate with the staff. Without the above-discussed restriction a relative entering QS will be able to access all information about all patients. This is not desirable.

For the staff working at NIVA this solution would mean adding an additional window to their user interface. This window handles the staff communication with relatives.

One advantage of using the QS-based solution is that all information is handled within the local network of NIVA. From a safety perspective this is desirable, since it allows no one outside the local network to access its information. Also no one using the terminal in the waiting room can reach outside the local network in any other way than defined by the administrator.

Currently there are two ways to handle the problem of restricting relatives' access to the QS database. One is to lock the QS software in the terminal to a specific bed/patient. This means that it would be impossible, unless you are an administrator, to change what patient information you are looking at. However, since there is more than one patient at NIVA, this solution requires one QS software license per patient, installed on the terminal. Since every license is expensive it is preferable to find a less costly solution.

Another way to go about the problem is to create a section in QS for each patient. Today there is only one section in QS called NIVA where all patient information is stored. By creating a section for each patient where only information passed on by the staff is stored one can constrain each relative to access only its corresponding patient's information. Also information such as questions and notes written by the relatives will be stored in each respective section. The staff would still be using the NIVA section since they would want to see all patient information. However, questions from the relatives will be shown in its respective section and therefore the staff would have to enter each section when answering questions from the relatives. Another problem is that when patients are removed from or entered into the system, this has to be done both in the NIVA section and the section containing the specific patient's information creating additional work for the staff. This solution is more of a speculative one and it is not known if it is possible to implement.

Web based solution

With an entirely web based solution both the staff and the relatives will communicate through a web page. The system will run on an external web server at the hospital and not be a part of the local NIVA network. For the staff to access the system they will have to open a web browser inside their QS workstation. Once they have opened the web page they will have to log in and the program running on the web server will store their username, keeping track of who has accessed the system. Also when answering questions from the relatives the program can automatically sign any answer with a name identified with the username and password logged in at that instance.

The web server will show two different interfaces depending on if someone in the staff or a relative is using the system. A database connected to these two interfaces will store all information used in the system and feed the appropriate information to each interface.

Relatives will use a web browser running on a terminal in the waiting room. When a relative does a login to the website the unique username and password will be identified and access will be given to the information in the database associated with that relative. The program running on the web server will handle this task by generating a new web page for each user, using the information stored in the database.

An advantage with this solution is that communication between the staff and the relatives can occur at any time since the system isn't dependent on the QS system's way of exporting and importing data. Another advantage is that by having a web based user interface it is possible to easily make links to other web pages of interest.

One of the biggest issues with this solution is safety. There is always a risk when sending data between the NIVA local network and some external server residing outside NIVA. Also there is a risk in allowing people not working at the hospital to access servers that could contain sensitive information (see "Security and legal aspects"). One way to handle that situation would be for NIVA to have their own web server residing inside their own local network, thus not allowing anyone from the outside to access the information and minimising the amount of sensitive information that a relative using the terminal can access.

Hybrid solution

What is meant with a hybrid solution is that the terminal in the waiting room uses a web browser to display information and to handle communication with the NIVA staff. The staff however, continues to work in their QS environment as in the QS-based solution mentioned above.

For this to work properly a web server is needed, either one located at NIVA or at some other place in the hospital. The configuration of the system would be that the terminal communicates directly with the web server. It sends information to the server and receives information from the server. For the workstations that the staff uses, some kind of communication has to be established between the server and QS. The communication link between QS and a server is however, as mentioned above, something the project group today know little about.

Benefits using the hybrid solution are mainly that the staff would continue to work within QS without having to use or log in to any other application such as a web browser. Also it would be easy to design and implement an interface for the terminal in the waiting room. Furthermore, no extra QS license is needed for the terminal. All that is needed is a web browser.

The main issues with this solution are importing and exporting data to and from the QS server and the safety factors. The hybrid solution will experience the same safety problems as the web based solution since they both use a web server that might reside outside the local NIVA network.

2.1.3.4 Discussion and choice of the technical solution

As seen above all solutions have their drawbacks as well as advantages. The QS solution is the most prominent one of the three presented. This since the QS solution would be the most integrated solution towards NIVA's computerized system today because this is also the QS system. Furthermore the QS license that would be used has already been bought by NIVA. The drawbacks of this solution would be that the relatives would be able to access information regarding other patients than just the patient related to them. Why this is true is because the QS system can not limit access to a specific patient or bed. Another aspect is that the project group has not gained enough information about the QS system to be able to implement BOSSEN without possible complications.

The thought of a hybrid solution originates from the idea of using a web server along with the QS system. In this way the possible access problem that would occur with the QS solution could be avoided. The staff would continue to use a QS interface while the relatives to patients at NIVA would use a web based interface. This web based interface enables the relatives to gain specific access to information regarding their patient and just that patient alone. The drawback of such a system would be two folded. Firstly the ability to export and import information between the web server and the QS system could generate problems such as how frequent information can be exchanged between the two systems. Secondly, since the

information is transmitted over the hospital local network there will be a security risk because this local network is open for users at the hospital.

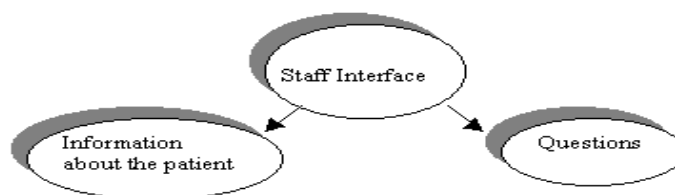
The final solution is the web based system. This is the system the project group suggests NIVA to implement at this time. The solution has both positive and negative features as the other two possible solutions. The project group believes that this solution is under the circumstances the best alternative. One of the drawbacks of a web based system is the security risk in the same manner as in the hybrid solution mentioned earlier. Another negative aspect is that the staff will no longer use the QS interface which means that they have to use a web based interface that differs from the QS layout. The advantages of this solution are firstly that it is the easiest solution to implement for NIVA. Secondly, the solution is not dependent on the QS system, which means for instance that its ability to export and import information is not limited to the QS' ability. Finally links to other web pages are easily implemented and the interface used by the relatives is a familiar one.

2.1.4 Prototype

The prototype is designed to be easy to use irrespective of people's experience of using a computer. When creating the design of the page intended for the staff, one of the most important requirements was that it should be easy to fill out information in order to minimize the time spent in front of the computer. The project group tried to make this page as similar as possible to the QS system in terms of functionality. When designing the page intended for the relatives the most important issue was to make the page self-instructional and easy to use. The design is simple but follows the general layout of the hospital's webpage. All information included on the pages are just suggestions that can be altered.

2.1.4.1 Staff interface

The page intended for the staff consists of two parts. One page contains all information that should be filled out concerning the patient (see figure 2). This information is what will be displayed in the page intended for the relatives. The other page concerns questions from relatives and answers to these questions from the staff (see figure 3).



In order to move between these pages, there are two buttons located in the left upper corner of the page. When you click on one of the buttons, the corresponding page is displayed and the button is shaded grey to clearly indicate on what page you are located.

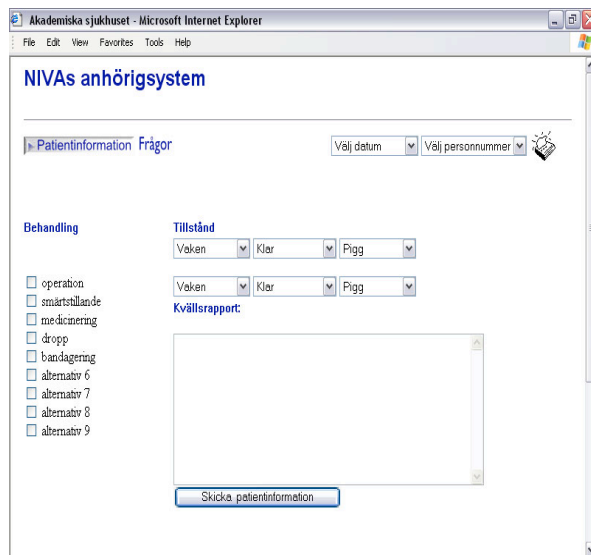


Figure 2

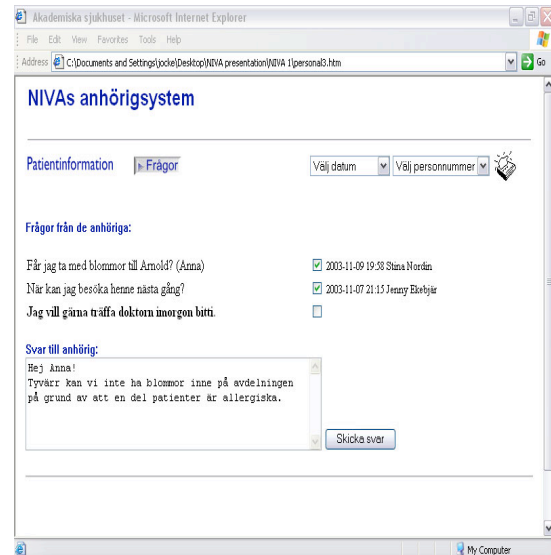


Figure 3

To be able to easily navigate between different patients and dates there are two dropdowns in the upper right corner of page. These dropdowns are a simple solution to a time-consuming problem. Suppose these dropdowns weren't included, then the staff would be forced to finish a session with one patient in order to start a new session with another patient. The dropdowns reduce the amount of mouse clicks needed and that will save the staff a considerable amount of time. One practical example of this is when the staff is going to read and answer questions. The system can only display questions from the relatives of the patient whose information is being used and changed for the moment. If the staff wants to look at questions from other relatives they choose another personal identity number in the rightmost dropdown. Further this function is also an advantage to the nurse who will write the evening report for each patient. When the report for one patient is finished, the nurse chooses another personal identity number and starts writing the evening report for the chosen patient.

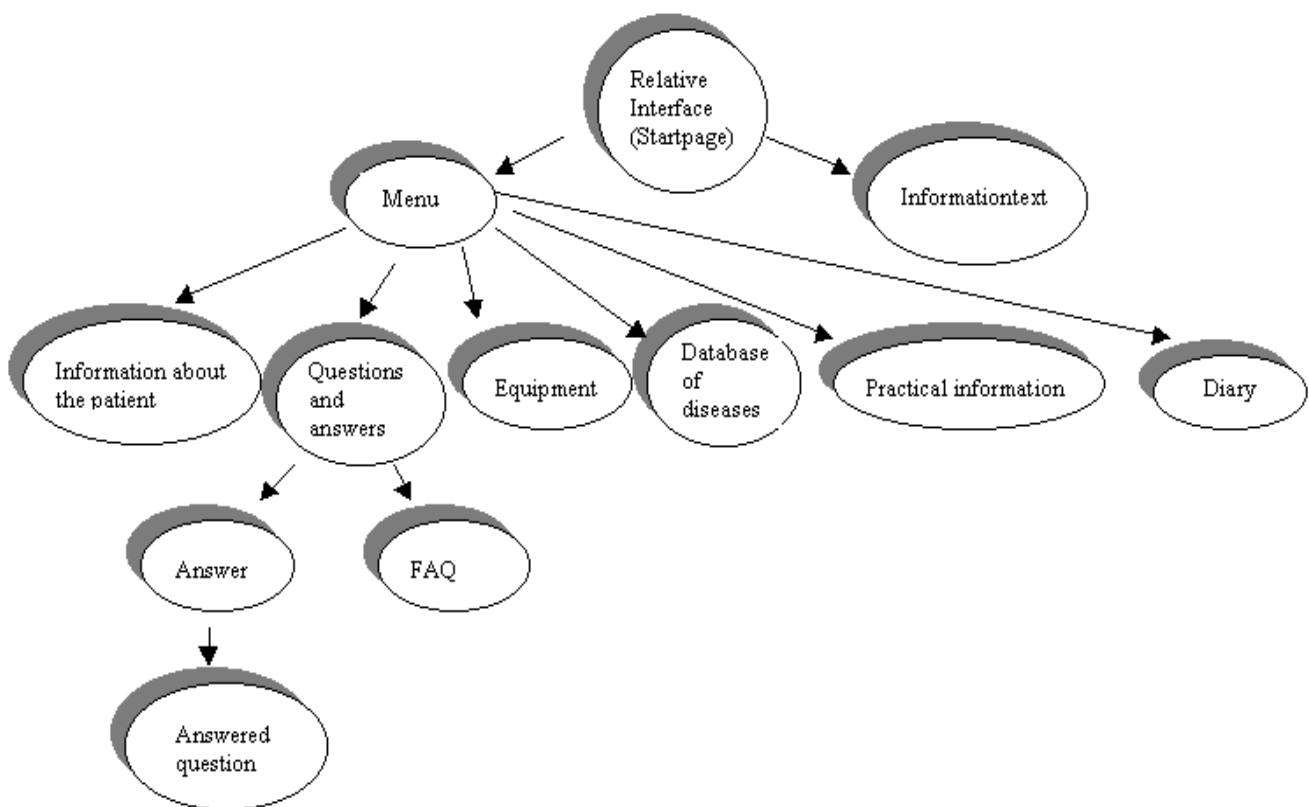
The page containing all information that should be filled out concerning the patient mainly consists of three parts. All values are so-called soft values. This means that the information doesn't consist of numerical values but explanatory words for the condition of the patient. It is believed to be easier for the relatives to understand these soft values and it will reduce the amount of questions for the staff. To describe the condition of the patient the staff chooses predetermined values in the dropdowns. For this task to be quick dropdowns were chosen because the staff is already familiar with these from the QS system and also because dropdowns are simple and straightforward to use. Other information for relatives in BOSSEN, is for instance what kind of treatments the patient has gone through during the day. For this purpose checkboxes have been used because they are easy and quick to tick off. They also allow the staff to choose more than one treatment if the patient has undergone several treatments that day. On the page there is also a text area where the staff will write an evening report. This report will contain information such as how the patient has reacted to treatments and what has occurred during the day. The report is meant to supplement the information presented above, i.e. the condition of the patient and its treatments.

Questions from relatives will be handled on a separate page. The structure of this page is different from case to case. If a relative writes a question and wants it to be answered orally, the question then will be displayed in a text area followed by a checkbox. This checkbox fills the purpose of documentation, in order not to leave questions unanswered. When the staff has

read and answered the questions they tick the checkbox and this makes the system display in what day, at what time and by whom the question has been answered. If the relative chooses to get a written answer, all of the above will be displayed with an additional feature appearing on the page. This additional feature is a text area where the staff could write their answer and then send it making it available on the page for the relative.

2.1.4.2 Relative interface

To begin with, the relative has to login with its username and password. Our prototype shows what the interface will look like after the login. The design is inspired by the official hospital-page, since our system will be internally linked to other web pages at the hospital. In the upper right corner, there are two drop-downs with the following functions; one to change contrasts or font size, and one with links to useful medical-related pages (also from the hospital's official homepage). One object desired is a "diary"-function where the relative can make her own notes.



Start page

There is a main menu on the left side of the page showing the six links that could be visited. They are placed in order starting with the one that is believed to be the most frequently used. The text should be as short as possible and only contain the most useful information.



Figure 4

Information about the patient

In the upper right corner the relative may select a different date, if it wishes to see previous information. By default, the selected date is today's. The information the relative can see is:

- selected date
- personal identity number
- condition of the patient
- treatment
- a shorter report

At the bottom of the page the relative can see when the page was last updated. This is an important function, so the relatives don't have to worry about unchanged values.

It might be possible in a future expansion of BOSSEN to have the possibilities to see exactly which values that have changed and when.

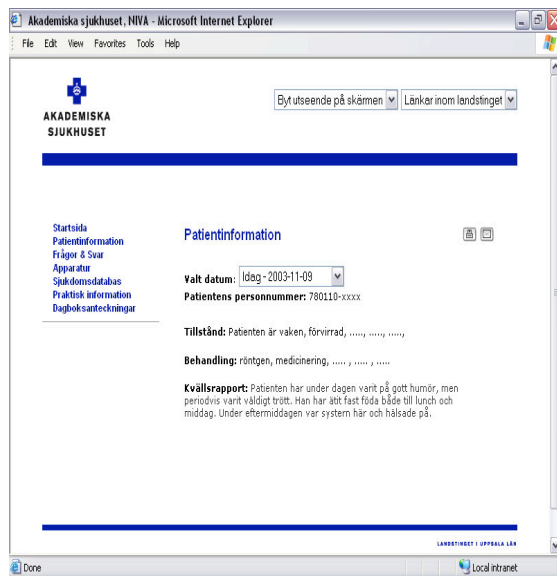


Figure 5

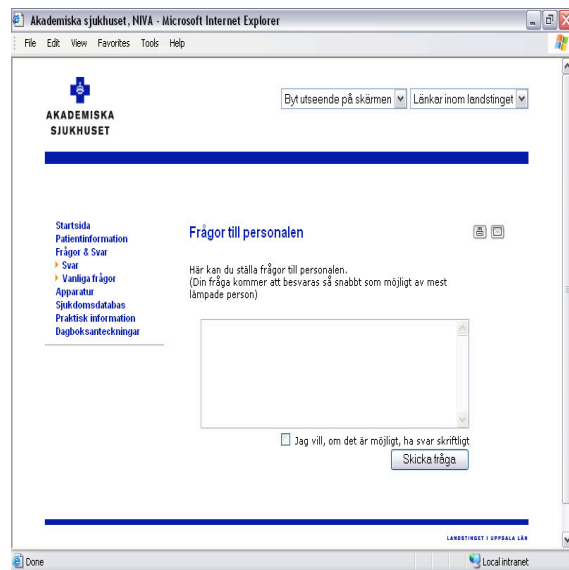


Figure 6

Questions and answers

Should be in three parts - one for questions to the staff (Figure 6), one for answers from them (Figure 7 and 8) and one part for frequently asked questions (Figure 9).

The main part of this page is a form, where relatives can write questions to the staff. It's important to have an explanatory text saying that the most suitable person will answer the question as soon as possible. We know that most of the staff doesn't want to write answers, because of the risk of misunderstanding, but all questions won't be sensitive questions. Some questions could be of the kind: "Where can I park my car?". These questions can easily be answered in written words via the system. If the relative prefers a written answer there is an optional checkbox to tick off. It's important that the relative make an active choice, regarding written replies. Even in this case it's important to explain that it's not sure the answer will be written (maybe the staff doesn't find it appropriate to answer the question in that way).

If the relative wants to read the answer to a question they select the value "svar" in the menu to the left. In the lower section of this page, information about what question has been answered, who answered it and what date it was answered is located. To read the answer to a question they click on the question and the answer appears on the page.

In the Question and answer page it's also suitable to have frequently asked questions (FAQ). In order to get to this page the user chooses this option in the menu to the left.

Some future improvements could be that previously filed questions could be shown in a dialog list. The relatives should not see if the question has been read or not, because this would probably create questions regarding why the question has not yet been answered.

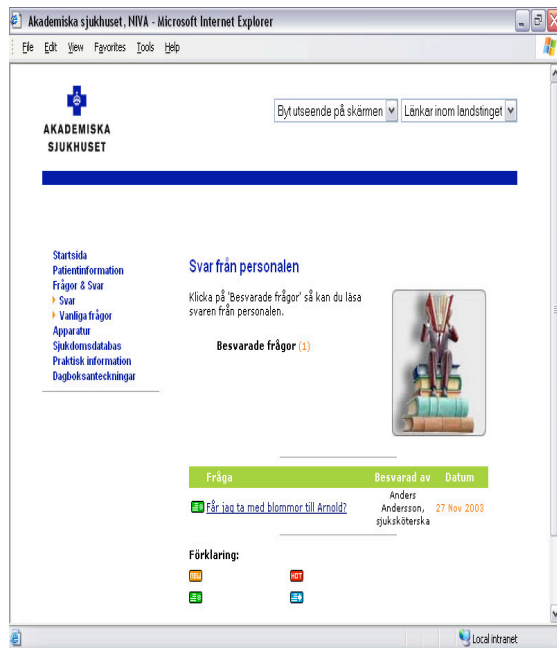


Figure 7

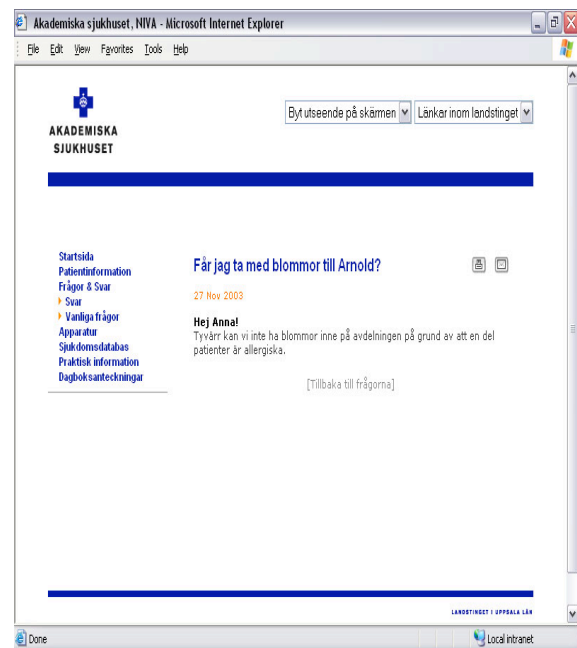


Figure 8

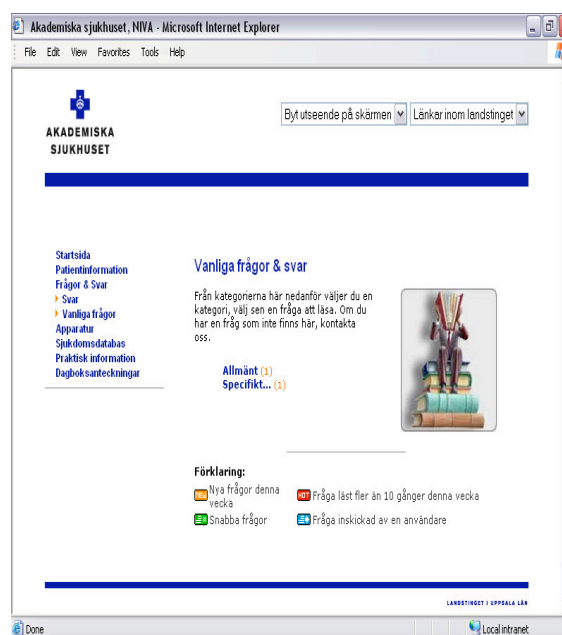


Figure 9

Equipment

The page giving information about the equipment will contain digital pictures of the technical equipment that surrounds the patient's bed. Placed in connection with these pictures, a short description of how the instrument serves its purpose will be shown. A possible future expansion could be links to more informative pages, as well as to the manufacturer's, to supplement the short description in connection with the picture. It's important to mediate to the relatives that the staff always has control of the panels, even if values look strange to an amateur.

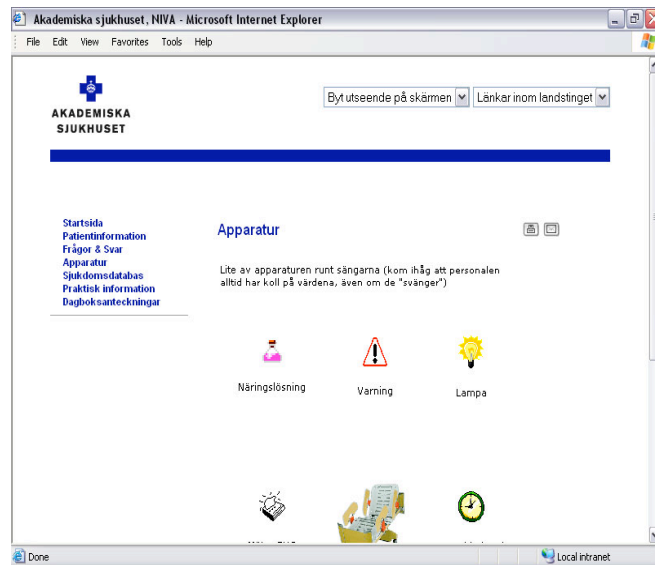


Figure 10

Database of diseases

This page is for relatives who want to know a little more about illnesses. It contains links to useful web pages, both internal (e.g. the Information site for patients with aneurysm) and external (e.g. "NetDoktor") where they could read more about a disease. More links and useful information then presented in this report are desired.

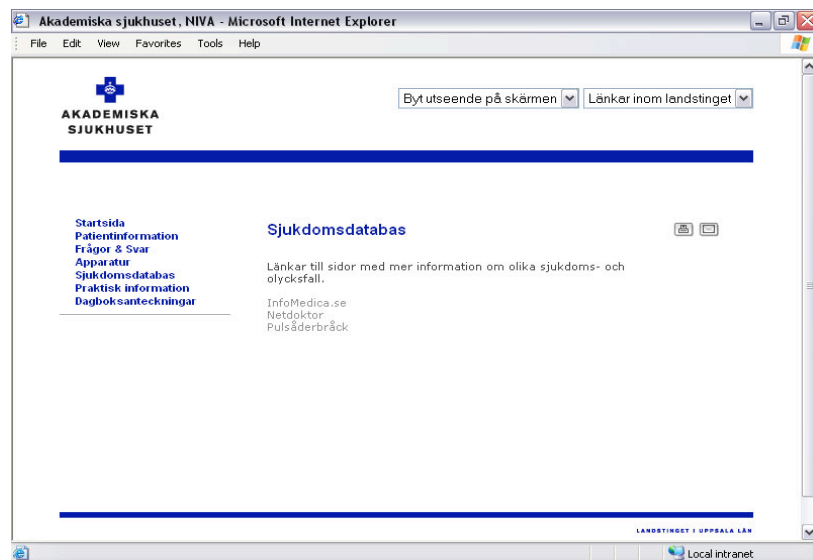


Figure 11

Practical information

This page contains useful practical information about for instance restaurants, hotels, parking, opening hours, and phone numbers. It's very important that the relatives can rely on the information and that it's always up-to-date.

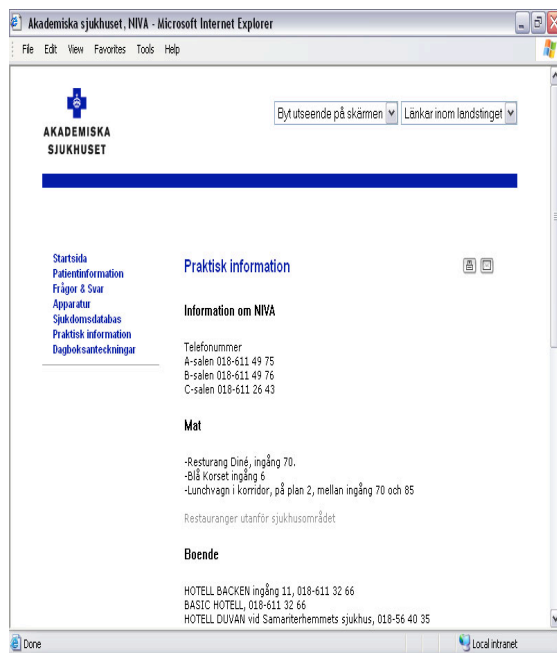


Figure 12

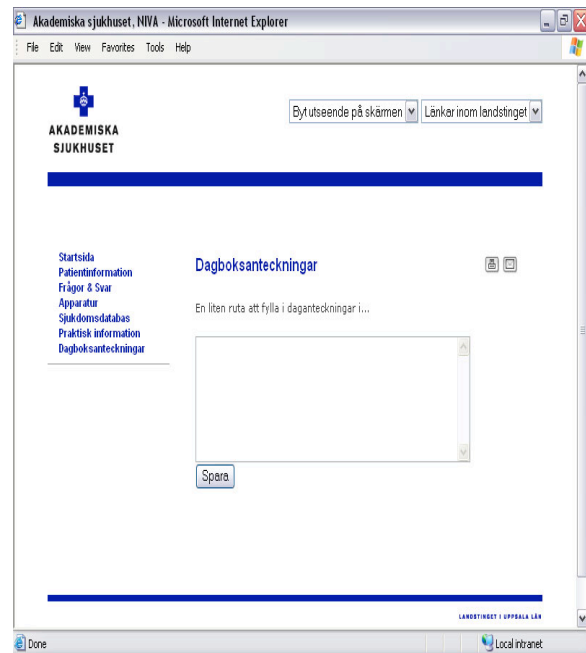


Figure 13

Diary

This application enables relatives to make a diary during their visit to NIVA. During a patient's time at NIVA, the relatives often don't remember much of what is said. Therefore it is useful to write a diary that could be brought home after the patient has been discharged. If a diary is written, the relatives can later describe to the patient the undergone treatments in retrospective. Furthermore many believe that the writing process helps related people to deal and overcome their grief and sorrow.

2.1.4.3 Evaluation

Two people from the NIVA staff have looked at the prototype and their responses have been good. A suggestion was that on the "patient information page" there could be pictures of the staff members handling the patient of concern that day. They also suggested the "online-diary". The prototype was also shown to three relatives. Their computer experience widely differed. Some of them would never ever sit in front of a computer but some saw this as a great opportunity. They were most interested in the practical information page and the equipment page. They thought it would be a good idea to have links to the most common banks, so the relatives for instance can pay their bills. In their opinion it is not hard to find someone to look after the house, but it's more problematic to find someone to take care of the bills.

2.1.4.4 Administration

The administration of the system is an important issue. The system needs an administrator that could register different users and give them usernames and passwords. Depending on what kind of user it is (e.g. nurse, relative) they will need to have different access to the system. For example nurses are authorised to write information about a patient whereas relatives are only allowed to read certain information concerning the patient they are related to. According to some members off the staff this task would be ideal for the secretary. The secretary is the one the relatives turn to if they have any practical questions, and it's the same person which helps the staff with administration issues when the staff is in lack of time.

2.1.4.5 Future aspects

After BOSSEN is developed in accordance with this report, following improvements are believed to be the next developments of BOSSEN. Following are three ideas which can be accomplished in the near future and two major improvements of BOSSEN that might be a possibility in the future. This is of course just a few suggestions of improvements and should only be seen as such.

Firstly more extensive information concerning the patient can be shown. An example of this would be a presentation of the staff that treats the patient in concern at any specific time. Secondly, web based services that can lessen the need for relatives to leave NIVA unwillingly should be presented in BOSSEN. This could for instance be links to different banking web pages. Thirdly, a shared log in system for all web based systems (Information system for relatives, Information site for patients with aneurysm and Homepage for researchers) that the staff at NIVA in the future might use could be developed. This will gather all systems under the same log in and ease the usage of the different systems for the staff.

More extensive changes of BOSSEN could be to amend the system so it is applicable to other units at hospitals around the world for its specific purpose to ease communication between staff and relatives to patients at the unit in concern. Another interesting possibility would be to open up BOSSEN for usage outside the hospital's local network. This would enable related people to see information of interest concerning their patient no matter where they are as long as they have an Internet connection.

2.1.5 Conclusion

The project group's purpose was *"to answer the question if a computerized system is desirable as a complement to today's spoken information between the staff and the patient's related people. Furthermore to examine if this computerized system is plausible and explain how it can be implemented."* This was done through a survey involving three doctors, three nurses, three staff nurses and two relatives to patients presently at NIVA. The results of the survey showed that such a computerized system was to a great extent desirable. The technical solutions, which have been discussed are a QS-based system, a web based system, and a hybrid of these two. The result was to suggest the web based solution mainly due to three reasons. The first is that this solution is the easiest solution to implement for NIVA at present time. Secondly the solution is not dependent on the QS system. Thirdly, links to other web pages are easily implemented and the interface used by the relatives is a familiar one. The web based solution was then explained concerning how it should be designed to ease the communication between the staff and the close relatives of the patient, and this prototype were presented. Future aspects and improvements of the present prototype concerns foremost more extensive information about the patient in concern, and more web based services that lessen the need for relatives to leave NIVA unwillingly. Furthermore a shared log in system could be developed for all web based systems the staff at NIVA might use. More extensive changes of the system that could be developed in the future are; make the system applicable to other units at hospitals around the world, and open up the system outside the hospital's local network, which would enable relatives to gain information about the patient in concern no matter where the relative is.

Generally the survey and the project as a whole were done without any complications.

2.2 Information site for people with aneurysm

2.2.1 Introduction

This project primarily turns to people who know that they have an aneurysm. Some people can live their whole lives without even knowing they have it. Once diagnosed, though, they have to make a choice about undergoing treatment or to live on with the knowledge that the aneurysm can burst anytime. The choice is a difficult decision to make since there is a risk factor involved in treatment

An aneurysm is a deformity of blood-vessels in the brain that some people are born with. About one percent of the population has an aneurysm in the brain. These are often found by coincidence when an x-ray is taken for other reasons, e.g. while examining a brain concussion. (Ronne-Engström, Elisabeth, 2003)

One percent of the aneurysms burst and cause a haemorrhage. These haemorrhages can result in serious consequences. Thirty percent of the patients pass away in the first bleeding and only one third of the survivors will be fully recovered. As a preventive action, patients can therefore choose surgery. Unfortunately the risk of surgery is as great (1%) as the risk of the aneurysm to burst. For that reason it is a difficult decision for patients to make. (Ibid.)

Considering that it is a hard decision to make, the patients are in need of close contact and support from the doctors. Even among the doctors the knowledge about aneurysm is insufficient, though, and it results in all kinds of scientifically unfounded advices, such as “do not fly” and “take it easy”. The outcome of these incorrect advices is that patients come to Akademiska sjukhuset thinking that they could die any day. (Ibid.)

Because of this the first thing the doctors have to do is to make the patients understand that the best thing for them at the moment is to continue to live as normal as possible. There are only two known things that increase the risk of haemorrhage, namely smoking and high blood pressure. (Ibid.)

The first step after detecting an aneurysm is to inform the patient about the condition. This information is given by a doctor at the patient’s local hospital. The patient then receives a referral from this doctor to Neuro Surgery at Akademiska sjukhuset where an appointment to a outclinic patient visit is made. (Ibid.)

During the meeting the patient is given facts about aneurysm and the two different ways of treatment, embolisation and surgery. There is also a possibility to ask questions to a doctor that is actually specialised in the area, unlike the doctors at the local hospitals. It is hard for the patients to take in all the information given at the meeting and therefore there is always a possibility to make another visit or to call a doctor at Neuro Surgery later on. (Ibid.)

The next step for the patients who choose treatment is to make an angiography of the brain. This is done polyclinically but the patient is installed at the hospital during the day. To let them know more about the angiography and prepare them for the day at the hospital, an information sheet is sent to the patient beforehand. During the day of the angiography they are not given any definite information about the treatment since the doctors have to discuss the result of the angiography in a so called vascular round. (Ibid.)

The past week’s angiographies are discussed in the vascular round that is held every Friday. During this round the doctors discuss whether it is possible to treat the aneurysm or not. If a treatment is possible they decide on what kind of treatment to recommend to the patient. This recommendation is made either via a telephone meeting or, in special cases, at a new

appointment. After that the patients are always welcome to turn to the staff at the hospital with questions until they have reached a final decision about what they want to do. (Ibid.)

As mentioned earlier, there are two kinds of treatments available. Embolisation is a method where the surgeon inserts a metal spiral into the aneurysm. After embolisation a patient stays at the hospital for about five days and is after that on the sick-list for a short period of time. An angiography is made after 6 months and then again after 2 years. The result from these check-up angiographies are handled the same way as earlier in the course of treatment. Surgery means that the surgeon puts a metal clip outside the aneurysm, preventing blood from entering it. After surgery the patient stays for 7-10 days at the hospital and is on the sick-list for 4-6 weeks, if the treatment is successful. There is a check-up again after approximately 3 months made by the surgeon who performed the operation. (Ibid.)

The staff at Neuro Surgery envision that a homepage containing information about aneurysm could be an effective way of preparing and supporting the patients along the way. First to prepare them for their first meeting, but mostly to reduce the stress that could arise when the patients are diagnosed with aneurysm.

2.2.1.1 Purpose

The purpose of our project is to provide a homepage as a reliable and an easy accessible source of information for patients who are diagnosed with aneurysm. The purpose is also to make the homepage user-friendly and easy to understand for all patients no matter background. Another goal is to achieve a high level of cooperation with the other project groups.

2.2.1.2 Limitations

The homepage is primarily made for patients and therefore we have focused on what their needs are all the time. The relatives and friends interest in the patients condition is of course great but we have not constructed a separate part of the homepage for them. But since the homepage is supposed to be published on the Internet anyone is free to visit it and it should contain relevant information for everybody.

2.2.2 Method

Our main method for gathering information about what the homepage should contain was planned to be through questionnaires. The reasons for this type of quantitative method are several. Since patients both before and after treatment are in a stressful situation, we thought that a questionnaire was a better choice since they could fill it in peacefully at home. It is also the best way to reach a larger number of patients rather than meeting them in person. In this way we could also reach patients from different stages in the treatment. There is a practical reason for using questionnaires as well, since the secrecy in a hospital environment is very high. To get in touch with the patients, our contact at Akademiska sjukhuset therefore suggested that we should send our questionnaires to the patients through her.

Before we constructed the questionnaires we had a meeting with our contact at the hospital where we discussed how the project should be run and more in detail what was expected. After that we contacted several other employees at the hospital, such as the webmaster and the people in charge of IT at NIVA, to get more information about the technical aspect of the project. An outclinic patient visit was attended with the intention to get a better picture of how the patient's situation is after they have been diagnosed and also to get a better understanding of what kind of information the patients are looking for. Another interview was held with a patient that had already gone through treatment giving us another perspective from someone

who had come far in the course of treatment. A meeting with a neuro-radiologist was held to get more information about how the staff perceive the patients with aneurysm.

2.2.3 Results

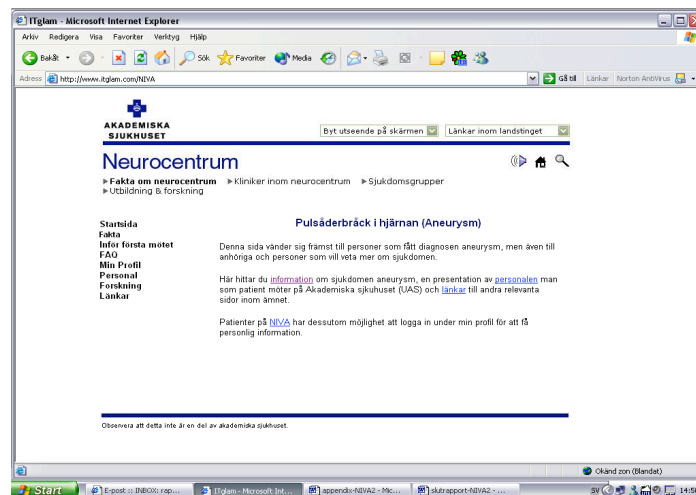
After gathering as much information as we could we started to build the homepage for the presentation. It was constructed with what we knew about patients situations, the advice of the staff and our own knowledge about aneurysm in mind. The template of the Neuro Surgery's real homepage was used to make the prototype look like an actual part of Akademiska sjukhusets webpages. The prototype was shown to a patient whose response was very positive. Further development was made on the prototype and it was presented in a presentation of the project. Here we received even more feedback, now from the staff, which resulted in our final result.

Along the way we have had some contact with the other NIVA-groups discussing common problems and approaches. With NIVA3 we see a possibility of linking research reports about aneurysm to our webpage. That depends on if the researchers are willing to supply the reports. With NIVA1 there is a possibility of giving the address of our homepage to people whose relatives are in the intensive care after an aneurysm have burst.

2.2.4 Prototype

The first thing we did when designing the homepage was to ask ourselves what we would like to know if we were one of the patients. After a lot of discussions within the group we concluded that the following parts were the ones we felt were most essential to be on the homepage:

- Facts about aneurysm
 - o What is an aneurysm
 - o Who is affected and is it genetically dependent
 - o What does it mean to have a aneurysm, how does it affect my life, do I have to change my way of living
 - o What are the different ways of treating aneurysm and what are the risks involved
 - o The treatment process, step by step
- Information about the first outclinic patient visit
- Presentation of the staff , with pictures, that are involved in the course of treatment
- My profile
 - o Contains summaries of the meetings
 - o Results from the angiography
 - o Calendar that tracks important meetings and information such as the two things mentioned above
- A FAQ (Frequently Asked Questions) for fast answers to common questions
- Research reports
 - o A link to research reports relevant to aneurysm, possibly presented by the third NIVA project group
- Former patient stories
- Links to support groups and to other homepages with more facts about aneurysm



Since the patients are of all ages and background, the individual computer skills are expected to vary a lot. In conclusion there will be high requirements on the system to be easy to use, no matter how experienced the users are. But since we have been asked to use the UAS homepage template, we have been limited in our design options.

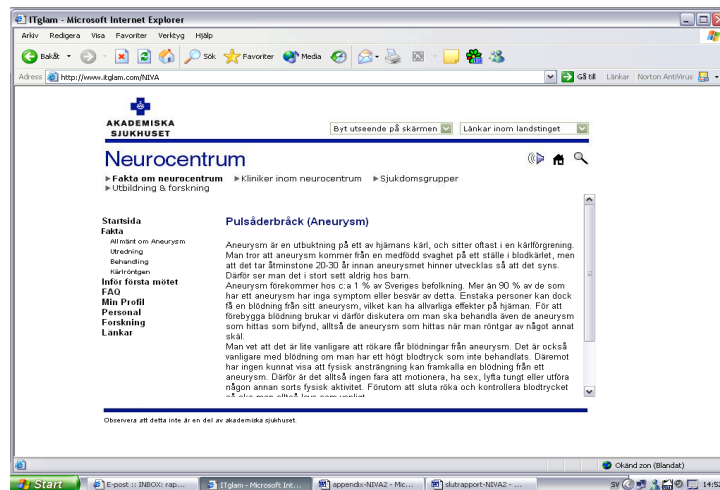
The following paragraphs are explanations of why we chose the different parts on the homepage and how they are presented.

2.2.4.1 Facts about aneurysm

This part is very important since the patients might not ever have heard about aneurysm before they were diagnosed having it. Because of this part's great significance we want to point out that it is a doctor who has written the text on the homepage. Our task here has been to present a suggestion of what kind of information the patients are interested in and then to read through the text and make sure that the doctor's language, that may contain many unfamiliar words, is easy for the patients to comprehend. It is necessary to have information, which is both precise and understandable so that many patients with different prerequisites can grasp the information.

Since the aneurysm can be deadly there is a natural question for patients to ask whether it could be genetically dependent. If that is the case it could be urgent for the patients close relatives to make an x-ray. It is also important to calm the patients but still be honest about risks. The usual reaction to the fact that you have something that can have a deadly outcome is naturally to get stressed and worried. Many patients think they have to do radical changes in their way of living. This is mostly wrong and it is necessary that the patients understand this as soon as possible.

The decision whether to treat the aneurysm or not, is certainly of great value to the patient. To facilitate this decision it is important with relevant information regarding the possible outcomes of each of these choices. When the patient has decided to treat the aneurysm, they have to choose between two different methods, embolisation or surgery. There is a risk with both methods that needs to be presented. We were unsure about mentioning risks but according to the staff patients do want to know this. The doctors will advise the patient of the most appropriate treatment method, but the decision is still left to the patient to make. In some cases it is not even possible to treat the aneurysm, it all depends on how it looks and where it is situated.

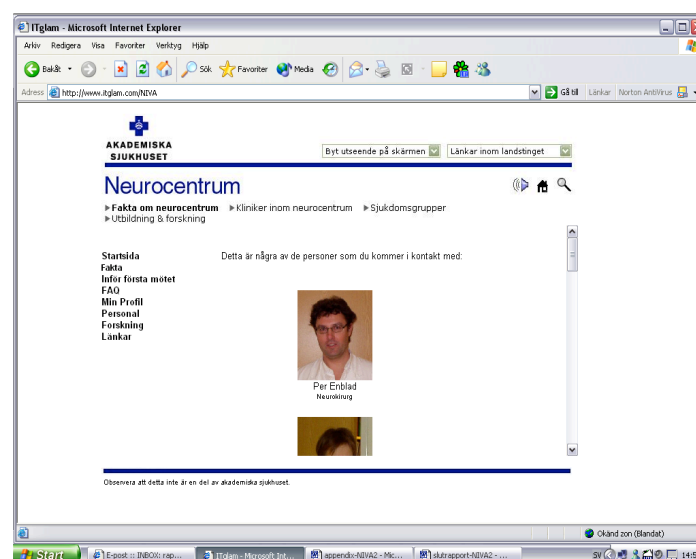


2.2.4.2 Information Before the Outclinic Patient Visit

The outclinic patient visit is the patient's first contact with doctors at the Neuro Surgery division at Akademiska sjukhuset. It would be desirable if the patients were well prepared so that they could make the most of the meeting once they were there. It would then probably make it easier for patients to grasp the information that the doctors give them and also make the patients able to ask more relevant questions. Therefore they are advised to write down questions beforehand and also feel free to bring a relative or friend if that makes them feel more comfortable in the situation.

2.2.4.3 Presentation of the Staff With Pictures

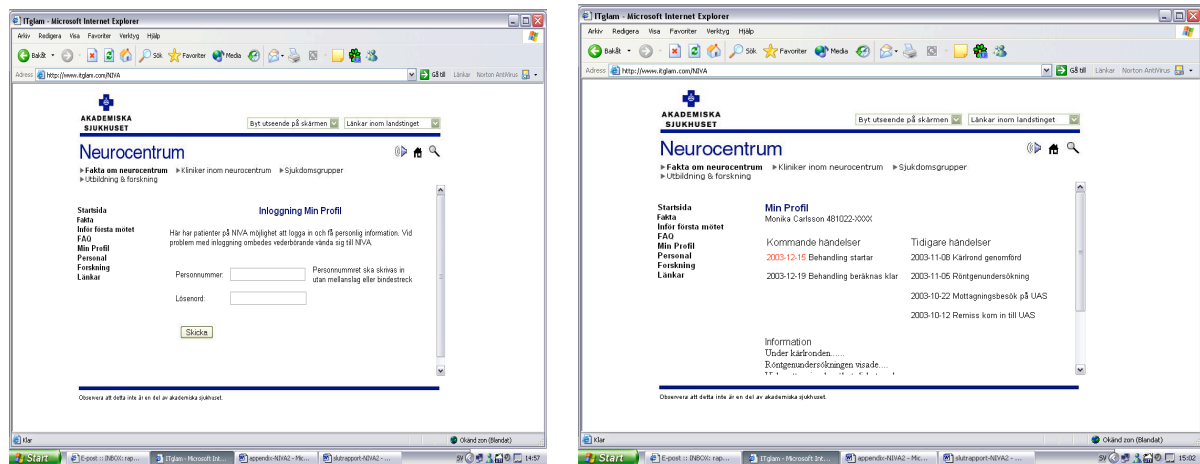
The reason for putting pictures of the staff on the homepage is to give the patients a chance to see the people they will meet later when they arrive to UAS. One desirable outcome of this is that the patients feelings of stress, that is naturally introduced during a visit to a hospital, could be reduced. During the meetings with staff, sensitive subjects are discussed, and it is therefore important for the patients to feel comfortable in the interaction with the hospital staff.



2.2.4.4 My Profile

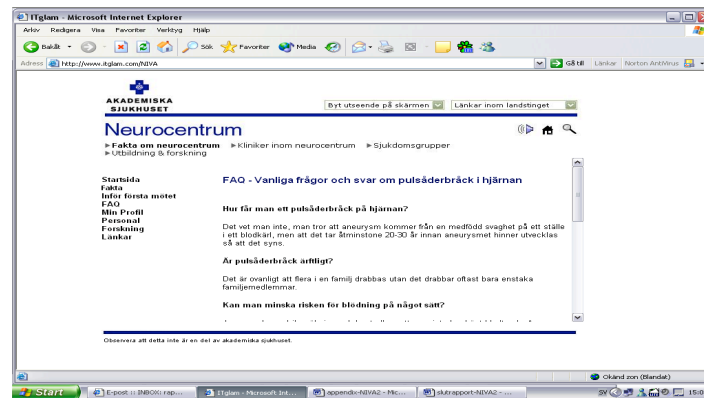
The idea behind My Profile is to give patients with aneurysm at Neuro Surgery the possibility to read personal information about their previous and current condition and the possibility to receive more personal messages from the staff. The patient would use this as a summary of results and meetings, but this service would of course be optional to the patient. The purpose of “My profile” is not to minimize the personal contact with the staff but to act as a complement. Results from the vascular rounds could be published directly on the homepage so that the patients can receive the results earlier than if they had to wait for a telephone call. It is also good for the doctors that they are forced to make a clear, unified decision about what to recommend to the patient since they have to write down a short summary to be put on the patients “My profile”.

High security is important when dealing with personal information, in order to protect personal integrity. To avoid unauthorized access, we have chosen to use a log-in where both a personal number and a corresponding password have to be entered. The patient receives the password from the staff. The password should be generated randomly, to avoid ways to hack the system.



2.2.4.5 Frequently Asked Questions (FAQ)

This section presents answers to the patients most common questions. Even though it is possible to find the answers to most of the questions in the facts about aneurysm, we feel that this is an important feature of the site. We have chosen to limit the number of questions, since too many questions could spoil the basic idea: the FAQ should be simple and finding information should be fast. We chose the questions in the FAQ after attending an outclinic patient visit, after dialogues with different staff members at Neuro Surgery, knowing what the patients main concerns are and also what we would be interested in knowing if we had been diagnosed having aneurysm.



2.2.4.6 Research Reports

To give the patients insights in progresses made in new better treatments or other matters concerning aneurysm, we have decided that this should be a part of the information-site. In extreme this could help patients in their decision whether to treat or not but mostly we included it because diagnosed patients want to read as much information as they possibly can about aneurysm. One of the other NIVA-groups, NIVA 3, worked with presenting research. One idea that was suggested by them was for researchers to make a short summary of their research and to present it in a simple way. If there was any research on aneurysm available this would be a good way to present it on the homepage.

2.2.4.7 Former Patients Stories

The objective of this part of the homepage is to give patients and relatives the chance to see how other people in the same position have handled the situation. We think that they can come up with good tips about everything from everyday events to more general views of life. It also serves a psychological purpose when patients get the feeling of not being alone. Many people before them have experienced the same thing, and even more important, they have managed to live on like anybody else.

2.2.4.8 Links

The links in this part of the homepage are links to other sites which contain relevant and complementary information to those interested in facts about aneurysm. The plan was also to link to support groups for patients, but none have been found. It is essential to put a big effort into finding reliable and factual web pages. This is important since getting false or poorly presented facts could have negative effects psychologically on the patients. False or contradicting information could also add more confusion to the first outclinic patient visit with doctors at the Neuro Surgery.

2.2.4.9 Future Improvement

In the future it would be desirable to receive more responses from the patients to be able to adapt the homepage to the real users needs and requirements. Therefore an online evaluation of the homepage could be an appropriate solution to find out more about patients views of the homepage and also if it lacks any particular information of great importance to patients. If so, that can easily be added.

The choice of technical solution in "My Profile" is left to the hospital to deal with so that it would meet their safety requirements. No implementation of the log in system connected to the database of the hospital is suggested. Of course this has to be taken care of, before

considering it as a part of a real homepage. Also it has to be clear what information there should be and who will add it to "My profile".

More relevant links should be added. The doctors have to be involved in this part to a great deal so that only links with proper information will be used.

The part about research projects has to be extended. Either if the researchers at UAS want to supply research reports about aneurysm or if research from other sources is used.

We considered constructing a discussion forum where both old and new patients could meet and discuss aneurysm. Along with the former patient stories the purpose of this is for patients to realise that other people have been through the same thing and they can support each other.

It is essential that all information is checked by doctors before added to the homepage, so that it never will contain incorrect information.

2.2.5 Conclusion

Our prototype includes most of the parts that we considered and we received positive response from both patient and staff. A positive personal aspect is that we have had the possibility to get insight into an environment, which is normally not accessible to us. Furthermore, we think that the result of our project will develop into a real homepage, which will serve its purpose to help the patients. As a result we have achieved our main goal of this project.

When we were allotted this project, our first thought was that it was pretty straightforward. If you just look at it strictly technical, perhaps it is, but then you have not looked at the whole process of making a final report. The process includes several important parts like for example gathering useful information and to have a successful collaboration with the staff at the hospital. It is here we have had the biggest complications since the staff has a heavy workload and thus hard to get hold of. A solution to this could have been to involve more people, with less workload than a doctor, such as nurses and administrative staff.

Dealing with patients was also a more complex question than we knew from the start since there is secrecy in a hospital environment and personal information about patients can therefore not be spread anyhow. Concerning questionnaires and interviews they should normally go through an ethical control within a certain ethics group at the hospital to be approved before they can be distributed to patients. Despite this difficulty our contact helped us to arrange patient meetings and also establish contact with other staff members. In the future, it might be advisable to solve these issues in an early stage of the project.

During this fall there has not been that many referrals to Akademiska sjukhuset making it harder to get hold of patients in the early stage of the course of treatment. Some outclinic patient visits have also been cancelled due to that the doctor had to do operations instead. These kind of unexpected circumstances are normal in a hospital environment, but naturally difficult to take into account.

As mentioned before our first plan was to get information from the patients via interviews. It turned out that this was difficult since it was hard to get in contact with former patients. We then thought that a questionnaire would solve this problem since we more easily could reach more patients but then again we had difficulties distributing them and ended up with only one response. This meant that we did not get as much information from the patients as we had wished for. However, we did some interviews with different staff members, we attended an outclinic patient visit and also interviewed a patient that recently was operated on. Also we have been able to ask the doctor questions along the way so we believe that our understanding

of what is needed is sufficient and we therefore think that we have constructed a homepage with relevant information.

One of the purposes for the project was to achieve a high level of cooperation with the other project groups. To some extent we achieved this goal. With the other NIVA groups we had regular contact concerning design and technical issues, but mostly about how we could benefit from each others work. With the Psychosis and Rehab group, however, we hardly had any contact at all during the development stages of the project since we believed our projects differed too much. However, after the final presentation we realised that cooperation with them could have resulted in new views of common problems.

The overall conclusion of this project is that the work has progressed well and that our prototype could be developed into something useful for patients. To be able to further develop our own prototype we would want to have more information from patients to back up the decisions that we have made regarding the homepage.

2.3 Information site for researchers

2.3.1 Introduction

Many of the research projects at NIVA are based on the clinical work on patients. These projects are run not only at the ward itself, but also at other sites, (mostly in Uppsala), connected to NIVA. NIVAs main partners in medical research are the groups doing clinical research and the groups doing experimental research.

A general feeling among researchers working at NIVA is that communication between the different research groups doesn't work satisfying. Even though many of the researchers think it's important to know what's going on at the department, not many of them know precisely what kind of projects other teams are working on. An important benefit of information exchange between groups would avoid repeated methodological errors in different groups and to point out possibilities for alternative solutions in similar research projects.

Therefore several suggestions have been discussed in order to improve the scientific climate at NIVA and to facilitate the scientific work. A recent idea was to make a homepage-solution available to everyone doing research at NIVA. This homepage should work as an information centre for the researchers to look for information concerning the department, the people who work there and research projects being run at the moment as well as previous work documented in journals and protocols. Another important task could be to publish news about congresses, meetings coming up in connected research fields and reminders of application dates for grants and funds.

2.3.1.1 Purpose

The purpose of this project was to find out if there was a need of a computerized system to help out the communication issue among the researchers at NIVA. If there exists a need for such a system what would it look like and which features would it include.

2.3.1.2 Delimitations

The work of creating an information site for researchers has a number of restrictions that must be taken in consideration when reading the report. The reasons for the limitations in the work are first and for all, that the total amount of time scheduled for this project was limited. That is also one of the reasons to why only one unit one hospital has been studied during the project. Secondly, it has been difficult to match schedules with the interview objects. The researchers that could find time for an interview were on the other hand well prepared and

have been of great help. One limitation that follows directly from the lack of time is that the project only covers research at NIVA. With more time and resources the research could have covered the researchers that are working on the rest of the hospital and maybe even other hospitals. The result could have been a system that covered several more medical researchers. That work is on the other hand not done so it is hard to tell if it would have made the system better for our clients.

Another limitation partly depending on lack of time but also on the goal with the course is that the system in its final version only is presented as a prototype without any actual functionality. The main purpose of this project has been to perform the research in order to find out the needs, and the interests for a computer based support, and then present our results. To make a fully working system a database would need to be created containing all previous research reports. Furthermore, information about all researchers at NIVA would need to be collected and presented with pictures on the web page.

A final limitation is that the present systems on the hospital are not prepared for some of the suggested solutions. An example is that the researchers automatically could be served with data concerning patients that are of interest for the research project. In order to do that in an efficient way the patient journals should be computerized. Since that is not the case, no information will be presented on the web page.

2.3.2 Method

After receiving the task, the group had meetings where the meaning of the task was analysed and a decision about how to work was made. Some information about NIVA was collected both from the Internet and through visiting the unit. After two meetings with some of the staff at NIVA the group discussed what the client was looking for and how to make something useful from these thoughts.

The choice became to make some kind of homepage for the researchers. Different functions on this should help the users to better communication and accessibility among the researchers at NIVA. As the communication works better, the efficiency would increase. The idea was mainly to display information about the researchers and the projects they're working on. This would eventually lead to cooperation and better understanding between research groups.

To get a better final product the group decided to work with iterative user evaluations of prototypes. This technique gives the users more influence in the development of the products user interface and what functionality that should be included. The first prototype was made based on our own ideas about what the homepage would look like. This first prototype was simple and consisted only of sketches on pieces of paper. One of the ideas for the first prototype was to make some kind of forum where scientist working on the same project could write questions and discuss different things concerning the project. If they are working in different places and if they have trouble getting hold of each other this could be a good way to communicate. There was also a discussion for the first prototype to have some kind of security to protect work from being read by unauthorised people. This could be helped by personal logins for the users. A further thought about the content on the homepage was that it should have space to put different data, tests and eventually some part results from the project.

To proceed towards a useful prototype the group decided to make interviews with the personnel who would use the possible future system. In cooperation with Elisabeth Ronne-Engström, the group chose 11 NIVA researchers to interview. From the interviews we expected to find out more about how the work at the department is being carried out, what

kind of information and functions that would be of importance and use on the homepage. The interview objects worked either with laboratory or clinic research and were either upper graduate students or scientists.

To get some feedback on the prototype, every interviewer had a drawing of the prototype that was shown at the end of the interviews. The idea of the sketch was that the interview object should feel free to make changes and draw on the prototype. This was encouraged by the interviewers and documented for further use when making the second prototype.

As some of the planned interview objects were not available or very hard to get hold of, the number of interview objects was decreased from 11 to 7. However this was considered enough as the answers were considerably coherent and the information received was enough to change the prototype into a more suitable solution from the client's perspective.

Using the summary of the interviews, the first prototype was evaluated and changed into a second edition. This edition had no forum, as the concerned employees are working very close to each other and it is more convenient to speak with the person next door than to write in a forum. The space for sharing information about the projects was also unnecessary and was therefore removed. The result of these changes became a second prototype, more like an information site for the researchers.

To get the researchers opinion on the second prototype an electronic questionnaire concerning the content was constructed and sent together with the second prototype to the already known interview objects. This time the prototype was made as a working homepage so the interview objects would be able to navigate in the interface and get a feeling of what the working prototype would look like. With this ability to navigate in the prototype, the interview objects were asked to evaluate different functions on the homepage on a scale from 1 to 5. The score 1 meant that no one would probably use the function and 5 meant that it was probably very useful. The people answering the form were also asked to come up with ideas that would improve the prototype. The answers from the forms were summarised to be the new guidelines while making the final prototype.

2.3.3 Result

The interviews

The interviews can be summarized as:

- The communication between the research groups in NIVA isn't very good. Most of the researchers wanted something that made their knowledge of other projects better. Ideas about a webpage with ongoing projects were discussed and became a part of the solution.
- To increase the communication and knowledge of other projects and researchers, an idea with an individual page for each scientist came up. On that page there should be some information about the specific scientist's ongoing and finished research and contact information.
- A request about a work schedule for each researcher came up during this time. The reason for this was that there was no trouble-free approach to see when a specific person works or not.
- One of the questions in the interviews was about collecting patient data on the website and that idea was not so popular, much because of the security issues

that came up. Most of the people asked thought it was easier to go to the department and ask the personal or look at the computer in the unit.

- A common opinion about how the page should be updated was to use a webmaster. Much because of the lack of time each researcher has. The people asked felt that the page needed to be updated often.
- The use of a forum for the scientist was dropped. The feedback that was received implied that there were often no big projects that took place in NIVA. The project group consists of often two to four persons and they often meet every day, which made the forum not useful.

Questionnaire

When the second prototype was complete we wrote a questionnaire. In the questionnaire there were some questions on each part of the new webpage. The number of questionnaire answers that came back were not that many which made it difficult to see if any specific parts were liked or disliked and there for kept or not.

In average the reactions received were positive. Here are some of the comments received:

- Good with a place where all the links to some researcher's pages are collected. Could be extended with more internal links.
- The calendar and notice board was popular. Every one can use it and announce meetings and important things that come up.
- The information page of the researchers could be extended even more. Could sensitive with information on specific researchers with regard to their research.
- The page with the work schedule came out with mediocre results. One comment was that there exist already so many schedules.
- Uppsala University or the institution for neuroscience is never mentioned on the website. Perhaps they should be, because they are a big part of the research part.

2.3.4 Prototype

We have been working with two different prototypes. The first one was made as simple sketches on pieces of paper. By having the design on pieces of paper we were able to encourage the people we interviewed to give us direct feedback on the first ideas we had in mind. This turned out to be a very good method and we received many valuable comments.

In the first prototype our main idea was to have some sort of community with researchers and research projects having their own pages. Our thought was to make the pages easy to update so that each researcher could update their own project page. Each project page was supposed to have a calendar, a link page, a discussion board and a page where the researchers working with the project were presented.

However, this was not what the people we interviewed had in mind. They where not interested in updating their own pages, and they thought that it would be unnecessary to have a calendar and a discussion board for each project. This was very useful information for us as we constructed the next prototype.

The next prototype was made as a simple webpage. No functionality was implemented since the purpose of the second prototype was to show the structure and design in HTML.

The design was constructed to resemble both the graphical profile of Uppsala University and the graphical profile of Uppsala Akademiska Sjukhus. We decided to use the left marginal as a menu, as recommended from Uppsala University, but instead of making it red we wanted to have the hospitals blue colour. This made the logotype of Uppsala Akademiska Sjukhus fit in very well with the design. Moreover, all the links on the webpage are blue, all text on the webpage is black and the background of the webpage is white.

The prototype has a first page that consists of:

- Links to present research projects
- Current information from the calendar and a link to the complete calendar
- Notice board
- A menu

Anslagstavlan
Doktor Udo Brinkman är nyanställd på avdelningen från 1/12-03. Han kommer närmast från Schwarzwaldklinik i Tyskland. Vi hälsar honom varmt välkommen.
Kom ihåg att anslagen för Wallenbergfonden ska sökas senast 7/12-03!!
Anmälan till Julbordet görs till Elisabeth under vecka 49. Kostnaden är 100kr.

Pågående forskning
Följdsjukdommar vid pulsåderbräck
Elisabeth Ronne-Engström, Mats Johansson
Hjärnans kemi under och efter primärvård av skallskador
Elisabeth Ronne-Engström, Carolina Samuelsson
Följder av vård efter skallskador
Klaus Brinkmann, Udo Brinkmann

Kalender
3/12-03 Seminarium "Blodets väg genom hjärnan och vice versa" hålles av professor Baltazar från KI, kl 14:30 i Hörsal 2.
7/12-03 Deadline för ansökan Wallenbergfonden
16/12-03 Öppet hus på Neurokirurgen
» Se hela kalendern

The prototype's menu that is seen on every page consists of:

- The logotype which is a link back to the first page
- A link to a presentation page for all the researchers
- A link to a work schedule page for the researchers
- A link to a page showing all previous research projects
- A link to a link page
- A simple search function and a link to an advanced search page

AKADEMISKA SJUKHUSET

Forskare på avdelningen
Tjänstgöringsschema
Avslutad forskning
Länkar

Sök

Sök

» Avancerad sökning

A
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Har
Vi f

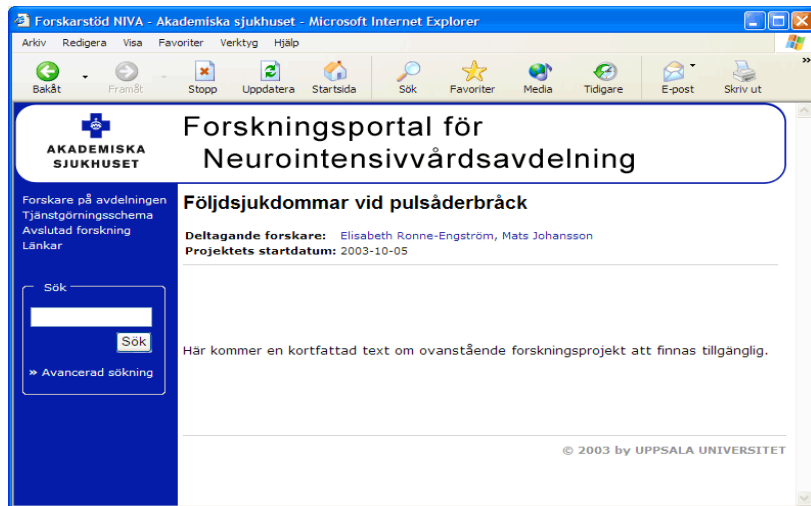
Kor
ser

Anr
Kos

P
Föl
Elis

The research project page

This page shows the title of the project, the name of the researchers and a link to their personal presentation page, the start date of the project and a brief description of the project.



The presentation page for each researcher

Each researcher has their own presentation page with contact information, education and research history and a work schedule.



The works schedule page

This page shows an overview of the researchers work schedule. To get more detailed information about each researchers work schedule, each name is a link to their presentation page.

The screenshot shows a web browser window with the title 'Forskarstöd NIVA - Akademiska sjukhuset - Microsoft Internet Explorer'. The page header includes navigation links like 'Arkiv', 'Redigera', 'Visa', 'Favoriter', 'Verktyg', and 'Hjälp'. The main content area is titled 'Forskningsportal för Neurointensivvårdsavdelning' and features a search bar on the left. The central part displays a 'Tjänstgöringsschema:' (Service schedule) for researchers: Elisabeth Ronne-Engström, Anders Levén, Per Bondegård, Lars Hillered, Mats Johansson, Carolina Samuelsson, and Tim Howell. The schedule is a grid with columns for weeks v. 47 to v. 4 and rows for each researcher. The cells are color-coded: green for 'Heltid' (Full-time), blue for 'Deltid' (Part-time), and red for 'Ledig' (Vacant). A legend at the bottom right explains the color coding. The footer contains the copyright notice '© 2003 by UPPSALA UNIVERSITET'.

The previous research projects

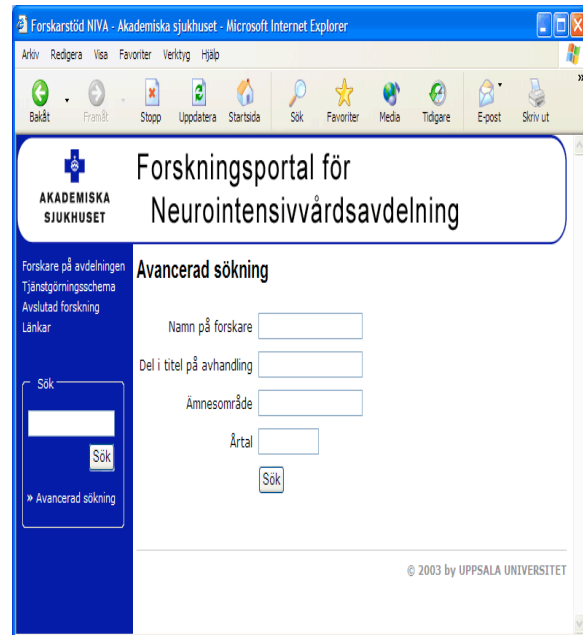
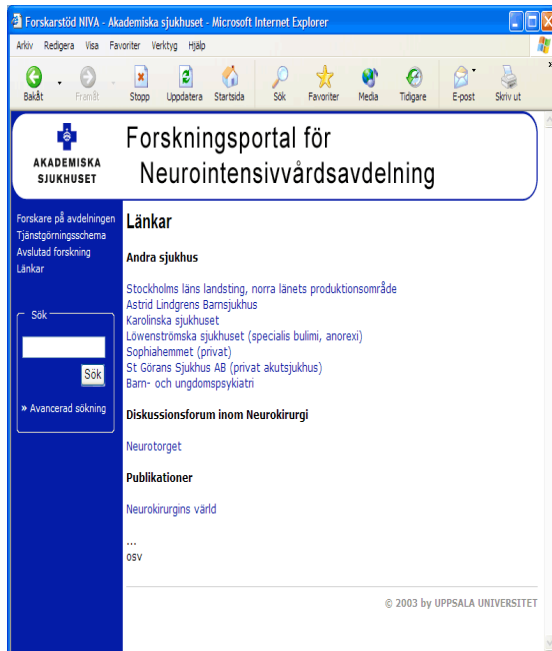
This page will show all the previous research projects sorted by title of the project and possibly by category of research. From here it will be possible to select a specific project and read the entire research report.

This screenshot shows the 'Avslutade forskningsprojekt' (Completed research projects) section of the website. It includes a search bar and a list of projects. The text below the search bar reads: 'Här kommer det att finnas en lista över de forskningsprojekt som avslutats på Neurointensiven' and 'Exempel på avslutade forskningsprojekt'. The footer contains the copyright notice '© 2003 by UPPSALA UNIVERSITET'.

This screenshot shows an 'Exempelrubrik på avslutade forskningsprojekt' (Example title for completed research project). It provides details for a specific project: 'Deltagande forskare: Elisabeth Ronne-Engström, Mats Johansson', 'Projektet påbörjat: 2001-10-05', and 'Projektet avslutat: 2002-05-07'. Below this, there is a search bar and a text prompt: 'Här kommer eventuellt hela forskningsrapporten att finnas tillgänglig. Är detta bra eller skall endast ett utdrag ur rapporten publiceras? Kommentera gärna i frågeformuläret.' The footer contains the copyright notice '© 2003 by UPPSALA UNIVERSITET'.

The link page

This page will consist of links that are useful and interesting.



The search page

The advanced search function will make it possible to search for researchers, titles of research projects, topics etc.

2.3.5 Conclusion

During the duration of this project the group has had a very constructive dialogue concerning the methods of collecting information as well as how to solve problems that came up during the work.

After the first interview it was clear that there was a need for some kind of computerized information support among researchers. With the help of the first prototype and the answers of the interviews a second prototype was developed. This prototype was more of a database and a medium for common information on the unit than a solution for internal communication. The research-groups at NIVA are simply too small to need help with internal communication between individuals. On the other hand there existed a need for a place to find basic information about other researchers and research projects. There was also a need for a forum to spread information to all the other researchers at the same time

According to the answers received from that questionnaire the clients do need a solution of the kind that has been developed. The answers were very encouraging and really showed that the last prototype is a good ground to build a real system upon. The answers on the questionnaire show that the prototype matches the need of the researchers. The reasons to why the needs for the final system look as it does are many. First and for all the present work procedure among the researchers on NIVA, which include close personal contact with the closest research team and the unwillingness to type several part reports only for presenting on the Internet. No forum to discuss with other people on NIVA was needed on the Internet. If anybody wanted to talk to someone they said that they found it easier to contact that person in

another way. Another reason is that Internet already provides a lot of services such as discussion forums and research database. The main issue that needs to be covered is therefore a forum that presents internal information. Especially the younger researchers are in need for a system that can work as orienting intro help. One example could be to inform them who they may ask about specific issues. That is answered by a detailed presentation about all the researchers.

The problems that has arouse during the project have been solved without disagreements in the group. For example, the project task was not defined when the course started. That was solved by contacting NIVA and discussing possible subjects, until a satisfying project was found. The lack of time and the problems to get appointments with some of the researchers were partly solved by careful preparations before the meetings. Thereby it was possible to receive enough information from fewer researchers than first estimated. An example of the preparations was that the interview questions were form in a way that should encourage the researchers to present their own ideas for what they needed in the system. By testing these ideas on other researchers that were interviewed it was possible to make small iterations within the first iteration. The proposal of how the system should look should give a good idea of what a computer based system for the researchers should look like. In order to make this solution work properly a web master is needed. Without a web master the system will not be updated as often as needed. That would decrease the use of the webpage a lot.

3. Psychosis and Rehab – Description of care unit

Psychosis and Rehab is a unit for care of patients with neuropsychiatric disturbances, especially for those with ADHD. Psychosis and Rehab consists of two subunits and their full names are the Psychosis clinic and the Rehabilitation clinic. The members of the unit work as a team and their major duty is to diagnose the patients who come to them with admission notes from other care units or those who have contacted the team directly. When they diagnose a patient they start with a screening of the patient's life situation, of problems nowadays and during school time. Then they set up a meeting with the patient where her/his whole background is discussed together with other parameters such as current employment, social situation and physical health. The patient will go through different tests, for example with the purpose to find out about their reading and writing skills, and the team members also interview other people close to the patient in question. At last the team has a conference where the results are being discussed and the diagnosis is finally made. If a person is diagnosed with ADHD, the team suggests different kinds of treatments depending on the actual case. Some get a drug-based treatment only; others get drugs in combination with help from an occupational therapist.

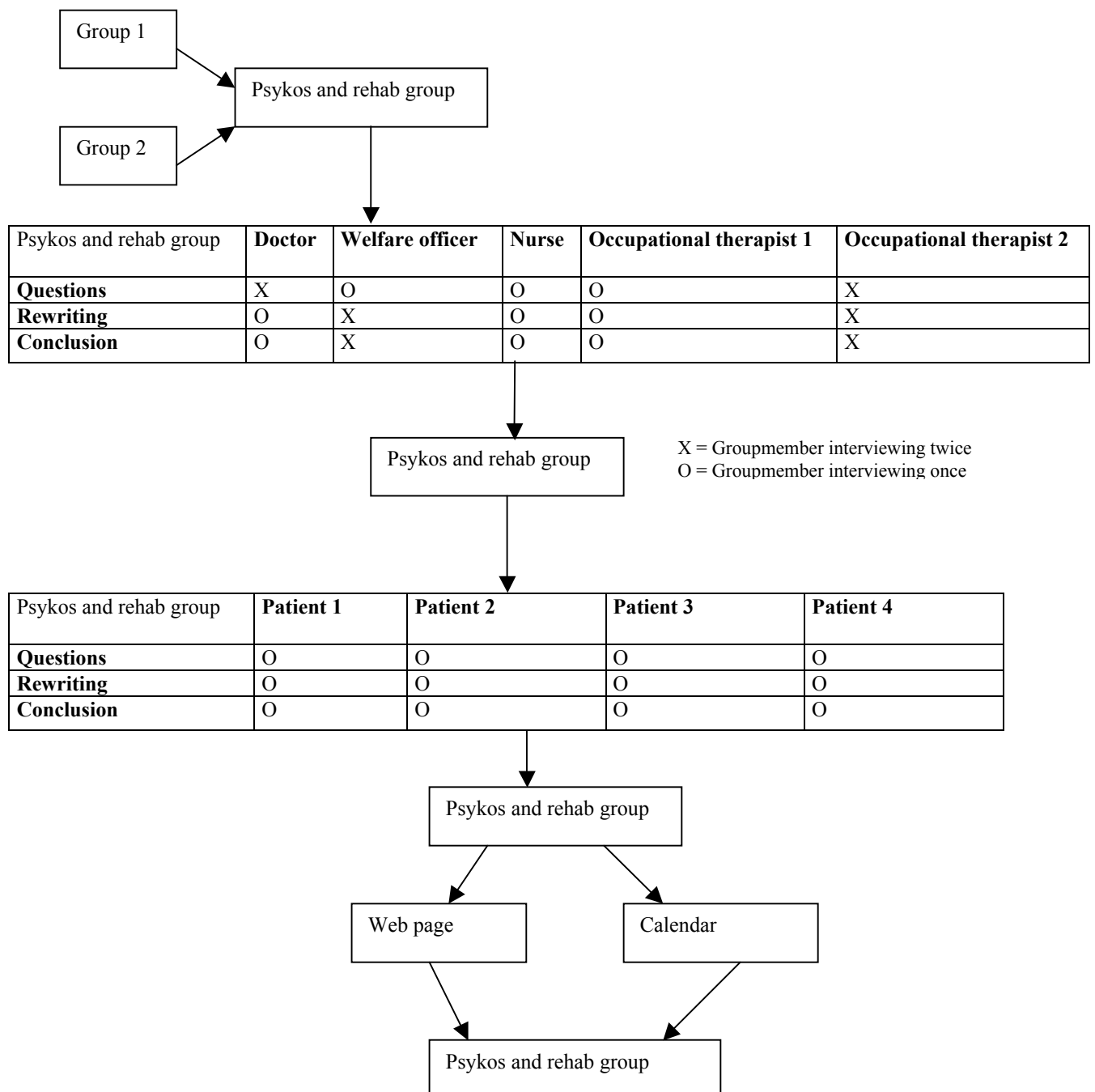
ADHD

ADHD is an acronym of Attention Deficit Hyperactivity Disorder, hence ADHD is a state of mind characterised by reduced attention and hyperactivity. To be diagnosed ADHD, these problems must have been significant since childhood, although with time, the symptom can change and find other ways of expression (www.akademiska.se/adhdvuxna). The major symptoms through out life are impatience, restlessness, inattentiveness, impulsiveness and reduced organising ability, which for example gives the person difficulties with completing tasks, but also problems with sleeplessness (www.lul.se/hoh/adhd).

Organisational structure

Public health care units all come under the supervision of the county council. The university hospital (Akademiska sjukhuset) in Uppsala is such a unit, and within this unit (i.e. hospital) you will find another subunit, the psychiatry centre, which in turn contains five other sub clinics; the universal psychiatric clinic, the drug addict clinic, the psychiatric clinic for seniors, the psychiatric clinic for children and youth and the psychosis and rehabilitation clinic. Within this last enumerated clinic, we finally find the Psychosis and Rehab team in question.

There are seven people working in the Psychosis and Rehab team; one nurse, two psychiatrists, one welfare officer, one occupational therapist and two psychologists. There is only one full time deployment for the team's work, which is undertaken by the welfare officer (see schematic view below).



3.1 Psychosis and Rehabilitation

3.1.1 Introduction

The assignment for our group was to develop an aid for persons with ADHD to help them with their everyday life. When the project started there was no specification about what kind of aid that was supposed to be developed. On an early stage of the project we decided to base our work on an idea about a portable calendar and a virtual meeting place by developing a prototype of a portable computer with calendar functions and a website called "The Cafe". The idea was appreciated by both staff and persons with ADHD, and we decided to try to develop such an aid.

3.1.1.1 Purpose

Many persons with ADHD are having problems with organizing their time. They also have problems remembering both appointments and reoccurring events in their home such as cleaning. To assist persons with ADHD we decided to develop a portable calendar that could help them to plan and remember their appointments and other important things in their everyday life. We also wanted to consider the conditions of persons with ADHD in every step of the design to make the calendar as adapted as possible to their special needs.

The purpose with the website is to facilitate for people with ADHD to live their everyday life. This is accomplished by creating a forum for the people where they can share experiences with each other. Experiences that have helped people with ADHD to cope with their daily life and that might do the same for other people. The forum shall be presented in a way that is appealing, logical and easy to understand since many of the people in focus have problems with reading long texts. Our hopes are that this project might be the starting shot to create a meeting point for people with ADHD that can help them live their lives. We have stressed the collection of information and the analysis of that material to be able to make the design guidelines for our website.

3.1.1.2 Limitations

The objective was to help people with ADHD in their everyday life, since the need for assistance is different for all of these people we decided to limit ourselves to the most general problems. In the development of the calendar we focused only on the user interface and what functions that should be available. We choose not to program anything and not to make any decisions about hardware or technical solutions for communication and synchronization with desktop computers. However we made some considerations on what properties the hardware should have. We also had the screen size of the hardware available in mind when we designed the interface.

We have a limited time to spend on this project since it is a half-time course, which runs from September until December. Since collecting information is the base for our website, most of our time was put into this. We have not been able to solve all the technological challenges and create a website ready to use due to lack of time and relevant technical knowledge. Instead we have attached importance to the design of the website since an appealing, logic and easy-to-use website has been requested by the people we have been in contact with. Our careful collection of information makes it possible for someone else to finish the technical features of the website using our design.

We have developed the website and the calendar with focus on adults with ADHD and have not taken children with ADHD into consideration since the problems we would like to solve are most likely to occur in the daily life of an adult person.

3.1.2 Method

We started as two groups working with ADHD. We decided to do the interviews together to start with. We had not really got a strict description on what we should do in our project. The first step was an idea for a solution to help ADHD-patients. We also wanted to know more about how ADHD affects you, therefore we decided to meet the only person that works fulltime with the patients, one of the welfare officers. The meeting with her helped us to find out what our two parts in the project would be about, the website and the calendar.

The next step was to conduct interviews with the staff and the patients. We wanted to start with the staff so we could get some information about what they thought we would ask the patients and how we should interview them. We divided the group into four subgroups with three people in each. At least one from each start group where divided into every interview group so we could continue with the projects separately after all the interviews. We also had both males and females in each group. The three people in each interview group had different parts in the new groups.

The *question group* wrote the question formulas. They first met to discuss the questions for the interview with the staff. Every interview-group then added their specific question for the staff member that they would interview. The patient interview questions where written after all the staff interviews where put together so they could regulate the questions after the staff's advice.

The *rewriting group* wrote down the interview after they had listened to the tape with the recorded interview. There were different strategies for doing this, some wrote the exact words and some wrote a compiled version.

The *conclusion group* went through all the interviews and compiled one each. They then discussed the most important things from all interviews and put it together in one report.

After all the interviews where made and compiled we had a new meeting where we decided who would work with what. It sorted it self out really good and everybody was able to work with the part they wanted. The new two groups worked with the different parts separately, but we held meetings during the time where we showed each other how far we had got and we gave each other's prototypes criticism.

When the prototypes where almost finished we met the patients and the staff again to make an evaluation. We let them test the prototypes and give us comments. After evaluating the prototypes we made some small design changes. All the comments we got and changes that should be done are written in the report. These changes can be done later since we do not have enough time for it.

3.1.3 Result

3.1.3.1 Conclusion of interviews with staff

The ADHD-group consists of staff of different occupations in medical care. To gather information about the disability and the diagnosed patients, from a professional view, interviews have been conducted with five of the groups' members: one doctor, two occupational therapists, one nurse and one welfare officer. They all have different tasks to perform and thus the whole group contributes in making the diagnosis of a patient. An

occupational therapist helps a patient with planning, structuring and organizing life. The only person working full time with ADHD is the welfare officer, who interviews the ADHD-patients and their relatives, while the rest of the group also is working with other types of disabilities, like Aspergers' and autism.

Usually, the process starts with the patient making an appointment after being given a referral from a doctor. The patient meets the whole ADHD-group for an "ADHD-screening", which means answering questions about possible problems and being tested for drugs. If necessary, the patient meets the doctor and the welfare officer at a later occasion, to shed some light on childhood, employment, social situation and health, to take a number of tests and to test writing and reading abilities, which are normal difficulties for these people. After this, the group holds a conference to make a diagnosis; the patient is informed and offered help, support or medication. The patients treated are aged from 18 to 50 years old. Mainly, they need help organizing, structuring and matching time and activities. It is just as important to get help remembering and getting started with an activity, as to get help scheduling a sufficient amount of activities. ADHD-patient is easily bored and therefore need to be presented information in an attractive and stimulating way. They also need to get some kind of response and reward for actions they perform. An alarm for remembering an activity is something many patients ask for.

Most ADHD-patients have computer skills and their interest for computers is above average. Therefore some form of technical device is often used to help them overcome their problems. Mobile phones, computers, palm pilots with electronic calendars serve as reminders for activities, like taking medication and appointments. Since the disability affects patients in so many different ways, some of them need more help than others. Over all, the staff is very positive towards any kind of IT-based help that can help patients get a better hold on their life. It is important to remember that some patients tend to spend too much time in front of the computer, which can make them forget about time and other engagements.

The ADHD-groups' opinion, regarding our two different projects; the calendar and the advising Web site, is positive. Concerning the calendar, the staff agrees that it is something patients have been looking for. The calendar could be multifunctional to help patients save time, serve as a link between patients and ADHD-group for booking appointments, and be portable for direct access. Other features could be colour coding to distinguish activities from one another, and rewarding functions for performed tasks. The interviewed staff thought that a web site where you can share your experiences and give others advices about how they can make their daily life a little easier, would help these patients. They also thought it would be good if the staff could give their advices. To be suitable for the patients the web site should consist of as little text as possible. This is because they get bored easily and it is also common to have dyslexics if you have ADHD. The site should look fun and exiting and have a lot of pictures. This is also because they often are restless. Since some of them also have dyslexics and they want everything to happen as fast as possible it might be a good idea to have a voice chat. The web site has to be easy to understand.

3.1.3.2 Conclusion of interviews with ADHD-patients

Who knows better what life is like for ADHD-patients and which problems they are struggling with every day than the ADHD-patients themselves? Therefore five persons, diagnosed with ADHD, were interviewed. The patients were over 35 years old and had all been diagnosed recently. Some of their problems were quite different, often depending on if the patients also were diagnosed with other related disabilities. In spite of this, it was still possible to extract general issues. These problems concern finishing activities, hyperactivity leading to fatigue, remembering things, under stimuli, dyslexia, keeping several things in

mind at the same time, expressing thoughts leading to misinterpretation, interpreting other people, organizing activities, controlling economy including paying bills on time, planning time and showing up on time etc. The ADHD-patients are therefore in great need of something to help them with these problems.

During the interview, the patients were asked to think of and give examples of possible IT-solutions to their problems, and then to give feedback the calendar and the advising web site. The conclusion drawn from their answers concerning to the calendar, was that they needed help with planning and reminders for taking medication, attending meetings and pay bills. A message could, for example, notify the patient about a meeting 30-60 minutes ahead. For these requirements to be applicable, the calendar ought to be on a palm pilot, easily handled with a possibility to synchronize with computer. A calendar has to contain schedules for planning with different colours, to-do-lists with a possibility to mark a performed activity, views for days and weeks, and some alarm for important activities. The advising web site could serve as a meeting point for patients. Information about the disability can be present, but links to existing sites are generally assumed to be preferable. It should be simple, with easily read texts, colourful pictures and animations, practical advises, fun and exciting design, and colour symbolizing different topics. A chat would be a nice feature.

3.1.3.3 Comparison

After interviewing both members of the ADHD-group and the ADHD-patients, it can be concluded that the staff has a pretty good picture of what life is like for the diagnosed patients. Problems and situations that arise with the disability are described in the same way by both parties. The only big difference that can be spotted in the interviews is that the staff would like an electronic help device to also serve as a connection between them and the patients, to help them in their work.

ADHD-patients need help planning and organizing their everyday-life, so that they can be able to function in society. Even though different patients have varying difficulties, there are problems they all need help with, and this is where focus is to be put when developing IT-based help.

3.1.4 Website Prototype

3.1.4.1 Method

The making of the prototype started with a discussion where the results of the interviews were analyzed. From that information we decided which pages should be included in the web site. It resulted in the following parts:

- A starting page where the project is presented.
 - “Suggestions and advice” – Tips & råd
 - “Voice chat “ – Röstchat
 - “Text chat” – Textchat
 - “My pages” – Mina sidor
- “Suggestions and advice” – Tips & råd
 - “Food” – Mat
 - “Housekeeping” – Hushåll
 - “Economics” – Ekonomi
 - “Health” – Hälsa
 - “Spare time” – Fritid
 - View advices on a specific topic.

- Under these parts of the site there another two sub pages with “All advices” – Alla tips and “Most recent advices” – Senaste tipsen.
- “Add own suggestions and advices” – Lägg till tips
- “Search for a given advice” – Sök
- “Vote on a advice” – Rösta

After deciding which parts to be included, the group implemented the common ideas into a layout on the black board. These ideas resulted in sketches on paper. The first part of the web site to be discussed and designed was “Suggestions & advices” – Tips & råd. The layout for the remaining parts of the web site was constructed in the same design. Since there was not enough time no prototype made for “Voice chat”, “Text chat” and “My pages”. These pages should follow the design of the other pages.

The members of the group had different ideas about the design of the web site. Three different prototypes were designed. The group combined the best out of each one of these to one final web page. The different prototypes were made in Microsoft FrontPage and Macromedia Dream weaver. The latter is based on a technique using frames, which the group thought was the best alternative, and this was also the reason why the group chose this software.

3.1.4.2 Considerations

The main thought was that the web site should be easy to navigate and understand. Another very important feature is that the web site should not contain too much pure text and not be too boring. This should be a fun web site, which you want to visit again often. As the result of the interviews indicates, color coding should be implemented.

3.1.4.3 Visualization

Starting page – Café

The first image you see on the web site is the Café page. From this page, you can easily access “Suggestions & advices”, “Voice chat”, “Text chat” and “My pages” via the buttons on the navigator bar on the left (Figure 14). The purpose of the design is to make the user feel confident while navigating the site. The user can choose to log on (Figure 14, bottom bar) or be an anonymous user. If you log on, you will have access to “My pages”, and you can also post suggestions. “My pages” mean that you can add and choose your own favorite suggestions. The user can be anonymous even if logged on. The reason for logging on before posting a suggestion is to give the web master knowledge about active users on the web site. This way, the web master can easily give a warning to users posting inappropriate suggestions.



Figure 14, the starting page.

The group decided not to post any direct information about the diagnosis ADHD. Instead there is a link to Attention's home page where the user can find more information. This decision is based on the criteria about posting too much text on the web site. There are already so many home pages about ADHD that there is no use making another one.

Suggestions & advices

This is the page that the group focused most on. It has the same design as the starting page so that the user can recognize it. The navigator bar has been modified with other buttons; this bar will remain the same in all sub pages (Figure 15, left bar):

- “Café” – Links back to the starting page.
- “Food” – Links to the advices on the topic food. The color related to “Food” is blue. Everything in connection with food on the web site will always be blue. On the button there is picture of food and this picture is also shown on sub pages related to “Food”.
- “Housekeeping” – Links to the advices on the topic housekeeping. The color related to Housekeeping is green. Everything in connection with housekeeping on the web site will always be green. On the button there is picture associated with housekeeping and this picture is also shown on sub pages related to “Housekeeping”.
- “Economics” – Links to the advices on the topic economics. The color related to “Economics” is red. Everything in connection with economics on the web site will always be red. On the button there is picture associated with economics and this picture is also shown on sub pages related to “Economics”.
- “Health” – Links to the advices on the topic health. The color related to “Health” is yellow. Everything in connection with health on the web site will always be yellow. On the button there is picture associated with health and this picture is also shown on sub pages related to “Health”.
- “Spare time” – Links to the advices on the topic spare time. The color related to “Spare time” is purple. Everything in connection with spare time on the web site will always be purple. On the button there is picture associated with spare time and this picture is also shown on sub pages related to “Spare time”.



Figure 15, the Suggestions & advices.



Figure 16, Add own Suggestions & advices

In the bottom frame of the web page, there are two buttons: “Add Suggestions & advices” – Lägga till tips and “Search” – Sök (Figure 15, bottom bar). The user will be redirected to a sub page when choosing “Add Suggestions & advices” (Figure 16, Add own suggestions & advice). The search function gives the option whether to search all topics or only one specified topic. In the main frame the top five suggestions and advice over all topics are shown. When adding suggestion or advice the user can choose what name to post. The purpose of the date is to show that the web site is up to date.

“Rating” – Betyg is based on the voting of a specific topic. After each suggestion, the user can vote by pressing the “Vote” button – Röst (Figure 17, Vote.) There are three different ratings of a topic, thumbs up, thumbs down and neutral thumb. The reason for choosing a system with thumbs instead of, for example a rating system based on numbers is that it in a way adds more fun to the web site with pictures. It also gives a more direct sense of the quality of the topic compared to a numbered scale. People associate the thumb up as positive while a scale from 1 to 5 doesn't say directly which number, 1 or 5, indicates the best rate. The posted final rating, is calculated by the number of thumbs up minus the number of thumbs down. The rating system also has a filter function ensuring only good topics to be posted. The topics badly marked will automatically not be posted on the top lists. Of course there will be a “top filter” scanning the added suggestions & advices for bad words and other inconveniences. There will also be a logging system controlling that no user votes more than one time for each topic.

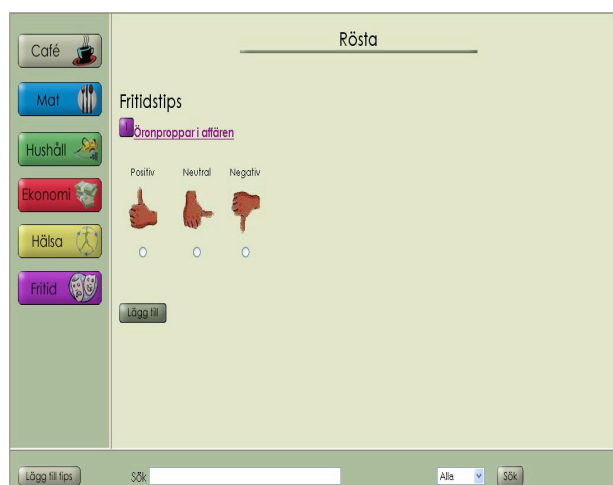


Figure 17, Vote.



Figure 18, the starting page for one of the five main subjects – “Spare time

Main page for a topic

The sub pages for each specific topic have the same design and layout. The only difference from the “Suggestion & advice” page is that all topics are of the same topic. In the main frame there are two new buttons (Figure 18):

- “Most recent topics” – Senaste tipsen. By pressing this button the user will be redirected to the sub page showing the five most recent topics arranged by date. (Figure 19, Latest advices)
- “All advices” – Alla tips. By pressing this button, the user will be redirected to the sub page showing all topics in the specified subject. There will only be five topics shown together. The reason for this is to minimize the amount of text. Instead, the user can navigate through all topics with two buttons: “Backward” – Bakåt and “Forward” – Framåt or directly via accessing a specified index page 1 to 6. (Figure 20, All advices)



Figure 19, Newest Suggestions & advices in topic spare time.



Figure 20, All Suggestions & advices in topic spare time.

View a specific advice

This sub page (Figure 21) shows detailed information of a specific advice. The user can read the advice, see how others have voted on the advice and vote. The voting is shown as different amounts of the different thumbs.



Figure 21, View information about a specific topic.

3.1.4.4 Evaluation

To see if we were on the right track we made an evaluation of our prototype. Unfortunately we did not have chance to meet as many patients as we wanted. In spite of this, we feel that we got a good understanding of how the web site will be received by the patients. We presented our prototype for three employees and four patients. These people were the same as we interviewed in the beginning of the project. We showed them our prototype and asked them to have a look around and tell us what they thought about it. Since ADHD patients do not get a lot of attention and there is no technical help that exist in present these people are very happy that someone gives them attention and tries to help them. It was therefore hard to get criticism from them. Both staff and patients thought that the idea of the web site was very good. Everyone understood how the logic behind the web site and had no problems getting where they wanted. They thought that the web site looked nice and professional. It was not too boring and not too childish. The idea to vote on the advices seemed positive. One of them thought that it would be nice if the web site changed more often, maybe we could show what is happening in different cities for ADHD patients. It would also be nice to see if someone else had logged in on the web site. One good idea that came up was to add the ability to add an advice under another advice if they are connected. The staff was a little bit concerned about how to handle the usernames and passwords. There might be restrictions from the hospital. Even though we had the voting to eliminate bad advices the staff thought that it might be good to have someone of them to go through all the advices.

3.1.4.5 Improvements

During the evaluation we did not find any major issues that needed to be changed. But we did find some things demanding more research and things that should be added. The main idea and construction of the web site does not need to change. The design is also good and does not need any changes. The question about how to do with the usernames and passwords need some more research. We tried to avoid the solution where someone from the staff has to go through all the new advices before they are posted on the web. That might be a solution that works in the beginning, but what if a lot of people use this web site and fifty advices are posted everyday? One idea might be to start using just the voting combined with a filter that filters advices using bad words to filter out the advices that should not be posted. Another idea is to start with letting someone from the staff go through all the new advices and if they get to many after a while this has to be solved somehow. It should also be considered if it is possible to make the web site change more often. The ability to add comments or a advice that is connected to another advice should be added. Since the prototype is not complete the text and voice chat has to be added as well as "My pages".

Aspects from the presentation session

We came across both old and new aspects of the website when we had our presentation for the staff. One important subject that we discussed was who should be responsible for the website and the maintenance of it. This should be a person that works in close contact with the patients and have some knowledge about IT solutions. Another aspect was the security of the website. It is important that people can feel safe using the website, which makes functions that prevent unauthorized people access essential. We also spoke about how the product should be introduced to the patients, it is important that someone will help them to understand how the website work and show them the use of it. We also discussed the accuracy of the website's name "Café". To find out whatever this name is a good or a bad idea, a thing to do could be to go out and ask the people that are going to use the site. A discussion about an extension of the website also came up during the presentation session. The question was whether the site only should be for ADHD patients in Uppsala or for the whole country. A

good solution would be if every region could have a site that is adjusted to that specific region. It would be a pity if only people from Uppsala could be able to use this solution. Policy issues from the hospital's point of view were also mentioned in terms of layout and colors. Should the website follow the policy rules for web pages, or could there be a way around these rules? The conclusion was that the website, although breaking the layout rules, could still be linked from a main web site within the hospital, as other external websites all ready are today.

3.1.5 Calendar Prototype

3.1.5.1 Method

We started by arranging several group meetings where we discussed and analyzed the result of the interviews. With that information we could start brainstorming about the design and functionality of the calendar. After that we had a long list with different functionalities prioritized, the ones that were most important and original and innovating were our highest priority. By drawing many simple pictures onto the blackboard we were able to get an overview how the calendar design would look like. And then we started to add more details to each view. Having all the views on the blackboard helped us design a uniform layout for the calendar. When we were satisfied with the sketches we took a photo print and started the design process on a computer. After designing a few views we sat down in the group and evaluated the layout, and made necessary changes and continued designing. We repeated the evaluation part several times to make sure that we were still on the right track. When all the different views were ready we printed them and used them to demonstrate our prototype.

3.1.5.2 Considerations

When developing an application intended for persons with ADHD some aspects are even more important than when developing standard applications. Since these persons have a shorter concentration span than most other people it is very important to have a user interface that is easy to understand and where the functions are very clear and logical. Another important aspect to consider is to make the application appealing and exciting so that it remains interesting to the user.

We wanted to be able to give the user a good overview over planned events, because of this we have a zoom function for the day view and a extensive use of color codes for different kinds of events. These color codes gives the user a good apprehension of what events are planned in a whole week without having to look at each day. A function that will give our application a higher interest for the user for a longer time is the ability to change the look of the application with the use of different available themes. This function could also be used to give the application a simpler interface where colors are reduced and simpler graphical elements if the user is disturbed by such graphical design. To easily navigate through the main functions of the calendar a menu-button is visible at the lower left. With the help of this the user can directly access the settings, the notepad or the to-do list.

3.1.5.3 Visualization

Day view

The main view is the first thing you will see when you enter the calendar, see Figure 22 below. From there you can enter different views of the calendar, either by day, by week, by month or by year. In the day view you see an overview over the whole day and the activities that are planned for the current day. The start and end times are shown at the left side. To see

more specific what activities that are planned in the next few hours you can click on the magnification glass and the interface will look like in figure 23, or if you want to see detailed information about one activity you just click on it and a pop-up window with the detailed information will be shown. From here you can either change or delete it. We chose to dim the smaller magnification glass because it can't be used in this view, but we didn't want to remove it because we had decided to have a uniform layout through of the calendar. To go to the next day you can click on the forward arrow or if you like to look on the previous day you click on the backward arrow. Figure 23 shows you a more detailed view of the day and also in a smaller time period, over four hours. It is also possible to scroll up/down to see previous or coming activities. If you want to go back to the previous view you click on the smaller magnification glass. Here we also chose to dim the magnification glass you cannot use, for the same reason as above.



Figure 22, Day view



Figure 23, Day view zoomed

Week view

The week view shows the activities that are planned for the current week. The fields that have no colour are free. You can change the week by clicking on the arrows. If you like to see a more specific view of some day, just click on a day and you will see the day view of that day (see Figure 24).

Month view

The month view represents the days and weeks of the current month. If you click on a day you will see a view for that day and the same goes for clicking on a week. Clicking on the arrows takes you one month forward or backward. We decided not to show the activities of each day because of the size limitation of the screen (see Figure 25).



Figure 24, Week view



Figure 25, Month view

Year view

As every other ordinary calendar there is a year overview. It basically shows you how the whole year is outlined. The functionality of the arrows is like in the other views, it takes you to the next or previous year (see Figure 26).



Figure 26, Year view

Add an activity

Step 1: Figure 27 is the view you are going to see when you add an activity. We have chosen to present an overview of the day on the right side to minimize the risk of overlap an already existing activity. You can choose the time period of the activity either by entering the time with the keyboard or by dragging the slides to the exact time. It is not possible to continue to the next step if you overlap an activity. Then you can choose between cancel or continue to the next step in adding an activity. If you choose to cancel a popup warning window will come up and inform you that if you cancel no data will be saved, and you can continue by either choosing yes for confirming or no for aborting the cancellation.

Step 2: First you have to choose what type of activity you would like to add by choosing one from the option list or by enter an own subject. Then you enter the description of the activity and the date and time when you want the alarm to go off. By checking the checkbox you

enable the alarm to give you a sound signal when the alarm is executed. Then you can either choose to accept and add the activity, go back to step 1 or to cancel. The cancel button works as described in step 1 above. See Figure 28.



Figure 27, Add an Activity – Step 1



Figure 28, Add an Activity – Step 2

Alarm

Figure 29 will be shown when an alarm is triggered. You can see the time and place of the activity. You can either choose to accept the alarm or you can tell it to remind you later, which Figure 30 shows. It will give you an option of either choosing one of the listed times or by entering another date and time. We decided not to show the date for an activity that is on for today, otherwise the date will be shown.



Figure 29, Alarm



Figure 30, Remind me Later

Doctor appointment message

When you receive an appointment message from a staff member it will tell you that she/he wants to book a meeting with you at a certain time. You can choose to accept or decline. If you decline you can enter a comment, which will be sent back. If this appointment overlaps an activity it will warn you and give you the option to change the time of the overlapped activity. This is done to remove the risk of overlapping activities. Accepting an appointment will automatically add it as an activity (see Figure 31).

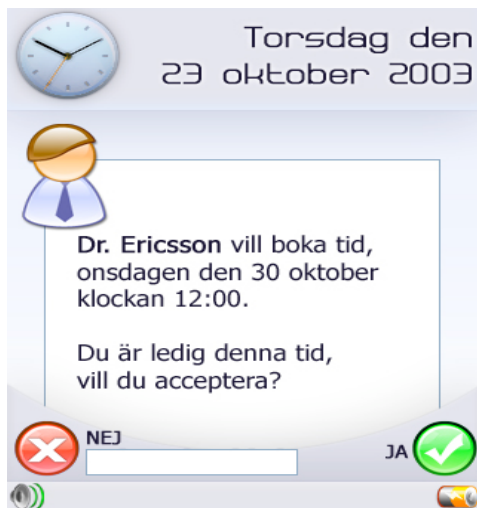


Figure 31, Doctor Appointment Message



Figure 32, Periodic Activity

Periodic activities

The periodic activities are colour coded so that you will recognize them easy in the day and week views. You can choose to add, change or remove periodic activities. If you choose to add, you will see a similar view as adding an ordinary activity (see Figure 32 above).

Step 1: To add periodic activities is just like adding an ordinary activity except that you choose the starting day of the activity and how often it reoccurs. We have chosen to have the same layout for adding a periodic activity as for adding an ordinary activity so the users will recognize and understand what to do more quickly (see Figure 33).

Step 2: As for adding an ordinary activity you choose a subject from the list or enter an own subject. The difference between periodic subjects and ordinary subjects is that the periodic subjects are associated with colours. This to make the periodic activities more easily recognized. Enter the text you would like to be shown when the alarm is triggered in the textbox (see Figure 34).



Figure 33, Add a Periodic activity – Step 1



Figure 34, Add a Periodic activity – Step 2

Main menu

In the main menu the different functionalities of the calendar are listed. You can choose between periodic activity monitor, notepad, to-do list, calendar and settings. The background becomes dimmed when choosing the menu to make it easier concentrate on it (see Figure 35).



Figure 35 Main Menu

Notepad

In the notepad you can add different notes and they are listed with the headlines in the first view of the notepad. To view a note you just click on it and it will appear. From this view you can change, delete or go back to the first view. From the first view you can also add a note by clicking on the add button (see Figure 36).

To-do list

A to-do list is like the notepad except that here you can list different tasks you need to do and that you cannot specify as an activity. A to-do task can also have a deadline for the task completion. You can choose a deadline when you add a task (see Figure 37).



Figure 36, Note Pad



Figure 37, To do List

3.1.5.4 Evaluation

The evaluation of the prototype was made when the first version was completed. It was carried out in such a way that the interviewees from the first phase of the project were presented with the prototype. During the presentation of the prototype the interviewee was asked what he or she was expecting every part of the calendar to do, and what he or she expected would happen when they clicked on different parts of the calendar. This was considered as a very important part of the evaluation because the calendar is intended to be as intuitive as possible. After that the intended functionality of the different parts of the calendar was presented, the interviewee was asked about what he or she thought about that as well. Other forms of evaluation, like for example written questions via e-mail, were also used, especially when it was hard to book an appointment with the interviewee.

The feedback from the interviews was mostly positive and appreciative. The few comments about things that the interviewees wanted to change were mostly things that were very easy to rectify directly in the prototype, without the need of any further development. The positive comments on the calendar prototype shown to the interviewees were mostly regarding the features and overall design. The interface, except for a few things, was easily understood by most of the interviewees and received a lot of positive feedback. The parts that weren't considered to be instantly intuitive, were explained by the interviewer until the interviewee understood. The parts of the graphical interface that got the most positive comments were the nice colours and overall look, the large and clear clock and date at the top, and also the week- and day-overviews. One of the features of the calendar that got especially good comments from almost everyone was the booking of meetings by text messages via a cell phone-connection. The person who wants to reach the patients doesn't have to spend a lot of time trying to reach them, and the patients can just agree to the appointment without the need to check in the calendar themselves another thing that was much appreciated by everyone was the ability to schedule recurring events. This was especially considered to help the patients a lot. Other features that were appreciated more than others were the colour coding of events, the possibility to click on a day in the week- and month-view to come directly to that day and the possibility to change events instead of first deleting them and then adding a new event.

There was some negative feedback and thoughts about how things could have been done differently regarding the functions of the calendar or parts of the interface. First it was the name of the part of the calendar that was called "Periodisering", where the scheduling of the recurring events is done. The word periodisering did not explain clearly enough what it represented. The interviewees all requested another, and clearer, name for that part of the calendar. Some interviewees didn't like the name of the "Start" button, instead the name "Meny" was suggested, and it was changed to that. The last part of the calendar that received some criticism was the alarm function, different sorts of alarms were requested, like different sounds for different events and a vibration function. The rest of the comments were mostly about minor additions to make it more like a paper calendar, like name-days and public holidays and minor graphical glitches.

3.1.5.5 Improvements

After the evaluation was carried through, some ideas that the interviewees had came up with were implemented directly into the prototype while others will demand some more development first. One idea was that when the text-message time-booking occurred, there would be some way to see the whole day's planning before answering yes or no. Other interesting comments were regarding the size and placement of the time in the day view. This is a problem that has a lot to do with the limitations of the present hardware in the current PDA:s. This will probably not be a problem in a nearby future, if and when this calendar will

be ready for production, the display and other necessary hardware will most probably surpass the hardware of today. Other features that haven't been looked into yet is the synchronization with other PDA:s and PC:s. This is probably an area where much work will be needed.

To further improve and adapt the calendar to the ADHD-patients more evaluations should be carried out with a larger group of ADHD-patients. This will give more representative feedback since there will be more representatives from the ADHD-patients with more diverse backgrounds and conditions. One problem that is approached here is that some persons won't have the same needs and wants as others. While some persons might want to be able to customize everything themselves, this will at the same time make the calendar too complex for others. The decisions for what way the project should go will probably also need a lot of research and evaluation. One approach to this could be that when the patient receives its calendar for the first time, she or he gets a brief education on the calendar and its features. At the same time the patient and someone from the staff together decide how advanced the calendar should be and what features each patient's calendar should contain. When the patient gets used to the calendar additional, more advanced, features can be added to the calendar in consultation with someone from the staff.

To increase the amount of people who want to volunteer for the evaluation of the calendar as the work continues, the calendar could be presented at the conference at Wiks slott in August. By judging from the response so far, there should be a lot more ADHD-patients who want to participate in the evaluation and developing process.

One possible approach to continue with this project, and doing something more of the work that has been done so far, is to let some students continue on this as a Master's thesis project.

3.1.6 Conclusion

3.1.6.1 Conclusions about the Website

We have tried to make a technical assistance for people that are diagnosed with ADHD. Through our investigations we found out that a web site could help them in their daily life. A web site suitable for these people has to be made a little bit different than ordinary web sites. Since they often feel restless, are easily bored and have problems concentrating the web pages have to look fun and exciting. They also have change often. The problems they might have also leads to the fact the web pages should not consist of a lot of text. The web site should consist of a part including advices that the patients can give to each other. The other parts should be two different chats – one ordinary text chat and one voice chat. We have made a prototype for a web site that can be very useful for people with ADHD. The prototype is far from ready and there is still a lot of work to be done. But we think that we have come far and that we are on the right track.

One problem we had was evaluating the prototype. Since all the people we talked to were so happy that something was made for them it was hard for them to criticize the work we had done. One solution to this problem might be to make two or more totally different prototypes. Then it might be easier for them to see what is good and bad in the different prototypes and compare them. They would also not have to feel like they were criticizing our work.

3.1.6.2 Conclusions about the Calendar

The facts that we have come up with from working in the calendar project, can be concluded in a number of areas. The initial phase was about collecting background information about the needs and problems in life for ADHD-patients. This gave us a solid starting point to proceed from and was the reason for the appreciation our first prototype received. Since we conducted

interviews with rather freely interpretable questions, we got a chance to have open discussions with staff and patients and therefore received information about problems that were not predicted. As the whole group developed the prototype together, a lot of ideas could be considered and evaluated more efficiently than if we had only worked individually. Every member of the group could contribute with their own experience and knowledge. The result from this kind of approach was a considerably thought through prototype.

To evaluate our prototype, we met staff and patients once again to get feedback and opinions. Since the evaluation was performed with the same persons as in the initial interviews, we believe that we got more valuable feedback than if we had presented our prototype to entirely new people. Staff and patients were already informed about the project and our ideas for IT-solutions on technical device and they had expectations on our results, which were more or less fulfilled.

We also got to experience that making interviews can be very time consuming. It is hard to find a time that suite both the one being interviewed and the students making the interview. Half of the time we got for the project was spent making interviews. The continued work making the prototype went a lot faster, but then it was time to evaluate and that also took a lot of time. Time was also a problem when the whole group held meetings. Since all of us are taking different classes we have totally different schedules and it was hard to find a time that worked for everyone. The group's hope for the future is the project will be continued somehow and that a web site will be up and running sometime in the future. We also hope that the research made for this web site could be useful in future projects for ADHD patients.

4. Comparison

Even though all groups were given different tasks, one can spot some common issues that all groups had to consider. Interesting to watch are the general issues present in most development projects, which connects the parts to one and other, and the specific issues that showed up in this project.

The similarities in the projects are interesting. Even though all groups have worked separately, they have had similar issues to handle and similar solutions. One example is the calendars that were developed with very different end-users in mind. One was developed for ADHD-patients and the other as a feature in a web page for researchers and PhD-students.

When developing the calendar for ADHD-patients an objective was to create a calendar that was as easy to use as possible and visually appealing. The objective was based on the fact that ADHD-patients have a low level of concentration and therefore the risk of ADHD-patients not using the calendar highly depends on its level of usability and attraction. An interesting thought is why this shouldn't be the objective when creating a digital calendar or any other software for users with a higher level of concentration. One of the reasons is probably that programmers focus on the functionality of the product hoping that this will be enough to motivate the use of the product. However, making a product visually appealing and easy to use can never be negative, whoever the user of the product is, and therefore this should be one of the main objectives when creating software.

The calendar that was developed for the PhD-students isn't a personal calendar in the same sense as the one developed for ADHD-patients. It is more of a note board containing the time schedule of the research staff and important dates, news etc. However, both groups would probably appreciate both calendars. For PhD-students it might sometimes take a lot of energy to try to keep one self updated on and reminded of all scheduled meetings, personally important dates and such. Here a personal calendar, such as the one developed for ADHD

patients, would fit perfectly in reminding the student in time what is about to happen in the next couple of days, for example. A more general, web-based, calendar could in some cases complement the ADHD patients' personal calendar with more general notes and support in everyday life.

Another example is "Café" – a virtual meeting place developed for ADHD-patients, which is meant to improve their communication possibilities with others in a similar situation. To be able to attract as many ADHD-patients as possible to "Café", and make them continue to use the website, it was important to create a fun environment for the meeting place. On one hand the creation of a fun environment could also be applied when creating the different sites for NIVA making them more attractive to use. For example the situation for relatives arriving at NIVA and ADHD patients are somewhat similar. For both groups it can be hard to concentrate, hard to remember facts and data and hard to focus and find interest in sitting down in front of a computer. On the other hand when dealing with serious matters it is important to give a serious impression. This doesn't mean that the two aspects can't be combined in a successful way. Although when creating the websites for NIVA the general layout rules of the hospital had to be taken into consideration which to some extent constrained the possibilities of making a more visually appealing website.

The meeting place has been a common feature both on the website for researchers and on the website for ADHD-patients. Both for PhD-students and ADHD patients there is here a possibility to discuss issues that arise in their day to day/work life and seek advice from others in the same situation. PhD-students and senior researchers are able to post advice to help new students find their way in the department at the beginning of their time in the department etc. Accordingly ADHD-patients can give each other advice about how to tackle problems in their ordinary life. Most people need advice, and have the need to communicate with people that are or have been in their situation. What differs in these two meeting places is the point of attraction and the reason for the user to continuously return to the page.

Below are discussions that emphasize some of the more general issues that all groups have had to deal with. These issues typically arise in most kinds of development projects. Products have to be maintained, they have to follow current laws, development has to follow some ethical guidelines etc. Since this project has been done for a hospital, consideration had to be taken for the fact that a hospital many times has its own guidelines when it comes to the issues mentioned below.

Administration

Most technical solutions demand administration to some extent. Information must be updated, new versions must be integrated, bugs must be fixed, and personnel must be educated. The list could be made very long. A system that isn't taken care of according to these requirements loses its ability of use, often in the long run because of changes evolving around the system that affect it in some way. How the technical solutions that we have provided are going to be administrated is an extremely important question.

At this stage there is no exact answer to this. As technical developers, the groups realized the need for administration and tried to develop solutions that didn't need great investments in money nor personnel. For instance the hospital is suggested to appoint a web master to handle updates on the various websites. The fact remains, technical solutions need administration and ours aren't exceptions.

Security

Security issues are very important and high security is a demand, in order to protect personal integrity, when dealing with personal information. Many of the groups chose to develop their applications within the hospital intranet to avoid having to handle major security issues, since this makes it harder for someone outside the hospital to access the information. Still, inside the hospital walls unauthorized access must be avoided and many of the groups chose log-in functions to handle that. Once again the administration issue rises. Someone has to distribute usernames and randomly generated passwords to relatives, patients and the staff. If for example patients are allowed to create their own passwords there is a risk that these passwords are easier to crack.

Legal Issues

Up to this point, the legal issues have been one of the most difficult aspects to consider, since juridical problems naturally lie in the hospital environment. A major part for all of the groups was questionnaires and/or interviews with patients and relatives. Normally prepared questions should go through an ethical control within a certain ethics group at the hospital, to be approved before being distributed to patients and relatives.

As already stated in the security discussion, most groups decided to develop their system inside the hospital's intranet, which results in "handing over" the security and legal responsibilities to the hospital IT-department. At future stages of the project these issues will have to be handled.

Policies

Many of the technical solutions provided in this project are web pages. One general issue, for most groups, was to decide how the web pages were going to be designed. The NIVA groups all chose to follow the hospital's rules for web page design. This due to the fact that all pages were going to be on the hospital servers, there was no way to go around the rules and change the design. The web page that was developed for ADHD-patients did go around the rules and have a special design. This was possible because the department of Psychosis and Rehabilitation has its own server and they can therefore decide what web pages or programs that they want to run on that server.

Ethics

Dealing with patients was a more complex question than we knew from the start. Not only because of secrecy rules in hospital environments preventing personal information concerning patients from being spread, but also because of the emotional situation of patients and relatives. Here the groups handled two very different kinds of situations. On the one hand, there were ADHD-patients that somehow already accepted their own situation and had learned how to live with it. While on the other hand, there were chocked relatives at NIVA with a very unstable and emotional situation. These technical solutions, developed to aid patients and relatives (and hospital staff) and to function as a complement to the human contact that is not always present, in some way gave both groups the help they wanted/needed. However, some of the patients had a hard time realizing the importance of their own rolls in the development process. Facts remain, when developing systems for people in difficult situations one must be prepared to handle the emotions involved in that difficult situation.

5. Conclusions

The purpose for this project has been to investigate as to whether technical systems could be an aid to the staff in the hospital environment at Akademiska sjukhuset. Four groups were given different tasks to solve.

All groups tried to use a user-centered approach to develop the systems. An idea about what users expected from the systems was defined with different kinds of interviews and questionnaires. Their expectations and needs for the system were analyzed and five prototypes were presented, even though the latter was not the main goal. The prototypes were developed through an iterative design process. The technical features of the prototypes have not been the important part, but *how* they should be developed to meet the users needs and what they should look like. The prototypes were defined but no functionalities have been implemented.

The vision was to implement all five prototypes and fully build useful technical solutions. In our investigation we saw the need for these applications and believe that they would facilitate everyday life for some people.

During the developing process all groups have encountered related difficulties like administration, policies, ethics, security and legal issues. Some of these obstacles could have been overcome by better planning and more time. Issues like these can probably be found in other environments as well, when dealing with technical solutions.

The prototypes developed were presented to hospital staff, patients and relatives and were well received and appreciated by a majority. This positive feedback will hopefully lead to complete implementation of actual systems.

This year's students concentrated on building a base for further development. The immediate steps on further development on two of the NIVA prototypes would be their integration with the QS system. More extensive changes to some of the applications would also permit their use in other hospitals. The integration of these systems with QS is a very complex process, seen from a technical perspective.

The prototypes presented for the ADHD-patients all seem needed. Future work for the Café webpage could be to fully develop and test it on a larger group of patients. After design iterations, the webpage could be used by all ADHD – patients in Sweden. Beside the webpage, a calendar was designed specifically for this group. None of the synchronization issues with desktops and other hand-held units have been handled this year. The calendar is fully designed but no functionalities have been implemented.

Working towards such a complex environment as a hospital was very interesting. All groups had to handle similar non-technical issues, as mentioned before. Legal issues and policies made the work more difficult. Having to handle all those issues was educational, since it is something we, as students, rarely encounter. During our time in the university, the technical issues have always been the most important. To have the opportunity of getting to know a real working environment truly enhance our understanding for how things work outside the academic world.

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