Interface update from older adult users’ perspective

Andreia Cantar, Eri Åström

UPPSALA UNIVERSITY
Abstract

Is it unavoidable fact that the interface of a program will change when the program is updated. It is a well-known problem that such changes lead to usability issues, even if the new interface in itself is usable. In increasingly digitalized society where using computers and the Internet is no longer a matter of interest, but a necessity to manage everyday life, it is important that older generation is included in the rapid development. Older adults generally suffer from physical, motor and cognitive decline that can create barrier to using computers. Changing interface can be particularly problematic for this age group, and a smooth transition from the old interface to the new one is needed. Fifteen older and five younger computer users were recruited, to study how a drastically modified computer interface influences older adults as computer users. Internet Explorer 10 for Windows 8 was used as testing software for the case study where the participants were asked to conduct a series of tasks to observe the effects of first time experience with the new interface. The attitudes and the emotions towards the new interface, as well as the difficulties encountered during the first time use were studied in the thesis. The result showed the clear difference between the younger and older participants. Older participants generally had a more positive attitude towards the new browser, even though they encountered more difficulties during the test. The younger participants managed to complete the tasks with less assistance, but were skeptical towards the new interface. Despite the differences in the emotional reactions, both groups were reluctant to update to the new interface, which was shown to be particularly problematic for older participants. The result of the study indicates that an interface that undergoes major restructuring is most likely to be problematic for senior computer users. Thus, there is a need for a bridging strategy between the old and the new interface.

Keywords

Human-computer interaction, Interface design, Updating, Usability, Digital exclusion, Elderly as computer users
Acknowledgments

We are extremely grateful for all the people who voluntarily involved themselves in this study. We would like to thank our mentor, Annika Waern, professor at Department of Informatics and Media, with a vast experience in human-computer interaction field. She offered us her support and assistance during the whole process. We would also like to thank our participants, the members of SeniorNet, as well as the non-member participants, and the young individuals who participated gladly in the study. Without their goodwill and participation, we would not have managed to conduct our case study, which gave us valuable knowledge that formed the basis for this study. We would also like to thank Marie Sjölinder who gave us wise advice during the incipient phase of the study.
### Table of contents

1 Introduction .................................................................................................................. 1
   1.1 Aim of study ............................................................................................................. 2
   1.2 Scope ......................................................................................................................... 2
   1.3 Outline of thesis ........................................................................................................ 2
2 Method ............................................................................................................................ 3
   2.1 Domain of study ....................................................................................................... 3
   2.2 Data collection method ............................................................................................ 5
      2.2.1 Participants ......................................................................................................... 5
      2.2.2 Case study ......................................................................................................... 6
3 Theory ............................................................................................................................ 9
   3.1 Digital exclusion ...................................................................................................... 9
   3.2 The older computer users’ special needs ................................................................. 9
   3.3 Universal accessibility and usability for older adults ............................................... 12
   3.4 Updating of interface ............................................................................................. 13
4 Result ............................................................................................................................ 15
   4.1 Difference in emotional responses to the new interface .......................................... 16
   4.2 Difficulties in the new interface .............................................................................. 18
      4.2.1 Training .............................................................................................................. 18
      4.2.2 Overlap .............................................................................................................. 18
      4.2.3 Terminology ..................................................................................................... 19
      4.2.4 Use of keys ....................................................................................................... 20
      4.2.5 Functional consistency ..................................................................................... 21
   4.3 The impact of the new interface on participants’ attitudes .................................... 22
5 Discussion ...................................................................................................................... 23
   5.1 Possible reasons for differences in the emotional experiences .............................. 23
   5.2 Possible reasons for the difficulties encountered using the new interface ........... 24
   5.3 Problems with transition from the older interface to the new one ....................... 25
6 Conclusion ..................................................................................................................... 27
7 References ...................................................................................................................... 28
1 Introduction

The proliferation of computers and the Internet has occurred at a furious pace since its introduction to the general public in the 90s. The majority of the Swedish population is frequent users of the Internet, and daily engages in various online activities (Findahl, 2012). Constant updating towards newer, and more improved version of software and web services is necessary to attract and retain the mainstream users who are becoming increasingly demanding and accustomed to new technology. In the world of information technology, which is characterized by intense competition and rapid changes, one of the most important survival strategies is the continuous updating and launch of new versions.

Updating aims to improve the functionality and usability of software and websites, and often results in changes in interface. In some cases, these changes in the interface can be a source of frustration rather than satisfaction. A number of users claimed they could no longer recognize the old features due to major changes in the interface when Apple introduced the new version of iTunes. Although learning to navigate in the new interface after a major redesign is manageable for many users belonging to mainstream, this transition can be difficult for other user groups.

People between 65 and 74 years old are the age group with the lowest percentage of Internet users (Findahl, 2012). The reduction in the perceptive, cognitive and motor skills makes it particularly arduous for people in this group to learn and remember new things. Over 20% of people in this group have never used Internet (Findahl, 2012), and even if the proliferation of the Internet is gradually increasing, it is still small compared to the other age groups.

We live in a world where everyday tasks such as paying bills are increasingly handled electronically, and consequently, the Internet can no longer be separated off from our everyday life. Even the Swedish government is aiming for Sweden to be "the best in the world at using digitalized opportunities" (Regeringskanslet, 2011) through the development of public e-Services in the city administration. Learning how to use computers and the Internet is no longer a matter of interest, but an important part to become an active part of the society.

To avoid digital exclusion and to promote universal accessibility, the special needs of older people have to be considered. The constant updating of software and websites that often involves changes in the interface, requires that designers should make sure to create a design that is easy to recognize and navigate through, focusing on facilitating the transition from the old interface to the new one.

On one hand, the urge for continuous improvement and change drives the development of information technology forward. However, on the other hand, this might be the source of frustration for senior users by repeatedly placing them in a new environment with unfamiliar design. Generally, the older generation experiences more difficulties to keep up with the rapid development of technology, and the software that is upgraded frequently is likely to be more cumbersome for senior users.

Therefore there is a need for a research that clarifies how the older generation is influenced by a changing interface to identify the difficulties and impediments that may hide behind the regular update of interface.
The process of transition from an old familiar interface to a new redesigned one, and the cognitive difficulties and affective responses experienced by elderly users, were explored using case study with senior computer users as main participants.

1.1 Aim of study

This study, explorative in its nature, was conducted to gain a deeper insight into how the inevitable change of interface due to software update influences older computer users by examining the behavior and the reactions during first time exposure to the new interface.

We identified the emotions and the difficulties expressed by the participants, by observing and interviewing them while using an updated version of a familiar application for the first time.

Our purpose with the study is to provide insight into a previously underexplored area, as well as potential inspiring knowledge for future studies that delve further into this field.

1.2 Scope

The scope of this study was limited to one particular piece of software, Internet Explorer 10 for Windows 8. We focused on the immediate effects and impacts that occur at the first exposure to the new interface. The immediate response and reaction were identified, and the subsequent processes such as learning and long-term adaptation process are not addressed in the thesis. In addition, the difference between the male and female participants is not discussed.

1.3 Outline of thesis

This thesis consists of following parts: introduction, method, theory, result, discussion and conclusion. In the introduction, we present the background image of the problems related to the major redesign of an interface following update. We focus on the central issue of this study, which is the older generation of computer users affected by this unavoidable process. The method section explains about the case study we used in the thesis, which consists of computer tests and interviews. This section also presents the domain of the study as well as the participants. In theory section, we cover the fundamental concepts and studies related to our thesis. We discuss the theories that represent the basis for our results, discussion and conclusion. Furthermore, we also present the principles developed to evaluate the usability of an interface for senior computer users, which will be used for analysis of our results. In the following result section, we present the results divided into the following areas: the emotional impact, the difficulties experienced and the attitudinal impact on the participants. For the presentation of the difficulties experienced by the participants, we use Telles’ five problem areas. In the discussion section, we reflect on the changes that were most problematic for the older participants, and the negative effects that these changes caused for them. Finally, in the conclusion part, we determine the effects of the interface change specifically on the older participants based on our result, which is divided into emotional, cognitive and attitudinal effects that we observed among the older participants.
2 Method

This exploratory study was conducted to take a closer look at how changes in the interface affect older Internet users compared to younger users. Our thesis is inductive, and consists of a case study that we use to get a deeper insight of the cognitive and emotional responses to the restructuring of an interface.

The case study included a computer test and a subsequent interview. We used qualitative data in form of recorded film sequences of computer screen during the test performance, and interviews where we focused on obtaining answers to the emotional responses to the participants’ experience during computer test.

We used overt observation to study the spontaneous reactions to the new interface. We chose not to use think aloud method during the computer test, since the participants were allowed to ask for assistance, and we had a continuous dialogue with them. In addition, we had the possibility to discuss about each task immediately afterwards. Furthermore, we used inductive method for analysis of the collected data, where we used two theories (see the theory section) to analyze and explain the results of the case study.

To find possible relations between the participants’ reactions and the new design we relied on the heuristics used for usability testing of web sides for senior Internet users. We have also used a study by Marcy Telles as the basis for the analysis of the difficulties and problems experienced by our participants. The study treats the problem of redesign of a familiar interface.

2.1 Domain of study

Web browser was chosen as the most appropriate testing program because of its wide distribution among computer users in all generations. To simulate the situation of software update resulting in major restructuring of interface, the tenth version of Internet Explorer (IE 10) for Windows 8 was used as testing program in the observation.

The main reason for the major change in the interface is that IE 10 for Windows 8 was developed for touch screen devices such as smartphones, tablets and touch screen computers. However, the interface is designed to suit desktop computers and laptops as well.

The appearance of the browser differs considerably from the previous versions. The toolbar, which was located in the upper part of the interface in older versions, is placed in the down part in the new version. Moreover, the toolbar was visible on the screen in the old version, while the new version permits full-screen browsing, which means that the toolbar appears on the screen only when is needed and disappears otherwise.
Some major restructuring and repositioning of the features can be seen in (a) IE 10 for Windows 8 compared to (b) IE 10 for Windows 7.

The new interface implements larger icons to allow easy tapping on touch screens. The color contrast is higher in the new version, which uses black and white to improve the visibility of the icons. The design of some icons such as the favorite button was dramatically changed,
from a yellow star to a pushpin. Other features such as the Back-button or Forward-button, which were placed on the left top of the browser in IE 10 for Windows 7, were moved to the down side of the browser in the IE 10 for Windows 8. The grouped functions such as “Add to favorites” and “Browse the favorites” are also placed on different screen locations.

2.2 Data collection method

2.2.1 Participants

The participants of the experimental group were mostly recruited from SeniorNet in Uppsala, a widespread organization that offers support in information technology use for seniors over 55. SeniorNet Uppsala is a local club of the national association SeniorNet Sweden, which is an organization that aims to promote and spread the use of information technology among the elderly. We needed older adults who were familiar with computers and who had experience of using IE 10 for Windows 7. The members of SeniorNet fulfilled both criteria, and participated in the study with visible interest. It should be mentioned that this great interest and the positive attitude towards the development of information technology shared by the majority of our older participants, had a major impact on the result of this thesis.

The experimental group consisted of fifteen (15) people, nine (9) from SeniorNet and six (6) from outside the organization who were over the age of 60 and participated voluntarily in the test. The participants were familiar with IE 10 for Windows 7, but had never used IE 10 for Windows 8. They were able to navigate through the interface of IE 10 for Windows 7 to find and use the common features. The majority of the participants had used computers in their work, and some of them were initial users of computers with an experience over 20 years. The group of our senior participants consisted of both, people who were high frequency users, as well as low frequency users, based on the time they dedicate daily to computer use.

A control group consisting of users from younger generation participated in the study to contrast the each group’s way of reacting to a new design. The control group consisted of five (5) people under the age of 60 who were familiar with the interface of IE 10 for Windows 7.

<table>
<thead>
<tr>
<th>Age</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>20 - 59</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>60 - 70</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 1. Age and gender distribution of the participants
Many of the participants, as seen in (c) and (d), were eager to learn the new interface, and had positive attitude towards the major change they experienced using it.

2.2.2 Case study

The case study consisted of a computer test and an interview of the participants. During the computer test, which was conducted before the interview, the participants’ immediate behavior and reactions were closely studied to clarify the process of adapting to a new interface.
During the computer test, the participants were asked to perform a series of tasks that they were familiar with when using IE 10 for Windows 7. The experimental group and the control group followed the same instructions and performed the same tasks using IE 10 for Windows 8. The test included nine (9) tasks, which were performed individually, and the participants were instructed to skip the tasks if they considered the tasks too difficult or if they were unfamiliar with the respective tasks since earlier.

Furthermore, the tasks were designed to only include redesigned features. In addition, the participants were allowed to get instructions from us during the computer test, if they needed. The screen was recorded during the test to find patterns in the reactions to the new interface.

After the test, we conducted structured interviews, in order to identify the emotional responses to the change in the interface. The first questions in the interview, 1-3 in the table below, concerning the positive and negative experiences with the new interface, permit us to identify the emotions experienced by the users being exposed to a new design. Questions 4-6 concern the difficulties and improvements with the interface, and allow us to identify cognitive reactions to the changes. Lastly, questions 7-10 concerning the attitude towards learning the new design allow us to study the attitude of our participants towards the new interface.
### Interview questions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you have a positive or a negative feeling about the design of new IE?</td>
</tr>
<tr>
<td>2</td>
<td>Why?</td>
</tr>
<tr>
<td>3</td>
<td>How do you feel after using the new browser?</td>
</tr>
<tr>
<td>4</td>
<td>How easy or difficult was it to use the web browser?</td>
</tr>
<tr>
<td>5</td>
<td>Are there any specific features that were improved or worsened?</td>
</tr>
<tr>
<td>6</td>
<td>What was the worst / best with the new design?</td>
</tr>
<tr>
<td>7</td>
<td>What do you think about the changes?</td>
</tr>
<tr>
<td>8</td>
<td>What are your thoughts about the software that changes its interface in this way?</td>
</tr>
<tr>
<td>9</td>
<td>Do you think you will be able to learn the new interface?</td>
</tr>
<tr>
<td>10</td>
<td>Are you willing to learn the new interface?</td>
</tr>
</tbody>
</table>

Table 2. The question used during the interviews with the participants

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Accomplished</th>
<th>Not accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go to <a href="http://www.google.se">www.google.se</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search “Uppsala kommun” ^1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choose a web page (click to go in)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go back to previous page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go forward to next page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Update the page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add the web page to favorites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go to favorites and open the page you have just added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close all the pages that you have opened</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Tasks performed by the participants using IE10 for Windows 8 during the case study

^1 Uppsala Municipality
3 Theory

This part of the thesis describes the theories and scientific studies that were used to frame our investigation and analyze our results. The theories and the age-related problems presented here also gave us motivation for our thesis.

3.1 Digital exclusion

The term “digital exclusion” is used to refer to the issues of different groups of people who are unable to take advantage of information technology due to various reasons, and who are thus excluded from today's increasingly digitized society. The notion initially defined the gap that exists between the people who own computers and have Internet access and those who lack these, and was used to talk about the differences in the physical access to computers and the Internet connection (Van Dijk, 1). All those who owned computers and had access to the Internet were considered capable of using information technology in order to take advantage of the new opportunities offered by society.

The older generation often suffers from physical, cognitive and motor impairments that can be a barrier to using information technology. “The grey digital divide” (Millward, 2003) describes the digital exclusion that many elderly people are exposed to, and Millward believes that to get the older non-Internet users to use the Internet, the “web skills” are far more important than access to the Internet.

As many as 79% of the people in Sweden aged between 65 and 74 years have access to a computer, but only half of them use the Internet daily (Statistics Sweden, 2012), which indicates that having access to computers and the Internet is not the same thing as using them. It is common among older people to have access to computers and Internet, but rarely use it due to age-related difficulties or a general lack of interest. Therefore it is important to take into account the gap between access and use, and focus on the group that is excluded because of physical and cognitive barriers or insufficient knowledge.

Many of the older adults who have a limited experience of computer use are not aware of the benefit and the possibility of using computers and the Internet (Sjölinder, 13). As a result, disinterest is mentioned as one of the main reasons why many seniors do not use the Internet, and this age group has generally low interest in trying new technology (Findahl, 2010). However, in some cases, this lack of interest is due to the fear of new technology or the misconception that seniors cannot use computers or the Internet (Millward, 2003). Older generations generally experience considerably higher anxiety during computer use than younger generations (Laguna et. al, 1997), which can create an emotional barrier to learning and using computers. Therefore, the feelings and attitudes have essential importance for the older generation to overcome this gap, and they constitute the subject of this study.

3.2 The older computer users' special needs

For many persons, aging implies impairments in physical, motor and cognitive abilities. These reductions usually involve that older people experience more difficulties performing various
computer-related tasks than younger computer users. Czaja and Lee compile a series of studies in their thesis showing that it takes longer for older people to perform various computer-related tasks, and they needed more help to learn these tasks (Czaja et al., 2001).

Furthermore, the impairments in motor skills can create different types of barriers for older computer users. Using the mouse, for example, is a task that can be difficult to accomplish for people with impaired motor skills, and as a result they end up making more errors and being slower in their performance, than the younger computer users (Laursen et al., 2001). An interface that requires precision when clicking the icons is obviously more problematic for this age group.

Furthermore, aging involves a decline of cognitive abilities. The change in cognitive abilities varies between individuals, but usually involves decline of short-term memory and cognitive speed (Christensen, 769). It is proved that short-term memory deteriorates linearly with age, while the long-term memory can be improved up to around the age of 60 or 70 (Christensen, 769). Salthouse studied the link between aging and deterioration of the five cognitive abilities: memory, speed, reasoning, spatial visualization and vocabulary (Salthouse, 2013). The study concluded that all cognitive abilities deteriorated except for the reasoning ability (Salthouse, 3).

The graphs below show a study that illustrates how the score of cognitive tests decreases with increasing age, except for the test that measures the crystallized ability that requires the use of long-term memory (Christensen, 770). The graphs illustrate how memory (b) and cognitive speed (c) decreases with age, while the crystallized ability stays at almost same level (Christensen, 770).
A computer interface that is not intuitive and requires users to have to rely on their memory to navigate can therefore be problematic, especially for people with cognitive impairments. In a study that was done to find out the age-related differences in navigation on E-mail (a website for online shopping) with different structures, it is stated that regardless of the structure of the website, the older participants experienced more difficulty than the younger ones (Lin, 2004).

Although the older computer users experience a number of difficulties in using computer, it has also been proven that the use of Internet helps to increase the life quality of the elderly. Older people who have learned to use the Internet are reported to have better attitudes towards aging and a decreased sense of social isolation (Cody et al., 1999). It has also been shown that the use of Internet creates the feeling of being an active part of society by facilitating communication in various ways (McConatha et al., 1995).
The physical and cognitive reductions constitute hinders for many senior computer users, but at the same time, today's information technology facilitates and improves the lives of many older people who suffer from these disorders. Thus, it is important for designers to consider the special needs of the older computer users to enable them to take full advantage of the possibilities that computers and the Internet offer.

3.3 Universal accessibility and usability for older adults

Universal accessibility aims to create a design that is open to all users, and that does not exclude persons with various types of disabilities or difficulties. For older Internet users who often have varied types of physical, motor and cognitive limitations, universal accessibility is directly crucial in order to be able to use information technology amply. There are a number of principles and guidelines developed to improve accessibility for users with varied needs. Heuristic evaluation developed by Jacob Nielsen is one of the most recognized usability evaluation methods for measuring the usability of a web page based on different aspects such as “Visibility of system status” and “User control and freedom” (Nielsen, 1994). However, these heuristics were created to measure the usability of an interface for the general audience represented by the younger generations, and do not cater to the special needs the older users usually have. To analyze the relationship between the new design of the interface, and the reactions we have got from our participants, we used the heuristics that were developed to measure the usability and accessibility of a web page particularly for older Internet users.

“New Heuristics for Understanding Older Adults as Web Users” were developed after examination of 50 web sites to include factors that are important for improving the performance and experiences of older Internet users over the age of 50 (Chisnell et al., 2006). The heuristics are based partly on Nielsen’s 10 heuristics and consists of 20 major principles that evaluate the usability from different aspects. Since we wanted to evaluate the usability of a browser, we selected only the relevant principles of the heuristics for our study. All the principles are shown in the table below and those that we used in our study are marked with an x.
New Heuristics for Understanding Older Adults as Web Users

<table>
<thead>
<tr>
<th></th>
<th>Heuristic Description</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Use conventional interaction elements.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Make obvious what is clickable and what is not.</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>Make clickable items easy to target and hit.</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>Minimize vertical scrolling; eliminate horizontal scrolling.</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Ensure that the Back button behaves predictably.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Let the user stay in control.</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Provide clear feedback on actions.</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Provide feedback in other modes in addition to visual.</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Make the structure of the Web site as visible as possible.</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Clearly label content categories; assist recognition and retrieval rather than recall.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Implement the shallowest possible information hierarchy.</td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>Include a site map and link to it from every page.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Make pages easy to skim or scan.</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Make elements on the page easy to read.</td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Visually group related topics.</td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>Make sure text and background colors contrast.</td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Use adequate white space.</td>
<td>X</td>
</tr>
<tr>
<td>18</td>
<td>Make it easy to find things on the page quickly.</td>
<td>X</td>
</tr>
<tr>
<td>19</td>
<td>Focus the writing on audience and purpose.</td>
<td>X</td>
</tr>
<tr>
<td>20</td>
<td>Use the users' language; minimize jargon and technical terms.</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 4. The heuristics used to evaluate the new interface of IE 10 for Windows 8 (Chisnell et al., 2006).

### 3.4 Updating of interface

Impressive amount of literature and guidelines exists for the purpose of designing an interface to achieve high usability and accessibility for all users. This means, however, to create a new design from the beginning. In case of redesigning an old interface, it is important to consider the existing user base (Telles, 243). The most challenging issue that designers must solve when redesigning a well-known interface is how to change an existing interface to optimize the usability for the existing users while attracting new users.

For the presentation of our results of the case study, we use Telles’ theory that comprises five problem areas that may occur when updating an interface. These areas consist of *Training, Overlap, Terminology, The use of keys* and *Functional consistency*. The problems experienced by the participants in the case study are presented based on these problem areas.

A familiar and well-known interface that suddenly undergoes a major redesign may generate frustration for users. Telles discusses this problem in his thesis, and claims that the need for change must be proved before a familiar interface can be redesigned. A piece of software or a web service are only valuable if they have many users, and an unsuccessful redesign can trigger frustration among the existing users and scare away potential users.
Telles argues that the following points must be taken into consideration in order to determine if there really is a need for change (Telles, 243-245):

- Changes in technology
- Changes in equipment
- New platforms
- Changes in interface standards
- Built-in limitations of the old interface
- Pressure from competitors

To make the new interface consistent with the previous version, designers have to take into account the installed base of existing users (Telles, 243). Seen from the usability perspective, the existing users have a strong tendency to prefer the commands and functionalities that they are accustomed to use, although they are much more complicated compared to the ones in the new interface. Telles states: "No matter how bad the old interface appears, it contains many excellent elements" (Telles, 245), and therefore habits and familiarity are much more important than a new interface that is easy to learn from scratch.

Furthermore, Telles discusses the following five problems that are hard to avoid even though the change is justified by the five points shown above. We relied on these problem areas in the presentation of our results in the case study.

<table>
<thead>
<tr>
<th>Common problem areas concerning updating of interface</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training</strong></td>
</tr>
<tr>
<td><strong>Overlap</strong></td>
</tr>
<tr>
<td><strong>Terminology</strong></td>
</tr>
<tr>
<td><strong>Use of keys</strong></td>
</tr>
<tr>
<td><strong>Functional consistency</strong></td>
</tr>
</tbody>
</table>

Table 5. The five common problem areas used to present the result of the case study (Telles, 246-247)

14
4 Result

All the older participants received more assistance and spent more time in order to fulfill the tasks, compared to the younger participants. However, the task $h$ below (Go to favorites and open the page you have just added), was accomplished in a larger proportion by the older participants than the younger ones. The older participants generally spent more time for solving the tasks than younger participants, and regarding the task $h$ we could see a pattern that younger participants gave up faster, while older participants generally were more persistent in solving the task. The graph below shows that some of the senior participants received assistance with all the tasks, while all the younger participants managed to solve the majority of the tasks on their own.

![Graph showing completed tasks by senior and younger participants](image)

Figure 2. Completed tasks by senior participants, respectively younger participants using IE 10 for Windows 8.

a: Go to www.google.com
b: Search “Uppsala kommun”

c: Choose a web page (click to enter)
d: Go back to previous page
e: Go forward to next page
f: Update the page
g: Add the web page to favorites
h: Go to web page to favorites
i: Go to favorites and open the page you have just added
j: Close all the pages that you have opened

j: Participants who received assistance with all tasks

---

2 Uppsala Municipality
4.1 Difference in emotional responses to the new interface

Surprisingly, negative feelings toward the changed interface dominated among the younger participants, even though they were able to perform the tasks in the test much faster with less assistance compared to the older participants. Conversely, the majority of the seniors experienced positive emotions during the computer test. One of the reasons may be the fact that most of our participants are members of SeniorNet, and have already a great interest for information technology. The majority of them expressed, even from the beginning, an eloquent interest for the new interface. They were full of enthusiasm for getting the opportunity to try it, and even full of curiosity about what the new interface has to offer. One of the participants stated: “It is always good to learn something new, maybe it is not that hard if you learn the features … I will continue to use Windows 8 more … there must be advantages” (Woman participant, age >70).

The younger participants were usually emotionally neutral or slightly skeptical for the new design, even before they encountered difficulties in using it. Especially among the youngest respondents (under the age of 30), the attitude towards the new interface quickly became negative when they could not perform a task instantaneously.

The negative feelings were far too strong for a 20 years old student who chose to cancel the test. Another participant, a 22 years old student, who had a fairly positive attitude at first, labeled the new interface as “a huge mess” after a short while. This rapid change in emotional experiences was distinguishing for the participants in the control group. The expressed feelings were not as strong for the participants over the age of 30 in the control group. However, they remained skeptical and claimed later in the interview that they experienced negative feelings about the changes, even though the browser as a whole felt quite accessible.

Most of the older participants maintained the positive attitude throughout the study. Although many of them did not perform the tasks on their own, the failures did not trigger negative feelings expressed outwardly. However, there was a big difference in the level of perseverance between high frequency and low frequency computer users. The different frequency of the senior participants computer use is presented in the table below. The low frequency users gave up quickly and asked for assistance. Nevertheless, they still described the entire experience as positive for the fact that they gained knowledge about the new “exciting” browser. The high frequency users had the tendency to explore the interface for longer time when they encountered a problematic task, and expressed great joy and satisfaction when they succeeded to accomplish the task.
Although the majority of the older participants in our study are members of the nonprofit organization SeniorNet Sweden, we also had six (6) participants (over the age of 65) from outside the organization. We could find a difference between the ones who were members and the ones who were not members of the organization, and thus had not as much interest in computing. Although the six (6) participants were accustomed computer users, and did not have greater difficulties in performing the tasks than the SeniorNet members, they expressed increased concern and anxiety regarding the new interface. One of the participants who belong to the non-members category compared the experience with the new interface to a neighboring shop, in which the location of the goods are changed frequently, and described how tiring it is to have to look after all the features again from the beginning.

The differences in the emotional experiences between the younger and the older participants were striking. The younger participants’ emotional experiences were controlled by how quickly and easily they could perform the tasks, and shifted extremely fast to the negative feelings when they experienced an interruption in the “smooth flow” of their performance, which was the result of the new interface.

Among the elderly, however, the experience was dominated by strong interest. It was entirely seen as positive by all the participants recruited from SeniorNet, whether they could perform the given tasks on their own or not. Those who were less enthusiastic described even the negative aspects of the experience, but there was only one person who perceived the experience solely negative.

A female participant over the age of 70 had an impressively positive attitude. She claimed that “the life should be really poor and empty without computers” and that she cannot even imagine the existence without technology. She considered herself lucky for having the opportunity to learn new things “in such a short time” and was totally pleased with the new version, “the more I use it the more I will enjoy it”, she affirmed.

Majority of the participants had a long time computer experience, but there were a couple of participants in the senior group who had a significantly short experience compared to the other participants. Despite their short experience, they had fairly positive attitude and were skillful computer users who did not encounter greater difficulties in performing the tasks.
4.2 Difficulties in the new interface

IE 10 for Windows 8 is characterized by a simple design. Components that were previously visible on the screen such as address field and favorites symbol are now hidden when the application is started. The appearance of this version is similar to IE 10 for Windows 7 ran on full screen, where the major features such as address field and back and forward buttons are made invisible. The scope of the right-click is extended substantially in this version compared to IE 10 for Windows 7. The new interface also uses different terminology, where some of the favorite-related functions are called "Pin site" instead of “Favorites” as in earlier versions.

These more or less dramatic changes created problems for both the younger and older participants during the computer test. We will present the difficulties and problems experienced by our participants based on Telles' five problem areas related to updating of the interfaces.

4.2.1 Training

As mentioned earlier, IE 10 on Windows 8 uses a simple design with fewer features compared to the previous versions. Some of the familiar functionalities such as grouping the favorite into different folders are completely removed, and the remaining features are even placed differently in the new interface. There were also a few features that were brand new, but none of the participants used them during the computer test since they were not included in our tasks. Functionalities related to favorites such as adding a page and browse the favorites are separated into two different menus, which generated major problems for many participants in both age groups.

Despite the dramatic change of the interface, it provides no help or tutorial mode that explains where all the elements are placed. One of the participants (woman, age > 70) claimed that she should watch a movie clip explaining the new browser in order to be able to understand it better. More of the older participants pointed out the lack of instructions, and there were even some who noted down the help instructions we provided, when they could not perform a task.

The new design generally created more significant problems for the older participants than for the younger ones, and despite their positive attitude for the new interface, the need for additional support for the seniors was noticeable.

4.2.2 Overlap

Some older participants also experienced the overlap of functionalities in the new interface. This is caused by two different interfaces, IE 10 for Windows 7 and IE 10 for Windows 8 in this case, which have same command for different use areas. The participants had learned from their earlier experience that right-click is used to copy and paste in the previous version. Some of them expressed confusion over the fact that right-click results in completely different outcomes in the new interface, depending on where on the screen the right-click is executed.
However, this was not a problem among the younger participants, who could understand relatively quickly that right-click on the text and right-click on an empty space on the screen leads to completely different results.

The "x" that appears in the right end of the address field when it is clicked was confusing for some of the participants from the senior group. This symbol is used to remove the web address in the address field, but a part of our participants mistook it for the closing button of the entire browser.

The majority of the participants in both groups confused the address field with the search field on the current page, which resulted in typing the address for the first task in the wrong place. Despite the mistake, they did not consider it a serious problem.

4.2.3 Terminology

Some new terms and symbols have been introduced in the new interface. The most obvious one is “Pin site” used as category name for features like “Add to favorite” and “Pin to Start”. This feature, represented by a completely new symbol, was bewildering for the majority of the participants. They did not associate its name and its symbol with the favorites and they did not understand it until they clicked on the icon to see the two features mentioned above. In IE 10 for Windows 7, a star is the symbol that represents the button containing all the favorite-related functions. IE 10 for Windows 8 uses a picture of a pushpin instead to represent the two functions used to add the web pages in different screen locations.

This introduction of the new terms and new symbols created greater issues among the elderly and minor problems among the younger participants. There were several older participants who could not find the “Add to favorites” feature, and one of the participants claimed that the symbol was not in the least suggestive, which was the reason why she did not make the association. Although there were few older participants who thought it was easier to add a page to favorites in the new version, the majority had difficulties to make the connection between the new symbol and favorite features.
Screen shots for favorite-related functionalities in the old version of IE (e) and in the new version (f)

4.2.4 Use of keys

The changes related to right-click, which is used in the new interface to bring up the toolbar, hampered the performance of the tasks among the majority of older users, and also generated frustration among some younger participants.

Using the right-click for the new purpose did not feel natural for all participants, and many of the older participants could not discover the new use area on their own. They right-clicked instead “by mistake” which resulted in bringing up the toolbar, but it was much more difficult for the participants in this group to associate the result with “action”, in order to understand
that right-click makes the toolbar to appear on the screen. It took usually longer period of
exploration of the interface or several “lucky mistakes” to establish the association between
the right-click and the appearance of the toolbar.

The younger participants, however, found it easier to connect the action of right clicking with
the new use area. This connection was made almost immediately when they managed to find
the toolbar once. However, there were many who perceived the new use area as being
unnatural. One of the younger participants, a 25 year old female student, claimed that she felt
frustrated when she did not know how she could find the toolbar that appeared when the
browser was started, but disappeared when she had entered a web address to access a page.

The older participants were generally more cautious, and tried to read the labels carefully
before they clicked, which meant that it took longer time for them to discover the new use
area.

4.2.5 Functional consistency

Many of the participants experienced difficulties due to the functional inconsistency that
characterized the new interface. The new interface applies different way of accessing the
functionalities in the browser, which created difficulties especially among the older
participants.

One of the changes that have caused frustration among almost all participants in both younger
and older group was navigating to the page that they previously had added to favorites. This
problem occurred due to the fact that all the favorite-related features, such as add and open the
favorites could be found on the same place in the previous versions of IE, but they are located
in completely different places in the new interface. In the new version, the favorites are
available only when the user opens a new tab or clicks on the address bar.

This was the task that created the most problems for both groups in the test. Although many
of the older participants received a step-by-step instruction on how to proceed in order to find
pages that they have added to favorites, they required a longer time until they could complete
the task on their own. Generally, the younger participants learned this faster when they
received assistance, but it took doubtlessly much longer time even for them to understand this
task compared to other tasks they performed.

All participants sought at first in the “Pin site” feature where the “Add to favorites”
functionality is placed, and many stated that the “browse the favorites” feature should also be
located there. The association between “add to favorites” and “browse the favorites” was so
strong that many of the older participants went repeatedly back to the “Add to favorites”, with
the intention to check if they really could not browse the favorites from there.

The senior participants had different opinions concerning the location of the address field. A
few argued that the address field is seen clearer in the new version compared to the old one,
while some claimed that its new location made it more difficult to find it. On the contrary, the
younger participants did not express any opinion about this change.
The seniors seemed to be extremely satisfied with the larger icons and the wider empty area on the screen that were characteristic elements for the new design. Nevertheless, the large icons created problems for some older participants. The “x” used for removing the text from the address field was so well-defined that several participants mistook it for the closing button for the entire browser.

4.3 The impact of the new interface on participants’ attitudes

All participants agreed that the new interface had undergone major changes compared to IE 10 for Windows 7. Although the majority of the participants described the new interface as easily accessible and simple, only a couple of people from the whole group were willing to voluntarily switch to the new browser.

These two individuals were older participants both over the age of 70, one of whom was a teacher who held courses on computing for the elderly. Both were high frequency computer users, and did not experience any major problems performing the tasks. Most of the other older participants needed assistance to fulfill the tasks, but maintained an impressively positive attitude even when they failed. Many described the entire session as a solely positive experience, an opportunity to “learn new things”, and also stated that “it will become easier once you have learned it”.

However, the majority of older participants from SeniorNet considered it difficult to compare the implementation of features between the old and the new interface, arguing that they needed to use the browser for a longer time to be able to make a decision. Although the older participants generally experienced greater difficulties using the new browser, this was compensated by their enthusiastic attitude that made them be more persistent and patient than the younger ones.

The enthusiastic attitude was not shared among all senior participants. The older participants who were not members of SeniorNet were more vocal in pointing out clearly the deficiencies encountered with the new design. One of these individuals described the change as only negative, and urged that he is not so keen to learn new things every time a web page or application that he often uses changes its interface. Thus, there was a significant attitudinal difference between participants who regularly attended computer courses, and the participants who did not despite the fact that the participants in both categories were almost on the same level in performing the tasks.

Unexpectedly, the younger participants were more skeptical about the change. Although they experienced much less difficulties performing the tasks for the computer test, their attitude remained negative. The majority responded that they neither have the desire to learn nor to use the browser unless they are forced to, and described the change as far too “drastic”. Their attitude was affected even more when they could not perform a task, and it had the tendency to exacerbate the more problems they experienced during the computer test.

Most older and younger participants were reluctant to update to the new interface as long as they had a choice, even though there was a clear attitudinal difference between the older and younger users. Participants in both groups claimed that they must be able to see an evident advantage of using the new interface before they can consider the update.
5 Discussion

To find a possible explanation for the problems experienced by the participants, we used the “New Heuristics for Understanding Older Adults as Web Users” (Chisnell et al., 2006).

5.1 Possible reasons for differences in the emotional experiences

The dominant positive reactions expressed by the older adult participants have strong connection with their background. The choice of being a part of an organization like SeniorNet outlines their interest in information technology, and the avidity to keep up with technological developments.

Still, despite the differences in the attitude between members and non-members of the organization, and between younger and older generations, the majority of the participants were reluctant to update to the new version. This can be seen as a sign that the emotional experience is not essential for the users to accept or reject an updated interface. Therefore, it is possible to have positive feelings vis-a-vis a changed interface, while not willing to use it.

One of the reasons for the difference in the emotional responses between the younger and the older participants can be explained by the fact that the Internet and computers are used for different purposes. All the younger participants used Internet, and thus browsers in their work or in school. Many of the older participants had used computers before in their work, but the use was often limited to a single type of software such as text editors. The younger participants used computers and the Internet widely, both at work and in private life, and therefore they were affected to a greater extent by the change in the interface. The elderly who used computers and the Internet to a minor extent, did not consider them as necessary tools to manage their work and everyday tasks, and thus had a less tense perception of the drastically changed interface.

The younger computer users are generally more familiar with a wider range of interfaces, and are able to use them without any difficulties. Conversely, the older generations who are not as familiar with different interfaces as younger generations cannot draw upon similarities with other interfaces when learning a new interface. Being accustomed to meeting difficulties on a regular basis makes the older users more persistent, which can be the cause of the difference in the emotional experience.

Accordingly, the initial attitude and emotions are crucial, and our results indicate that a dramatic change in the interface does not elicit negative reactions with people who already have positive feelings for the changing interface. However, a drastic change in the interface causes significantly higher level of anxiety for people who do not share this positive view of technological developments. For these people, an interface that undergoes a major change can be so problematic that they even consider to stop using the software.
5.2 Possible reasons for the difficulties encountered using the new interface

This section addresses the cause of the difficulties encountered by our participants during the use of the new web browser. The difficulties are discussed based on the heuristics for older adults as web users (Chisnell et al., 2006). The results are summarized in table 6.

One of the major problems the users confronted was the favorites-related functionality. This was mainly due to the inconsistency of the symbols and the horizontal scrolling. Especially the senior participants were not accustomed to horizontal scrolling, and many experienced problems with understanding the length of the bar and learning to scroll in the right way. The favorites list is found after the recently visited pages on the toolbar and in order to be seen on the screen or accessed, the users have to make use of horizontal scrolling. This contradicts with the heuristics, which suggest the elimination of horizontal scrolling. Additionally, the inconsistency of the symbols was noticed and pointed out by almost all the participants. The seniors were the ones who encounter more problems recognizing the favorites symbol, which changed from a clearly visible yellow star to a pushpin.

The labels of the symbols were not considered enough intuitive either, since the majority of the older participants found it difficult to associate the text that follows the symbols with the function of the symbols. The users did not easily understand the designation of certain functionalities, such as “Pin to Start”, and many of them questioned the functionality of the feature.

The group-related functionalities, such as “add to favorites” and “browse the favorites” are dispersed into two different locations in the new design unlike the older one, where they are grouped together. This change was extremely confusing for all of the participants.

In the new version, the toolbars are not visible on the screen, which created difficulties for the participants in both groups. How to make the toolbar visible was not clear, and this left participants with the feeling of not having full control over the browser. Even thought the toolbars were not seen on the screen all the time, some of the older participants considered that the contrast of black and white colors and the larger icons made the toolbar more clearly defined and more accessible.

The inconsistencies regarding the use areas of right-click were particularly problematic for the older adult participants. They needed more time than the younger participants to differentiate between right-click on an empty area on the screen and right-click on the text, which result in completely different outcomes.
Table 6. Deficiencies of the new interface of IE 10 for Windows 8 according to the New Heuristics for Understanding Older Adults as Web Users (Chisnell et al., 2006)

<table>
<thead>
<tr>
<th>The heuristics</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize vertical scrolling and eliminate horizontal scrolling</td>
<td>The horizontal scrolling is used to browse the favorites and recently viewed pages.</td>
</tr>
<tr>
<td>Let the user stay in control</td>
<td>It was unclear for the older participants how to make the toolbar visible. Many of the older participants experienced that the toolbar was uncontrollably disappearing.</td>
</tr>
<tr>
<td>Clearly label content categories; assist recognition and retrieval rather then recall</td>
<td>The label “Pin site” was not recognizable for many senior users.</td>
</tr>
<tr>
<td>Visually group related topics</td>
<td>The favorite-related functions (“Add to favorites”, “Browse the favorites”) were separated into two different menus</td>
</tr>
<tr>
<td>Make it easy to find thing on the page quickly</td>
<td>The majority of the participants experienced difficulties finding all the functionalities.</td>
</tr>
<tr>
<td>Use the users’ language; minimize jargon and technical terms</td>
<td>The term “Pin” used in “Pin site” and “Pin to Start” was not familiar for the participants.</td>
</tr>
</tbody>
</table>

Most of the differences between older and young users are related to cognitive and physical decline. The new design, features and terms introduced in the new interface require the users to rely on short-term memory capability rather than habitual recognition, which can be extremely problematic for older users due to the age-related cognitive decline. For older users with decline in motoric skills, the horizontal scrolling is problematic. Some of the participants experienced difficulties in using the mouse, and thus horizontal scrolling was impedimental. As discussed previously, some of the differences are also related to less overall experiences with a variety of interfaces which use similar functions.

5.3 Problems with transition from the older interface to the new one

The younger generation expressed a clearly negative attitude for a potential update, and this mostly due to their lack of patience and time for learning an interface that underwent such a “dramatic change”. The older participants generally had a more positive attitude towards the change in the interface. However, despite this positive attitude, they were still hesitant for the idea of updating their browsers. The fact that they are already familiar with the old version affects their attitude towards changing to the new version. Some of the participants claimed that the time of the computer test was far too short and they needed to test it more in order to evaluate the new interface and consider a potential update. However, the difficulties experienced by both younger and older users made the new interface less convincing.
The majority of the participants in both groups were reluctant to the update and they were not willing to change to the new version until they are forced. The new interface requires the users to learn many new features and does not support recognition and habits, which are crucial for senior users.

Consequently, the new interface is impedimental for transition from the old interface, if no assistance is provided. This kind of major change in interface is unavoidable in the rapid technological development. A strategy to facilitate the transition process for older users is needed in order to not exclude them from the development. Different kinds of support that are based on recognition rather than memory should be provided in order to bridge between the old and the drastically changed new interface.
6 Conclusion

Generally, older users are associated with lack of experience, lack of knowledge or with emotional reactions such as frustration, anxiety and fear of making mistakes in the context of computer use (Bob Lee et al., 2011). In contrast, the younger generation is often perceived as faithful followers of the technical development. The result of the case study though, offered us a clearly different picture of both the older and younger generations as computer users.

The emotions experienced during the computer test, where the participants were asked to perform a series of simple tasks, reveal the major differences between older and younger participants’ emotional reactions vis-a-vis the new interface of IE 10 for Windows 8, as well as the capability of using the changed interface.

Based on our results, we reached the conclusion that the change itself has negligible influence on the older users’ emotions towards the new interface. The users who initially had interest and positive feelings towards the technological development will keep their positive feelings, regardless if the change is crucial or insignificant. Conversely, the old users who have negative feelings towards the technological development will, unfortunately, keep it too. Thus, the initial attitude will decide the emotions expressed with the new interface.

The differences in difficulties experienced by the older and the younger users were remarkable. The introduction of new features and terms that the users have to learn from scratch again overburdens the short-term memory. To make a new interface learnable for senior users it should support recognition and habits. The result of the case study also shows that the senior users are usually more careful which made it harder for them to discover and learn the new features.

A majority of the old participants claimed that they are going to use the new interface only if they have no choice, despite the positive emotional reactions that characterized this group during this particular trial. Older users who expressed only negative feelings towards the change were particularly affected negatively by the change. The majority of them claimed that they would consider to stop using the browser if the change was forced. Hence, the major change in the interface will create barriers to using the interface particularly for older users regardless of their emotional reactions.

Our study revealed that older computer users, particularly those with no or little interest in computer use, are vulnerable to interface change. Changing interface is a common phenomenon in this increasingly digitized society. The aging population in combination with the unavoidable negative effects of interface change that has been observed in this study emphasizes the importance of the future studies to minimize these negative effects. Designers should consider the special needs of older computer users to avoid digital exclusion of this group.

Furthermore, it is important to understand that the problems we revealed in this study are something that all of us are likely to experience at some point in the future. Therefore, there is a great need for future researches that focus on how to facilitate the transition from the old interface to the new one, especially for older adult computer users.
7 References


Findahl O. (2012), Svenskarna och Internet 2012, Stockholm: SE


Lin, D. Y. M. (2004, June). A Comparison of Navigation Performances between Older and Young Adults in Hypermedia E-mail Shopping. In The 8th ERCIM Workshop "User Interfaces For All", Universal access in interactive applications and e-services (pp. 28-29).


