Graphical Guidelines for "Internet banks"

Subject: Computer Science
C-level Essay 10 points
Authors: Kristina Boltzius
Anna Johansson
ADP Final Dissertation
Tutor: Christer Rindebäck
Summary

Title of the Essay: Graphical guidelines for “Internet banks”

Authors: Kristina Boltzius
Anna Johansson

Acknowledgement: We would like to take the opportunity to thank our tutor for his dedicated support and help during our work with this essay.

Purpose of the Essay: The number of users of “Internet banks” is continuously increasing as more and more become aware of the possibilities offered. Therefor the demands of an “Internet bank” designer also increase to make sure the “Internet bank” is usable to as many different customers as possible is also on the increase. Many guidelines have been developed during the years to help designers to design usable graphical interfaces, but are they useful even when designing “Internet banks”? That is the question that we are trying to answer in this essay.

Target group: This essay is first of all aimed at the people designing ”Internet banks” and secondly to other designers within the area of Internet application design, to hopefully help them in making even better and more user friendly Internet applications. It can also be useful to students studying graphical Internet design.

Method: In the search for answers to our questions we have concentrated on the design of MeritaNordbanken’s “Internet bank” “Solo”. By using information in books discussing design of interface usability we have tried to find guidelines used in the design of “Solo” and from that evaluated whether or not they are used as intended. We have also used a test group to get a second opinion in the question of guideline usage. The test group was intended to give us insight into the usage from an independent user’s point of view. Our opinions were then compared to the users’, to give us an answer as to how the guidelines were used and if changes where needed to better support the design of “Solo”.

- 2 -
Table of content

SUMMARY ......................................................................................................................... 2

1 INTRODUCTION ............................................................................................................ 6

2 PROBLEM DEFINITION ............................................................................................... 6
   2.1 CONCEPT DEFINITION 7
   2.2 QUESTIONS TO BE HANDLED IN THE ESSAY 8

3 LIMITATIONS IN PROBLEM DOMAIN ..................................................................... 8

4 TARGET GROUP ............................................................................................................ 9

5 BACKGROUND .............................................................................................................. 9
   5.1 ”ORDINARY” HCI VS. WEB-HCI 11

6 METHOD ....................................................................................................................... 12
   6.1 METHOD FOR INTERVIEW WITH WEB DESIGNER 13
   6.2 METHOD FOR INTERVIEWS WITH END-USERS 13
       6.2.1 THE COMPOSITION OF THE TEST GROUP 15

7 EXISTING GUIDELINES OF GRAPHICAL USER INTERFACE ............................... 15
   7.1 GENERAL 16
       7.1.1 CONSISTENCY 17
       7.1.2 SIMPLICITY 17
       7.1.3 EFFICIENT COMMUNICATION 17
       7.1.4 BREATHING ROOM 17
       7.1.5 UNIVERSAL ACCESS 18
   7.2 GRAPHICS 18
       7.2.1 REAL WORLD REPRESENTATION 18
       7.2.2 FUNCTION KEYS 19
       7.2.3 LINK INDICATION 19
       7.2.4 FUNCTION BUTTONS 20
   7.3 COLOURS AND TEXT 20
       7.3.1 RECOGNITION AND REUSE 20
       7.3.2 STANDARD COLOURS 21
       7.3.3 COLOUR PARINGS 21
       7.3.4 STATUS INDICATION 21
       7.3.5 LINE LENGTH 22
8 ANALYSIS OF OUR EXPERIENCE ACHIEVED

9. ANALYSIS OF THE TEST GROUP INTERVIEWS

10 CONCLUSIONS

10.1 ANSWERS TO THE QUESTIONS

10.2 ANALYSIS OF THE GUIDELINES USED IN “SOLO”

11 FURTHER STUDIES
12 LIST OF REFERENCES

12.1 Books ................................................................. 40
12.2 Articles from Magazines and Newspapers .......... 41
12.3 Articles from the Internet ................................. 41
1 Introduction

This final dissertation has been written during the third year of the International ADP programme at the University of Karlskrona/Ronneby\(^1\). With this essay we have completed our studies and received a bachelor’s degree in administrative data processing. The subject of the essay was supposed to discuss an area within information technology and we have therefore chosen to write about usability of “Internet banks”. Interaction between humans and computers is of great interest to us, so the subject was obvious. To see how computers and humans interact with each other and that the cooperation hopefully will turn out the best way for both parties is something that we would like to take a closer look at. Why it works and how it works was the question that was the start of our essay subject discussion and we finally decided to look at the market surrounding “Internet banks” which is a very new and a “hot” subject.

During the writing of this essay changes may have occurred in the graphical layout and functionalities of MeritaNordbanken’s\(^2\) “Internet bank” “Solo” (which we will use as an example of an “Internet bank” throughout the essay). These possible changes have not been taken into consideration when completing the essay. Information regarding the general functionality and appearance of “Solo” is presented separately in appendix B, because of its lesser importance to those readers that are already acquainted with the “Solo” structure.

Throughout this essay we have followed the standards of essay writing discussed in the Swedish book by Patel and Davidsson (1994). The book was first introduced to us in our scientific methodology course during the spring of 1999 and since then it has been used as support to our essay writing in different attended courses.

2 Problem definition

When designing the graphical user interface of an “Internet bank”, the designer needs to keep in mind the different user groups that the “Internet bank” is aimed at. A general question for a designer is to ask “Who are the users and what are the tasks?” to clarify who the target group(s) for the application are [Shneiderman, 1998]. This question could be hard to answer with regard to designing an “Internet bank” because of the mixture of different levels of experience among “Internet bank” users. The differences a designer needs to keep in mind when designing, might for example be the age and educational level of the users, but the group of users with physical disabilities should not be forgotten [Shneiderman, 1998]. They all have different needs in order to be able to perform their tasks in the right way, without hesitation and mistakes. Therefore it is important to design a graphical user interface that suits and supports as many end-users as possible. At the designers disposal there are guidelines

---

\(^1\) The name of the University has changed since we started writing this essay and today the name is Blekinge Institute of Technology

\(^2\) The name of MeritaNordbanken has changed since the start of this essay and is today named Nordea. But we have decided to keep the old name in our essay because of the company is more known as MeritaNordbanken and not as Nordea.
that give directions and suggestions on how to design the most usable graphical user interface. Though there are several guidelines regarding user-friendly interfaces, in our experience as information technology students, they are perhaps not easily adapted or used when designing “Internet bank” applications. They are instead designed for use on non web-based computer applications. To find out whether they can be adapted to “Internet bank” applications or not, the existing guidelines will be evaluated.

During our evaluation we will either find that the guidelines can be used for “Internet banks” or that there are no existing design guidelines for “Internet banks”. In the first case we will try to find out if the guidelines are adapted in the right way and used properly by the designers. Results indicating that the guidelines are misused will be handled further, asking the question why. On the other hand, if the guidelines are found to be adequate, our task will be to try and make suggestions as to how to change them so as to be applicable to the design of “Internet banks”.

In design many different concepts are used to explain and categorise different areas. Therefore we feel a need to explain the concepts used in this essay to avoid confusion or misunderstanding. There are many different definitions of the concepts explained below though we have chosen to follow the concept definition discussed by Dix et al (1998).

2.1 Concept definition

- **Guidelines and standards**: Since guidelines, principles and standards are often mixed, we see a need to explain the meaning of the words, though we only use two of them within our essay. It is easy to understand that the words are misused, since even experts within the area of human computer interaction have their own definitions. [Dix et al, 1998; Preece et al, 1994; Anon IBM, 9]. As mentioned in the above section we have chosen to follow Dix’s theories regarding standards and guidelines, since he makes the difference between them very clear, and therefore makes it easy for us to use in our essay. Dix does not differentiate between guidelines and principles, which we agree with, since the boundary between the meaning of the words is blurred.

According to Dix (1998), there are two kinds of design rules, which should be taken in consideration, standards and guidelines. Roughly speaking, standards are limited in application and high in authority, whereas guidelines tend to be more general in application and lower in authority. Since it is more likely that the more general design rules will conflict with other rules, there is a greater need for the designer to understand the theory behind the rule. As a result we can make another rough distinction between standards and guidelines. Guidelines tend to be more general and therefore more important for the designer to know what theoretical evidence there is to support them. Regarding standards, the need for that knowledge is less important. [Dix et al, 1998]

Authoritative and specific standards are very difficult to produce due to the incompleteness of theories regarding the design of interactive software. Therefor the majority of design rules are suggestive and more general guidelines. There are
guidelines available for all stages included in the design process of a computer based system but we will concentrate on guidelines specified for the design of the graphical user interface (GUI). [Dix et al, 1998]

- **Usability:** This is also a term which is often misused and misunderstood and therefore we have chosen to use the following definition given in one component of the ISO standard 9241, pertaining to usability specification [Dix et al, 1998]:
  - **Usability** - The effectiveness, efficiency and satisfaction with which specified users achieve specified goals in a particular environment.
  - **Effectiveness** - The accuracy and completeness with which specified users can achieve specified goals in a particular environment.
  - **Efficiency** - The resources expended in relation to the accuracy and completeness of goals achieved.
  - **Satisfaction** - The comfort and acceptability of the system to its users and other people affected by its use.

2.2 Questions to be handled in the essay

The questions presented below are questions that will help and support our final work of both adapting guidelines and standards to be applicable on “Internet banks” or to help us evaluate if the existing ones are used in the right way. We will also have some further sub questions to provide a wider view of the subject, though they are only to be found in our Question graph in Appendix A and will not be specifically answered in this essay since they are only sub questions leading to the main question. In the Question graph we also explain how we proceeded with our questions and interviews.

- Are today’s guidelines to interface usability adapted for use as a support to “Internet bank” design?
- If so, have they been used in the right way in the design of MeritaNordbanken’s “Internet bank”, “Solo”?  
- If not, how could the guidelines be changed to better support the interface design of “Solo”?

3 Limitations in problem domain

We have chosen to limit our essay to the development of “Internet banks”, more specifically, the graphical layout and the presentation of the elements used in design. Our reason for choosing this subject is that since the market for “Internet banks” is quite new (the end of the 20th century), the “Internet banks” are continuously updated and redesigned. Therefore it is important to make sure there are guidelines to be found so that the work of the “Internet bank” designer can be eased and supported. Our task will therefore be to investigate the existing guidelines to layout design and how they can be used in the sense of designing the graphical interface of an “Internet bank”.

The area surrounding Internet applications is too big to discuss in this essay. In the world of Internet applications there are many different kinds, therefore we felt a need to look at a specific kind of Internet application. The choice made was to investigate
guidelines that can be used in the design of “Internet banks”. “Internet banks” is an interesting area since it is one of the most recent introductions on the Internet application market. Our opinion is therefore that the guidelines might not yet have been adapted to give support in the design of “Internet banks”. By gathering information and knowledge regarding existing guidelines and their use, we hope to be able to come up with suggestions on how to use the existing guidelines in the best way to suit the design of “Internet banks”. In case we find the existing guidelines and standards are not fully adapted, we will investigate what is needed to make them more usable and try to direct them to the graphical design of “Internet banks”.

An end-user does not only look at the graphical layout when evaluating an “Internet bank”. There are several areas that affect the usability of a system but we will only investigate the pure graphical guidelines such as the use of colours, popup menus etc and not for example the ease of navigation and the security aspects [Dix et al, 1998].

To be able to find out if the existing guidelines are used and used correctly, a case study has been made using one of the many “Internet banks” on today’s market. Our choice of “Internet bank” fell on MeritaNordbanken’s “Solo”, mostly because we are both customers in the bank and one of us uses its Internet services, but also because we have come in contact with staff of the Internet department at MeritaNordbanken. They were very interested in helping us with supervision and they were also very positive to our choice of subject.

4 Target group
This essay is first of all directed towards the people designing ”Internet banks” and secondly to other designers within the area of Internet application design, to hopefully help them in making even better and more user friendly Internet applications. It may also be useful to students studying graphical Internet design.

5 Background
In 1983 the field of human-computer interaction was established due to the fact that software at that time mostly was designed for experts and not for novices. This fact made the novices complain because the applications were too difficult to use and the design was then reconstructed. Between the beginning of the 1980’s and the beginning of 1990’s the focus on user groups (experts and novices) has switched a couple of times. During the years of struggle with finding a solution to the problem of which target group to focus on when building computer applications, the Internet has established its place in the computer application market. Now the application will reach even more users with different backgrounds and varying knowledge in using computer applications. [Nielsen, 2000:1]

Nowadays people are becoming aware, both at home and at work on how much the Internet can be used with the different services offered. MeritaNordbanken for example has 800.000 “Internet bank” customers and 3,500.000 regular private bank customers using their services. [Byttner, 2001] One of these quite new services are the ones from the banks. Some banks only have services on the Internet and others use the
Internet as an extra support to the customers as a complement to their normal offices. With the "Internet banks" customers are able to carry out their bank business at any time of the day. Though there are today some limits to what services are offered. [Byttner, 2000]

The market around “Internet banks” is increasing every day more and more people are introduced to the service. An investigation of Internet habits around in the world, made at the request of American Express, found that about 79% of the Swedish people have access to Internet, and 46% of these people use the Internet for “Internet bank” use. [Aspelin, 2000]. It is not only private persons that see the possibilities of “Internet banks”, but also companies. There are however still people not convinced that “Internet banks” are a good way of carrying out bank businesses, mostly because of uncertainty surrounding the security of money transactions over the Internet. This is something the banks are aware of and which has a high priority within the banks. Today’s “Internet banks” offer a wide range of services that are continuously increasing. [Byttner, 2000] There are of course differences between the different banks, with regard to what are prioritised or not. New services are frequently released, to more and more customise existing services to different customer groups. The most commonly used services are money transfer, accounts overview, bill payments and buying and selling funds [Byttner, 2000]. These services are almost offered by almost all “Internet banks”. There are also additional services like opening and closing accounts over the Internet, buying and selling stocks and so forth, but they are still in development at many “Internet banks”. Another thing that differs between the different “Internet banks” is the way the users log in to the “Internet bank”. Some banks offer a personal code, together with the personal number and a disposable code (for example MeritaNordbanken) or other banks offer a personal “Smartcard” which are read in a special device connected to the computer used for the occasion. The third option in the log in procedure is a small device (almost looking like a calculator) that sends a signal at the log in time to the computer which identifies the customer together with personal code applied on the device.

The work of an “Internet bank” designer and other Internet designers does not differ too much. To design an Internet application is not as easy as other non-web based applications, since the designer for Internet applications has to give up full control on how to use the application. For example, the user has the possibility to change the size of the screen, which can have an extreme effect on the layout, or they can choose to go back and forth between web pages by using the buttons in the browser window (BACK and FORWARD). An action performed by the buttons in the web-browser can make a money transfer happen a second time without notifying the user just because the page is reloaded. There are of course also similarities, like both groups design interactive applications and neither design physical objects. Objects will look different in different web browsers found on the market. The user can also take paths that were never intended by the designer, for example that they might jump straight into the site from a search engine without ever going through the home page. [Dix et al, 1998; Nielsen, 1997] A further explanation of the differences between Internet design and non-web based computer applications is discussed in the following chapter regarding “Ordinary” HCI vs. Web-HCI.
When designing “Internet bank” applications, support is most often needed to facilitate decisions regarding graphical layout by the designer. Guidelines have therefore been written to answer some of the questions. We believe however, that all guidelines are not written to support the design of “Internet bank” applications, but are written for non-web based computer applications and Internet applications in general. Therefore we believe there is a need to study the existing guidelines to see if they are designed to support “Internet bank” applications also. In this essay we will study the existing guidelines and evaluate them to see if changes are needed to provide better support.

5.1 "Ordinary" HCI vs. Web-HCI

At first sight the differences in the graphical layout between ordinary applications and web-based application might not be noticeable. The graphical layout may be quite similar although from the designer’s viewpoint the task of designing a web-based interface differs in many cases to the procedures used when designing the interface for an ordinary application. Even though what the user sees may be exactly the same the steps and decisions taken during the development of it will be very different. Internet applications are one part of hypertext systems where links are used to move from one page to another. In non-hypertext information systems the user usually only has one option (except for example Cancel or Quit) to use to move through the system while a hypertext system provides the user with a wide range of choices each time he/she wants to leave a page. This gives the user the opportunity to select the page order though it also loads the user with extra responsibilities since he/she has to keep track of the present location in the system to prevent being “lost in hyperspace”, so to say. This is one part that the designer has to take in consideration when designing the graphical interface for a hypertext system. The user has to be able to remember his/her location and where he/she started off in the system. [Dix et al, 1998]

Another design issue that the designer has to evaluate when preparing for a user interface layout is the fact that one web-based page can look very differently depending on the browser used when viewing it. The complexity is that different browsers may achieve similar results in different ways, or may support different functionalities. Because of this, the designer has to figure out what the page is supposed to look like and secondly, how that can be done to suit the most common browsers. The length of a text line is also a problem since it can either be presented dynamically (case 1) depending on the screen size or static (case 2) where the length of the line is set in the code. The first alternative is most suitable for small screens since the text line appears to be too long on a big screen. On the other hand the second alternative is better for the wider screen since it cuts off the text line at a pleasant length while the user with the smaller screen has to scroll horizontally to view the text. [McMillan, 1] It is important to remember that conventional office desktop machines have a screen size of 640 * 480 or 800 * 600 pixels. It is becoming conventional to assume that browsers offer a page size that is at least 472 pixels wide. [Dix et al, 1998]
Case 1: \(<\text{TABLE ALIGN="CENTER" WIDTH="100%">}\)<TR><TD>This line will stretch over the screen, from the left side to the right and only begin a new row if the screen is wider than the text line</TD></TR></TABLE>

Case 2: \(<\text{TABLE ALIGN="CENTER" WIDTH="150">}\)<TR><TD>This line will be cut as soon as its length exceeds 150 pixels which means that it is independent of the screen size used</TD></TR></TABLE>

Screen (Case 1)       Screen (Case 2) [Lemay, 1996]

Usually when traditional computer systems are built the end users’ capabilities, knowledge skills etc are known by the designer. The system is often developed for a specific group of users as for example a booking system for a hotel, or an administrative system for a firm. When designing hypertext systems and web-based systems the designer is likely to develop the system for an unknown group of people, or more a group of people where the individuals are so different so that it is impossible to bring forward a “typical” or traditional user. [Dix et al, 1998]

The list of differences can be long but we have chosen the above mentioned, since we believe that they are the most divergent ones. More examples and details can be found in chapter 7.

6 Method

For us to achieve knowledge within the area of usability in graphical layout we have searched in both books and articles on the Internet. We have found very much of interest to our subject during our search for information, and the result of this search is presented in chapter 7. During our work we have also carried out interviews with both web designers and end-users. The procedures for these interviews will be presented in two sections, one for designers and one for end-users.
6.1 Method for interview with web designer
After collecting information, we interviewed a web designer at MeritaNorbanken’s Internet department. During the interview we discussed different angles of graphic design and what the procedures are from an order of a page on “Solo” to a complete graphical layout and delivery.

From the interview we gained knowledge about the use of guidelines when designing a page layout for an “Internet bank”. The information received has helped us to answer one of our main questions for this essay. To set a date and time for a meeting with the web designer at MeritaNorbanken we got in contact with the Internet department. A date was set where we met both the web designer with main responsibility for “Solo” and the publisher. During our meeting we asked questions related to “Solo”, such as its history and general information and the web designer was asked questions directed more to a discussion surrounding graphical layout. For example the questions contained subjects like education in graphical design, if guidelines are used and in that case what guidelines etc. These questions were written in advance though some sub questions followed depending on the answer given. The questions’ content were based on experience achieved during our search for information about graphic layout and their guidelines, but, as mentioned earlier in this chapter, we also used guidance from books found in the subject of investigating usability. The questions asked during these interviews are not included in this essay, since we do not find them relevant. It was more a discussion then a formal interview. We did not tape the interview, though notes were taken during the interview made at MeritaNorbanken’s office in Stockholm. The answers have then been summarised and sent back to the persons being interviewed to confirm the correctness of the notes taken during the interviews. We then received approval of the text and permission to use the information in this essay. Later on we have used the information to refer to in this essay and also to base some of our results on.

6.2 Method for interviews with end-users
In our case study, information needed to be collected to gain knowledge about the behaviour of the users and their experience of the graphical layout. Therefore we decided to interview a number of people. After having read an article on the web by Jakob Nielsen (March 19, 2000) about the number of test people necessary to achieve the right test results, we were guided towards the number of users used in our tests. Nielsen’s study was also recommended by Shneiderman (1998) as a good example of how to perform studies of the end-users to an Internet application.

In the article Nielsen recommended testing no more than five users, if only one group of users is to be found with the same background and experience. It is better to perform a number of tests with each selected user than to perform only one test on more than five users. By using five users we will be able to analyse which different parts of the graphical interface are most important to the user and which ones cause most problems when using them. By testing one user, we will learn almost a third of what there is to learn about user behaviour. The next four users will overlap each other in information, though people are different and their behaviour will also differ
so we will learn some more from each one of them. Though the groups of users are very different, there will still be great similarities between the observations from the three groups (experts, middle and novices). Also, many of the usability problems are related to the fundamental way people interact with the web and how other sites influence the users. After the collection of all the information from the article, the test group ended up at be nine people divided into the three groups mentioned above. [Nielsen, 2000:2] After some discussion we decided to double the group to eighteen people. The decision to increase the test group was based on the idea that we were not sure of being able to collect the right amount of information from the different group members. But by adding some more test users we could increase our chance of having an even set of men and women in the right age groups used. Therefore our test group has been put together with people from Ronneby and Stockholm and then divided into the three above-mentioned groups. The selection of people has not been made using any special statistical pattern, they are all people in our surroundings. We decided to do so, since the test takes quite a long time to perform and we thought it might be hard to get people to take the time necessary. Now we could perform the test in their home in a quiet and calm environment, which we do not believe to affect our results.

The eighteen people in our test group were, as previously mentioned, a mixture of men and women, and also different age groups to make the test group as representative as possible. We wanted to reflect reality as much as we could, therefore the mixture of groups of test users. (The composition of the test group is more discussed in chapter 6.2.1.) During our search for users we had to change the mixture a little bit, however, because of the difficulty in finding exactly the right amount as specified. [Shneiderman, 1998] With this group of users the interview and a test including a set of tasks to be made in the demo version of “Solo” were performed. The interview included five parts, short statistic questions, questions regarding experience of Internet use, test tasks, a question to rate the importance of different graphical aspects when using “Internet banks” and finally some more questions regarding their experiences appeared during the test.

After having answered the first two parts regarding statistics and experiences it was time to test “Solo” in practice (functionality and description of “Solo” can be found in appendix B). The users were observed while performing a number of tasks in “Solo”. The tasks were the most commonly used services on “Solo” and were performed without interference from the observer. We wanted to make the tests as close to real life as possible, to get the results reliable enough to be used as the result of this study. Performance on the practical part of the tests was followed by some more questions investigating the reactions to the tasks made. With these last questions we hoped to get a clear picture of what parts the user feels are important in the graphical layout. Even though we wanted to observe the test user during their performance of the test, we also wanted to hear and discuss their opinion of the experiences achieved during the test.

A question with declarative sentences were given to the test group, which they then were asked to rate with the grade 1-8 where the grade one was most important and eight was least important. By exploring and analysing the rated sentences we could see the importance of the different parts of the graphical layout. With the result we
knew which parts of the guidelines and standards that were most important to focus on when trying to adapt them.

6.2.1 The composition of the test group
The test group was, as mentioned before, eighteen people, half of the group comprised people from Ronneby and the other half came from Stockholm. Within these two groups people were also sorted by age, gender and experience as we wanted as reliable a result as possible [Shneiderman, 1998]. The experience is based on the use of “Internet banks”, not only MeritaNorbanken “Solo”, that is any “Internet bank” to be found on the Internet. Beneath is the composition structure shown:

**Ronneby:**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Experience of “Internet bank” usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>&lt; 26</td>
<td>Novice</td>
</tr>
<tr>
<td>Male</td>
<td>&lt; 26</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Male</td>
<td>&lt; 26</td>
<td>Daily use</td>
</tr>
<tr>
<td>Male</td>
<td>26 – 40</td>
<td>Novice</td>
</tr>
<tr>
<td>Female</td>
<td>26 – 40</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Female</td>
<td>26 – 40</td>
<td>Daily use</td>
</tr>
<tr>
<td>Female</td>
<td>&gt; 40</td>
<td>Novice</td>
</tr>
<tr>
<td>Male</td>
<td>&gt; 40</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Male</td>
<td>&gt; 40</td>
<td>Daily use</td>
</tr>
</tbody>
</table>

**Stockholm:**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Experience of “Internet bank” usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>&lt; 26</td>
<td>Novice</td>
</tr>
<tr>
<td>Female</td>
<td>&lt; 26</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Female</td>
<td>&lt; 26</td>
<td>Daily use</td>
</tr>
<tr>
<td>Female</td>
<td>26 – 40</td>
<td>Novice</td>
</tr>
<tr>
<td>Male</td>
<td>26 – 40</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Male</td>
<td>26 – 40</td>
<td>Daily use</td>
</tr>
<tr>
<td>Male</td>
<td>&gt; 40</td>
<td>Novice</td>
</tr>
<tr>
<td>Female</td>
<td>&gt; 40</td>
<td>Monthly use</td>
</tr>
<tr>
<td>Female</td>
<td>&gt; 40</td>
<td>Daily use</td>
</tr>
</tbody>
</table>

7 Existing guidelines of Graphical User Interface
Today’s applications are to a great extent built on ease of use and it is the factor for success. To market an application as user-friendly can be very dangerous. A designer has to have in mind the different views of the end-users. What does the consumer care about? Different people have different concerns and to succeed in building an application that will be a success all concerns have to be met. This is of course an impossible task for a designer. Therefore the designer needs to look at the group of
users the application is aimed for. From there, the concerns can be taken under consideration when building the application. [Shneiderman, 1998]

To ease the task of designing usable graphical interfaces, guidelines have been drawn up during the years of studies. We have selected to present only the ones only concerning the graphical part of the interface described in literature found in books and on the Internet. When searching for information we have also limited the amount of guidelines presented in the essay to those most frequently presented in the different literature used. Our decision is based on our knowledge that many guidelines are only thoughts from the authors of the literature. By only using the ones most frequently discussed we hope to decrease the possibility of having half-completed and untested guidelines in the essay. Further description of the guidelines and more specific information will be presented in the following sections.

Most of our material has been taken from articles found on the Internet because of the subject’s age. We have had problems finding books discussing the subject, and to our knowledge this depends on there not having been time to write many books in this area yet, since it is still quite new. However, one of the books we found was a book by Ben Shneiderman called “Designing the User Interface” (1992) and later on during our essay writing we have found a later edition which has also been used. The first book from 1992 did not contain any specific information regarding Internet applications, though in the later edition a new chapter on Internet design has been added. We have still chosen to use some information from the version from 1992 since the general design guidelines have not been changed. This makes a very good point in how long it took to release books discussing Internet application design. Shneiderman also takes help from other experts in the area by referencing to other literature found within the subject. Also the book by Preece et al, 1994, is frequently used as a reference for discussions regarding the web-design. For example in the lecture material by “Billsweb” references are in many cases taken from the Preece-book. Much of the information found is very equal in a lot of literature written by different authors so the guidelines are well used in web-design.

The information used for this chapter was in some parts practical examples found in books, on how different guidelines can be used to ease the proceedings of designing Internet applications and computer applications. We have not found any specific guidelines aimed for “Internet banks”. First we discuss the guideline or standard, and then if possible, we have made examples, why they are useful and how to use them in the best way. We also try to clarify what guidelines of today that is designed for Internet applications and which are only aimed for non-hypertext applications. This to try to give you a picture of the amount of guidelines that already today discuss the design of Internet applications. There are probably a lot more guidelines and standards that are not mentioned in our essay, but we believe and think that the most important ones are to be found.

7.1 General

There are certain guidelines that are general for all parts of the graphical interface or for some of the sections mentioned below. Things that are general can be for example the goal to be consistent when presenting components within an application or a
whole system or the advice to design the graphical user interface as simple as possible. These general guidelines are presented first so that they can be kept in mind while reading the coming sections.

7.1.1 Consistency
One of the major guidelines, which also is one of the most important ones, is the need for being consistent when using things like buttons, objects’ position, dialogue boxes etc, within a given application. Even rules within any specific software system should be applied consistently to all elements. If being consistent users can more easily learn new things in the system since they recognise similarities frequently used within the system. When using similar buttons users will know in advance what kind of actions will be taken when using them. Giving objects like buttons and textboxes the same position every time they are used, can speed up the users actions since the user knows where to look for a specific item or component. [McMillan, Pattersson, year unknown; Preece et al, 1994]

7.1.2 Simplicity
Consistency by itself cannot make the graphical interface more usable, it has to be complemented with certain other guidelines that have been taken into consideration to be able to increase usability. One of these guidelines is the purpose of simplicity – the need to keep the graphical interface simple so that the users can benefit from functions that are easily accessible and usable. An interface that is poorly organised and cluttered will distract users from accomplishing their tasks [Cotton, Oliver, 1993]. But a well-organised interface fades into the background and allows the users to work efficiently. A cluttered interface can give the sense of displaying items in a non-structured way, which makes it hard to find the appropriate item looked for. Usually, a lot more things than are necessary are shown on the screen. That can cause frustration among users since it makes it more difficult to find the specific information searched for. [Author unknown IBM, 1997:7; Shneiderman, 1998]

7.1.3 Efficient communication
Every page has a message and the message that the page is supposed to give to the user must be clear and obvious. Therefore it is important to present it in the most effective way. Graphics can sometimes be more effective than words and should therefore be used when it is the most clear and efficient way to communicate. When developing web pages and web based systems it is a great idea to take advantage of an image more than once, since the browser keeps a visited image in memory and does not have to reload it again. However, you have to keep in mind that graphics such as images might slow down the downloading of a web page and should therefore be used with care. [Author unknown IBM, 9]

7.1.4 Breathing room
When designing an interface there are certain components that need to be displayed, such as images, buttons, text etc. Between these different graphical objects, designers often want to save space to make room for more information and pictures, but do not. When eliminating extra space in your image visual “breathing room” disappears. [Author unknown IBM, 1997:1] With extra white spaces, it will help the page to look more structured and clear. Items will be more easily to find since the items displayed tend to be more visible. Everything that is shown on the page should be taken into
consideration, to evaluate the importance and necessity of being displayed. This can prevent the page from being too crowded and cluttered. It is preferable to use a uniform distribution of fields to crowding one part and leaving other parts blank. Also using alignments makes the screen look more structured and comprehensible. When users are working from hardcopy, the screen should match the paper form to make the transformation as easy as possible. [Shneiderman, 1992]

The danger with saving screen space can greatly influence the layout of web sites due to its constraints. Forcing the audience to scroll to be able to view the information looked for has a negative effect and has to be reduced as much as possible. By establishing a grid and only using the basic unit of space which is the minimal image safe area, the negative effects of scrolling can be minimised. Sometimes elements are scrolled out when the user is for example reading a text on the page. The designer has to choose whether an element should be allowed to be scrolled out, or not. It is important to really consider splitting up the information into two pages and including white space or including it all in one page and risking confusion and frustration because the user cannot find the function searched for. [Author unknown IBM, 9]

7.1.5 Universal access
It is important to support universal access, which means different platforms and web browsers. Designers must accommodate small and large displays, monochrome and colour. The users can have fast or slow transmission that will make use hard or easy. Many different web browsers are also on the market and they all have different features and possibilities that have to be taken into consideration. The web browser may be an old version that does not support all the tasks that the designer wants the application to perform. [Shneiderman, 1998]

7.2 Graphics
As mentioned before, when searching for something on a screen, users can generally find what they are looking for more quickly if it is presented as an image or an icon than if they had to search for it in a text list. It may therefore be appropriate to use icons instead of text. However, it is important to use images or icons that the user recognises or that can be connected to the related action, otherwise the icons may awake the opposite reaction, confusion and frustration of having too little help. [McMillan, 2]

7.2.1 Real world representation
A general rule when using icons in a program is that the icons should represent some “real world” objects, something the user will recognise and understand. Mostly the picture on an icon is an object that represents the process started by pressing the button or the like. [McMillan, 2]

Using icons will allow users to learn the program’s functionality easier. People can recognise things easier as they recall information from long-term memory. Thus, recognising an icon on the screen is a much easier task than trying to remember a text command. When searching for something on a screen, users can generally find the appropriate icon more quickly than they could find the function they want in a text list. This is because icons usually tend to be quite different from each other, then it is
easier to distinguish between them than it is to separate words from each other. Icons are mostly universal and people from all over the world can understand the picture. If the same icons were used in all computer programs it would be very easy for the user to recognise and learn a new program. Though, it is very important to think the picture through before using it. The picture needs to be very telling and allow very little chance of misunderstanding. Recommendable is also to include a popup text when the user is moving over the icon with the cursor. This to more clearly give an explanation to what will be performed when the icon is being pressed. [McMillan, 2]

By using the same icons from one application to another, the user will remember the picture and function and will connect it to the new application as well. Users should not have to learn new things to perform familiar tasks. Facilitate this by allowing users to build on prior knowledge, especially knowledge gained from experience in the real world. This can for example be used when presenting an action with an icon that can be connected to the same action in real life. By being consistent with something the user already understands, an interface can be made easier to learn. [Author unknown IBM, 1997:2] Real-world representation in the interface where possible can be achieved by using objects that are recognised by the user. It gives the interface a more familiar look and feel, and can make it more intuitive to learn and use. One example is the use of a trashcan on the desktop where the user can discard things. Visual representations provide cues and reminders that help users understand roles, remember relationships and recognise what the computer is doing, for example the hourglass which is visible when the computer is “thinking”. [Author unknown IBM, 1997:3]

7.2.2 Function keys
There are always a few commands that are used more often than other, these high-frequency commands should be possible to simulate the use of. This both for keys on the keyboard and to make icons on the screen to be pressed for easy performance of a command. By using function keys, the programme will be easier to use and faster in performance. Do not forget to give feedback when function keys have been pressed. Grey out and inactivate function keys that cannot be used in each situation appeared on the screen. [Mayhew, 1992] When using function keys the user should be informed about the possibility of using them and how they can be used. It is important to use logical key commands that have a connection to the action performed by it. Doing that will ease the difficulty for the user to remember it in the future.

7.2.3 Link indication
Web pages are always connected with links. The user will press the link to move to a different page. A link can either be a text line or an image. Other possibilities are also represented. Regarding links where only the mouse pointer changes when the user passes a link is not reliable. However, indications provided by HTML for hypertext links (coloured, underlined text) are sufficient, as long as the audience has learned it, but it is graphically limiting. The statements are based on the fact that the user has to scan the content of the page with the mouse pointer to discover all hypertext links, if only relying on the first example. The chances are that the user will be more satisfied with the page if it is possible to recognise all the links only by looking at the web page. No one wants to search for a link that should be obvious. [Anon IBM, 9]
7.2.4 Function buttons
Sometimes the user has to submit, cancel or admit information on a web page. Therefore buttons are used that indicate the different options that the user has. The use of function buttons can be both positive and negative. The Reset button clears away the user's input on a web form, but instead of pressing the button for the intended reason, it is more likely that the user presses it by mistake. Furthermore, a user rarely wants to clear all editing done. Therefore the web application would be more usable if the Reset button was removed since it hurts more often than it is helpful. [Nielsen, 2000:3] The Reload/Refresh button can easily substitute the reset function. However, a Reset button can be useful for a form that satisfies both of the following criteria:

- the form is filled in several times by the same user
- the data to be entered differs significantly from one use of the form to the next.

7.3 Colours and text
Users will first pay their attention to the colours, in regard to graphics, when using an application for the first time. Therefore it is extremely important to be observant of what colours that are going to be used and how they are used (in what context and extent). [Winograd, 1996] The recommendation is to not use more than four to five different colours in one document [Shneiderman, 1998] not to confuse the user. Some colours are standard to different actions and should therefore not be used in other contexts than the one defined for the action. But it is not only the use of the specific colour the user observes, but also how text is supposed to be presented in the right way, to make the use of the application as easy as possible.

7.3.1 Recognition and reuse
It is important for designers building and developing applications to think of the elements on the screen and their behaviour. For the end-users to understand the graphical user interface when a new application is taken in use, the same screen elements and colours are to be used from the old application to the new one. By using the same colours and forms on the screen elements, the users feel more familiar with the application. Using colours that users recognise from the real world such as green and red (for example traffic-light colours) makes them more certain of what the performance of the element will be. Since they know what red and green mean in traffic, they will connect it to the colours used on for example a button. A red button will make them more observant of what will happen when used and to the users the colour will say "stop". Compared to red, the green colour is connected to "go" or "ok". Therefore it is important for designers to use the same colours and forms of elements that the users are used to, and not change the behaviour of them from one application to another. [Winograd, 1996] Though a designer has to remember that one colour can mean one thing in one country and a very different thing somewhere else in the world. One example of this can be found on the Yahoo’s financial pages. The pages display different rates for exchange markets, currencies, indexes etc. and there is one page for every country registered. The use of colours differs between the different pages. On the Swedish page [Yahoo, 2000:7] positive rates are green and negatives are red while the positive rates are black on the Canadian [Yahoo, 2000:1] and Indian [Yahoo, 2000:5] pages. The same design as for the Swedish page is valid for the Danish [Yahoo, 2000:2], Norwegian [Yahoo, 2000:6] and British [Yahoo,
2000:8] page as well. Furthermore, the financial pages in France [Yahoo, 2000:4], Hong Kong [Yahoo, 2000:9] and Spain [Yahoo, 2000:3] actually use red for positive rates, which is the opposite use compared to Sweden.

### 7.3.2 Standard colours

As mentioned in the previous section, 7.3.1, some colours can be connected to situations in real life. When using these colours the designer has to be observant so that they will not be misunderstood by the users. Some colours are even standards for certain actions and it is very important not to use these colours in another context. If wrongly used, the user might make mistakes that can cause problems to occur. It is important to take the colour into consideration before using it, since it can give certain signals to different people. Colours to watch out for, used in text, are for example blue, red and purple, since they are standard colours for links on web pages indicating if a link has recently been clicked or not. The colour blue is used to give the user notice of a link to another web page or text documents. Red and purple are often used to denote hypertext links that have already been visited. [McMillan, 1; Shneiderman, 1998] To provide the user with a colour code panel can be appropriate. [Shneiderman, 1992] When adding this code panel to a web page a separate window can be used, which will make the codes available at all time, independent of where the user is currently working in the system.

### 7.3.3 Colour parings

When using colours it is not only the meaning of the colour that is important to have in mind. Colours can be used in different combinations for example colour parings. Colour parings must be used with caution since they can otherwise irritate the user’s eyes. Colours, such as red and blue are on the opposite ends of the spectrum and if they are used at the same time on a display, the muscles around the eye will be taxed by attempts to produce a sharp focus for both colours simultaneously. Blue text on a red background is especially difficult to read, as well as two very similar colours used in the same combination. For example yellow text on a white background is very strenuous to distinguish. [Shneiderman, 1992]

### 7.3.4 Status indication

A lot of documentation has been done regarding the use of colours and their meanings but there is still one thing that has to be mentioned, the use of colours in the sense of indicating a change in status. For example, an invoice that has not been paid changes colour as soon as it is paid [Shneiderman, 1992]. This will make it much easier for the user to quickly recognise which invoices have been paid and which have not. Sometimes it is necessary to focus the user's attention to a specific item or component. There are several different techniques used for drawing attention:

- **Marking:** Such as underline, close in a box, point to with an error or use an indicator (asterisk, bullet, sash or an X)
- **Inverse video:** Use inverse colouring
- **Blinking:** Use blinking display (2 - 4 Hertz)
- **Colours:** Use no more than four colours where additional colours are reserved for occasional use.
- **Colour blinking:** Changing colours when blinking from one time to another.
Caution has to be taken so that the displays will not tend to be cluttered by overusing the techniques mentioned. A page with a lot of figures moving around can make the user confused and as a result a lost interest in using the application. [Shneiderman, 1992]

7.3.5 Line length
The length of a line might not be seen as something that can be discussed but the length can actually affect the user. If a text is rather long and the lines are spread over the entire screen it may be apprehended as hard to read because of the strenuous eye movements that have to be performed. There are standards for the length of lines in a document, though when making pages presented on the Internet other things have to be considered. It is not so easy to set a font size or font style as the user can make their own settings, which will overwrite the code written in the page code. In this latter case the length of text lines will automatically adjust to span the window, unless the designer uses certain techniques to counteract this effect. To make it easier for the user to read the text of the page after scanning the window, a fixed row and column size should be set to stop the user from adjusting the text as well when spanning the window. [McMillan, 1]

7.3.6 Font style
When writing text in a document with a standard length of lines (recommended standard 640*480 pixels [Shneiderman, 1998], no more than three font types and three font sizes should be used within a web site [McMillan, Patterson, Year unknown; Preece et al, 1994]. If using more styles than this, the web site tends to be cluttered and it might make the user confused. As mentioned earlier, it is important to use the same colours on each web page within the site to make the user feel comfortable. Since the same colours and font types have to be used in different situations and for different purposes, the layout formula chosen must be flexible [Anon IBM, 9]. Of course, the use of font types should be limited even in documents outside the standard length of lines [Shneiderman, 1992].

7.3.7 Content layout
As mentioned earlier users want to find their way easily and quickly. Therefore, to increase the users’ satisfaction laying out the content in a logical structure should be the primary goal of a display designer and from that point decide whether to use colours or not. Monochrome displays should be seriously considered as the primary format, since approximately 8 percent of males in Europe and Northern America have some kind of colour blindness. [Shneiderman, 1992]

7.4 Command presentation
There are always certain commands available for the user to utilise, at least an OK-button or a Cancel-button. Usually the interface can offer the user more than that and in that case it is very important to present all the options in a practical way. When designing an application or changing an existing one the designer must think about keeping it simple and staying with old layouts so that the users will recognise in spite of the fact that features have been added or changed. As long as the users recognise the application’s outlook the changes will not affect them as much as if they did not recognise the new environment. [Löwgren, Stolterman, 1998]
7.4.1 Grouping related commands
Grouping together related commands such as buttons that can be used in the same situation or buttons performing related actions, will help the user to find the correct component looked for and even give the user information about which different options that are available for the desired action. [McMillan, Patterson, Year unknown; Preece et al, 1994]. There are some typical bases for sequencing commands including the following [Shneiderman, 1992]:
- Chronological ordering
- Numeric ordering (ascending or descending)
- Physical properties such as length, area, volume, weight etc
- In many cases there are no obvious or natural order which makes it necessary to choose from possibilities such as:
  - Alphabetical ordering
  - Grouping of related items. Something to indicate the border between the groups is needed.
  - Most frequently used items first
  - Most important item first. May be very difficult to decide the importance of each item because the opinion can differ between users.
A study proved that the alphabetical order was the fastest one of three. The two other ones were functional and random ordering. Even though alphabetical ordering was the fastest one, functional ordering might be the most appealing sequence in an application where the user has to decide which item is the most suitable one. Users' memory for the functionally grouped items would be likely to surpass the alphabetical or random sequences.

7.4.2 Differentiating commands
Commands in a system are not always possible for the user to use but the users should not have to “search” for available commands it should be obvious which commands are possible to use and which are not. Therefore available commands and those not available should be differentiated. [McMillan, Patterson, Year unknown; Preece et al, 1994] This can either be done by giving them different colours as mentioned earlier or by greying out commands that cannot be used. Both methods will tell the user that there is a difference between the two groups of commands, ie. that one group includes available commands and one includes unavailable commands.

7.4.3 Command representation
There are always functions that users use more often than others. Those functions should be immediately apparent, while advanced functions may be less obvious to new users. This is due to the fact that users want, as mentioned several times before, to find what they are looking for quickly and without hesitation. [Anon IBM, 1997:7] In terms of the logical sequencing of material, you should start at the top left of the screen (the Western world) since that is the part of the screen, which the user gives the first glance when looking at it. [McMillan, Patterson, unknown; Preece et al, 1994].

- 23 -
7.5 Feedback and error-handling

For a user to be able to trust an application’s performance, the user should be able to foresee the outcome of a task. To have control over the performance of the application will eventually make the user trust and rely on the application to perform the task correctly. [Löwgren, Stolterman, 1998]

7.5.1 Step-by-step presentation

When an application is performing something that the user cannot see, information should be displayed explaining what is happening. If the application skips showing a couple of steps in for example, a payment made through an “Internet bank”, the user would probably become unsure of whether the payment has been made correctly. On the other hand, if the application shows step by step every task that is carried out, the user feels more part of the performance. [Löwgren, Stolterman, 1998] This is why feedback is such an important part of a system and the graphical interface that presents information to the user.

7.5.2 Feedback categories

When a user has performed a command he/she needs an indication immediately that the command has been acted upon, any delay intrudes on the user’s tasks and decreases the confidence in the system [Anon IBM, 1997:6]. Feedback is often considered to be in one of the following categories [McMillan, Pattersson, Year unknown; Preece et al, 1994]:

Lexical feedback – This is when the system indicates ‘message received, but no changes have been made to the underlying structure of the system.’ This is for example when a menu name has been highlighted when being pointed to or the ungreying of menu commands when an object has been highlighted.

Syntactic feedback – This is when the feedback requires a little bit more dialogue with the user but still does not perform any fundamental change in the system. For example, the fact that menus are disabled when there is a dialogue box on the screen or when information about sub-menus within main-menus is shown.

Semantic feedback – A visual or a text message that informs you that there has been a fundamental change made to the underlying structure of the current document. For example when you change the font style then you will see the new style, or when you sort a database you will see the items displayed in the new order.

7.5.3 State information

Actions that are possible for users to perform and the current state of the system should be obvious. This is even more important when working with web based systems since a loaded/busy network can slow down the system’s performance. For that reason the user might become unsure if an action was registered or whether the system is waiting. For example, Netscape lets the user know in what state the system is by showing the following messages:

• ‘contacting remote host’
• ‘X% of YK loaded, Z sec remaining’

[Anon IBM, 1997:8] By presenting this information to the user, he/she will be more patient with the system and feel more comfortable with it. This is due to the knowledge of what is happening and the reason for delay. If the user is aware of what
the system is performing it is easier to let the system complete the task without intruding in the system or getting irritated.

7.5.4 Error prevention
The designer should prioritise to prevent the user from making errors instead of concentrating on error handling. To be able to do so the interface can provide:

- visual cues
- reminders
- lists of choices rather than having the user type the word or file name. Other possibilities to reduce the typing are the use of drop-down menus and checkboxes. [Anon IBM, 1997:5] This kind of error prevention will also result in greater user productivity though the user has to move the hand from the keyboard to a separate input device such as a mouse. Experienced users often prefer to type six to eight characters instead of moving to a different input device. [Shneiderman, 1992]
- other aids, either automatically or on request. [Anon IBM, 1997:5]

To help the user avoid making any big mistakes or errors, good error handling needs to be provided. There are a few more things to think about, than the ones mentioned in the previous section, when providing error messages and so forth [Mayhew, 1992]:

- Always give the user the possibility of undoing an action. Clicking on a link by mistake can easily be undone by using the “Back”-button. There are other situations when the undo-action is more difficult to provide such as when sending an e-mail. However, it is important to have the undo-action in mind.
- Use cancel-functions especially for actions with a long process time. That can for example be very usable when saving a file from Internet since it is difficult to know in advance how long it will take, due to the fact that the speed will depend on how busy the systems are.
- Return cursor and highlight the error field. A web page can be very usable if only the error-field(s) is shown when the user has made a mistake. Other fields do not need to be displayed since that can confuse the user and make the error-indication harder to notice.
- Allow editing error fields. Do not make the user need to re-enter the whole word or sentence. It is better to only mark the incorrect value since it both indicates where the error is located as well as tells the user what value was entered so that he/she will not make the same mistake again.

7.5.5 Error message positioning
An error message is displayed because the system needs to inform the user about something. Naturally the message is shown with the purpose that the user will notice it. An effective error message will therefore have to appear in the user’s field of vision. That can for example be near the error field, in window or on top of the screen. It can also be positioned near the next action, in other words, close to the link or button that will perform the upcoming action. In many cases it is very important that the user actually notices the error message since it otherwise can cause huge misunderstandings between the user and the system. [Mayhew, 1992]
7.5.6 Reuse of and remembering data
There is always information that is needed for several different purposes or used over and over again in the same situation. That can for example be file names, previous settings or personal details. A user should never have to remember these things, things that have already been entered and that the system has already registered once. [Anon IBM, 1997:5] Furthermore, data that has already been entered once should not have to be retyped. The user wants everything to be as fast as possible, both manual entering and editing of data as well as processes run by the system. By letting the system keep track of entered data and settings the time for the manual part of the performance will be decreased and the user will be more satisfied. [Shneiderman, 1992]

7.6 Personalisation
It is not unusual that the users vary in experience and other relevant personalities such as age or nationality. These issues have to be taken in consideration by the designer. Different people have different concerns and to succeed in building an application that will be a success, all concerns have to be fulfilled. This is of course an impossible task for a designer. Therefore the designer needs to look at the group of users the application is aiming for. From there, the concerns can be taken under consideration when building the application. [Winograd, 1996]

7.6.1 Personalisation levels
There are three different techniques to use when adjusting an application to users’ needs. They are all more or less personalised to individuals, though the last one mentioned below are the most adapted one to one specific user.
- To be able to meet the needs of many different users, clear icons and on-line help can be provided as well as keyboard shortcuts for experienced users.
- Layer the interface so that novices need not be aware of the full complexity of the system on a first encounter, but can learn the fundamentals and then gradually add the more advanced and sophisticated functions to their use. [Mayhew, 1992]
- The graphical interface should be adjusted to individual users’ needs and desires. It can help the user to feel more comfortable with the system and makes the interface more familiar. [Anon IBM, 1997:4]

7.7 Form-fill-in
Applications often contain fields to be filled in by the end-users. It is easy for the users to be confused if the right information regarding how to fill in the fields is not given. Or, the information can be complex and hard to understand, so to remember when designing applications, is to be noncomplex in sentence and word descriptions and to make the fill-ins as easy as possible, otherwise the end-user might skip the part including the form. [Löwgren, Stolterman, 1998]

7.7.1 The title
The first thing a user notices when entering a new page is the title. That makes the title very important and sometimes determines if a user will continue to explore the page or decide to look elsewhere. Since the user’s decision mainly depends on the
title, the title has to be easily understood and briefly explain the content of the page, using terms that are well known by all users without computer terminology. [Shneiderman, 1992]

7.7.2 Instructions
Where form-fill-ins are to be used comprehensible instructions should be given to provide the user with brief information about the task to be performed. A short description of the necessary action can look like the following: “Type the telephone number” or simply “Telephone number”. Avoid pronouns such as “You should...” and references to the user like “The user of the form should...”. Another useful rule is to use “Type” for entering information and “Press” for special keys such as TAB, ENTER etc. It is important to use a familiar language to the user and to be consistent regarding the grammatical style. A language that is too formal, or the opposite, too informal can either confuse the user or decrease confidence in the system. [Shneiderman, 1992] To help the user to know what to fill in and what is asked for the use of underscore and other markers indicate the number of characters needed in a field. It can help the user to understand if an abbreviation is asked for or the complete word. It can also be useful when the user is supposed to type a specific number such as a telephone number where it is possible to type the dialling code or even the country code. This can sometimes be a better alternative than giving examples in the instruction text. [Shneiderman, 1992]

Explanatory messages for a specific field should be visible to the user in a consistent way. It can for example happen whenever the cursor is in the field. [Shneiderman, 1992] If the information message moves, suddenly shows up or changes in shape or colour, it will be easier for the user to notice it and therefore receive the information before the action is proceeded.

If the user after all types in an incorrect value or character after all, the system should give an indication that it was not correct done. The message should also show permissible values of the field. [Shneiderman, 1992] Simply telling the user that the fill in was incorrect will not be sufficient help. If the user has to spend time figuring out the correct typing on his own, he or she will soon stop using the system.

7.7.3 Required and optional fields
Sometimes a form includes both optional and required fields. In that case the optional fields should be clearly marked. If it is possible, optional fields should follow required fields [Shneiderman, 1992]. Separating required fields from optional will prevent the user from missing the required fields and it will also help the user to concentrate on the most important parts. Another advantage gained by using separation is that users, as soon as they reach the end of required fields, will notice that they have completed the compulsory part.

7.7.4 Cursor movements
Cursor movements within a form need to be suitable and convenient, and also simple for the user to understand. It can be either a TAB-key or a cursor movement arrow, other techniques are also used. [Shneiderman, 1992] This will primarily help experienced users that quickly want to fill in a form. It is also a method that is easy to learn for novices if they are informed about its functionality.
7.7.5 Completion of the fill-in
When the user has finished the fill-in of the form it should be clear what to do next. Though, automatic completion when all required fields are filled should normally be avoided. This is due to the fact that the user might want to change a value after the last field has been filled in. [Shneiderman, 1992]

8 Analysis of our experience achieved
The many guidelines and standards for graphical design within computer applications might not always be used the right way by the designers. To be able to get an opinion as to whether existing guidelines and standards are used as they are intended when applied to “Internet bank” design, we have interviewed a web designer at MeritaNordbanken and also a test group with people who have or have not used ”Internet banks” before. To find out more about the test group and how we performed the interviews and tests, see chapter 6 Method. In this chapter we will try to summarise the experiences we have acquired during the writing of this essay. We will discuss the big issues that have crossed our minds and also give a picture of how we evaluate the use of guidelines in “Solo”, the “Internet bank” of MeritaNordbanken.

The major opinion received when studying users is that a graphical layout is not the important thing when looking at an “Internet bank”. Functionality is what the user mostly looks for when evaluating the usage of the “Internet banks”. In our experience, “Internet bank” layout is not too complex and they therefore follow many of the guidelines presented in chapter 7. General guidelines (7.1) have been used to help the different experienced users of an “Internet bank”. The necessity of supporting different web browsers is very little when working with general guidelines. When using these general guidelines it can also be seen from the negative side by the users since the page can be seen as boring and not as colourful as normal Internet pages. It is therefore important for the web-designer to find a good way of simplifying the layout without removing the cheerful part.

When evaluating the information found in the literature surrounding layout design we have found clear pictures of what is most important from the author’s point of view. The colour is one thing that is frequently discussed, how many colours to mix in one page, which colours to use and how to best use them. Authors are united regarding these questions though as the web-designer at MeritaNordbanken said in the interview: “We often have to re-do and adjust the guidelines to suit the special requirements from the company.” MeritaNordbanken has made their own collection of guidelines to be used when designing the layout of “Solo”. By using already defined guidelines they can shorten the amount of time spent on design of colours and graphical objects every time a change or an add is made to the “Internet bank”. The web-designer also says: “It is important to the users to feel at home every time they visit the web page. With a change in layout and colours between times of use, the users would feel more insecure of how to perform different tasks and where to find them in the page layout.” The guidelines discussed in the collection are for example what special colours to use in the background, where to place the different graphical objects, the size of the objects and pages, colours and format of the text and how to
design the frame setup. To have the same layout on all company letters, commercial leaflets and so forth will help to build the company trademark even stronger and the users will always recognise themselves.

When adapted guidelines are created, general guidelines from literature are often used as a frame around which company specific parts of a guideline are composed. One example of this is when using the colour red to show the change of the payment date and at the same time as using the colour blue in the frames. Here the designer follows the guideline instructing to use colours that is connected to real life (red as for stop) but not the guideline to have red and blue in the same screen (see figure 4 in appendix B). When going trough the layout of “Solo” you can in many places trace guidelines found in literature though with a specific approach to adapt to MeritaNordbanken’s layout principles. Specific guidelines and how they are used in “Solo” are presented in the following subchapter (8.1).

Not to much attention in books regarding guidelines is put on where to place important objects, such as log off buttons. The users we studied had a hard time finding the log off button on “Solo”. Log off button in “Solo” is placed in the centre part of the window and not nearby the close button of the web-browser window which is in the top right corner. Many users therefore forget to log out before closing down the window. When discussing the log out button it could also be of importance to take in consideration when the log out possibility should be available to the end-user. As of today an end-user in “Solo” can log out at any time, no matter what task is being performed. Maybe the log out button should not be made available when performing tasks such as payments, transferring money and so forth.

Guidelines regarding the use of pictures need to be taken under great consideration when discussing “Internet bank” layouts. With a lot of pictures the page download time is increased and the user might get tired of waiting and cancel their command, especially users connected via a modem. In guidelines regarding this issue there are big differences between guidelines directed to non-hypertext applications and Internet applications. Non-hypertext applications are often stored locally on the hard-disk drive and therefore the download is not too complex in comparison to the download time when searching through on the Internet, where every page with its content needs to be received from another hard-disk drive, maybe found in another part of the world compared to where you are situated. The saying “A picture says more then a thousand words” you are not talking about an “Internet bank” page. An “Internet bank” page should have as few objects and pictures as possible to give the user the support needed to be able to perform transactions and commands.

When areas like company culture, download and process time etc. are taken into consideration when looking at the existing guidelines of today you will se how important it is to question the use of each guideline when designing “Internet bank” applications. To follow the guidelines slavishly might only make the result worse. Use the guidelines with consideration and care, and the result will most often be to the satisfaction of all involved parties (users and company).
9. Analysis of the test group interviews

In this chapter we will take a look at how the end-users reacted to the graphical interface of “Solo”, when performing a number of pre-defined tasks. Their reactions have then been studied and compared between the user groups and the guidelines will here be presented from the view of the users.

Our test group consisted of different experienced users of “Internet banks”. To receive some background information of why the test group use ”Internet banks” or not, we asked some general questions regarding the use of “Internet banks”. 1/3 of the test group had never used an ”Internet bank” before and reasons given were that they felt that the bank had not given them enough information regarding the service and that the technology was not ripe enough to offer a secure solution for ”Internet banks”. Many felt unsure about the security, money is a very sensitive issue for a lot of people and before trying something new, they want to be absolutely sure nothing can go wrong. The part of the test group that already were using ”Internet bank” services at any kind, saw the possibilities of performing their bank tasks at any time without having to think about the opening hours of the local bank office. The fees of bank services were also important. When using the ”Internet bank” to pay bills and transfer money, it is for free in comparison to performing these tasks at the bank office. To be introduced to using ”Internet banks” at work, is also a common way of starting to use ”Internet banks”.

The most commonly used tasks in ”Internet banks” are paying bills, overview of one’s financial status, payroll payments and stock purchase. Other services are not used to any larger extent, the new function of receiving bills over “Solo” was a feature many of the users had missed when it was introduced. The choice of not using the other services depended mostly on loss of interest in the service or that they found it non-usable.

Graphical layout was discussed more after the test group had performed the tests. They were then given the opportunity to, during the test, evaluate the graphical design and consider possible changes and comments to the design. During the interview with the test group, one task was to grade the importance of different parts of a graphical user interface. To give confidence to the user during the performance of different tasks were the highest rated statement, the colours of the background and the layout and colours of the text were not the most important when using ”Internet banks” according to the test group. Of course, people notice the colours and layout, although it is not something the users complain about in the first place if they are not satisfied. The web designer at MeritaNordbanken also commented this during the interview, as a big problem when designing web pages. When no comments are given regarding the graphical layout, the designers do not know if the users are satisfied or not. As the web designer said: “As long as no comments arrive, we believe the web page to be to the satisfaction of the users.” The result of the grading will follow sub chapter, 8.1.

The tests performed by the test group contained tasks such as to transfer money, open a new account, get a financial overview and so on. What we wanted them to look at during the test was the layout, how they reacted to different colours on the screen, where to find information and the overall design. Comments and reactions were very
different from one user to another. The part of the test group that had never worked with an "Internet bank" before had greater problems finding the information asked for by us, while the more experienced users had comments regarding different short cuts not working and functions to ease the way through the tasks. Many of the experienced users also missed important data because of earlier know-how on how the "Internet bank" works in different situations, this for example when the payment date is changed when a payment is registered for future payment. The colour on the payment date is marked with red text to make the users aware of the changed date. Some of the more experienced users were not observant enough to see the change while the new users noticed this change and became unsure of how to move forward. The insecurity occurs more often to the less experienced than to the experienced ones. This was one thing that we saw during all interviews. It was also something that was commented by the less experienced, more information on how to behave in different situations without having to go to the help page, which did not always give a very clear answer on how to move on with the task.

The first point noticed by most of the test group members was when downloading the first page of www.nb.se. Comments were given regarding the number of pictures on the introduction page that had to be downloaded before the link to “Solo” appeared and the possibility to move further came. This problem is even more obvious to users having to connect to Internet trough a modem connection and can become a problem if the modem connection suddenly closes because of incoming calls for example. The download time has to be decreased.

Sections containing a large amount of information is one of the biggest issues when looking at the graphical layout, this according to the test groups’ reactions to how the information is shown, in what colours and format used and where it is situated on the screen. Seen during the tests are also the differences between screens regarding screen size and dots per inch (dpi). With small screens and poor resolution, text was hard to read and therefore some hesitation occurred before the users continued with their task.

The test users tried to connect to other pages by clicking on the emboldened text on the welcome page, instead of using the links displayed on the left side of the frame where all connections to different pages can be made. This caused some confusion before they understood that the text were not for connection, just for further and more extended information regarding each service. As for the information page, the users found it very good since they got the information needed to know where to go to perform the tasks given to each test user. Some of the users suggested using pop-up text when moving over each link in the left frame, to ease the search for information of what services hidden behind each headline. However, the only headline that caused confusion, and where further information were needed, was “Snabbköpet”, where almost all the test users needed to go to the welcome page to find further information of what was hidden behind the name. Only one person, with earlier experience from “Solo” knew where to go without hesitation. The test person explained afterwards that the page had been visited before when a new account had been opened. But he agreed that the name was not too illustrative of what services would be found there.

Regarding colours used in the text, complaints were made that no information was to be found concerning what the different colours meant and for what purpose they were
used. This complaint mainly came up during the task were the test users were asked to register a payment. The colour red is used to make the user aware of changes made by the system, as for example change of payment day or incorrect reference number. However, as previously noted, some of the participants in the test did not even notice the changed date. When we discussed the issue afterwards, they asked for more clear notice than just the change of colour in the text.

The layout of the page in context of colours, pictures and design was very satisfying for most of our participants in the test group. However, some of the users thought the colours and design a little bit boring, they would have liked more colourful design with gayer colours together with pictures. But, after a discussion regarding special colours for each company they understood why just these colours where used. Pictures could of course have been added anyway, according to them to make the web pages more cheerful. Some of the input-boxes together with accompanying text information were not necessary according to above lying input-boxes and text. Some of the users felt a little bit irritated by this, since they felt they had to look and move their eyes to fill in all information needed, especially when transferring money from one account to another. Last but not least was the problem in finding the log off button. Many users forgot to log off since they only used the cross in the top right corner to shut down the web browser.

Some of the test users also discussed the issue of a personalisation, so that the necessity to remember all the most frequently used account numbers is not needed. They should instead be stored in each users personal file.

9.1 Ordering the precedence

In this section one of our investigations is presented. It is based on a questionnaire answered by eighteen people. The task was to rank different elements of an “Internet bank”. The investigation is not based on any statistical rules or standard. However, we have taken Nielsen’s (Mars 19, 2000) thoughts regarding the number of test subjects in consideration during the preparation.

Nine women and nine men participated, divided in three groups (weekly users, monthly users and novices). There were eight elements to order by giving them numbers between 8 and 1. The most important element was given the number 1 and the least important one the number 8. A summary of the results is presented below:

<table>
<thead>
<tr>
<th>General</th>
<th>Women</th>
<th>Men</th>
<th>Young</th>
<th>Old</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system should inspire confidence.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Receiving confirmation after performed task.</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Easy to navigate within the system.</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Easy to correct a mistake.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Easily understandable terminology.</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>That the system is fast.</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Be consistent with words and terms.</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Colours and layout used easily read.</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

- 32 -
The first number (to the left) shows the average order of precedence, including the answers from both women and men. We can see that confidence in the system is considered as most important. Also the second ranked element is connected to the safety of the system and that that user can trust in the system, while elements connected to the graphical part of a system are the least prioritised.

When comparing the answers from women and men separately there is a big difference on how they prioritise speed. While men give speed second priority, women find it the least important element. There is one more element where opinions differ, terminology. Women believe that it is of high importance while men find ease of reading and understanding less important. Except for speed and terminology the overall result shows us that the difference between the two groups is not prominent.

There has also been a separation and comparison between younger subjects (under 41 years old) and older ones (over 40 years old) to see if there is a difference in how they prioritise the different elements. There were two differences worth mentioning, (1) their differing views on speed and (2) the younger people’s higher prioritise of the colours and the layout. According to the test, younger people do not rate speed as highly as the average user, they actually rated it as the least important element.

It is important to think about the different experiences that the users have, says the web designer. “You have to build an “Internet bank” that suits every kind of user with any background. However, since users learn very quickly the user interface at “Solo” is designed not for novices but for somewhat experienced users.”

10 Conclusions

10.1 Answers to the questions

10.1.1 Are today’s guidelines, regarding interface usability, adapted to be used to support “Internet bank” design?

We gathered a lot of information regarding guidelines for the graphical user interface, some of them considering graphical interface over all and some of them specified on web based interfaces. After reading a lot of books, performing tests and interviews we could draw a conclusion, or rather several conclusions. It was not easy since there is not one simple Yes or a No, but a combination of both. According to our experience during the writing of this essay, guidelines have come far in adaptation towards Internet applications and especially “Internet banks”. Before we started our investigation in the subject area, we did not believe that development had reached so far. In our opinion, the area surrounding “Internet banks” is quite new and modern and therefore we did not believe that the guidelines would be so fully adapted. But as a result of our tests we have drawn the conclusion that guidelines, although they earlier only concerned computer applications, they can very well be used today in the design of “Internet banks”. We have also found many special guidelines only focusing on Internet applications that without hesitation directly can be applied within “Internet bank” design. The greatest difference found between guidelines for computer applications and Internet applications is the area of page format, where the layout and limitations differ. There
are also some minor areas like the use of colours in different functions that also caught our attention during the investigation. We have not, however, found any specific guidelines regarding “Internet banks”. All guidelines are both designed for computer applications specific or Internet applications and then used during the process of designing “Internet banks”. We believe this occurrence has appeared because most guidelines can be used without any changes directly in the design of “Internet banks”.

As we have worked with and analysed “Solo”, MeritaNordbanken’s “Internet bank”, we have seen how previously presented guidelines have been used in practise. Most of the existing guidelines can be used on an “Internet bank” with small adjustments or no adjustments at all. These are the more general guidelines concerning for example consistency. All guidelines that are mentioned in this essay but not commented in the following section, 10.2 Comments to guidelines, can be used without significant adaptation or are not relevant in the process of designing the graphical user interface of an “Internet bank”.

Several guidelines can be used without any adjustments but there are also guidelines needing to be adapted in order to improve usability. These guidelines were designed in a way helpful during the design of computer applications, but to really match the special needs of designing web-based graphical user interface, they had to be extended with some limitations of use and extra adaptation to Internet applications. The guidelines’ new version can be found in section 10.2. As mentioned earlier all of the guidelines from the essay are not included, and some are also new when we present the comments on the previously presented guidelines in section 10.2. Based on the knowledge received during reading, interviews and tests we present only the ones where we have something to comment. There were also a few guidelines that could not be used at all due to differences between developing an ordinary computer system and the development of a web based system as well as the special conditions for an “Internet bank”.

10.1.2 If so, are they used in the right way in the design of MeritaNordbanken’s “Internet bank” called “Solo”?

It has sometimes been hard to see if guidelines have been used correctly or if they have not been used at all, since the misuse of one guideline can indicate that the guideline has not actually been used at all. For example the guideline regarding effective error messages says that it is important to place them where the user will notice them. If an error message is provided but positioned somewhere on the screen where it is hard to see, it is uncertain if the designer took that specific guideline into consideration but misunderstood the positioning, or if it was never considered at all.

When performing the interview with Ulf Larsson at MeritaNordbanken, he informed us that he found existing guidelines helpful and that they mostly gave him the support needed. As mentioned before, MeritaNordbanken has their own compendium with guidelines specific for “Solo”. We believe that other companies that design “Internet banks” should also have their own compendium including guidelines to make sure the “Internet bank” stays consistent throughout changes made. This to insure the user not to make it more difficult to use after a major change in the design of the “Internet bank”.

- 34 -
Furthermore, we believe that the guidelines could be used even more to increase the usability and make the design stricter from one “Internet bank” to another. It is important that a user of an “Internet bank” feels secure of the usability even if he/she changes bank. It should not be necessary to learn the entire system from scratch again just because they change bank. Many guidelines are very good, but are not used, and some guidelines are also used too often and it decreases the usability instead. Therefore as mentioned before, it is really important to consider different situations before using a guideline.

10.1.3 If not, how should the guidelines be changed to better support the design of “Solo”?  
It is not as easy to say that all guidelines are useful when designing the graphical interface of “Solo”, or that no guidelines at all can be used. Even though most of the guidelines are useful without being changed, with some guidelines it has to be taken under consideration how to use them in the best way. By using the test group members experience and thoughts together with our experience we believe that some new views of how to use the guidelines can be given to the designers. We have collected all our conclusions from the tests and literature and tried to sum them up in the following section 10.2.

10.2 Analysis of the guidelines used in “Solo”  
Comparing “Solo” with earlier mentioned guidelines in this essay, we noticed how they are used and whether there had been an adaptation. In this chapter our experience and thoughts regarding the use of guidelines are presented in combination with comments from the test users. The use of most of the guidelines can be traced in the graphical user interface of “Solo”, though we decided to only mention some of them since a majority are used properly or are not relevant, in our opinion, and therefore no comments are needed. Many guidelines are even used within sections without being in the title since they are connected to the guideline mentioned.

As mentioned in the section above, comments from test users will be included in this section and compared with our thoughts and conclusions regarding the guidelines in this essay. Since we are concentrating on the graphical layout users’ comments regarding areas like functionality and security will not be evaluated. However, it is worth mentioning that users found confidence in the system the most important issue when evaluating an “Internet bank”. Also security was ranked high. Due to this, the graphical layout is of low priority among users and it is not seen as a major issue when evaluating an “Internet bank”. Nevertheless, the design and layout, such as images, colours and also text messages, will affect the user’s attitude regarding safety and also influence the user’s confidence in the system.

To be able to connect the following section to the correct guideline, the same titles are used as in chapter 7.

10.2.1 Consistency  
There are a few guidelines that are more general than others and often used in combination with one or a few other guidelines. One of those is “consistency” which is clearly used during the design of “Solo”; buttons have the same position within
each page and the text is reused. There are, however a few differences to be found. One example is the use of the “Klar” – button, which completes most of the possible tasks the user can perform, but when performing security activities the “Klar” - button is missing (see figures 6 and 7 in appendix B). This example of inconsistency was not commented on by the test users since they did not visit the page during the test.

Even the use of the key “Enter” differs between the pages. For most of the pages the key “Enter” does not have a purpose but for a few, the page is reloaded if “Enter” is pressed and all fields are reset. Note that this inconsistency was not mentioned by any of the users. The reason for that might be that they followed our instructions very carefully during the test, and did not take any advantages beyond those. This problem with the “Enter”-button occurred to us when we went through “Solo”, finding the different tasks the test group later performed.

Furthermore, the font is the same for all pages except for “Snabbköpet” where the title is italics where as all other titles are not (see figures 3, 5 and 8 in appendix B). All users visited this page during the test but did not mention or comment on the title. We believe that that is due to the confusion and irritation among users finding the name of the page very unclear and improper. While concentrating on the name, the differences in layout and font compared to other titles were not noticed.

Consistency was not something the users noticed too much, only in very few cases. We believe it was because of the concentration the test group members had to perform the right tasks we asked for and to answer our questions. But to us it became very obvious since we entered the page very often and had the opportunity to fix our attention on different parts each visit. Once aware of an inconsistency, it gets very irritating each time the inconsistency occurs.

10.2.2 Simplicity

“Solo” is in the main very simple to use and it is possible for the user to decide the level of complexity. Though there are nevertheless a few changes that could make the web site even more easily used. As it is today all help is found when clicking the “Hjälp” – button and no text at all is available at the “bank” pages. In some situations a little text box with a short description would help the user to fill in all information correctly and understand the information displayed. For example when the user visits the page “Kommande betalningar” (future payments) where some payments can be red-texted if they are not performed correctly (see figure 5 in appendix B), the user might find it positive to have a short explanation available directly on the page. One experience gained from the test was that users did use the help but were not always satisfied with the explanation received. There was also a demand for a colour guide including all colours used on the “Internet bank” and a description of where and why each colour was used.

The placing of the “Help”-file is also very important to make it easy to find. Help information needs to be put in a position easy to find on the screen so that those who need help do not need to look for it.
10.2.3 Breathing room and Graphics
Solo is offering a log off, so called, breathing room (explanation of breathing room can be found in section 7.1.4), it can actually be seen as boring when pages include so little information. Many users find the pages in “Solo” boring with comments as above-mentioned. See chapter 9. Though when including more pictures, they see the problem with to many pictures in consideration to download time.

A shortcut would avoid the problem with a long download time in the first page of www.nb. This would of course be a problem for the “Internet bank” since they would lose commercial possibilities if the introduction page is not used by the end-users. But in some way downloading time will have to be decreased to help the end-users to reach “Solo” faster. The bank may just have to find another way of marketing their products which is not at the expense of the customers’ phone bill.

There are hardly any images and graphics used in “Solo” except for a few buttons and arrows. Some more images could make the page more attractive and pleasant. One example could be to use a “Trash can” image when the user wants to remove a registered payment instead of having a text button, the “Trash can” image would also refer to earlier experience of using buttons with a trash can used in many other applications. In our opinion the help of previous experience and reuse of button images could help the user to more easily find the meaning of the button more easily, without always having to read the text to, only interpreting the picture for a change.

10.2.4 Function Keys
This is one of the guidelines that “Solo” is not adapted to. However, since almost all parts in “Solo” can be reached via a link from the welcome page we find that there is no need for function keys or shortcuts. Having the menu visible at all time makes it easy for the user to move between the pages without having to go through more than one step. The results from the test also support our conclusion since hardly any test user complained about short cuts or function keys not working or not existing. We believe that they found them unnecessary due to the fact that all parts in the system can be reached without greater efforts from the user.

10.2.5 Link indication
There is a menu presented to the left in “Solo” and on the welcome page a description can be found with information about the different pages that can be visited and used in “Solo” (see figure 2 in appendix B). It is not however obvious if both the menu on the left side and the introduction text are links since they are presented using the same font and both are in bold text. The only thing that distinguishes them is the arrow in the menu on the left side of the page. The users believe it needs to be more obvious what the differences are between the two parts. To display them differently or using an image to make it more clear which are links, might improve the usability so that the users will not be confused. Or why not make the descriptions also links to the different pages, this would make it easier for the end-users.

10.2.6 Colour Parings
As mentioned in section 7.3.3 red and blue should not be used in a combination since that can cause eye irritation. “Solo” uses the combination on a few pages and even though it is not recommended in this case it can be accepted. The reason for that is
that blue is one of the standard colours used in MeritaNordbanken’s and red is used when the user needs to be aware of a fault that might have occurred or changes being made by the application. According to the users they did not notice the problem with colours and did not comment it, but when reading research some colours should not be used on the same page. Though in this case we believe the guideline not to be important and could therefore be deviated from.

10.2.7 Grouping related commands
There are many different situations where related commands should be grouped together. In “Solo” this is, among other parts, used in list boxes on the security page. There are a few different sorting algorithms used, for example alphabetical ordering, most frequently used first and even one time based ordering. Since they do not use the same ordering it might be seen as an offence to the consistency guideline, though sometimes breaking one rule will improve the usability of a page. There is always a balancing of knowing when to break the rule and not to make the most usability friendly “Internet bank”. This guideline was not something the users commented on because to them it is very common to sort related commands and text in different orders, and therefore nothing to react to.

10.2.8 Feedback (Ref: 7.5.2, Feedback Categories)
When filling in new payments in “Solo” there are certain information to enter, for example if the payment is a postal giro account or a bank account, and the date the payment is supposed to be paid. If the user forgets to mention what kind of account it is or if the date is an old date the system will only reload the page without telling the user where the incorrect data was entered. Reloading the page will cause all data, entered by the user, to disappear since the page will be reset. This can really frustrate the user since no feedback is given. However, as seen from the test, no users have made the mistake of forgetting to fill in certain information and therefore no one faced this problem. Even though this did not cause any problems among the test users we believe that this is serious problem where the users is screened from what was is going on in the system and why it is happening. More comments regarding feedback will be presented in the following section, 10.2.9.

10.2.9 Error message positioning
As mentioned in the previous section a date needs to be entered for each payment. If the date appears to be a holiday a new date is given and marked red. This might not be enough to get the user’s attention. A more centralised and bigger message would probably be easier to notice and even better if it mentioned that the date was actually changed. Also our test users agreed with this conclusion since most of them missed the information telling them that something was changed. A few of them, mostly novices, noticed the red marked text but instead of helping them it actually confused them since they did not know why it was red or why the date had been changed. A short comment in the margin would probably make more users notice the red marked text and it would inform the users about the change.

There is one more situation where the error message could be more pronounced. This situation appears when a user is registering a security transaction (buy or sell) and misses filling in all required fields. Since there is no indication if all fields are required or not it is not obvious if there are any optional fields or not. One of the
items asked for is a rate limit when selling or buying securities. We believe that this data is not always relevant and therefore can be interpreted as an optional field. If the user decides not to enter a number into this field there will be an error message. The error message tells the user that the share selection is incorrect instead of drawing attention to the missing rate limit. Further more, the error message is very small and might be hard for the user to find. The user is asked to fill in one of the one-time-codes even though there is only a change that has to be made and not the transaction (buy or sell). This can really confuse and frustrate the user. This is one of the parts that were not included in the test and therefore no comments are to be added from the test users.

10.2.10 Reuse and remembering data
The user is helped by the system to remember a lot of information as for example account numbers and security holdings. There are, however, a lot more things that the system could do to improve the ease of use. One thing is that accounts that are reused over and over again, eg. the account for rent or the telephone bill etc, could be registered in the system so that the user can select them when registering a payment instead of having to retype them every time. There were only a few of our test users who mentioned this, though we believe that most of them would find this possibility an improvement of the system’s functionality even though they did not come up with the idea during the test.

10.2.11 Object positioning (new guideline)
It is very important to help the users to find what they are looking for and also to place different objects close to other related objects. Some of our rather more experienced test users made us aware of the very poorly positioned log out button. Where it is placed today, in the centre of the window it is hard for the user to find. But if it were to be placed nearby the window close button or the “File”-menu in the web-browser menu we believe it would be found more easily when exiting the page with the help of one of the above mentioned ways. This problem is not discussed too much in the literature but we believe it is a very important issue to take into consideration and that designers should be more aware of the problem, that users very frequently forget to log out because of the position of the object used. Objects should be positioned together with other related objects.

10.2.12 Log out availability (new guideline)
The availability should be decreased so as not to cause any serious disruptions in different tasks being performed by the application or user. In the present version the user can leave “Solo” whenever they want, with no consideration to what is being performed at the specific moment. This is mostly important when performing tasks that should not be interrupted because of transactions between accounts and payments being made. Some of our test group members had the feeling that if they logged out the task would be closed and they would escape back to the most recent situation. To avoid confusing the user it is a lot easier just to remove the functionality of logging out during some tasks so that they have to escape or finish the task before logging out.

10.2.13 Consideration of guidelines usage (new guideline)
One thing that is general for all guidelines is the need for consideration before use. No guideline should be used without being analysed first. Since all guidelines do not suit
all situations and there are times when a guideline can decrease the usability instead of increasing it, if used incorrectly. Usage should therefore be considered in each specific situation, it is very important to really think the design through before getting started, who is going to use it and for what purpose. Do they need some special help because of lack of experience or do they already know how to use the special system?

11 Further studies
The subject around “Internet banks” is large and can be investigated in many sub-areas. Our chosen area leaves many other areas un-investigated. During our work we have found that the questions handled in the report leave gaps that could be filled with further studies. Since the result of this study is that most guidelines are already adapted and that they mostly are used in the right way it could be interesting to find out exactly which guidelines that are not properly used and why not. This would help designers even more in their work if they knew how they misuse the guidelines and what they could do to improve their use. Of course areas like guidelines written for security and other parts of user interface are also to be explored and investigated, since we only chose the graphical part of the huge area of human computer interaction.

12 List of references

12.1 Books


Lemay, L, 1996, Teach Yourself Web Publishing with HTML 3.2 in 14 days, United States of America: Macmillan Computer Publishing


Mayhew, D, 1992, Principles and guidelines in Software User Interface Design, United States of America: Prentice Hall PTR


Preece et al, 1994, Human Computer Interaction, Great Britian: Biddles Ltd


### 12.2 Articles from Magazines and Newspapers

Aspelin, L, November 27, 2000. Svenska Dagbladet

*Internetbanker går hem*

### 12.3 Articles from the Internet

Anon IBM, 1997:1. *Affinity*,

Anon IBM, 1997:2. *Familiarity*,

Anon IBM, 1997:3. *Obviousness*,


Anon IBM, 1997:5. *Safety*,


Anon IBM, Year of publication unknown. *IBM Web Guidelines*,

Byttnner, K-J, January 2, 2001 Computer Sweden, *Fel på Nordbankens system igen*
http://nyheter.IDg.se/display.pl?ID=010102-CS11 [Accessed: 02/01/2001]

McMillan, B, Pattersson. G. Year of publication unknown. *HCI Guidelines and Standards*,

McMillan B et al, 1, Year of publication unknown. *University of Ulster, MSc Computing and Information Systems, Lectures HCI 2000/2001*
http://starform.infj.ulst.ac.uk/Billsweb/HCI/Lectures/lect6a.html, [Accessed: 04/05/2000]

McMillan B et al, 2, Year of publication unknown. *University of Ulster, MSc Computing and Information Systems, Lectures HCI 2000/2001*
http://starform.infj.ulst.ac.uk/Billsweb/HCI/Lectures/LECT6B.html, [Accessed: 04/05/2000]

Nielsen, J, May 1, 1997 Jakob Nielsen’s Alertbox *The Difference Between Web Design and GUI Design*


Nielsen, J, Apr 16, 2000:3 Jakob Nielsen’s Alertbox *Reset and Cancel Buttons*,

Yahoo Inc., 1, Year of publication unknown. *Yahoo Finance Canada*
http://ca.finance.yahoo.com/ [Accessed 05/11/00]

Yahoo Inc., 2, Year of publication unknown. *Yahoo Finans Danmark*
http://dk.finance.yahoo.com/ [Accessed 05/11/00]

Yahoo Inc., 3, Year of publication unknown. *Yahoo Finanzas Espana*
http://es.finance.yahoo.com/ [Accessed 05/11/00]

Yahoo Inc., 4, Year of publication unknown. *Yahoo Finance France*

Yahoo Inc., 5, Year of publication unknown. *Yahoo Finance India*
http://in.finance.yahoo.com/ [Accessed 05/11/00]
Appendix
Appendix A  Questiongraph

Appendix B  "Solo", MeritaNorbanken’s “Internet bank”