DESIGN AN INTERFACE PROTOTYPE FOR ELSKIFT.DK
Two year Master Thesis

A thesis submitted in partial fulfillment of the requirements for the degree of Human Computer Interaction

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Program Authorized

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Date __________________________
This document is a master thesis within the program for Human computer Interaction at Uppsala University. The aim of this thesis project is to create a user interface for a web-based system. This implies creating a design prototype based on the need of people and company. This project was made on account of The Elskift, a service provider company in Denmark.

The successful completion of this work involves dedication, sincerity, intense research study and encouragement by many people including my family, friend who have been my emotional back bone and all my teacher who have helped me reach this fear.

I am thankful and heartfully appreciate the Uppsala University, Sweden and personals who have helped me a lot .My special thanks to Else Nygren (Associate professor Human-Computer Interaction, Head of Graduate Program, Department of Informatics and Media).
ABSTRACT

Now a day the revolution in computer technology has changed the trend of human life. Congenital methods are a being replaced by new technique. The purpose of this study was to make an interface design prototype of Elskift company website. Another aim was to find out the prototype should concentrate on usability and user interface design heuristic. Main goals were that the prototype was easy to learn, efficient of use and subjective satisfaction. Both Quantitative and Qualitative approaches were used in this study. Interviews were performed with the management and developer of Elskift. Survey was conducted to collect data from the participant. Iterative design was used in this design process its include evaluation, design and prototype. Usability testing was performed in the final design option. The Elskift design prototype is not an abundant and the complete web-based prototype but it contain maximum attribute
LIST OF CHARTS

Chart 1 .................................................................................................................. 13
Chart 2 .................................................................................................................. 14
Chart 3 .................................................................................................................. 15
Chart 4 .................................................................................................................. 15
Chart 5 .................................................................................................................. 16
Chart 6 .................................................................................................................. 17
Table 1 .................................................................................................................. 22
LIST OF FIGURES

Figure 1 ........................................................................................................................................... 18
Figure 2 ........................................................................................................................................... 24
Figure 3 ........................................................................................................................................... 24
Figure 4 ........................................................................................................................................... 25
Figure 5 ........................................................................................................................................... 25
Figure 6 ........................................................................................................................................... 26
Figure 7 ........................................................................................................................................... 26
Figure 8 ........................................................................................................................................... 26
Figure 9 ........................................................................................................................................... 26
Figure 10 ........................................................................................................................................... 27
Figure 11 ........................................................................................................................................... 27
Figure 12 ........................................................................................................................................... 27
Figure 13 ........................................................................................................................................... 27
Figure 14 ........................................................................................................................................... 28
Figure 15 ........................................................................................................................................... 28
Figure 16 ........................................................................................................................................... 28
Figure 17 ........................................................................................................................................... 28
Figure 18 ........................................................................................................................................... 29
Figure 19 ........................................................................................................................................... 29
Figure 20 ........................................................................................................................................... 30
Figure 21 ........................................................................................................................................... 30
Figure 22 ........................................................................................................................................... 31
# TABLE OF CONTENTS

Preface ........................................................................................................................................... iii  
Abstract .......................................................................................................................................... iv  
List of Figures ................................................................................................................................... v  
List of Charts ................................................................................................................................... vi  
1. Introduction ................................................................................................................................. 2  
   1.1. Electricity Market .................................................................................................................. 3  
   1.2. Deregulation ....................................................................................................................... 4  
   1.3. Competing companies ......................................................................................................... 4  
2. Background ................................................................................................................................. 6  
   2.1. Electricity market and marketing ......................................................................................... 7  
   2.2. Data entry design patterns ................................................................................................... 7  
3. Objective ...................................................................................................................................... 9  
   3.1. Goal 1: easy to learn ........................................................................................................... 10  
   3.2. Goal 2: efficient of use ....................................................................................................... 10  
   3.3. Goal 3: subjective satisfaction ........................................................................................... 10  
4. Methods ...................................................................................................................................... 11  
   4.1. Survey of user preferences ................................................................................................. 12  
   4.2. Iterative prototyping ........................................................................................................... 18  
   4.3. Evaluation .......................................................................................................................... 21  
5. Results ....................................................................................................................................... 78  
   5.1. The design process ............................................................................................................. 25  
   5.2. The final design .................................................................................................................. 30  
   5.3. Result of the evaluation ...................................................................................................... 34  
6. Discussion ................................................................................................................................... 37  
   6.1. Problems ............................................................................................................................. 37  
   6.2. Future work .......................................................................................................................... 39  
7. Bibliography ............................................................................................................................... 43  
Appendix A: Questionnaire .............................................................................................................. 40
1. Introduction

Due to popularization of the Internet, more and more people are involved in web browsing. Some of the web pages are easy to use and may accomplish user requirements. Some researchers conclude that web designing is not simply an art it's a science. We can use techniques, logic and usability tests to make a web page easy to use and easy to understand.

As we know that in the last ten years there has been a mass groom in Internet business. Numerous companies prefer to offer its product through online purchase. It is the most rapid, secure and easiest way for the user to select the product from webpage and purchase it. There are chances that user will leave the webpage due to irritating texture, color, and design. If the user leaves the webpage because of this, it means a big loss for companies, and there is less chance that the user will return to the webpage. Users have many different options to visit other webpages to find their required product. Because of this it is important for companies to design their webpage well.

There are different issues in electronic commerce but one of the most important is trust in transaction. Electronic commerce is different from television and catalog shopping, it provides you with a detailed overview and specification of the product and it provide information in a very dynamic and interactive format.

The user interface plays a major role and it is the main component of a web based system.

Good user interface design has a capability to attract the user with the help of multimedia technology. While an effective interface does not guarantee the system success, a poorly designed interface will likely lead to user dissatisfaction and ultimately system failure. The ideal user interface is comprehensible, predictable and controllable (Schneiderman, 1998).
1.1 Electricity market

The electricity market in Denmark depends upon the policies of the European Union. Other than the European Union market Denmark is also trading with Norway, Sweden and Finland as a single market. As a result of this trade the price of electricity is dependent on the exchange of electricity between these Nordic countries.

In 2007 the European energy commission adopted an energy policy. The main purpose of this energy policy was to proceed in accordance with the objective of competitive, sustainable, and secure sources of energy. If the Euro energy commission would continue to follow their old policies, then these key objectives will not be achieved. For the citizens of the European Union, these policies will inform them about what are the current issues in energy saving and about their roles in reducing their energy consumption.

The Danish electricity market is one of the big markets in Europe and is divided into two parts, the east part and the west part. The two parts did not have a direct physical link of electricity, but Danish companies planned to make a link at the end of 2010. Two main companies are the major suppliers in this area: Dong energy and Vattenfall. Dong energy is one of the leading energy groups in Northern Europe and their head office is located in Denmark. Most of the products of Dong energy are based on distribution, producing and trading energy in their region (Dong website 2011).

Vattenfall claims that they own and operate one quarter of the energy facilities in Denmark. Vattenfall is more focused on green energy and half of the energy consumption is generated by wind power. They are also the main player in the gas market.

As we discussed above the whole Danish market is integrated with the Nordic power market that consist of Finland, Sweden and Norway. It was observed that due to insufficient interconnection capacity every Nordic country might have
different electricity prices. Competition is increased for medium size and big size customers. Many customers renegotiate their current contractor change suppliers. Smaller customers often avoid renegotiation or switching of supplier.

1.2 Deregulation

In the Nordic region, the electricity market was subsequently integrated with Swedish, Danish, Finland, and Norway. It is the first integrated, interconnected electricity market in the world. In the Nordic region deregulation of electricity started in 1991.

The Danish market is an open Electricity market for competition but generation of electricity and gas are still hold by the state. The Danish government legally separated supply and distribution of electricity in late 1990. Government owned transmission of electricity and transmission of gas were separated. Due to the deregulation, negotiation and switching between customers became common in the industry but it is still unusual in small and house hold customers. European countries have some standards on prices for electricity. Generally variable prices are below average and fixed prices are higher because of high taxes and other sort of assessment charges.

Performance was the main motivation for deregulation and liberalization of electricity market, due low investment behavior performance was dissatisfactory in this region, and the demand of electricity was affected. Other reason was inspiration from the electricity markets of United Kingdom and New-Zeeland. Before the deregulation of the electricity market there were no assessment of quality or efficiency in production, evaluation was done based on demand and capacity.

1.3 Competing Companies

At the end of the twentieth century and the beginning of twenty first century different companies started to invest in the market of Denmark. Foundation of
DONG (one of the biggest electrical company in Denmark) was made in 2006, after that Frederiksborg, Forsyning, Copenhagen Energy, Elsam and Energi E2 were merged in with Dong. Those companies were experienced in oil and gas exploration, electricity generation, distribution and customer consultancy. DONG energy has increased trade in the northern European energy market they also trade within the international market. Today DONG is focusing on the Nordic region and focus on low prices, services and convenience in energy.

After the deregulation, Nesa, Copenhagen energy, and Frederiksberg Forsyning, also introduced their packages in the electricity sales market as well as electricity related supply services. Their concern was about consultancy, customer services and reliable energy supplies outside the grid.

Elsam and Energy E2 moved towards oil-based energy to further diverse energy sources. Sources included energy from recycling processes of residual products from waste and trash, coal-fired processes and wind energy.

Vattenfall has played a significant role in the restructuring of the Danish electricity market since 2004. Vattenfall has been in the electricity market since 1996 and sales electricity and energy related solutions for companies and customers in Denmark. From July 2006 twenty four percent of electricity power plants were under the authority of Vattenfall. After an agreement with the DONG Company, they showed their presence in the electricity market of Denmark. Vattenfall also shared their experience of the Danish market. They produced sixty percent energy from wind based plants and there were 413 wind turbines monitored in Denmark (Vattenfall website 2011).

Vattenfall own and operates coal, gas and biomass-fired plants in Copenhagen and its surroundings. Vattenfall operates in both regions east and west. Vattenfall are trying to improve in production, sale of electricity and in trading services.

Elskift is a company that will provide service for the consumers on the Danish electricity market and it will also help consumers to check contract information with their electricity supplier. It will also help current consumers to negotiate or change supplier and display the results of the best electricity supplier in the area according
to prices and service. The company Elskift is currently developing a web-based
information system for their customers.

Purpose

The purpose of this thesis is to make an interface design prototype of an
information system for the Elskift Company. This information will help new
customers to find an electricity supplier in the particular region. It will also help
consumers to check contract information with their current electricity supplier. It will
also help current consumers to negotiate or change supplier and display the
results of the best electricity supplier in the area according to prices and service.
This prototype should concentrate on usability and user interface design heuristics.
The proposed system will be visualized as a prototype.
2. Background.

2.1. Electricity market and marketing

Denmark is one of the growing electrical markets. As we know due to the deregulation, many companies entered in this market and as a result competition increased. Due to this competition users have many choices to select the best supplier from the market. More choices make it more difficult to customers to identity the best supplier in their area. To overcome these problems different companies developed web based information systems that can help user to find the best supplier in the market. Examples are Uswitch.com a UK based company, elsking.se Swedish website and recently comparicer.se has also added the switching service to their earlier comparison service so now they're a direct competitor. A Danish comparison site is elpristavlen.dk operated by the Danish energy association. The Danish energy association is the industry organization for electricity companies in Denmark. A future Danish competitor will be skiftenergi.dk and they are still developing their webpage. All these companies are doing the right thing when it comes to website functionality except for elpristavlen.dk which presents the prices too soon, without letting the user decide on factors such as green electricity or contract length.

2.1 Data entry design pattern

In this prototype design some pattern and entry fields will be used. We observed that some existing information systems asked users to provide some information, for example in flight booking they have gone through the registration process or done some online tax calculation.
Some web-based systems normally use login systems to access their data. Login account may be used when the user want to personalize recommendations or other individual services. In the Elskift prototype if a user just want to use the services of the information system we do not want to force the user to set up an account or to go through the signing-in process.

Many users avoid making an account on the website and possibly would leave the website if they had to create an account. In a data entry form the process should be simple, painless and minimizes the number of mistakes that would can happen and keep the number of steps as few as possible.

On the other hand, many information systems require some information with a lengthy process of registration. These lengthy processes could be painful for users where too much or non-relevant information may be asked for.

The number of fields should be minimized and kept relevant to the process. In the Elskift prototype we do not require personal information and the user can clearly distinguish what fields are important and what are optional.
3. Objective

The main objective of the project is to develop the web-based information system that takes the customer requirements as input and guide the customer towards power supply companies, and also make the information exchange between the actors. The Elskift web-based service would work like a bridge between the different companies and the customer.

As we know that, the criteria for building customer centered websites are based on the content providing best understanding for all customers, this information system is based on the customer needs and the main focus is on the usability and solid fundamentals of design principles. The Elskift web-based system should be designed in a customer centered way to make it easy to use and, where it helps to increase the customer potential on the platform.

A basic factor is to build a trust between this system and the customer. Key to the design is simplicity. The design pattern of the Elskift website should be uncomplicated and familiar to the customer, each pattern containing a collection of themes that continue throughout the process. The design pattern helps the customer to navigate and complete the task. A simple and attractive homepage will create customer attention and also increase the involvement of the customer by letting him or her add some content. The Elskift web-based system should strive to provide valuable useful and useable navigation, make it easy to find information and complete tasks successfully. The main goals are described below.
3.1 GOAL 1: EASY TO LEARN

The web content should be designed in such a way that the customer will not be frustrated. A common theme will be used and the pattern should be similar to other web content.

3.2 GOAL 2: EFFICIENT TO USE

To make an efficient website, companies are investing effort to remove the barrier for the user, to develop a competent web-based system is the issue for the companies. They want to avoid that users become frustrated due to time-consuming data entry or specific tasks and effort for navigation. The second main goal is thus that the system will be performing or functioning in the best possible manner at a minimum of time and effort. It should satisfy the customer and it should be reliable and competent.

3.3 GOAL 3: SUBJECTIVE SATISFACTION

Customer satisfaction also depends upon how they think about the system design. It is really difficult to find out what is in the customers mind regarding the task but it can be evaluated by usability testing. Subjective satisfaction is our third goal and a main factor that will affect customer satisfaction to browse the web content.
4 Method

Creswell defines research as a study that goes beyond the influences of personal ideas and experiences of an individual. A researcher’s work is primarily based on the utilization of some research methods and techniques (Creswell 2002). As per Creswell there are three types of research: qualitative, quantitative and mixed.

Quantitative and qualitative approaches were used in this research study. Data was collected by means of a questionnaire and participants were selected by random sampling. In a random sampling each element of a population has equal probability of selection.

Each element will be selected independently by drawing randomly from the population. During the survey ten participants were attempted to solve the questioner and five persons were participated in the usability evaluation. Interviews were also conducted with representatives of the company’s management and developers to find out the requirements of the company.

Data gathering

A background study was made of previously established web-based information systems, the data was gathered from a number of web-sources. This preliminary research has served as a guide to the methods chosen for further data gathering. In order to develop the artifact, interviews and a survey was utilized as a tool for designing prototype.
Interviews

Three interviews were conducted with people from the management and developers of Elskift.dk. The interviews were loosely formed for broad discussion on the quality, usability and the design process. Before the interview with the participants, central knowledge about the study was provided to the participants. The interviewer focused on the knowledge of the participant but also made sure that everything would be explored in the discussion. An open interview such as this, with only slightly guidance from the interviewer allows for a more naturally flowing conversation, but interpretation might be slightly more complex than a more tightly regulated interview (Molich 2002).

There was no recording equipment used during the interview, only a simple notebook and a laptop were used to write down the conversation. The interview themes were based on the results from the background study. The interview thus focused on quality aspects of the prototype in order to establish a user friendly and effective system. A general theme about quality was also implemented as a final point to discuss. To avoid interviewer effects on the interviewee, they were encouraged to speak and feel freely as a relaxed conversation.

4.1 Survey of user preferences

Survey:

There are two types of surveys that are normally conducted, one of them is paid survey and another is statistical survey. We performed a statistical survey. *Survey is a method used to collect in a systematic way, preferences (e.g., for a presidential candidate), behavior (smoking and drinking behavior), or factual information (e.g., income), depending on its purpose* (Fritz Scheuren, 2004). Since survey research is always based on a sample of population, the success of the research is dependent on the sample representative. The survey itself consisted of
a number of statements and questionnaire where the respondents were being asked to agree/disagree or to leave a comment. The attributes that were considered in the survey queries were the research objectives, the target audience, the distribution medium, and phrasing of text. In order to gain a flowing scale of responses most of the questions were formed as statements. *The statements may open or closed-ended, ordered lists to establish easy interpretation* (Kasunic, 2005).

In this section we will present the survey result. A survey was based on different topics and average from the sample of individuals was calculated. The design of the Elskift prototype was based on the results of the survey. This prototype contains the design sequence, and also contains some selection icons and form. Customers have to select and fill in data. The result explains the users’ preference and also shows the good and bad parts in the design.

**ELECTRICITY CONSUMPTION**

Electricity consumption is an important and recommended part from the company. Through this survey I would be able to find user knowledge about electricity consumption. Red color in the graph shows that users did not have knowledge about how to calculate their annual consumption of electricity. 40% of the customer selected option NO. That means that this has to be explained by the system which should also add some help to guide the customer. 26.66% of users selected YES option.
In the next question, the users were asked if they would prefer to use green energy. Almost half of the users answered yes to this question (46.66%). The green energy selection option will be used in the design mentioned in step 2 (Preference). After the deregulation more companies were investing in the electricity market, and to attract customer and follow government restrictions they introduced green energy. The blue area in the graph showed that the YES option was selected by 46.66% of the customers. The second one is Red which is NOT SURE and 33.33% customers selected this option. Green energy is more costly. This option relates to the result and change the ranking of result.
INFO ABOUT CONTRACT

In the next question the users were asked about if they wanted to have information about the time frame of the contracts. Most of them answered yes to this question (73.33%). Companies are marketing multiple contracts. A contract may be fixed, variable and both. Contracts can be based on the time frame like 6 months one year or more than a year. Green color in the graph shows the NO option and 20% people selected this option. Blue color shows the YES option and 73.33% selected it. It is also available in sorting of the results and depend on the result. Blue shows that people want to know about the companies’ contract.

![Chart 3](image)

SUPPLIER PREFERENCE

This question explained about user preference selection between service and money. Negotiation is made upon user preference. Some companies are good in service and they bill extra charges. The blue area in the graph shows economical preference and 20% selected this answer. The red area shows service preference and 46.66% people answered this option. Through this option the user can rank the companies. This ranking in the result section of the interface will be helpful for companies.
NEED OF INTERFACE

The next question asked, was about what kind of need a user interface like the proposed one would satisfy the users. The result is shown in the chart. Every user seems to have a different set of mind regarding using the service. Some customers just want to use this service to update information (40%). The red area shows that 46.66% of the users selected the option satisfaction. The green area in the graph shows that 13.33% select the option to know about new contracts. This explains that participants want to know about new contracts or they will just go through this process to seek information. This ratio will help to make the design in such a way that it fulfills the user requirement. The satisfaction option shows that it will help confirm that their current contractor is satisfactory.
PROCESS FUNNEL

A process funnel lets people complete their goals by breaking down complicated tasks into a small number of steps, using floating windows for detailed information, and including only critical links, so that people are not distracted known as “the process funnel” (Nathan Shedroff, July 2002). This graph shows the importance of using the process funnel design pattern in the prototype. Participant preferences helped to develop the task at every stage. Sixty percent participant liked this process and thirteen percent did not like this process. Twenty six percent were not sure about if they liked the process design pattern. The main purpose of the design pattern is to break up a complicated task into smaller manageable steps.
4.2 Iterative Design Process

The process that involves working on the existing design and redesigning the prototype until it fulfills the requirement of the evaluation is known as iterative design. Designing of an interface through the iterative design process is valuable, but another truth is that every design is not perfect. Design teams consist of people and it is possible that people make mistakes. Requirement gathering from the customer is one of the issues that affect design. The iterative design process can cover major possible mistakes. The main advantage of iterative processing is quickly coming up with a design prototype, to which customers can respond and give quick feedback. This makes the design flexible and reduces future problems because many of them have already been discussed in the iterative process. The iterative design process consists of three stages; design, prototyping and evaluation. The first step is related to the customer needs, goals and design concepts. Prototyping is the second step where an artifact is developed on the basis of a story-board and scenarios. The prototype helps us to achieve
the goals of the iterative process. The third step, evaluation, covers evaluation techniques like usability testing and expert evaluation. In the evaluation step one can also check that the designed prototype is according to the requirements of the customer's needs.

To make an efficient iterative design process is very helpful. Nathan Shedroff said that "make simple prototypes instead of full-fledged sites" (Nathan shedroff, July 2002). In the full design when html web is ready, changes are more expensive and time-consuming. One of the famous architects Frank Lloyd Wright said "you can use an eraser on the drafting table or a sledgehammer on the construction site."

In developing the Elskift design prototype, the iterative design process was used. The first Elskift design prototype was made on paper to cover the need of the customer. Then the prototype was reviewed by an evaluator. After that Photoshop CS3 was used to make a more attractive prototype. The iterative design process helped this design to get quick feedback from the customer and the expert. The design was iterated four times. The process funnel pattern was used in the Elskift design process. It was observed that the customer wants to use specific tasks on the websites. But many questions, different links and paths will prevent the customer to fulfill
the particular task (Nathan shedroff, July 2002). The process funnel approach was very helpful to overcome customer diversions, to find a balance and to keep focus on the actual data-entry process. The process funnel pattern contains some basic steps that were followed in the Elskift design prototype. Those steps are given below

- minimize the number of required steps to complete the particular task.
- by using a progress bar in the design, the customer will easily know their current step or stage.
- to increase the customer focus towards completion the tasks, temporarily remove the unnecessary hyperlinks and advertisements.
- use popup windows to provide extra information and help. Customer will not diverse and their main focus will remain on the completion of the task.
- all buttons should be in working condition including the navigation buttons
- to move on to the next step, all options or buttons are clear and guide the users to proceed.
- during step completions, make it possible that any error message will be shown to the users through some popup window or automatically prevent errors as much as possible.

In the initial stage of the design prototype, a detailed story-board is developed to define the low level pattern. Basic advantage of design prototype is that it can be changed easily, because it does not contain the full features of the final site. Another advantage is the visualization of a page, it will help to acquire the feedback from the customer and it will help in the final prototype. Iterative design process is supportive to identify the dead and the active part of the page.
When making a design we should make some design goal. In the Elskift design prototype, the design goals were evaluated continuously. Information architecture, navigation design and graphic design were used in the design. The navigation design pattern was used in the Elskift design prototype and consider user objective. The user could effortlessly find the navigation options and without difficulty navigate the web. The graphic design is a tool of visual communication of the information. Graphic design was used to clarify elements such as colors, images and layout.

4.3 Evaluation

Multiple techniques were used in the evaluation of the design. The reason for using different techniques was to wrap the cost and time. The evaluation was performed from low-fi prototype to high-fi prototype by using the iterative design process. *Informal evaluation* of the low-fi prototype was helpful and effective, because of the detailed requirements and the changes could be performed in the prototype easily. To figure out major problems, our focus was to maintain the quality at every stage of the design prototype. *Expert evaluation* was used to determine the difference between possible variants of the design pattern. *Formal testing* was not used, because it requires the maturity of the web-page. Testing was performed in the development process of design. When the design rested on final hi-fi prototype, some changes were done to consolidate the web pages. Basic section of usability testing was performed, it was observed that the difficult task was to satisfy the management of the company on multiple changes, especially when the webpage is deploy and have high traffic of users. In future it would be possible to evaluate through more formal usability testing.
Main objective of the evaluation is to

- Identify the problems in the design process funnel at every webpage.
- Get an approximate effectiveness of the system.
- Based on the above findings, highlight the possible redesign suggestion.

More specifically the evaluation method was used to answer the following questions

- Did the users understand the process to find the electrical suppliers?
- Did Users understand about the color and pattern?
- Did the users find out the difference between the selecting options and tabs?
- How easily and successfully the users complete the process?
- Did users understand that they need to fill the registration form to get the contract with the company?
- How users recognize the icon and the buttons?
- How users experience the ease of use, trustworthiness of the processes in general?

The expert review and the informal evaluations are two evaluation processes, were also be used in the evaluation of prototype. In the expert review evaluation, the experts should be more experienced and the good evaluator. Expert reviewers were really effective in early stages and evaluation. The second evaluation process was informal evaluation and it was helpful in the iterative process. The informal evaluation was performed multiple times, every user had different opinion. Expert review was an effective way of evaluation and the reviewer used heuristic evaluation. Heuristic evaluation was the most common type of the expert review developed by Jakob Nielson. It contained ten general principles for user interface design. They were more in the nature of rule of thumb than specific usability guidelines (Jakob Nielson 2005).
Expert review was the first evaluation technique was used in the Elskift design prototype. There was an expert reviewer in the evaluation process, the expert evaluate the process and gave suggestion on the design. Other experts’ opinions were also used in the development of the Elskift design prototype. Four times interface design went through the Iterative design process.

Second technique used in evaluation was the informal evaluation. Informal evaluation is a development process of the fast iteration and applicable on the low-fi prototyping. In the informal evaluation the participants browse the Elskift web prototype. Goal was to take the qualitative feedback from the participant and on the subject of what effort they performed.

Recruitment process was the simple, five people were recruited. Normal recruitment was done on the information of participants from the company but participant were also recruited with the help of social networks like the Facebook and the Twitter. Details of the participants are given below.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>18 - 25</td>
<td>2</td>
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<tr>
<td>26 - 36</td>
<td>3</td>
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</tbody>
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<table>
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<td>Student</td>
<td>4</td>
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<tr>
<td>Worker</td>
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<th>Gender</th>
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<tr>
<td>Male</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
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</tr>
</tbody>
</table>

All the participants were familiar with online browsing and three participants had experience of online registration and purchasing system on the web.

Think aloud method was used to collect the qualitative process data in the evaluation. Talk to me method was also known as Think aloud testing, and the focus was on the actual users, rather than solely usability experts. (Rubin, Chisnell, 2008).
Qualitative data were utilized to improve the work pattern. During the usability test, main purpose was to evaluate that process where participants were confused and express negative comments. Feedback from the test incident was noted, positive result of the design discovered from the feedback of the participant. For the further improvement of the Elskift web prototype those were included in the design. Sub purposes were to get access to the thinking process and intension of the participant about the Elskift design prototype. During the test, miscellaneous design of the same process was not demonstrate to participant. It is a usability recommendation because the participant intension would be diverted. Final result of the Elskift design process discussed in the next chapter.
5. RESULTS

5.1 The design process

In this chapter we discuss about the design process from first stage to last stage. Design process gone through the iterative design process so different results came out after evaluation of each stage. Five prototypes are given below.

5.1.1 Prototype 1

In the first prototype, the process funnel was design. Main goal is to divide the task into the subtasks. Different question and the options were design in figure 2 and figure 3.

![Figure 2](image1.png)  ![Figure 3](image2.png)
5.1.2 Prototype 2

Pattern and different fields were designed in the second prototype. Tabs and theme were also design, background and foreground colors was set. Navigation bar, main page and sub-pages were design. Figure4 and figure5 showed some details.

![Figure 4](image1)

![Figure 5](image2)

5.1.3 Prototype 3

In the third prototype five stages of the process funnel were design. In the first stage user must enter the postal code, necessary information related to the postal code was defined under the postal code field as shown in figure6. News and subscribe menu were design to update the users.

Second stage named as preferences. In the preference window as shown in figure9 the users can select the different option to answer the questions. Figure8 showed third stage named as results, contained the result according to the user preference and the postal code.
Fourth stage named as user information. In figure 7 the user has to enter his personal data. Fifth stage is the last stage where the users have to submit his application.
5.1.4 Prototype 4

After the evaluating the prototype 3 we found some problems in the text and visualization of the image and the object. In the fourth prototype we tried to solve these issues and some additional feature for example new icon and background images as shown in figure 10 and figure 11.
5.1.5 Prototype 5

This prototype was fifth prototype, old prototypes had problem in the selection of the objects and with the text field. Waiting screen and help window was added by using popup window as shown in figure16 and figure17. Grammar and spell mistake solved and the welcome text and the question were rewritten.
5.2 THE FINAL DESIGN

In this section final design is discussed, it was made after the evaluating four prototypes and usability testing. The screen shots of the process funnel are display below. Figure18 showed home page of the prototype and it contains information about Company, news update, subscribe menu and information of environment friendly power. Homepage includes some guidelines for the user and the informative text.

![Figure 18](image1.png)
![Figure 19](image2.png)

Figure19 is about the preference page and the second step of the process funnel. In this page six questions were asked, the questions were design according to the results of survey and the requirements form the Elskift Company. Questions were about the accommodation, annual consumption, size of home, service and cost preference, contract type and the environmental friendly options. Different graphic icons used to describe the
question and made selection easy. Two buttons were design in the bottom of the prototype for page navigation as shown in figure19.

The third step of this process shown in Figure20. Waiting screen was also design between step2 and step3. In third step some text was added, it is about the calculation and variable to find the result of the particular area. This page has sub-pages, but most considerable result presented in the four tabs as shown in figure20. User can view company packages through pagination option. Top four companies’ specifications contain the company logo, contract time, cost per kilo-watt and the annual cost. Each tab has selection button and the common color theme was use in the button.

![Figure 20](image)
![Figure 21](image)

The fourth step of the process is shown in the figure21, named as the user info. This page was design to show the agreement selected by the user. This
page consists of two sections, the first section describe the user agreement which contained the company name, appointment type, Price, estimated annual cost and environment option. Second section consist of a form, form fields are first & last name, address, zip code, city, email address and mobile or landline phone numbers. Necessary checks were designed and it restrict the user to enter the correct information. Asterisks are placed to show the importance of the field.

The last stage of the process named as submit, shown in figure 22. Design purpose of the submit page was that the users were satisfied and download their application. This page has one section and it contains button, images and the text.

Figure 22
5.3 Result of Evaluation

Results of the evaluation discuss in this section. As discussed in chapter 4.3 evaluation, two type of evaluation was performed. In the expert opinion evaluation, as per the recommendation we had to take the opinion from three experts. One expert was the HCI lecturer and other two were the human computer interaction masters graduates. Iterative design process was used and Elskift design prototype went through the process four times. Results are given below.

- At the first stage, the paper prototypes and the small images were designed. Design pattern of webpage and questions were decided and the design scenarios were developed. For the Home page welcome text and the text content for other scenarios was evaluated.

- At the second stage, design sequence was set in the prototype. Process funnel navigation was resolute and the selecting option is defined for example the number of people, electricity usage and user types were defined. Alignments of the different tabs were corrected and added some feedback for the users.

- At the third evaluation, field setting in the form, error and the help message were reformed and process funnel was redesigned. The design pattern was evaluated and removed the number in the preference and result stage. Problems found in the form and reduce the number of field. Different icon was introduced in the scenarios. For example home, building and service icons.

- At the fourth and the final stage, the waiting screens and the error message was design in the popup window. Text and grammar correction was done at the every selection options. Process funnel was reshuffle according to the consistency of the webpage.
Second method used in evaluation was the informal evaluation. The results of the evaluation are given below.

- First step of the evaluation was to find that the user would understand the process for example to find the electrical supplier in desired location. Results showed that most users understood the process. Few users expected more result, for example after entering the postal code they want results.

- Second step of evaluation was about the color and the pattern understanding. Color combination helped the users to understand the difference between different objects. Users liked the brightness and the contras of Green and Gray color combination.

- Third step of evaluation was that the user would understand the difference between the selection option and tabs. In the option tab different icon and common selection item were used. Due to this it was easy to understand for user.

- Fourth step of evaluation was that the users completed the process successfully or they faced problems. The Process funnel was used in the whole process and it helped the user to complete the process successfully, some users were confused in the last step but they overcome the problem easily

- Fifth step of the evaluation related to the contract with the company. Nowadays it is common practice on the web to fill the registration form to make contact. But it was noted that some users misunderstood that it was the contract with the particular company.

- Sixth step of evaluation was to recognize the different icons and the buttons on web. Same types of buttons were used in the Elskift prototype. The icons were new and reflect its meaning. Overall users understood the icons and buttons and did not face any problem.
Last step of evaluation to examine the overall evaluation like ease of use and trustworthiness of the process. As stated before it is a prototype and not connected to any database. The Elskift prototype only a design prototype. As far as trustworthiness concern, it could be evaluated on the running application. But as the design prototype we tested and found that the users liked it. Even they gave good feedback and comments on different option, which may help in further development. The information architecture of the Elskift prototype was consistent and clear in the structure. Every group was related to each other like selection of fields and options, associated to the result of survey.
Chapter 6

6 Discussion

6.1 This study evolves the following problems.

The Elskift prototype is not abundant and the complete web-based prototype but it contains maximum attributes of the interface. The aim of this thesis is to design a user interface prototype and to meet the standards. There is a possibility that it could not be pursue to full extent. According to Neilsen usability component are learnability, efficiency, memorability, errors and satisfaction (Jakob Nielson 2005). One of the requirements of usability testing is that software will be absolute and finalize in task completion. As far as interface design concern most of the attribute are covered to some extent.

As discussed in the previous chapter the paper prototype was very helpful to focus the large picture. A good approach was used to show first paper prototype then shifted to the subjective detail prototype. Through this approach designer got rapid and inclusive feedback. The hi-fi prototype have its own significance compare to the other prototype, it is simple to explain and communicate the idea to others involved in the project.

The expert review analysis facilitates in this design prototype and helpful in the iterative processing, but difficult to accomplish the requirement of all experts. Enhanced approach was used to merge the feedback from the experts and the endeavor to solve the common question. Selecting the appropriate questions and the quantity of question to be answered
from the participant was according to the usability evaluation. Sometimes expert recommendation and the designer had conflicted judgment. Another consideration was the importance of the questions according to the expert and the designer. To find out usability problem and issues, heuristic walk through and think aloud combination for expert and participant was delightful outcome.

During the survey ten participants were attempted to solve the questioner and five persons were participated in the usability evaluation. To enhance the usability testing more tests would be perform. Due to deficiencies in the task completion other tests were not performed. Those tests would measure time and performance. From the static web page, all the tests were performed quite well and the good behaviors were perceived from the participant. For the better feedback and the design enhancement it was nice that the participant experienced the dialogue box, waiting and help screen.
6.2 Future work

The Elskift prototype was mainly focus on the designing part and result was to make the good and usable prototype. This design may be implemented, but primary goal was to create a user friendly interface design which fulfill the requirement of the users and acceptable for the company. Photoshop CS3 used to design the web-interface to make Hi-fi prototype and iterative design process is implemented at every stage. The Elskift company management was satisfied with the design and inspired form the prototype and the process funnel.

This prototype has different advantages but also have some weakness. Every design cannot be hundred percent perfect and there is always room for Improvement. More functions may require in future for this prototype to satisfy utmost customer need. For future work, Company expects more refined web-base product and more development may require to support and implement the design idea. For usability testing it is important that the user should experience each step to complete the task.
Appendix A: Respondent Questioner

**Request:**
I humbly request and encourage your kind support, cooperation and active participation to fill out this form so that I may conclude accurate and relevant findings of our Research through your perception.

1. Gender?
   - Male 1
   - Female 2

2. Are you?
   - Tenant 1
   - Owner 2
   - New mover 3

3. Do you know number of electrical supplier in your area?
   - Yes 1
   - No 2

4. Do you need information regarding electrical supplier?
   - Yes 1
   - No 2

5. Did you get easily to your supplier?
   - Yes 1
   - No 2

6. Are you satisfied with your supplier?
   - Yes 1
   - No 2
7. Are you in some contract with your supplier?
   - Yes
   - No

Main Questionnaire
1. Do you know how much electricity or power you utilize?
   - Yes (go to 1.1)
   - Not sure
   - No

   1.1 Where you find it?
   - Electricity Bill
   - E-receipt
   - Call to help-Center

2. Did you know about Green energy?
   - Yes (go to 2.1)
   - Not sure
   - No

   2.1 Do you Need Green Electricity?
   - Yes
   - No

3. Do you need contract information of your local area Electrical supplier?
   - Yes
   - Not sure
   - No

4. What is your preference when selecting electrical supplier?
   - Economical
   - Customer Service
   - Both
5. Did you like process funnel design (navigation at every stage)?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not interested</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. What do you want from interface?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update your info</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Contract</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other __________________</td>
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<td></td>
</tr>
</tbody>
</table>

7. What are your suggestions about interface?

__________________________________________________________
__________________________________________________________
__________________________________________________________
__________________________________________________________

Classification:

YOU’RE NAME: ___________________________________________

ORGANIZATION: __________________________________________

DESIGNATION: __________________________________________

COMPANY LOCATION: ______________________________________


Ben Shneiderman
Catherine Plaisant
Maxine Cohen