Usability Evaluation of Ireland's Travel Websites

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I certify that this dissertation which I now submit for examination for the award of MSc in Computing (Knowledge Management), is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the test of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Dublin Institute of Technology and has not been submitted in whole or part for an award in any other Institute or University.

The work reported on in this dissertation conforms to the principles and requirements of the Institute's guidelines for ethics in research.

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Date: ***15th of July 2013***

ABSTRACT

The World-Wide Web has been growing at a very fast rate since its inception in 1990. A very wide range of products and services are now available to purchase online. To successfully exploit the full power of the Web organisations must ensure that these products and services are made available to as wide an audience as possible.

Usability evaluation is one approach that can help to reduce the barriers that prevent people from using particular websites, and the incorporation of usability into design process of User Interfaces may have significant benefits. It may lower costs associated with product development, maintenance and documentation, and make software development cycles shorter. Usability may help E-commerce businesses improve companies competitive positions. The main benefit for users is increased efficiency and productivity (Donahue, Weinschenk and Novicki 1999).

Usability evaluation is the process used to assess how easy and pleasant User Interfaces are (Rosson and Carroll 2002). Usability evaluation should be of particular interest to E-commerce businesses because usability has a positive impact on company's sales and its revenues (Donahue, Weinschenk and Novicki 1999; Nielsen 2001a).

This research focuses on the usability assessment of Ireland's travel websites. The research involves usability evaluation of five travel websites with their typical users. The aim of the research is to identify how well Ireland's travel websites conform to usability principles. The research also aims to form a set of recommendations on how to improve these websites in order to increase their level of conformance, and how to make the systems more satisfactory for the use of their regular customers.

The evaluation framework used in the research consists of the following steps: 1) Establishment of suitable usability evaluation criteria 2) Distribution of the pre-test questionnaire 3) Conduction of the usability test in order to find out usability problems 4) Distribution of the post-test interview 5) The analysis of the usability of Ireland's travel websites by using established usability criteria 6) Provision of recommendations for usability improvements.

The results of the evaluation are presented in this research as well as recommendations on how to improve the usability of the travel websites.

Key words: *Usability, Human Computer Interaction, User Centered Interface (UCI) Design, Usability evaluation, Usability evaluation methods, E-commerce, Travel websites*

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1. INTRODUCTION

1.1 Background

Usability evaluation is used in order to detect usability problems. Evaluation also helps understand these problems, what in turn helps find appropriate solutions (Rosson and Carroll 2002; Bolchini, Finkelstein, Perrone, and Nagl 2009). Usability assessment can be performed at any stage of system's development process or after the system has been delivered to end users (Welie, Veer, Eliens 1999). It can be done with real users or by using scenarios and walkthroughs (Welie, Veer, Eliens 1999).

E-commerce represents the websites that sell products and services (Rohn 1998). E-commerce websites provide users a convenient way of shopping (Zainudin, Ahmand and Nee 2010) as customers are able to easily search and purchase desired products at their homes via the Internet. Nowadays, E-commerce is critically important for travel industry (Mushtaq and Sulaiman 2010). The benefits offered to travel sector by E-commerce are cheaper distribution channels, better customer care (Yom 2003 cited in Hummer, Kretschmer and Hofmann 2005), improved business operations and enhanced competitive positions (Law, Leung and Wong 2004). The main benefit that is offered to customers of travel sites is convenient way of booking as customers can purchase travel products such as holiday packages, flights and travel insurance without the need to visit offices of the travel agents (Mushtaq and Sulaiman 2010). In accordance to Chariton (2011), 85% of all purchases of holiday packages are made via the Internet.

Usability is important for E-commerce websites. Nielsen has stated: *"On the Web, usability is a necessary condition for survival. If a website is difficult to use, people leave"* (Nielsen 2003). Usability can lower system's development, support, training, documentation and maintenance costs, improve companies competitive positions (Donahue, Weinschenk and Novicki 1999), make the website more successful and popular (Palmer 2002), and increase companies sales (Nielsen 2001a). Users also benefit from usability as they have improved efficiency and productivity (Donahue, Weinschenk and Novicki 1999).

In order to ensure high level of usability, important to perform usability evaluation. There are a number of usability evaluation techniques such as usability testing, usability inspection and usability inquiry (Hom 1998). There is a variety of evaluation methods, e.g. Think Aloud Protocol, Coaching method, Heuristic evaluation, Cognitive walkthroughs, Observations, Interviews, Questionnaires, etc. These methods can be used on their own or in combination (Nielsen 1993).

This dissertation will perform usability evaluation of five Ireland's travel websites, i.e. Gohop.ie, Ebookers.ie, Limericktravel.ie, Letsgotravel.ie and Holidaysonline.ie, in order to identify their level of usability. The purpose is to find out how these websites conform to usability principles. The research will also propose recommendations that can be used by the travel websites in order to improve usability.

1.2 Research Problem

E-commerce websites have low level of usability having the average user success rate *("percentage of tasks that users complete correctly"* (Nielsen 2001b)), of only 56% (Nielsen 2001a). Although, some researches show that there is a slight improvement in usability of E-commerce websites, web usability is still not fully implemented (Nielsen 2011; Webcredible 2011). This is especially true for online travel agents (Webcredible 2011). According to the study performed by Webcredible (2011), the average usability score of travel agent websites is 65.9%. This is due to various usability problems that are present on the travel websites. For example, in accordance to Q4 2011 report on worldwide visitors to travel and hospitality websites by iPerceptions, the users state that the main problems of travel websites is unclear pricing, bad functionality and bad website design (European Travel Commission 2013b). According to Chariton (2011), other issues that negatively influence users' experience are: hidden charges, lack of information, lack of online help, difficulties searching for holidays, lack of images of accommodations, small size of photos, lack of functions for enlarging images, etc.

Such low level of usability is mainly due to the absence of commitment to usability among the companies in IT sector, and the lack of knowledge of usability guidelines

and principles among the IT staff (McCoy 2002). Websites that do not meet users' expectations usually lose their potential customers who desire more usable websites (Offut 2002). As a result unusable websites lose their revenues. Nielsen states that by improving usability, a website can increase its sales by 79% (Nielsen 2001a).

It is essential to evaluate the usability of websites in order to reveal implementation flaws and to propose solutions on how to correct these design problems. In accordance to the literature review performed in this study, there is a lack of usability evaluation of Ireland's Online Travel Agents. Therefore, this research is going to perform web usability analysis of five Ireland's travel websites that are Gohop.ie, Letsgotravel.ie, Ebookers.ie, Limericktravel.ie and Holidaysonline.ie, in order to see how they conform to usability principles, and propose specific recommendations on how to increase their conformity to usability principles and to make these systems more enjoyable for their users.

1.3 Research Questions

The following research questions will be addressed in the study:

1st R.Q.: How Ireland's travel websites conform to usability principles?

2nd R.Q.: How to improve these websites in order to increase their level of usability and to make them more satisfactory for the use of their typical customers?

1.4 Research Aim

The aim of the research is to evaluate usability of Ireland's online travel systems with their typical users in order to determine the websites' level of usability. The evaluation will be performed by using usability principles. The findings of the research will show how efficient Irish online travel systems are at meeting these usability principles. If the research will find out that the websites are not good at conforming to usability guidelines, then recommendations on how to improve these systems will be made. Also, the research aims to provide recommendations on how to make Ireland's travel

websites more satisfactory for the use of their regular users. By following these recommendations, Ireland's online travel agents can ensure that they meet usability needs and desires of their typical customers.

1.5 Research Objectives

The following objectives have been achieved throughout the dissertation and contributed to the overall outcome:

1 Conduction of a literature review in order to explore the area of usability and its importance, and to establish a set of criteria that will be used for usability evaluation of Ireland's online travel systems. The criteria will consist of appropriate principles.

2 Conduction of a literature review in order to identify a profile of a typical customer of online travel agents.

3 Conduction of a literature review in order to explore the range of evaluation techniques and methods.

4 Conduction of the experiment by applying appropriate evaluation techniques and methods.

5 Analysis of the data gathered from the experiment by using the set of usability criteria in order to determine Ireland's travel websites' level of adherence to these usability metrics.

6 Creation of recommendations for usability improvements by using the data gathered from the experiment.

1.6 Research Methodology

To answer the research question the usability evaluation of Ireland's online travel systems will be performed with their typical customers. The research will be conducted by using qualitative research methods. Qualitative research is focused on understanding qualitative data such as people's words and actions. Unlike quantitative research, it does not concern numerical data (Hogan, Dolan and Donnelly 2009).

The research will be based on collecting two types of data, i.e. primary data and secondary data. Secondary research will be carried out in order to state the research problem and to define research methodology. It will also be used to identify the criteria, i.e. usability principles, for usability evaluation, and also to explore the area of usability and E-commerce. This data will be gathered by conducting an extensive literature review using a number of sources and will play an important role in getting an insight into the topics related to this research. After the exploring the area of usability, the primary research will be carried out by performing an experimental usability evaluation of five Ireland's travel webistes.

Accordingly, the research will be done in several stages (Figure 1.1):

1. Collection of secondary data by conducting a literature review.

2. Collection of primary data by performing usability evaluation.

3. Close analysis of usability of the websites under the evaluation.

4. Creation of recommendations for improvements.

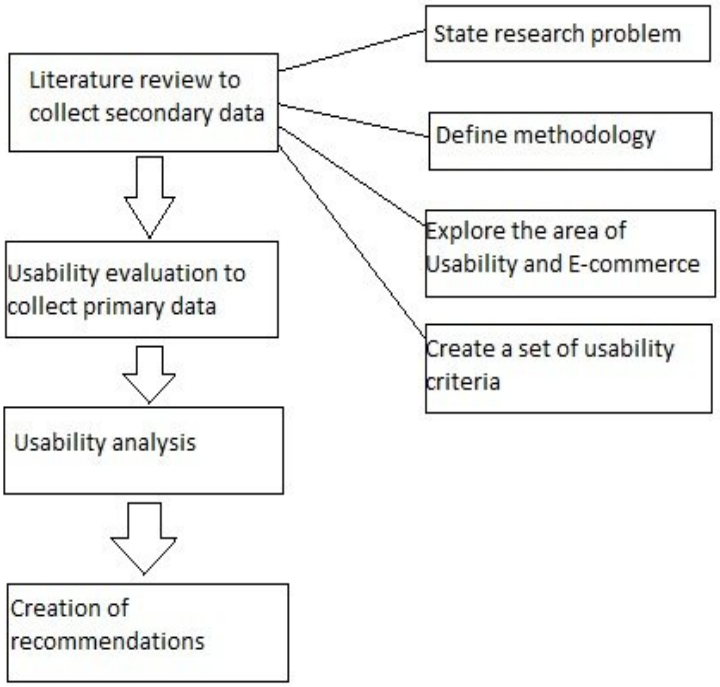

Figure 1.1: Structure of the Research

Usability evaluation itself will incorporate a number of usability evaluation methods. The choice of techniques and methods depended on the following factors: resources that are available for the project, people who are able to participate in the experiment, strengths/weaknesses of each evaluation method (Preece, Rogers and Sharp 2011), number of available participants, and experience of the experimenter (Nielsen 1993). The preference was given to two techniques: usability testing and usability inquiry. Among the methods of usability testing, Think Aloud method was chosen for the evaluation and will be used for collecting usability problems of the websites (Nielsen 1993). Usability inquiry technique will be used to gather supplementary data such as users' opinions and recommendations (Nielsen 1993). Among the methods of usability inquiry, the preference was given to questionnaires and interviews.

As the study will use qualitative research method, it will be evaluated by using the following qualitative criteria: credibility, transferability, dependability and confirmability (Trochim 2006). This criteria is alternative to the criteria for evaluation

quantitative research that are internal validity, external validity, reliability and objectivity (Finlay 2006).

1.7 Resources

There are two types of resources that are required for this research. These are technical and non-technical resources. Technical resources such as the laptop will be required to implement the usability test. The Internet connection will be required in order to have the access to the websites that will be investigated. It will also be used to search relevant material for this study using search engines such as Google and Google Scholar, and in order to have the access to DIT library databases.

Non-technical resources are needed to gather literature relevant for this research such as academic articles and books. Examples of non-technical resources that are required for this dissertation are the access to the DIT library that will be used in order to borrow some relevant books and the access to DIT library's electronic resources such as library databases, e.g. ACM Digital Library, IEEExplore Digital Library and Business Source Complete, and e-journals. This type of resources also includes the participants that will take part in usability evaluation, i.e. in questionnaire, usability test and interviews, who will help to gather primary data.

1.8 Scope and Limitations

This research is concerned with usability of travel websites from the point of view of their typical users. The research focuses only on Ireland's travel websites. It does not look at non-Irish travel websites or some other E-commerce websites other than travel websites.

The aim of the research is to evaluate usability of Ireland's websites in order to determine the level of usability of these websites. Evaluation will be performed by using usability criteria. The research is primarily concerned with usability, while there are other disciplines that are closely related to usability such as accessibility, universal design (inclusive design), interaction design and user experience (UX).

1.9 Organisation of the Dissertation

Introduction:

Chapter 1 sets the scene for the dissertation. The chapter start with introducing E-commerce and usability followed by the explaining the background to this research. The chapter states the research problem and the research questions. It presents the research aim and research objectives, and discusses the chosen methodology for the research. The chapter lists the resources required for the dissertation and present the research limitations. It closes with discussion of the organization of the dissertation.

Usability:

Chapter 2 discusses usability and its related concepts. The chapter start with explaining usability related concepts such as Human Computer Interface, Human Computer Interaction and User Centered Interface Design. The chapter then describes the concept of usability. After discussing usability and its importance, other usability related concepts are described. These concepts are: accessibility, universal design (inclusive design), interaction design and user experience (UX). The chapter presents published usability principles that will be used as usability evaluation criteria for the experiment. The chapter closes with explanation of the process of usability evaluation and describing usability evaluation techniques and methods.

E-commerce and Travel Websites:

Chapter 3 describes E-commerce and online travel, and presents an architecture of a typical travel website. The chapter presents a profile of a typical user of travel website, which will be used in the experiment in Chapter 6 as the basis for test users selection. The chapter lists the benefits that usability gives for E-commerce and online travel. The chapter closes with introduction of the websites that will be used for the evaluation. These websites are Gohop.ie, Letsgotravel.ie, Ebookers.ie, Limiricktravel.ie and Holidaysonline.ie. The chapter also presents usability guidelines that are specially designed for travel websites.

Usability of Travel Websites:

Chapter 4 is concerned with the general level of usability of the travel websites. Related researches are discussed and existing recommendations are provided in this chapter.

Planning Usability Evaluation:

Chapter 5 discusses the planning for the usability evaluation. The chapter presents the stages of the experiment. It presents the chosen research methodology and usability evaluation techniques and methods. It explains how test participant will be selected and how test tasks will be created. This chapter presents the test plan of the evaluation. It also gives the chosen usability criteria that will be used for the analysis.

Performing Usability Evaluation:

Chapter 6 is concerned with the actual experimentation. It explains the process of performing the usability evaluation, i.e. the analysis of the sites using usability guidelines; creation and distribution of the pre-test questionnaire, and analysis of its results. The chapter also discusses the process of performing usability test and post-test interviews.

Results and Analysis:

The aim of the experiment is to discover websites' problems related to usability. Also the experiment aims to get understanding of how regular users interact with these websites. These data is analyzed to measure the level of usability of the websites. The analysis is performed by applying usability principles. The results of the analysis are presented in this chapter along with the recommendations for websites improvements.

Conclusion:

The last Chapter 8 is the concluding one. It gives an overview of the research, presents the research findings in the context of previous research, gives experiment's limitations and provides suggestions for future research.

2. USABILITY

2.1 Introduction

In this chapter, usability and its related concepts are discussed. The concepts such as Human Computer Interface, Human Computer Interaction and User Centered Interface Design are explained in this section. The chapter defines and describes the concept of usability and discusses other related disciplines such as accessibility, universal design (inclusive design) and user experience (UX). Published usability principles are presented. The chapter closes with explanation of the process of usability evaluation and describing usability evaluation techniques and methods.

2.2 Human Computer Interface

Human Computer Interface has a central role in Human Computer Systems. Human Computer Interfaces, humans, machines and environments are the elements of Human Computer Systems. Human Computer Interface provides the means for human computer interaction, i.e. the communication between the humans and machines. Machines are the machineries, equipment and tools, humans are machines' operators and managers, and Human Computer Interfaces are the control panels, touch screens and software interfaces. In computing, machines are the computers, humans are the end users, and the Human Computer Interface is called a User Interface. Human Computer Interface, or User Interface, allows users and computers to interact. Users input the information by sending instructions to computers. Computers, in turn, output the information by presenting processed results (Chao 2009). In accordance to Chao (2009), there are different interaction modes such as data interaction, image interaction, voice interaction and intelligent interaction.

The process of a design of Human Computer Interface consists of three overlapping stages, i.e. structure design, interactive design and visual design. During the first stage, a framework for interface design is created. It involves analysis of user requirements, analysis of the purpose of task, and the task design. The second stage, the interactive

design, is the design of human computer interaction. It involves defining types of interaction and carrying out design of interaction. This design is developed according to the interaction principles. Design must be 1) User oriented; 2) Consistent; 3) Identifiable and Operational; 4) Easy to communicate. It also must contain shortcuts, feedback and effective help. The last stage, the visual design, is concerned with the issues such as the use of colours, graphics, images, fonts and layouts of pages (Chao 2009).

The two facts that make design of Human Computer Interfaces very important is that interfaces are becoming too complex (Manaris and McCauley 2004) and a number of users who have no technical expertise increases (Granic and Glavinic 2002). Therefore, designers of user interfaces must put a lot of effort into creating interfaces that are easy to understand and use.

2.3 Human Computer Interaction

Human Computer Interaction (HCI) is the discipline that investigates the communication, i.e. interaction, between humans and computers (Booth 1989), and concerns design, development and evaluation of interactive computer systems (Dix, Finlay, Abowd and Beale 1998). The practice is close related to interaction design (Preece, Rogers and Sharp 2002) that is later discussed in his chapter. HCI has other terms that are sometimes used as synonyms. These terms are Man-Machine Interaction (MMI), Computer and Human Interaction (CHI) and Human-Machine Interaction (HMI) (Booth 1989). According to Granic and Glavinic (2002), the main goal of HCI is the improvement of systems' usability, what in turn, maximizes the systems' chances of success (Cabinet Office 2003).

Like User Centered Design (UCD), HCI is a multidisciplinary approach. It incorporates the following areas: software and hardware that is involved in human computer interaction, various models of human computer communications, different methods for eliciting users' needs and requirements, user centered design and development, and system's impact on organizations and people within these organizations (Booth 1989).

HCI is based on a range of techniques. Their incorporation into software development promises an improvement of usability of Human Computer Interfaces (Granic and Glavinic 2002). However, it is critically important to involve these techniques from the very start of software development till the very end (Cabinet Office 2003), otherwise HCI has little positive impact.

Principles of HCI approach focus on early involvement of users into development process, assessment of usage of systems and iterative software development (Granic and Glavinic 2002).

2.4 User Centered Design

User Centered Design (UCD) can be defined as *"the practice of the following principles: the active involvement of users for a clear understanding of user and task requirements, iterative design and evaluation, and a multi-disciplinary approach"* (Mao, Vredenburg, Smith and Carey 2005). According to Preece, Rogers and Sharp (2002), the main idea behind this approach is that the users are central to the user interface design process. The authors proposed several principles that state that:
"User's tasks and goals are the driving force behind the development ";
"Users' behaviour and context of use are studied and the system is designed to support them";
"Users' characteristics are captured and designed for";
"Users are consulted thought development from earliest phases to the latest and their input is seriously taken into account";
"All design decisions are taken within the context of the users, their work, and their environment".

Apart from the focus on system's users, usability evaluation also has the central role in UCD approach (Otaiza, Rusu and Roncagliolo 2010). Nevertheless, Mao, Vredenburg, Smith and Carey (2005) state that UCD practice should not be considered as just usability evaluation or software engineering.

2.5 Usability

2.5.1 What is web usability?

The main focus of usability is on the improvement of a quality of the user experience (O'Connor 2011). Usability achieves this by making user interfaces simple, natural, easy and straightforward to use (Safavi 2009a). Usability is highly important in website development (Bolchini, et al. 2009) and is one of the factors that make website's design successful (Matera, Rizzo and Carughi 2006; Beaird 2007 cited in Gardner 2007). Another factor that positively affects user interface design is the visual appeal (Beaird 2007 cited in Gardner 2007). Usability of websites can be affected by variety of aspects such as navigation, design of input forms, layout of web pages, terminology and jargon (Gardner 2007).

In accordance to Safavi (2009a; b), usability can benefit both the websites' users and the search engine crawlers. The crawler is the program that enters the websites and aggregates their textual content. This content is then indexed and searched by the users by using the search engines (Risvik and Michelsen 2002). Developers should provide good usability for both the websites' users and the search engine crawlers. However, design of the navigation must take into account the fact that a good navigation for users is opposite to a good navigation for search engines. Navigation that is easy for users is not always optimal for search engine crawlers. This may lead to the search engine being unable to recognize the website and thus adversely affect its popularity (Safavi 2009a; b).

Incorporation of usability into software development process requires at least the following (Rohn 1998):

involvement of usability engineering techniques and methods from the start of software development process until the end, understanding the goals, identifying and profiling actual users, designing the software according to the requirements of the actual users, and adopting an iterative design approach.

2.5.2 Definitions of usability

There are several definitions of usability: most widely known and accepted definition proposed by Nielsen (1993), definition given by International Organization for Standardization (ISO) in ISO 9241 that is now the standard for usability practitioners (Matera, Rizzo and Carughi 2006) and definition proposed by Shneiderman (1998)

ISO 9241 Part 11 defined usability as *"the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"*. Effectiveness in turn is defined as *"the accuracy and completeness with which users achieve specified goals"*. Efficiency is defined as *"the resources expended in relation to the accuracy and completeness with which users achieve goals"*. Satisfaction is defined as *"the comfort and acceptability of use"* (ISO 9241 1997 cited in Matera, Rizzo and Carughi 2006). This definition, however, is quite abstract and is not considered practical (Welie, Veer and Eliens 1999). According to Welie, Veer and Eliens (1999), usability attributes that were given by ISO 4241-11 are similar to usability characteristics that were proposed by Nielsen (1993). Nielsen's usability principles are explained below.

Nielsen (1993) defined usability in terms of 5 usability characteristics:

1) Learnability - this means that the system is easy to learn and understand regardless of user's experience, education level, knowledge, language skills, etc.

2) Efficiency - this means that once a user understood and learned the system, he/she can efficiently use this system.

3) Memorability - this means that the system is easy to remember and that it can be efficiently used even if the user has not interacted with the system for some time.

4) Errors - this means that the system minimizes chances of making an error. In the case of making an error, the system must be able to provide a guidance on how to recover from this error. Extremely harmful errors must be eliminated.

5) Satisfaction - this means that users are happy with the system.

Nielsen also proposed a model where usability is a small part of a much wider concept which is system acceptability (Nielsen 1993). In accordance to the author, system acceptability means how well the system satisfies its users, users' clients and managers. System acceptability is split into two concepts which are system social acceptability

and system practical acceptability. System practical acceptability is split into usefulness and other attributes such as cost, reliability, etc. Usefulness, in turn, is split into two concepts which are utility and usability. According to the author, the concept of usefulness means how practical is the system; utility means how useful is the functionality of the system and usability means how well system functionality can be used (Nielsen 1993).

Another definition that is close to the definition proposed by Nielsen (1993) is given by Shneiderman (1998). The author explained the concept of usability in terms of five "measurable criteria" such as time to learn specific functions, speed of task performance, rate of errors by users, user retention of commands over time, and subjective satisfaction (Shneiderman 1998).

The European Telecommunications Standards Institute (ETSI) accepted and further augmented usability definition given by ISO, stating that usability is *"a pure ergonomic concept not depending on costs of providing the system. Usability together with the balance between the benefit for the user and the financial costs form the concept of Utility. This means that ergonomically highly usable system may have low utility for a particular user who considers the cost too high in relation to his or her need for using the system"* (ETSI 1993). According to ETSI (1993), usability can be assessed by using objective measures by observing how users are interacting with system (ETSI also calls it performance measures), and subjective measures by getting users' opinions and feeling about the system (also called attitude measures).

Definition proposed by Research and development in Advanced Communication technologies in Europe (RACE) was developed to assist systems designers. RACE states that designers have *to "ensure the appropriate enabling state exists for each of the users' goal tasks"* and that they must *"reduce to a minimum the costs to the user in reaching the appropriate enabling states for their goal tasks"* where the goal task is *"what the user wants to do"* (ETSI 1993).

Some authors such as Gould and Lewis (1985), Shackel (1990; 1991), Sharp, Rogers and Preece (2007), Stone et al. (2005) do not explicitly define usability but explain it using elements like (Petire and Bevan 2009):

1) *"Flexibility: the extent to which the system can accommodate changes desired by the user beyond those first specified".*
2) *"Learnability: the time and effort required to reach a specified level of use performance with the system".*
3) *"Memorability: the time and effort required to return to a specified level of use performance after a specified period away from the system".*
4) *"Safety: aspects of the system related to protecting the user from dangerous conditions and undesirable situations".*

The variety of definitions means that there is no mutual explanation of the concept of usability. In accordance to (Petire and Bevan 2009), the concept of usability depends on system's users, their goals and the context of use. For those users who interact with the system very regularly, at work for example, the element of learnability will be of less importance than the requirement for efficiency, as they will be willing to spend more time in order to learn how to use the system, but once they will learn it, they will require higher levels of efficiency. This is in contrast to the users who do not use the system frequently (Petire and Bevan 2009).

2.5.3 Importance of usability

Developing high quality web applications that are reliable, usable and maintainable requires laborious effort (Offutt 2002). Furthermore, it is really hard to develop and maintain truly usable websites (Safavi 2009a). However, if incorporated successfully, usability engineering can offer benefits for a number of stakeholders, i.e. software development companies, E-commerce businesses and systems' users. By employing usability engineering into software development process, software development companies can lower development, documentation and maintenance costs, and make software development cycles shorter. Usability can help E-commerce businesses gain a competitive advantage, make the websites more successful and thus increase company's sales. End users benefit from usability by having increased efficiency and productivity (Donahue, Weinschenk and Novicki 1999).

Costs

By incorporating usability engineering practices, software development companies can lower their development, support, training, documentation and maintenance costs. By knowing real users and understanding their actual requirements and needs, development companies can shorten software development processes and lower development and maintenance costs. Apart from development costs, usability may also lower support costs. The incorporation of usability can lower the workload of support staff because less users need to call a support centre to resolve usability problems. Thus, such development companies often require less employees for telephone support. Training costs may also be lowered, as usable software needs less training. Costs for documentation may also be reduced because documentation for user friendly systems is easier and quicker to create (Donahue, Weinschenk and Novicki 1999).

Competitive advantage

Today, competitive advantage is of high importance for internet enabled businesses (Donahue, Weinschenk and Novicki 1999) because there is a tight competition among E-commerce websites (Nielsen 2011). Usability can help E-commerce websites to improve their competitive advantage (Donahue, Weinschenk and Novicki 1999). Thus the websites must enhance usability in order to provide their users a pleasant and enjoyable experience what in turn will help to boost the competitive edge and move one step further of the competitors (Nielsen 2011).

Website success

The success of internet businesses primarily depends on the success of their websites (Palmer 2002). Usability helps to make the websites more successful. A usable website, i.e. the website that makes its users satisfied and enables them to easily find products and services that they need, is more prosperous as its customers are willing to return to the site and use it again. Usability makes the users loyal (Safavi 2009b) and thus makes the websites more successful.

Sales

The success of websites has a positive effect on the revenues of internet businesses. Websites that provide good user experience and match users' needs, satisfies customers and thus increases return visits. This in turn increases revenues for the businesses

(Donahue, Weinschenk and Novicki 1999). According to Nielsen (2001a), if a website improves usability, it can increase its sales by 79%.

Efficiency and productivity

End users benefit from usable systems by having improved efficiency and productivity. In the case of E-commerce, users interacting with user friendly systems require less time and effort for searching products and services on the websites, and making a purchase (Donahue, Weinschenk and Novicki 1999).

However, usability alone can not guarantee 100% success, no matter how well usability engineering practices were implemented (Nielsen 2001a; McMahon 2005; Cabinet Office 2003). In addition to usability, there must be a tight cost control (Nielsen 2001a) and a provision of something that can differentiate the website (McMahon 2005).

2.6 Usability and Accessibility

Both accessibility and usability are used when dealing with user interfaces and websites (Petrie and Kheir 2007). In accordance to Web Accessibility Initiative (WAI), "*Web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web"* (WAI 2006). According to this definition, accessibility is concerned about the design of interfaces for people having some disabilities (Petire and Bevan 2009).

Another definition of accessibility that is opposite to the definition made by WAI (2006) (Petire and Bevan 2009) was proposed by ISO 9241 Part 171 . According to ISO, accessibility is *"the usability of product, service, environment or facility by people with the widest range of capabilities"* (ISO 9241 cited in Petire and Bevan 2009).

These two definitions show that it is not possible to determine a clear relationship between the concept of usability and accessibility. According to the first definition that

states that accessibility only concerns the people with disabilities, accessibility can be considered as a part of usability. The second definition, on the contrary, states that accessibility concerns the people with various capabilities such as people with disabilities and healthy individuals. Thus the usability is a part of accessibility (Petire and Bevan 2009). Despite of this, Petire and Bevan (2009) states that in practice the term usability is used when dealing with general users and the term accessibility is dealing with elderly or people with disabilities.

2.7 Usability and Universal Design (Inclusive Design)

According to Zhang *et al. (*2008) Universal Design is a method that directs and shapes industrial design of environments, products and services. The idea of Universal Design emerged in 1970s when people started to focus on the needs of people with various disabilities. Afterwards the focus of Universal Design shifted to more wider problems concerned not only the needs of disabled people but also different obstacles healthy individuals encounter in their life (Zhang *et al.* 2008).

As defined by Mace (1988) cited in Prajapati and Asai (2010) Universal Design *"is the design of products and environments to be usable by all people, to the greatest extend possible, without the need for adaptation or specialized design"*. In other words, Universal Design focuses on such product's, service's and environment's designs that will be equitably used by all people without additional change or the use of additional technologies such as Assistive Technologies. Universal Design focuses on individuals having various abilities including healthy people.

As stated by Valerie Fletcher, Executive Director of the Institute for Human Centered design (Adaptive Environments) (National Park Service and National Center on Accessibility 2008) there are many terms used more or less as synonyms for Universal Design. The term Inclusive Design is a common synonym. There are another terms such as Design-for-All which is widely used in EU and the term Human-Centered Design used in USA. Another similar concept is a Barrier-free design that focuses on eliminating architectural barriers that people with disabilities encounter in their lives (Ron Mace 1998 cited in Emerson 2003).

Important point here is that Usability and Universal Design are not the same concepts. While usability is concerned with people that have no disabilities (Petire and Bevan 2009), Universal Design is a broader practice since it is targeted not only at vulnerable people. It is a general approach focusing on various people having different capabilities including disabled and healthy individuals (Zhang *et al.* 2008).

2.8 Usability and Interaction Design

Preece, Rogers and Sharp (2002) defined interaction design as *"designing interactive products to support people in their everyday and working lives"*. Interaction design differs from regular software engineering (Preece, Rogers and Sharp 2002). Like user centered design, interaction design recognizes the importance of user involvement (Dix, Finlay, Abowd and Beale 2004). Dix, Finlay, Abowd and Beale (2004) state that the main goal of interaction design is to *"put the user first, keep the user in the center and remember the user at the end"*.

There are many disciplines and practices that are closely related to interaction design. Psychology/Cognitive Science, Software engineering, Social sciences like Sociology and Anthropology, Human Factors (HF), HCI, and various design practices such as product and graphic design are all interrelated to interaction design (Preece, Rogers and Sharp 2002).

In accordance to Dix, Finlay, Abowd and Beale (2004), interaction design is an iterative process. The basic iterative design process consists of five stages which are: requirements elicitation, analysis, design, iteration and prototyping, and implementation and deployment. During requirements stage users' needs and requirements are collected using HCI techniques such as interviews, observations, etc. The following stage involves techniques such as task models, task analysis and scenarios to analyze the requirements collected during the first step. The third step, the design stage, is the central one. Different guidelines and design principles are used for interaction design. Furthermore, there are various methods to model and describe interactions. The fourth stage, prototyping, is about the evaluation of a user interface

design. There is a range of methods and techniques that can be used for design evaluation. These are discussed in Chapter 5 of this thesis. After the step four, the analysis step is executed again. Such iteration takes place until the exact design is created. The last step involves system's implementation and demployment (Dix, Finlay, Abowd and Beale 2004).

Interaction design is not a stand alone practice. Apart from HCI, interaction design is very closely related to usability. As stated by Dix, Finlay, Abowd and Beale (1998), the main goal of interactive design is to improve systems' usability. This is achieved by applying usability principles and usability evaluation methods into interactive design process (Dix, Finlay, Abowd and Beale 1998).

2.9 Usability and User Experience

User Experience (UX) is a quite new concept (Petire and Bevan 2009). In accordance to Petire and Bevan (2009), usability can be considered as a subset of UX. The UX discipline incorporates all the characteristics of usability plus the additional aspects that are specifically relevant to UX such as amusement and entertainment.

If compared to usability, there are three additional characteristics that are incorporated into UX which are (Hassenzahl and Tractinsky 2006 cited in Petire and Bevan 2009):

1 Non task oriented aspects of system's use like joy, happiness, challenge and self-expression;

2 Focusing not only at how to eliminate usability problems, but also at how to maximize these non task oriented aspects;

3 Giving preference to subjective measures like users' opinions and satisfaction with systems.

2.10 Usability Evaluation

2.10.1 What is usability evaluation?

Usability evaluation is defined as empirical evaluation of software's usability. The purpose is to identify a usability problem, understand it, get an idea of why this problem occurred, and help to solve the problem (Rosson and Carroll 2002; Bolchini, Finkelstein, Perrone, and Nagl 2009). Acoording to Bolchini, Finkelstein, Perrone, and Nagl (2009), a usability problem prevents users to easily and successfully complete desired actions on the website (or any other computer system). The authors define usability problem as *"an obstacle to a successful user experience, meaning by 'successful' the effectiveness (feasibility) and efficiency (spending an acceptable amount of time and energy) in carrying out tasks"*. Usability evaluation can be done at any stage of system's design/development process or after the system has been developed (Welie, Veer, Eliens 1999).

There is a range methods and techniques used for usability assessment. Hom (1998) classified usability evaluation methods into three usability evaluation techniques which are usability testing, usability inspection and usability inquiry. These methods are discussed in Chapter 5.

2.10.2 How to perform usability evaluation

In order to successfully perform usability testing with real users, the researcher needs to create a test plan, select suitable participants, then conduct the actual test and finally analyze the results (Galidz 2002). Before the real test, it is recommended to perform a pilot test (Nielsen 1993; Preece, Rogers and Sharp 2011).

1. Test plan

Detailed test plan is very important for proper evaluation. The plan must be created before the actual test (Nielsen 1993). According to Nielsen (1993) every test plan must include the following:

Well defined purpose of the test.
When the test will be performed?

Where the test will be performed?

Duration of each test session.

List of computer devices and other equipment that is needed for the test.

Software that is required for the test.

Required system/network load and response time.

Who will be an experimenter?

Profile of test users;

Number of required test users;

List of test tasks;

Criteria which will be used to determine when test tasks are successfully completed.

List of user aids, e.g. manuals, online help.

How the experimenter will be allowed to help the users?

Description of the data which is going to be collected.

How the collected data will be analyzed?

Evaluation criteria which will be used.

2. Pilot Test

Pre-test is performed before the real test and usually requires only one or two test users. The test is performed like a planned test but with fewer participants. Pilot users may not be from the group of real users. The basic aim of the pilot test is to find the mistakes in the design of the real experiment (Nielsen 1993). According to the author, the pre-test can find problems that are related to test tasks. For example, some tasks can be misunderstood by the users, they may be too easy or too difficult, or there may be incorrect allocation of time to the tasks. In such cases the tasks must be redesigned.

3. Test users

A critical task of every test plan is to identify a profile of test users. Such profile represents "the kind of people you want to gather data from" (Preece, Rogers and Sharp 2011). Nielsen (1993) argues that test users "should be as representative as possible of the intended users of the system". Gould and Lewis (1985) also recommend to involve typical users into usability evaluation process. After the profile is created, people who fit this profile must be found. Individuals who fit the user's profile are called population. When population is found, it is time to choose test participants. This is called sampling. A selection of participants may be done by using either probability

sampling or non-probability sampling. In probability sampling, the participants can be chosen either randomly or by applying stratified sampling. Stratified sampling is similar to random sampling. The only difference is that the population must be first divided into some groups. Probability sampling is more suitable for statistical analysis. In non-probability sampling test users can be chosen by using either volunteer panels or convenience sampling. Using convenience sampling, participants are chosen because of their convenient availability. Non-probability sampling is more suitable for qualitative studies (Preece, Rogers and Sharp 2011).

Nielsen (1993) argues that computer users differ based on their experience and knowledge. Users have different experience with computers, different experience with concrete systems and different knowledge about concrete tasks. The author states that usually there is a requirement to divide users based on their experience with specific system. So the users should be divided into two groups: novices and expert users. The novices are the users who are not familiar with the system being tested and the expert users are already familiar with the system. Novices and expert users must participate in discrete tests. Some of the test tasks must be the same for both groups (Nielsen 1993).

Between-subject or within-subject testing also requires division of test users into groups. These types of testing are useful approaches when participants need to test several systems. In the first case, separate systems are being tested using different groups of users, so each user tests only one system (Figure 2.1). In the second case, separate systems are being tested using same group of users, so each user tests all the systems (Figure 2.2). However, the involvement of novice users in this testing creates a problem. This is due to the fact that the user has the "transfer of the skill … between systems" (Nielsen 1993). When the novice tests the first system, he/she gets some experience with particular type of system and thus can not be accepted as novice user any more. It is recommended to divide participants into several groups. A number of groups depends on the number of systems that need to be tested. Each group must have equal number of novice users. The first group of users must test the first system first, the second group must test the second system first, and so on. After that all the groups must test the rest of the systems (Figure 2.3). This approach ensures that all the systems can be tested by novice users (Nielsen 1993).

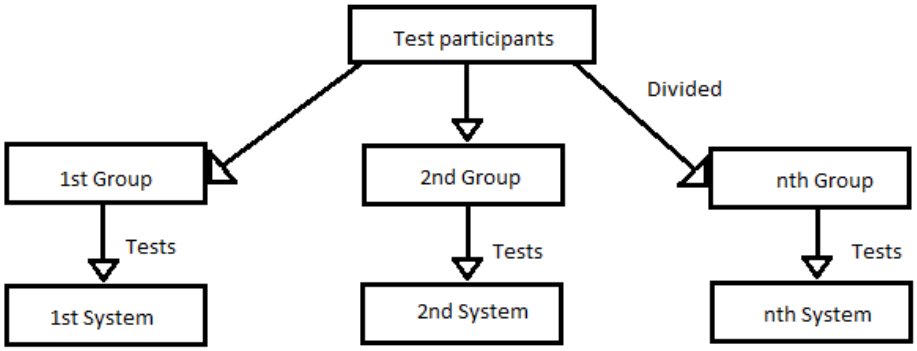

Figure 2.1: Between-subject Testing

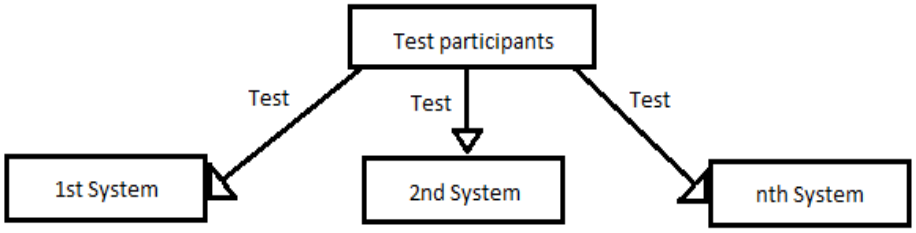

Figure 2.2: Within-subject Testing

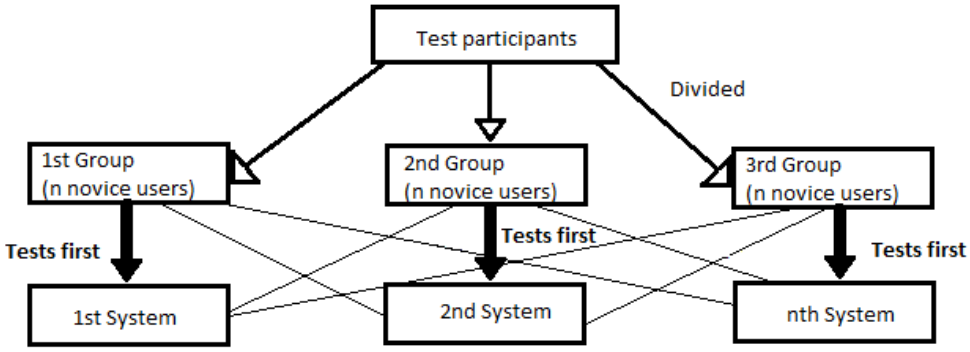

Figure 2.3: Within-subject Testing involving Novice Users

4. Test tasks

Nielsen (1993) and Dumas and Redish (1993), cited in Corry, Frick and Hansen (1997), state that test tasks must be real, i.e. the tasks must be designed in such a way that they represent real life uses of the system being tested. Nielsen (1993) also states that when designing test tasks it is necessary to involve system's most used elements.

5. Selecting methods

When making decision about which evaluation method to employ it is important to consider different factors (Preece, Rogers and Sharp 2011). The authors state that such decision depends on people who will take part in testing, strengths and weaknesses of the methods, and available resources. Nielsen (1993) states that the number of available users and the experience of the experimenter must also be taken into consideration. According to the author, unexperienced experimenter should use simple methods such as Think Aloud protocol or observation.

Galidz (2002) states that a successful evaluation process requires a mixture of evaluation methods since all techniques have their own strengths and weaknesses. Nielsen (1993) also does not recommend to perform a test using only one evaluation method. He argues that all the methods can complement each other. It is obvious that a proper evaluation requires a combination of different methods. In accordance to Nielsen (1993) usability evaluation methods can be combined in numerous ways and there is no best approach for combining them (Preece, Rogers and Sharp 2011). Usability testing and usability inspection are the main techniques for software evaluation. Inquiry methods can be used to collect supplementary data (Nielsen 1993).

Nielsen (1994) argues that in accordance to the studies made by Desurvire (1994), Desurvire, Kondziela and Atwood (1992) and Karat, Campbell and Fiegel (1992) the best way to perform usability evaluation is to use methods of usability testing and usability inspection in combination. Testing methods are able to reveal errors omitted by inspection methods and vice versa. Nielsen (1993) suggests using heuristic evaluation with think aloud protocol. Beer, Anodenko and Sears (1997) cited in Galidz (2002) advice to use cognitive walkthroughs to find the most critical problems and then use think aloud method in order to identify remaining issues.

2.10.3 Usability evaluation techniques and methods

Hom (1998) classified usability evaluation methods into three usability evaluation techniques which are usability testing, usability inspection and usability inquiry.

Usability testing

Defined by Dumas and Redish (1993), cited in Corry, Frick and Hansen (1997), usability testing is a technique used to identify usability problems of a product by observing how representative user utilizes this product. Issues faced by a user during product usage are discovered and then analyzed. Nielsen supposes that usability testing is the most widely accepted method for user interface evaluation (Nielsen 1994).

Dumas and Redish (1993) state that the basic aim of every usability test is to improve product's usability. The test must involve real users and incorporate real tasks. Tasks performed by users must be observed and every action taken by a user must be written down. Finally, the analysis of gathered information must be made with the aim to identify various issues and to make recommendations for further usability improvements (Corry, Frick and Hansen 1997).

User testing technique involves a set of evaluation methods: Think Aloud protocol which is very popular evaluation method, co-discovery method, question asking protocol, and coaching method (Nielsen 1993; Hom 1998).

<u>Advantages</u>

Usability testing is good at showing how users use computers and systems and what problems they encounter (Nielsen 1993).

<u>Disadvantages</u>

In most cases software evaluation requires a large number of real users. In such cases it can be quite problematic or expensive to conduct the tests (Nielsen 1994).

1. Think Aloud Protocol

Defined by Lewis (1982) cited in Nielsen (1993), Think Aloud is the method where users perform test's tasks and speak out what they think about the various aspects of

the system being tested. This method shows how users view the system and whether they understand design elements of the system (Nielsen 1993). Nielsen (1993) argues that Think Aloud protocol requires 3 to 5 test users.

Advantages

The advantage of using this method is that it can collect a lot of useful qualitative data from a small group of testers (Nielsen 1993; Otaiza, Rusu and Roncagliola 2010).

Using Think Aloud protocol it is quite easy to create recommendations for usability improvements. Recommendation must be created for every function and element which were not understood by users (Nielsen 1993; 2012).

Other advantages found by Nielsen (2012) are: a low cost because the method requires no special equipment, ease of learning, robustness meaning that it is always possible to get useful data no matter how well the experiment is designed, and flexibility since Think Aloud can be used during any software development phase.

Disadvantages

One of the main disadvantages stated by Nielsen (2012) and Otaiza, Rusu and Roncagliola (2010) is that it does not produce quantitative data.

Think Aloud method creates unusual situation since users must talk to themselves during system's usage and this seems unusual to many people (Nielsen 1993; 2012).

Another drawback of this method is that sometimes testers will not think out loud everything that comes in their mind. This is especially true with expert users. To resolve this issue the experimenter must always prompt the users by asking appropriate questions (Nielsen 1993; 2012).

2. Co-discovery method

Co-discovery method involves two users who test a system in pair (Hom 1998). This is a type of Think Aloud method (O'Malley *et al.* 1984 cited in Nielsen 1993). Co-discovery has all advantages and disadvantages of Think Aloud protocol.

Advantages

Unlike Think Aloud protocol, co-discovery method creates more natural situation because it involves two people who must communicate while using a system (Nielsen 1993).

When users are working in pair they can make more comments compared to traditional Think Aloud protocol (Hackman and Biers 1992 cited in Nielsen 1993) thus more usability problems can be found (Hom 1998; Otaiza, Rusu and Roncagliola 2010).

Disadvantages

The major advantage of this method is that two people are working in pair. This advantage may turn into disadvantage in situations when two individuals find it difficult to cooperate (Nielsen 1993).

While co-discovery is more natural method compared to thinking aloud, a working in pair may still seem unusual to some people (Otaiza, Rusu and Roncagliola 2010).

In contrast to Think Aloud protocol, co-discovery is more expensive since it requires twice as many testers (Nielsen 1993).

3. Question Asking Protocol

Question asking protocol is another version of Think Aloud protocol. Here the experimenter continuously prompts testers to think out loud by asking questions (Hom 1998).

Advantages/Disadvantages

As question asking protocol is a slight variation of Think Aloud method, it has all advantages and disadvantages of this method.

Furthermore, as question asking protocol involves asking the questions, this method is more effective than Think Aloud protocol (Hom 1998).

4. Coaching method

Using coaching method, the experimenter acts as a coach and "guides" software testers. Users are free to ask any questions. Unlike other methods, coaching method allows interaction between the experimenter and users (Nielsen 1993).

Advantages

Coaching method is also a variation of Thinks Aloud method and thus it has all advantages and disadvantages of this method.

Compared to Think Aloud protocol, coaching method is more natural since users are not forced to talk to themselves and are free to communicate with the experimenter

(Nielsen 1993).

Usability inspection

Usability inspection is a technique used to identify usability problems of a software interface. In contrast to usability testing where a software must be evaluated by real users, usability inspection must be done with expert evaluators (Nielsen 1994). Nielsen (1994) states that depending on the chosen method, usability evaluation can involve different number of evaluators.

The main methods for usability inspection are Heuristic evaluation, Cognitive walkthroughs, Formal usability inspections and Feature inspection (Nielsen 1994; Hom 1998).

Advantages

Unlike usability testing, usability inspection can be cheaper because it requires only several experts (Nielsen 1994).

1. Heuristic evaluation

Heuristic evaluation requires the experts to evaluate system's elements by checking whether these elements conform to widely accepted usability principles which are called heuristics (Galitz 2002).

Advantages

Heuristic evaluation is quite inexpensive and easy to run, and can reveal many usability problems (Galitz 2002; Otaiza, Rusu and Roncagliola 2010).

Disadvantages

The only people who can participate in heuristic evaluation are interface design experts and not the real users (Nielsen 1993).

Another drawback is that it is not suitable for finding systemwide structural problems, missing design elements such as exits (Galitz 2002) and domain specific issues (Otaiza, Rusu and Roncagliola 2010).

2. Cognitive walkthroughs

Cognitive walkthroughs require evaluators to create tasks and then walk through these tasks as ordinary users (Galitz 2002; Hom 1998). All the actions taken by evaluators must be recorded and analyzed (Galitz 2002). In accordance to Galitz (2002) this method has the following advantages and disadvantages.

Advantages

Cognitive walkthroughs are low cost, can be performed without working prototype what makes it possible to use the method early in software lifecycle. This method is suitable to evaluate alternative solutions. Compared to Heuristic evaluation it is more structured, does not require interface experts and can be performed by software developers.

Disadvantages

The method is tiresome to implement.

3. Formal usability inspection

According to Karat, Campbell and Fiegel (1992) cited in Nielsen (1994), Formal usability inspection combines Heuristic evaluation and Cognitive walkthroughs.

4. Pluralistic walkthroughs

This method of usability inspection requires a group of evaluators consisting of users, software developers and usability experts to walk through different task scenarios and discuss them in detail (Bias 1991; 1994 cited in Nielsen 1994).

Usability inquiry

The main methods for usability inquiry are Observations, Interviews, Focus groups, Surveys, Questionnaires, and Logging actual use (Nielsen 1993; Hom 1998). According to Otaiza, Rusu and Roncagliola (2010), Usability inquiry methods are very effective if they are used for confirmation of usability problems which were detected using other evaluation techniques. In addition, the methods can be used for measuring users' satisfaction with the system. In other words, such methods are used to collect supplementary data (Nielsen 1993). In accordance to Otaiza, Rusu and Roncagliola

(2010) this technique has the following advantages and drawbacks.

Advantages

According to the authors, Usability inquiry technique provides both qualitative and quantitative types of data. The methods are quite easy and cheap to carry out.

Disadvantages

Information that is gathered using this technique is subjective and sometimes can be unreliable.

1. Observations

Observation requires the experimenter to visit testers, to watch how they interact with the system in their real-life environments and to take notes about users' actions. In contrast to other methods, the experimenter should not disturb testers while they are using the system (Nielsen 1993). Nielsen (1993) argues that this method requires a minimum of 3 test users.

Advantages

The main advantage of the method is that in comparison to other methods, this method can detect more problems. The reason for this is that users' behaviour in real-life environments often differs from behaviour in laboratory experiments (Nielsen 1993).
The method is very simple (Nielson 1993).

Disadvantages

One disadvantage of this method is that the appointments for the tests are quite difficult to make since they require experimenter to visit users' workplaces. Another drawback is that the experimenter has no test control (Nielsen 1993).

2. Interviews

Interviews are used to get users' opinions about the system being tested. The experimenter can use the method to understand what users do with the system, how satisfied are they with the system and what they like and dislike about it (Nielsen 1993).
Interviewing requires experimenter to read questions to the users and to record their

answers (Nielsen 1993).

This type of inquiry is especially useful when experimenter needs to explore some issues about the system being tested and is typically used to collect qualitative data (Preece, Rogers and Sharp 2011).

In accordance with Nielsen (1993), it is enough to interview five users.

3. Questionnaires

As with interviews, questionnaires are used to get users' opinions about the system (Nielsen 1993).

To gather information using questionnaires, the experimenter must print a set of questions on a paper and then send the form to the users. Computer programs can also be used to create questionnaires. Users answer the questions and send the questionnaire form back to the experimenter (Nielsen 1993).

Questionnaires can be used to collect both quantitative and qualitative data (Preece, Rogers and Sharp 2011).

Questionnaires must be carefully designed. It is advised to do pilot questionnaires in order to eliminate misconceptions (Nielsen 1993; Preece, Rogers and Sharp 2011).

According to Nielsen (1993) questionnaires must be sent to at least thirty users.

Advantages/Disadvantages

In accordance to Nielsen (1993), these methods have advantages and disadvantages in relation to each other. In accordance to the author, these methods have the following strengths and weaknesses. From the viewpoint of the experimenter, questionnaires require less time than interviews. Interviewing requires experimenter to write down users' answers. Answers to questionnaires, on the other hand, are written down by respondents. However, questionnaires lack flexibility. Interviews, on the other hand, are more flexible. If it is required, the experimenter can explain or paraphrase the questions, and he/she can also "guide" the interviewees by asking additional questions. Nevertheless, data gathered by interviews is hard to analyze. Questionnaires, typically, have a low response rate and it may take a long time for the answers to arrive. In contrast to interviews, questionnaires can be used to inquire a large number of users without high expenses (Preece, Rogers and Sharp 2011).

4. Focus groups

This method requires a moderator to run a group of six to nine users. The group have to discuss a system with the aim to find various ideas and the system's problems (Nielsen 1993; Galitz 2002). The method is suitable for collecting qualitative data, but also may be used for gathering some quantitative data. (Nielsen 1993).

Advantages

Compared to other methods, it is quite easy to run a focus group. The method is cheap and is good for gathering new ideas and recommendations (Galitz 2002; Preece, Rogers and Sharp 2011).

Disadvantages

In order to produce good results, a focus group must be run by experienced moderator. The method can not be used to gather information about how people are really working with systems and what usability problems they have (Galitz 2002). Data that is collected using this method is hard to analyze (Nielsen 1993).

5. Logging actual use

The method requires experimenter to use a computer program which collects data about how users are using the system (Nielsen 1993). Nielsen states that commonly this data is about the frequency with which the system's features are used. According to the author, this method requires at least 20 participants. In accordance to Nielsen (1993), this method has the following advantages and disadvantages.

Advantages

The method helps to identify the most frequently used and unused features of the system. The method is easy to carry out since it provides an automatic collection of data.

Disadvantages

The method requires the use of analysis programs. The use of this method violates privacy of users.

2.11 Conclusion

Usability is aimed at improvement of user interfaces (Safavi 2009a). This practice is highly important in website's development (Bolchini, et al. 2009) since it brings a number of benefits. Usability is tightly related to other practices such as Human Computer Interaction, UCD, accessibility, UX, etc. Usability evaluation is the process of assessing software's usability (Rosson and Carroll 2002; Bolchini, Finkelstein, Perrone, and Nagl 2009). There is a range methods and techniques used for usability evaluation. Usability is extremely important for E-commerce sites (Safavi 2009a).

3. E-COMMERCE AND ONLINE TRAVEL SYSTEMS

3.1 Introduction

Chapter 3 focuses on E-commerce and Online Travel. It defines these two concepts and explains why usability discipline should be considered as very important for E-commerce. The architecture of a typical travel website is presented in the chapter. Also, the profile of a typical customer of travel website is given in this section. This profile will be used in the experiment in Chapter 6 as the basis for test users selection. The websites that will be used for the evaluation as well as usability guidelines specially designed for travel website are presented in this chapter.

3.2 E-commerce and Online Travel

3.2.1 What is E-commerce?

Rohn (1998) defined E-commerce as the websites that sell goods and services using various means such as Internet, phone, fax, etc. The advantage of E-commerce is that it provides a convenient way of shopping (Zainudin, Ahmand and Nee 2010) as it allows the customers to easily access the offered products and services at anytime and anywhere (Safavi 2009b). The aim of E-commerce websites is to assist their customers in decision making and online purchasing process by providing appropriate information and services (Safavi 2009b; Kuan, Vathanophas and Bock 2003). Nevertheless, unlike physical stores, an online shopping can not provide customers the same shopping experience. As Nielsen (2011) said, Internet shopping is an information experience as online customers are unable to touch, feel, taste or smell the products. In accordance to Nielsen (2011) this is a major disadvantage of E-commerce.

Starting a successful E-commerce site that is able to gain new customers (Rohn 1998), is not an easy process. Apart from creating a website, a company must also change its business processes. For example, it must modify its customer service, supply and distribution channels, and competitive strategies (Safavi 2009b). From a technical

point of view, a successful E-commerce system requires all its components such as UI, web servers, E-commerce engine and database systems to work together accurately and collaboratively. Also, the processes such as security and encryption, search algorithms, customization and personalization are critically important for successful E-commerce website (Safavi 2009a). Once sufficient effort is put into the process of starting online business, an E-commerce can benefit a company by providing a *"cost effective way of trading"* (Safavi 2009b).

3.2.2 What is Online Travel?

Online travel is a form of selling travel products and services where the Internet acts as a medium between customers and companies that provide these travel products and services (Law, Leung and Wong 2004). In other words, Online travel is a form of E-commerce that distributes travel products. It is an information based business (Werthner and Ricci 2004). Travel products' providers are tour operators, travel agencies and travel suppliers (Dixit, Belwal and Singh 2006; Patricia 2008). Travel suppliers are airlines, hotels and car rental companies that provide their products and services directly to the customers (Patricia 2008). Tour operators are the companies that act as the mediators between travel suppliers and customers (Patricia 2008). They search travel suppliers (Dixit, Belwal and Singh 2006), and offer their products or combine the products and offer complete holiday packages (Patricia 2008). Travel agencies, in turn, are the companies that act as intermediaries between the tour operators and customers. They offer holiday packages supplied by tour operators as well as information and advice on these packages (Patricia 2008).

By operating online, travel industry have a number of benefits such as new and cheaper distribution channels, better customer care (Yom 2003 cited in Hummer, Kretschmer and Hofmann 2005), improved operations and enhanced competitive positions (Law, Leung and Wong 2004). E-commerce offered travel industry a range of new business opportunities (Werthner and Ricci 2004). The tourists also benefit from Online travel by having convenient way to shop as well as extensive and appropriate information which assists them in their purchasing experience (Law, Leung and Wong 2004).

2.2.3 Users of travel websites

End user is a person who uses a computer system to achieve some goal (Abras, Maloney-Krichmar and Preece 2004). According to Eason (1987) cited in Abras, Maloney-Krichmar and Preece (2004) end users are divided into several groups. The author calls the regular users as the primary users, the users who either use the system irregularly or through some third party are called secondary users, and the rest of the stakeholders, i.e. not the actual users but the people who are affected by the use of the computer system or who's opinion can affect the system's acquisition, are called tertiary users. Eason (1987) argues that design of user interface must involve all these users (Abras, Maloney-Krichmar and Preece 2004).

Nielsen (2011) categorized users according to the type of website's use. In accordance to the author, the website must be designed taking into account four categories of users which are: users who visit E-commerce website to buy already known products, users who search and buy products that are most suitable for them, users who visit the websites to search for bargains, and users who look for products for inspiration.

In this research, the typical users (or customers) of Online travel websites proposed by Kamarulzaman (2010) are involved. The research that was performed by Kamarulzaman (2010) examined geodemographic profile of people who are making travel purchases online. The study was based on the survey that was conducted in 2009. The participants involved in the survey were people living in UK. In accordance to the author, a typical customer of online travel websites is:

- female;
- between the ages of 25 and 44;
- with higher education;
- married or living with partner;
- having household income ranging from 25,000 GBP (30,968 EUR) to 44,999 GBP (55,470 EUR);
- having Internet experience ranging from 4 to 6 years.

The author argues that these survey results are also consistent with the results of other researches.

3.2.4 Importance of usability for E-commerce and Online Travel

UI is a software component that has a direct impact on the success of E-commerce websites (Safavi 2009a). This is due to the fact, that a appropriate user interface helps to create a good online shopping experience (Zainudin, Ahmand and Nee 2010). This in turn, makes usability highly important for E-commerce sites, since usability assists developers in creating simple and natural user interfaces (Safavi 2009a).

Usability helps to attract and make users loyal (Safavi 2009b) what is critically important for internet enabled businesses, especially in such highly competitive times (Zainudin, Ahmand and Nee 2010). The Internet made the process of keeping customers very difficult, as it gave the users the possibility to easily go from one website to another in order to search for more suitable products or better prices (Safavi 2009a). Delivering well designed user interface helps to attract and retain customers, thus increases business' revenues, meanwhile, as badly designed user interface turns away the users, thus decreases company's sales and can even have a negative influence on company's brand (Safavi 2009b). According to Nielsen (2001a), the E-commerce websites that are difficult to use have nearly 50 percent decrease in their potential sales. Thus it is crucial for E-commerce to design interfaces that facilitate users in searching for desired products and services, and information regarding them (Nielsen 2011).

In order to create successful E-commerce websites that attract new customers and retain existing ones, websites' developers should focus not only on technical aspects but also on the human/social variables (Safavi 2009b). According to the study performed by Safavi (2009b), the most important human/social aspects for users are: privacy protection, ease in use, timeliness and fast loading time, accessibility and ease in understanding. To design simple E-commerce websites that are straightforward to understand and use, usability must be incorporates in all aspects of a website such as web pages, presentation of information, personalization, registration and check-out, shopping cart and payment process (Safavi 2009a).

3.3 Architecture of Online Systems

3.3.1 Architecture of web applications

A web application is a software that rely upon the Internet. It can be a Web site, Web based journal or any other software that needs the Internet for its implementation (Gallersen and Gaedke 1999). Application developers are departing from the one-tier and two-tier web application consisting of clients (web browsers) and web servers. The majority of modern web applications uses a three-tier or even N-tier architectures (Figure 3.1). The current web sites consist of the following components: a web client (a web browser), a web server, an application server and a database server. The web browser is used by a user to request the web pages from the web server. This is a client-server interaction that is performed using the Internet. Most of the functions of the web applications are performed at the application server. This has a number of benefits since it allows better security, reliability, availability and scalability. The application server is a separate computer that handles software's application logic. In the case of a large web site, there can be several such computers running concurrently. The application server interacts with the database server that runs a database. The communication between the web server, the application server and the database server is typically performed using a middleware (Offutt 2002).

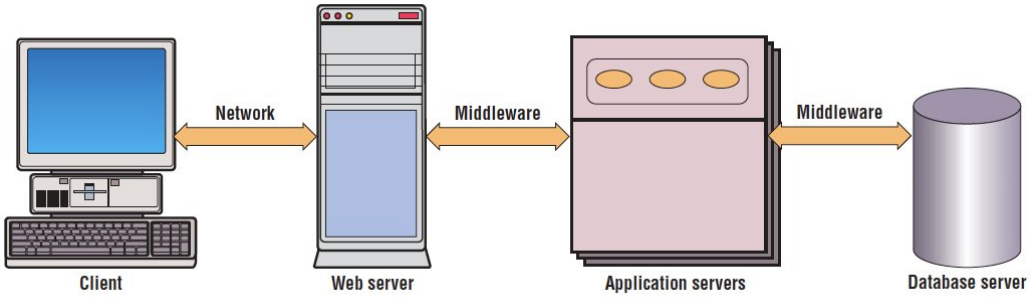

Figure 3.1: Three-tier model of Web Application (Offutt 2002)

3.3.2 Architecture of travel websites

Since travel website is a web application, its typical (simplified) architecture, an N-tier architecture, consists of web clients, web servers, database servers and application servers (Offutt 2002; etutorials.org). However, a travel website which is also an E-commerce system, is more than a simple web application. In comparison to a regular website, an E-commerce website has a number of compulsory requirements that has a direct impact on the success and competitive position of E-commerce system (etutorials.org). Such requirements are high performance, high availability, scalability, security and modifiability. Added components like security servers, proxy servers, transaction servers, routers and firewalls, and load balancing components help to meet the requirements. Proxy servers store frequently accessed web pages and thus help to improve performance. Routers and firewalls inhibit unauthorized accesses to the system, so improve security. Load balancing component improve performance, scalability and availability by distributing the website load (etutorials.org).

Apart from the clients (the web browsers), online travel systems interact directly with travel suppliers such as airlines, hotels and car rental companies (Patricia 2008) by searching their travel products (Dixit, Belwal and Singh 2006). Figure 3.2 demonstrates a complete typical architecture of an online travel agency. This figure shows the interaction between the system and the customers known as Business-To-Consumer (B2C) interaction, and interaction between the system, corporate customers and travel suppliers known as Business-To-Business (B2B) interaction. This figure also shows other components of the travel system such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems (Rainer and Cegielski 2011).

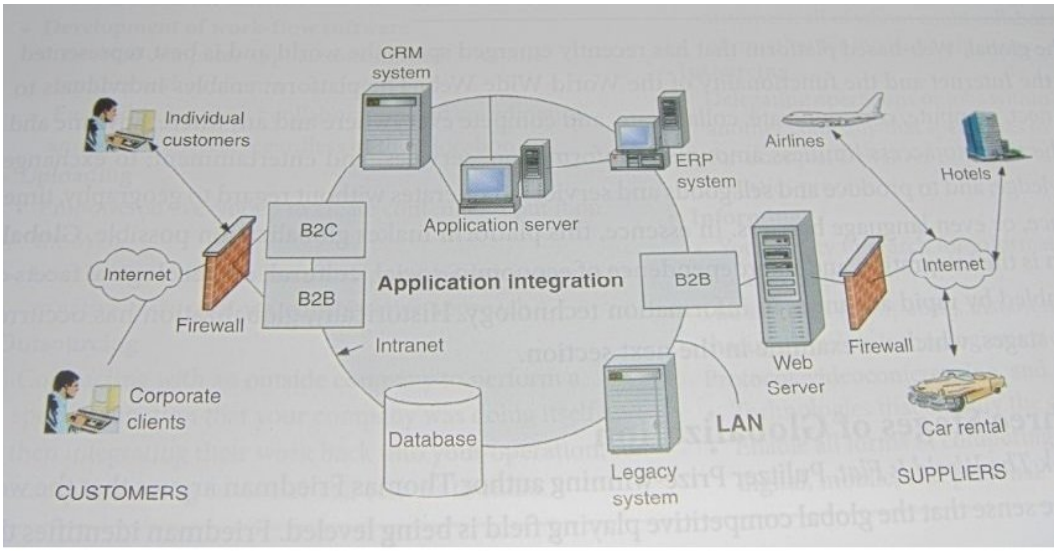

Figure 3.2: Architecture of Online Travel Agency (Rainer and Cegielski 2011)

3.4 Ireland's Travel Websites

There is a number of Ireland's travel companies that operate online. By entering the keyword phrases such as 'Ireland's travel websites' and 'Ireland's online travel agents' using Google search engine, the following list of travel websites is presented:

- gohop.ie
- ebookers.ie
- budgettravel.ie
- skytours.ie
- limericktravel.ie
- cassidytravel.ie
- letsgotravel.ie
- sunway.ie
- holidaysoline.ie

In order to obtain a written permission to use these websites for research purpose, these companies were contacted over the phone. The emails were sent requesting the consent to use the websites for this dissertation. A written permission was obtained from gohop.ie, ebookers.ie, limericktravel.ie, letsgotravel.ie and holidaysoline.ie.

1. Gohop.ie

Gohop.ie (presented in Figure 3.3) is the leading Ireland's travel website having more than 230 000 Irish users. The website was started in 1998 and is licensed and bounded by the Commission for Aviation Regulation. Gohop.ie offers a range of products. The

main products are: flights, hotels/apartments, flight + hotel packages, car rentals, flight + car packages and transfers. The website also provides extensive information that assists the customers in purchasing process. Flights and holiday packages are protected by ATOL and the Commission for Aviation Regulation. Gohop.ie claims they provide easy to use website along with a high quality service. Gohop.ie is the winner of a number of awards: 2011 and 2012 Travel Media Award for "Best Travel Website", award for "Best Irish Travel website" and "Best use of Social Media", and award for "Best Honeymoon supplier" that was received in 2013 (gohop.ie).

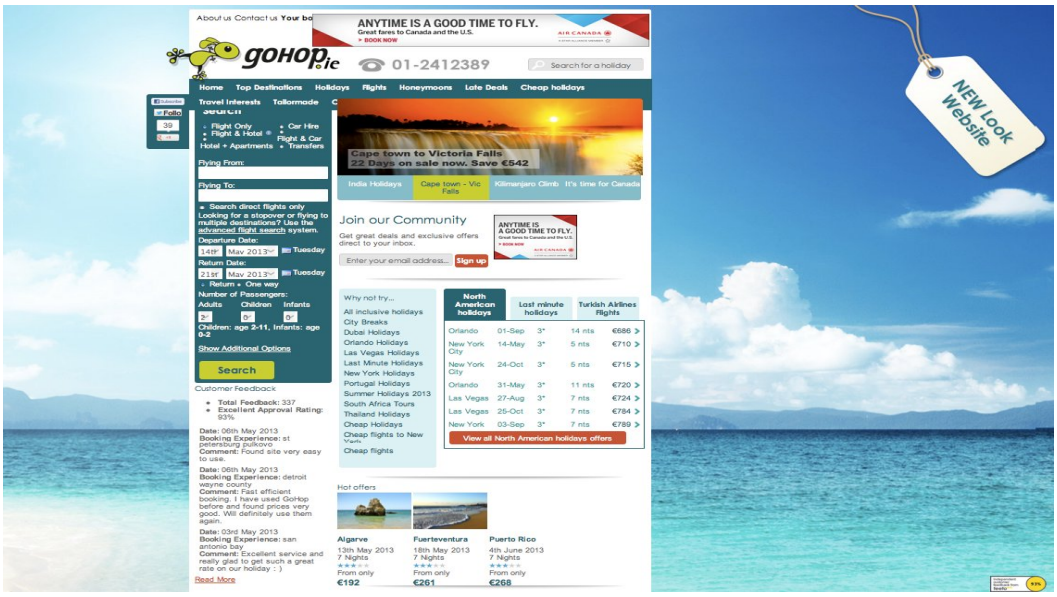

Figure 3.3: Homepage of gohop.ie

2. Ebookers.ie

Ebookers is the leading European online travel agency that has local travel companies in 12 European countries including Ireland. Ebookers.ie (presented in Figure 3.4) was started in 1998 and is part of Travelport. There is a wide range of various products offered by ebookers.ie. The website's main products are: flights, hotels and car hire. The website also offers packages such as flight + hotel, flight + car, hotel + car and flight + hotel + car. Other products are: cruise holidays, tours, transfers, airport parkings and travel insurance which are protected by IATA, ATOL and the Commission for Aviation Regulation, and secured by VeriSign. Ebookers.ie claims they have the best range and value of offered products, as well as the best quality service by providing travel advise, Best Price Guarantee for every product and 24/7

service line. The company also argues that their website is easy and convenient. It provides a live chat with sales and customer service people, allows to book several hotel rooms per one booking, allows to purchase products up to 4 hours before check-in, and provides an easy way to create account on the website (ebookers.ie).

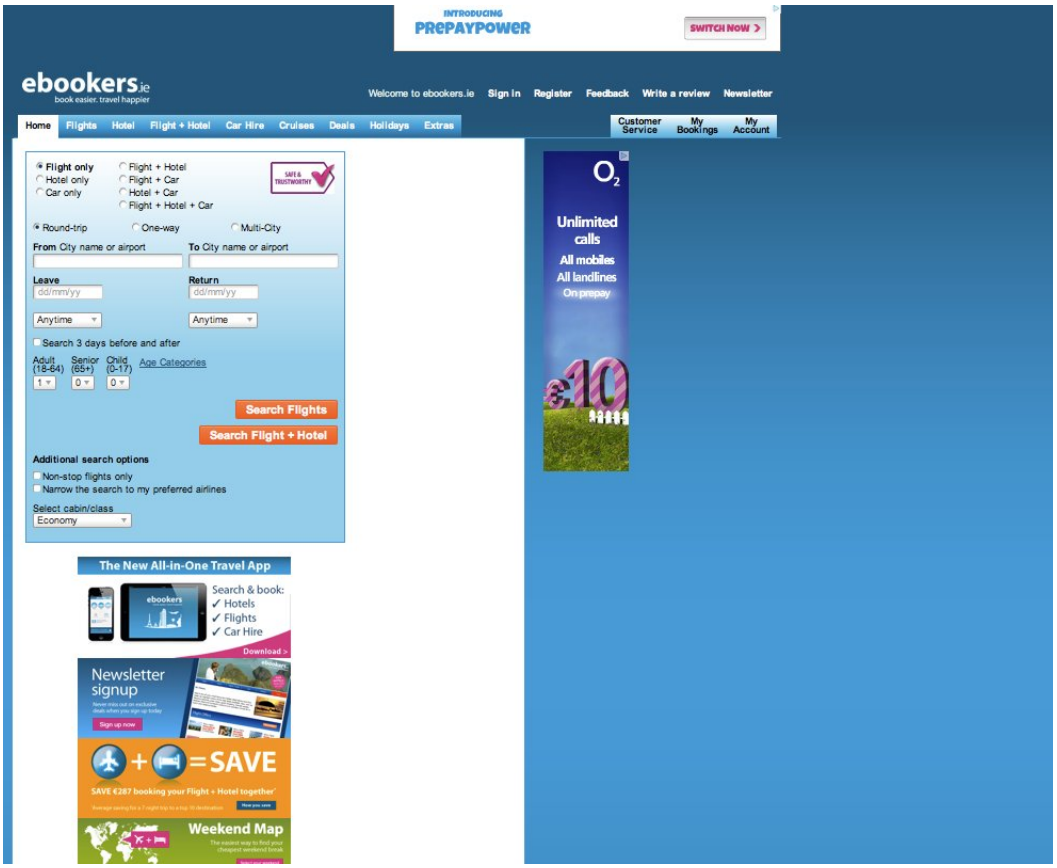

Figure 3.4: Homepage of ebookers.ie

3. Limericktravel.ie

Limerick Travel is one of the popular Ireland's travel agencies. The company was established in 1971 and was the winner of Irish Travel Agency of the Year award. Limerick Travel is specialized not only in holidays abroad by offering products such as flights, summer and ski holidays, car hire, hotels, city breaks, honeymoons, concerts and theatres, cycling holidays, cruises, sport breaks, insurance, etc., but it also specializes in holidays in Ireland by offering hotels, golf, etc. in Ireland (limericktravel.ie). Limericktravel.ie is presented in Figure 3.5.

Figure 3.5: Homepage of limericktravel.ie

4. Letsgotravel.ie

LetsGo Travel was established in 1971 and is part of the Limerick Travel company. It is the winner of ITAA travel company of the year award. Letsotravel.ie (presented in Figure 3.6) offers different holidays, flights, hotel rooms, transfers and travel insurance. The company claims that it has an extremely high service, by offering a broad range of holidays, the lowest prices and 24/7 support line. The website also provides the features that allows customers to purchase tailor made holidays (letsgotravel.ie).

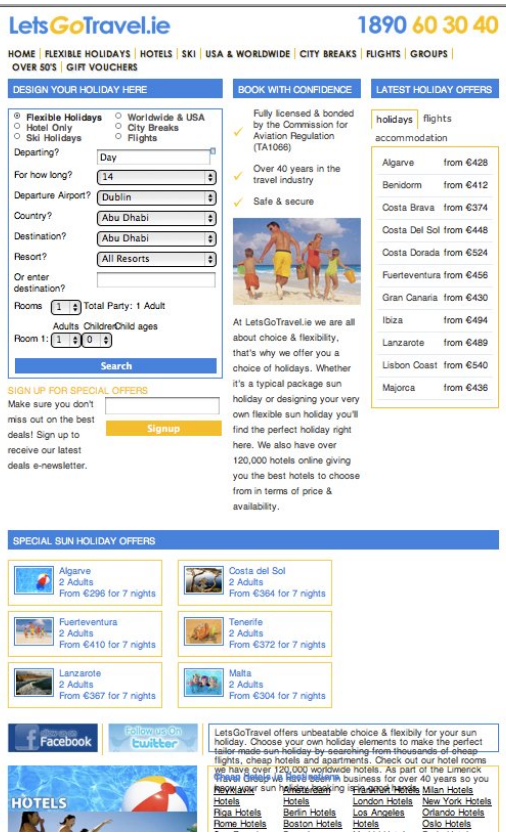

Figure 3.6: Homepage of letsgotravel.ie

5. Holidaysoline.ie

Holidaysonline.ie (presented in Figure 3.7) is Ireland's travel agency that operates more than 30 years. The website offers a range of travel products that are fully bounded and protected. The main products offered on the website are: various holidays such as city breaks and worldwide holiday packages, flights, etc. Holidaysonline has a strong focus on Irish customers. The company claims that they provide straightforward and easy to use website (holidaysonline.ie).

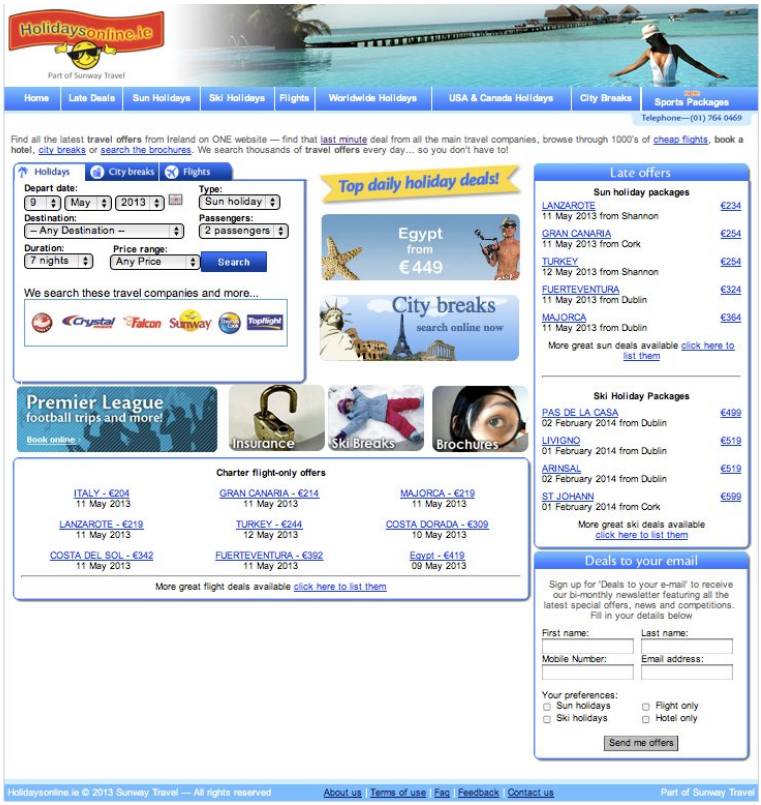

Figure 3.7: Homepage of holidaysonline.ie

3.5 Usability Guidelines for Online Travel Sector

Webcredible, the group of usability and accessibility specialists, wrote several reports regarding usability of online travel systems (Webcredible 2006-2007; 2008; 2009; 2010; 2011). In 2006-2007 Webcredible has developed 10 key guidelines that can be used for travel, airline carriers, hotel and car rental websites (Webcredible 2006-2007). In 2008, 2009, 2010 and 2011 Webcredible has presented 20 guidelines relating to product search, search results and product summary, booking, errors and error handling mechanisms (Webcredible 2008; 2009; 2010; 2011).

In accordance to Webcredible (2006-2007; 2008; 2009; 2010; 2011), developers who strive to produce straightforward and easy to use travel websites must do the following:

Provide easy search. This can be achieved by:

1. Making the first step of the booking process clear and obvious for users. This first step must be clearly visible on the home page and must be situated above the page fold.

2. Allowing users to make special bookings. This in turn can be achieved by:

- Allowing users to be flexible with travel dates
- Including option to search direct flights only
- Including option to book multi-flights trips
- Including option to select a flight class

3. Providing well designed graphical calendar that enables users to determine their travel dates. This guideline, in turn, can be implemented:

- Providing a clear button to open the calendar
- Providing an easy way of closing the calendar
- Creating identical links for previous and next month and placing them in the same positions
- Placing the calendar in such a place which does not close relevant date field
- Placing the calendar beside relevant date field
- Allowing users to type in the date manually
- Placing the calendar for choosing return dates after the calendar for selecting departure dates

4. Making the first step of the booking process flexible by allowing users to enter either an airport name or a city. Facilitate the search process and make everything possible to eliminate errors that might be encountered.

5. Displaying cheap products such as holidays, flights, hotels, etc. clearly on the website's home page and make their booking straightforward.

6. Supporting users who do not know exactly what they want.

Providing clear search results and an easy way for their manipulation. This can be achieved by the following guidelines:

7. Provide clear search result pages. Any unnecessary information must be eliminated.

8. Allow users to easily change the order of search results.

9. Allow users to easily share pages or email them to friends.

10. Allow users to compare products across different websites. Do this by saving search data across sessions.

11. Display full price or estimated price as early as possible in the booking process. This price must include all the costs.

12. Provide an easy way to refine the results and make the search of another product such as flight or holiday, straightforward and obvious. Paste all entered data into new search.

13. Add description of an airport. Provide its location, explain how to get to it and how long does it take to get to the airport from the city center, provide a list of a transport that goes to that airport.

14. Provide a map that shows a route of a flight.

15. Display prices in multiple currencies. Prices must be displayed in at least two currencies: local currency and currency of destination country. If appropriate, customers must also see the prices in EUR and US dollars.

16. Allow users to print pages in a format that is easy to understand and read. Printed pages must contain all important information. The users must be aware that this is a

'print friendly' page.

17. Show a clear confirmation page (summary page) before the actual booking will take place. The confirmation page must contain:

- Full price that is clearly displayed
- Additional costs if they are not initially included in the full price
- To and from locations
- Other important information such as times of flight departure and arrival, and any extras that are included in the package

Provide easy booking process. This can be achieved by the:

18. Display contact number clearly during the search and the booking process.

19. All extra costs must be clearly displayed and must be automatically excluded from initial price.

20. Include a progress bar for the booking process. This progress bar must:

- Be clearly visible
- Be easy to understand
- Show current position in the booking process
- Look like a progress flow

21. Make an access to information such as the terms of conditions, easy and obvious.

Make error messages easy to understand. Provide clear error handling mechanism. This in turn can be achieved by the following:

22. Make error messages clear and understandable. Display them clearly at the top of the page. Instantly notify users if an error occurred.

23. Highlight elements that need to be corrected.

24. Describe clearly how to correct errors. This description must include:

- Explanation of an error (what is wrong)
- How to fix this error
- Avoidance of long words and jargon
- Avoidance of using words such as 'error' and 'mistake'
- Additionally, software developers should put the blame on the system, not on the users.

3.6 Conclusion

E-commerce represents the websites that sell products using electronic means (Rohn 1998). E-commerce provides a convenient way of shopping for their customers (Zainudin, Ahmand and Nee 2010) as it allows them purchase products at anytime and anywhere (Safavi 2009b). Online travel is a form E-commerce that sells travel products and services (Law, Leung and Wong 2004). Usability is important for E-commerce because it helps to attract and make users loyal (Safavi 2009b). The usability of websites of online travel can be evaluated by using different guidelines such as Webcredible guidelines. These guidelines focus on provision of easy search process, provision of clear search results and an easy way for their manipulation, provision of easy booking process, and provision of error messages that are easy to understand. These guidelines will be used for websites' analysis in subsequent sections.

4. USABILITY OF TRAVEL WEBSITES

4.1 Introduction

This chapter is concerned with the general level of usability of the websites that sell travel products. It presents various researches that focus on usability of travel websites. The recommendations for usability improvements that were given by these studies are also given in this chapter.

4.2 E-commerce Websites and Usability

4.2.1 Usability of e-commerce websites

Much research has focused on the importance of the usability of E-commerce websites. The study performed by Lowry, Spaulding, Wells, Moody, Moffit and Madariaga has showed that a high level of E-commerce website's interactivity has a positive effect on users' satisfaction what in turn is one of the main indicators of usability (Lowry *et al.* 2006). Another research has showed that E-commerce website's ease of use, ease of learning and ease of understanding are important for senior users. These attributes positively affect senior user's intention to visit E-commerce websites and buy offered products (Smith 2008). One more research has focused on the factors that affect satisfaction of users of E-commerce websites (Jianchi and Xiaohong 2009). The findings show that appropriate and user-friendly website design has a positive effect on users' satisfaction level.

Much attention is given to assessing the usability of various E-commerce websites (including websites that offer various travel products). In 2011 Nielsen Norman Group has performed usability evaluation of 206 E-commerce websites by using 874 usability guidelines (Nielsen 2011). The research methodology has involved usability testing, eye tracking and field research (diary study). The results of the study indicate that developers of E-commerce websites are doing some work on the improvement of usability of their websites. Compared to the previous usability study conducted by

Nielsen Norman Group (Nielsen 2001), new evaluation has fixed better task completion rate (72% compared to 56%). According to Nielsen, the main usability problems relate to bad website content, i.e. incomplete and unclear information, and non descriptive error messages (Nielsen 2011). The recent research that was made by Peppa, Lysikatos and Metaxas in 2012 involved 120 test users. The users were asked to perform tasks on five websites that sell hardware/software and household appliances. Usability test has involved Think Aloud protocol and Asynchronous Remote Usability Testing (ARUT). The participants also were asked to fill out the questionnaire about each website. The research results show that the average usability performance of these websites is quite good but there is still a lot of room for improvement. According to the authors, the problems such as poor navigation, bad display of important information, misleading messages, inappropriate design of buttons and bad presentation of search results should be corrected (Peppa, Lysikatos and Metaxas 2012).

4.2.2 Usability of travel websites

Much research has stressed the importance of the usability of websites from the travel industry. Some research proposed various usability guidelines that were specially designed for websites that sell travel products. Other studies have focused on studying usability of travel websites.

Chariton and Choi (2002) developed specific design guidelines for travel websites. The researchers argue that existing guidelines that are appropriate for variety of E-commerce sites, are ineffective for the websites that sell travel products and services. According to the authors, travel websites must: provide the same information which is available through an agent, provide explanation of concepts that relate to travel industry, not to use airport codes, provide an access to advanced search on the basic search form, provide a way to directly access additional information, and briefly display all necessary information (Chariton and Choi 2002). New guidelines have been verified by evaluating the prototype that has been developed according to these guidelines (Chariton and Choi 2004). The usability of the prototype was compared to the usability of two travel websites (Expedia and Travelocity). According to the results, the prototype that conforms to the above guidelines has higher level of

usability compared to the travel websites.

Other design guidelines have been promulgated by Webcredible. The group of usability and accessibility specialists created several reports in 2006-2007, 2008, 2009, 2010 and 2011. These reports contain information about the usability evaluation of the websites that offer various travel products. As part of the researches, Webcredible has presented usability guidelines that were specially designed for the websites operating in the travel sector. In 2006-2007 Webcredible has developed 10 primary guidelines for airline carriers' websites (Webcredible 2006-2007). These guidelines are also appropriate for other websites such as travel, hotel and car rental websites. In 2008, 2009, 2010 and 2011 Webcredible has evaluated usability of UK travel websites by using best practice guidelines relating to product search, search results and product summary, booking, errors and error handling mechanisms (Webcredible 2008; 2009; 2010; 2011). These guidelines are presented in sub-section 3.5.

There is a number of researches that have conducted an evaluation of travel websites. According to the results of eMysteryShopper survey, that was held in 2012 with the aim to collect data regarding the usability of 53 websites that offer travel products, users perceive a travel website as easy to use if it provides some of its functionalities in a visual format, as well as high level of interactivity and enticing imagery (Moth 2012). The results of research that was performed by Webcredible in 2008 by using 20 usability guidelines, show that UK travel websites have low level of usability by having an average usability score of 51.5% (Webcredible 2008). The results of the most recent Webcredible researches show that the websites' developers are doing some work in order to improve usability of their websites. However, the websites are still not perfect and a lot of effort should be made in order to make the websites more convenient. In 2009 the average usability score of UK travel websites was 56.7% (Webcredible 2009). In 2010 this figure was 64.4% (Webcredible 2010) and in 2011 it has only increased to 65.7% (Webcredible 2011).

Carstens and Patterson (2005) have performed usability assessment of three travel websites: Expedia.com, Orbitz.com and Travelocity.com. The purpose of the research was to find websites' usability problems. The study also produced recommendations for the improvements of the above websites. The methodology that has been employed

by Carstens and Patterson is similar to the methodology that is used in this research. The pre-test survey was used to collect participants' demographic information and their experience with the Internet. The test involved accomplishment of specific task (to find flight itinerary) on these websites. The test users were observed while they were performing the test tasks. The post-test questionnaire was used to collect users opinions and their recommendations for usability improvements. The study involved 20 participants 19 - 65 years old who are university's students and staff. The results of the evaluation revealed that the travel websites that were assessed, in general, are perceived by users as easy to use. However, the study also identified several usability problems that are present on the websites. Expedia.com, for example, lacks clarity. The website is not considered as user friendly. Travelocity.com and Orbitz.com are bad at presenting the search results (Carstens and Patterson 2005).

Another usability study of a major OTA (Online Travel Agency) website was performed by Pan, Zhang and Smith in 2011. The evaluation was performed from the travel product search perspective. The study methodology is also similar to methodology employed by Carstens and Patterson (2005) and to the one used in this dissertation. It consists on three parts. The first part is the pre-test survey that was used to get participants' general experience with travel websites. The second part is the test. The users were asked to perform the task on the selected travel website (the users were asked to find a flight ticket and a hotel in Orlando and Las Vegas). The last part is post-test survey. It was used to get users' recommendations as well as their demographics. The authors used Think Aloud protocol combined with eye tracking method. The evaluation study employed 41 participants (students and university staff). Result of this study indicates that the selected travel website is perceived by the users as easy to use, however it has two main problems. First of all, the website displays search results for the flight + hotel packages in a form of matrix listing. This in turn confuses the users. The users state that such form of displaying results provides too much information and is quite complicated. Another flaw relates to the virtual tour function that has some technical problems and is mostly neglected by the users (Pan, Zhang and Smith 2011).

Other research has used Accessibility and Usability automated testing tools to perform an assessment. The study performed by Maswera, Dawson and Edwards (2005) has

evaluated 318 tourism websites including tourism, airlines, hotels and lodges websites, as well as websites of travel agencies and tour operators in Africa and Europe. These websites were assessed using two testing tools, Bobby and Lift (both softwares test websites for compliance with the Web Content Accessibility Guidelines (WCAG) and the US Government Section 508, however Lift is more concentrated on usability, whereas Bobby is directed on accessibility) with the aim to identify how the sites comply with usability and accessibility guidelines and standards. The results of this study show that only 4% of travel websites that have been tested (7 out of 192 websites) have no critical problems and nearly completely meet the accessibility and usability standards, whereas 96% of travel websites contain important usability flaws and thus have bad compliance with the guidelines (Maswera, Dawson and Edwards 2005).

The research performed by Smith (2008) focused on E-commerce websites' usefulness, ease of use, ease of navigation and ease of understanding from the point of view of senior users. The research consisted of two parts: questionnaire and usability test. The questionnaire has been used to The experiment was performed with 21 senior users 66 - 86 years old. The task was to visit the websites, search and select the products offered on the websites. The results of the experiment show that travel websites (Orbitz.com and Travelocity.com) have worse usability compared to bookstore websites. Longer average completion time, lower percentage of successfully completed tests, higher number of errors made and higher number of requests for help indicate that the travel websites are more difficult in use than the online bookstores (Smith 2008).

Another study involving senior users, has tested three popular travel websites, roadscholar.org, gct.com and getours.com. The study was performed with 9 users 55 - 80 years old. The result of the study is that the websites have low level of usability since they have a lot of usability flaws. According to the study, the main problems are: difficulty of finding website's home page, bad design of links, the use of terms that are confusing for users, bad website navigation, poor organization of website's content, unreadable pages due to too much information, and difficulty of controlling website's menus (Finn 2012).

The results of the usability study of Hong Kong hotel websites show that in general

usability of such websites is quite good. The problems that were found on the websites are not critical. They relate to User Interface, Layout and Graphics, Information Architecture (outdated information, moving addresses and poor labeling) and General problems such as long download times, slow response times and unnecessary use of latest technologies. The methodology used in this research has used heuristic evaluation technique involving 77 Hong Kong hotel websites (Yeung and Law 2003).

4.3 How to Improve Usability of Travel Websites

The research that was made by Fact-finder in 2011 has tested five Germany travel websites. The aim of the research was to compare two types of search forms that are generally provided on travel websites: conventional search form and semantic search form. In order to improve usability of travel websites, researchers recommend provide a semantic single-box search form (in order to enable users to make special searches) in combination with a traditional form.

Pan, Zhang and Smith (2011) recommend make the interfaces of travel websites simpler and more intuitive, by removing unnecessary information and useless functionalities. Yeung and Law (2003) recommend improve a speed of travel websites by improving download speed and server response speed. The authors also recommend ensure that all the links and back buttons on the websites are perfectly working. The recommendation that was given by Carstens and Patterson (2005) is to improve the appearance of websites pages by making them less cluttered. Another recommendation is to provide a way to make special searches based on the individual needs of users.

4.4 Conclusion

The previous researches show that usability of E-commerce websites is quite good but there is still a lot of room for improvement. Some researches that are focused on usability evaluation of travel websites found that these websites are generally easy to use (Yeung and Law 2003; Carstens and Patterson 2005; Pan, Zhang and Smith 2011; Webcredible 2011) Other researches discovered that travel websites have low level of usability and are difficult in use (Maswera, Dawson and Edwards 2005; Smith 2008;

Finn 2012). According to the findings, travel websites lack clarity and are bad at presenting search results (Carstens and Patterson 2005; Pan, Zhang and Smith 2011). They have bad design of links, unreadable pages due to too much information, bad website navigation (Finn 2012), etc.

5. PLANNING USABILITY EVALUATION

5.1 Introduction

This chapter discusses the planning for the usability evaluation. The chapter presents and explains stages of the experiment. The experiment of the research is the usability evaluation of Ireland's travel websites such as Gohop.ie, Ebookers.ie, Limericktravel.ie, Letsgotravel.ie and Holidaysonline.ie, with their typical users. This chapter presents the test plan of the evaluation. It also gives the usability criteria that will be used for the analysis.

5.2 Stages of the experiment

The experiment will be done in several stages:

1. Analysis of the websites by using Webcredible criteria.

2. Distribution of the pre-test questionnaire. The questionnaire will be used to get information about what users do on travel websites, their demographics and their general experience with the travel systems.

3. Conduction of the usability testing. The test will be performed in order to find usability problems of the websites.

4. Conduction of the post-test interviews. The interviews will be carried out in order to get the level of users' satisfaction with the websites, their recommendations and personal desires for improvement of the websites.

5. Analysis of usability of Ireland's travel websites. The analysis will be performed by applying usability principles that were collected by conducting the literature review.

The experiment's findings will help to discover how Ireland's online travel systems

conform to usability principles. Also, the results will be used to create recommendations on how to improve these websites in order to increase their level of usability and to make them more satisfactory for the use of their typical users. Figure 5.1 displays the stages of the usability evaluation, as well as inputs and outputs for each stage.

5.2.1 Analysis of the sites using Webcredible criteria.

To supplement the usability test, the analysis of the sites using Webcredible criteria which were identified in sub-section 3.5 will be performed. Each of the 5 websites will be evaluated against 24 usability guidelines. Results of this analysis will be compared to the results of evaluation with real users. This will help identify an overlap between 2 sets of problems what in turn will help determine the most critical usability problems.

5.2.2 Pre-test questionnaire

The pre-test questionnaires will be used in order to get the information about what users do on travel websites and what functionalities of travel websites they commonly use. This data will be used to create the test tasks. This will help to ensure that the tasks represent the real uses of the travel systems. The questionnaire will also be used to collect information about demographic characteristics of the participants and their general experience with the travel websites. Information about demographics will be used in selecting suitable participants for usability testing.

5.2.3 Usability test

Usability testing, in turn, will incorporate a number of stages :

1. Planning the usability test by creation a test plan.

2. Selection of test participants. The test participants will be selected on the basis of the user profile that was identified by conducting the literature review.

3. Performing the actual test. The test will involve 5 websites: Gohop.ie, Ebookers.ie,

Limericktravel.ie, Letsgotravel.ie and Holidaysonline.ie, and will be aimed at finding flaws relating to usability.

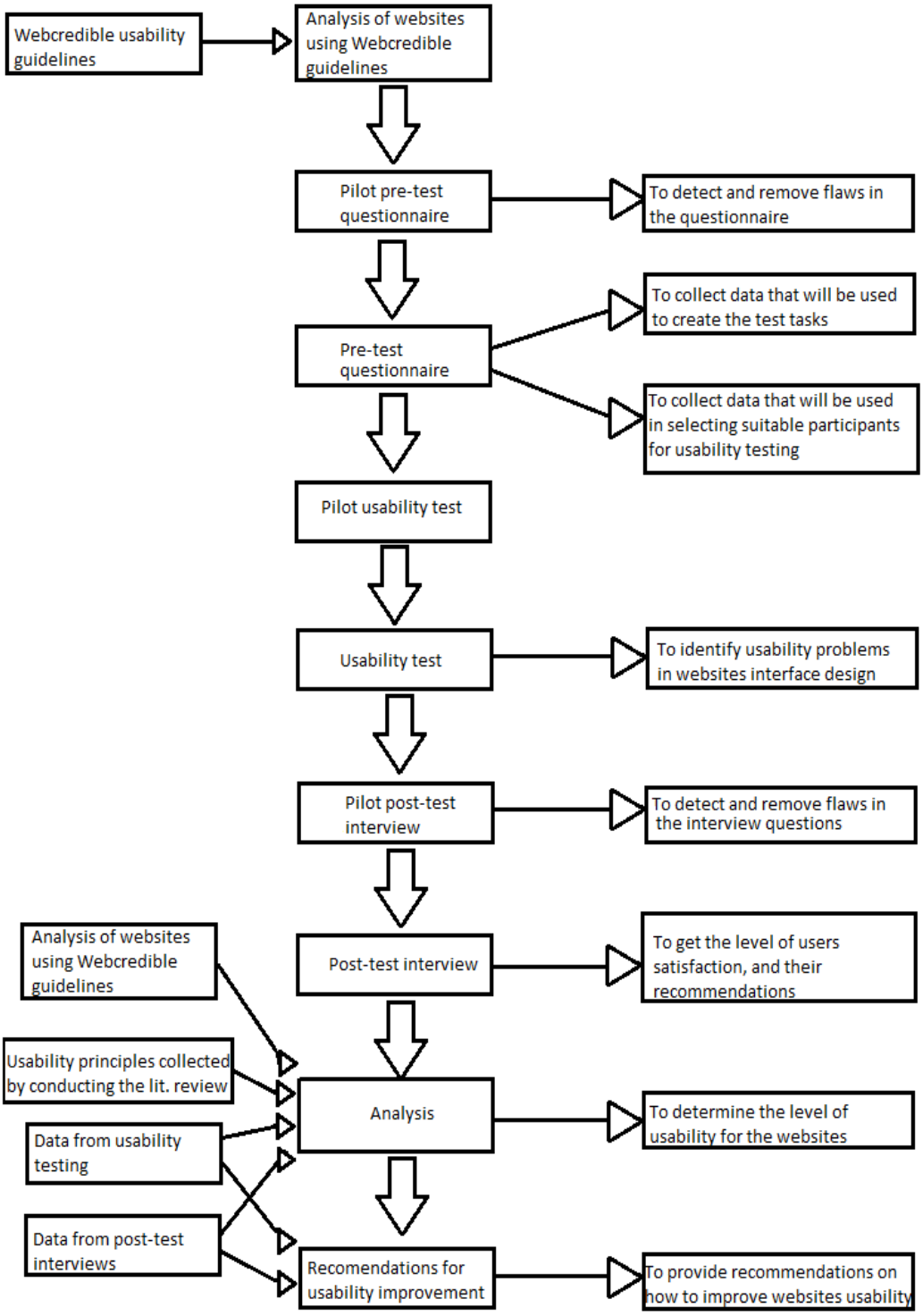

Figure 5.1: Stages of Usability Evaluation

5.2.4 Post-test interviews

The post-test interview will be used after each test session, in order to get information about which features of user interface users like or dislike, which test tasks were easy or difficult for them, how satisfied are users with the websites, what are their recommendations and desires regarding usability improvements of the system.

5.2.5 Analysis

The analysis of each website will be performed by applying the set of criteria identified in the literature review. For this purpose, data gathered by the usability test and the post-test interviews will be discussed by using usability criteria. Also, the results from the first analysis (involving Webcredible usability guidelines) will be used to determine which problems are the most critical ones. The goal of this analysis is to determine the level of websites' conformance with the established criteria.

5.2.6 Creation of recommendations for usability improvement

After the analysis of the usability of Irish travel websites, recommendations for usability improvements of these websites will be created. The recommendations will be created by using information about users' desires and their personal recommendations. If the research will identify a gap between expected and actual usability of the websites, then the recommendations on how to redesign the websites in order to improve their level of conformance with usability principles will be made. Expected usability represents the compliance with all usability evaluation criteria.

5.2.7 Pilot studies

Pilot test is carried out before the real test with the aim to find design flaws in the actual test (Nielsen 1993). Therefore, the experiment will incorporate the pilot usability test that will be run before the real test to eliminate problems in the test tasks. Accordingly, the pilot questionnaire will be carried out before the pre-test questionnaire and the pilot interview will be carried out before the post-test interviews in order to remove any ambiguities and misunderstandings that might be encountered by the respondents.

5.3 Ireland's Travel Websites

The evaluation will be performed with 5 Ireland's travel websites. The target websites are: gohop.ie, ebookers.ie, limericktravel.ie, letsgotravel.ie and holidaysoline.ie. In order to obtain a written permission to use the websites for research purpose, several companies were contacted over the phone and emails were sent requesting the consent to use the websites for this dissertation. The websites that were considered for this research are:

gohop.ie
ebookers.ie
budgettravel.ie
skytours.ie
limericktravel.ie
cassidytravel.ie
letsgotravel.ie
sunway.ie
holidaysoline.ie

A written permission to use the websites for research purpose was obtained from 5 websites that are listed above.

5.4 Evaluation Methods

The choice of techniques and methods that will be used for usability evaluation depends on the following factors: resources that are available for the project, people who are able to participate in the experiment, strengths/weaknesses of each evaluation method (Preece, Rogers and Sharp 2011), number of available participants, and experience of the experimenter (Nielsen 1993).

The preference was given to two techniques: usability testing and usability inquiry. Usability inspection technique was rejected because usability evaluation experts (Nielsen 1994) are not available for this project. Among the methods of usability testing, Think Aloud method was chosen for the evaluation. There are number of reasons for this choice. First of all, while question asking protocol and coaching

method have advantages over Think Aloud method (Hom 1998; Nielsen 1993), they require more expertise from the experimenter. Think Aloud is the simplest method, thus is suitable for unexperienced experimenter (Nielsen 1993). Secondly, while co-discovery method creates more natural situation during a test compared to Think Aloud protocol (Nielsen 1993) and may identify more usability problems (Hom 1998; Otaiza, Rusu and Roncagliola 2010), this method requires twice as many participants (Nielsen 1993). This makes the method impractical since the number of people that are available for this test is limited.

Usability inquiry technique will be used to gather supplementary data (Nielsen 1993). Among the methods of usability inquiry, the preference was given to questionnaires and interviews. The questionnaire can gather opinions from a large group of participants at a low cost (Preece, Rogers and Sharp 2011), that is why it will be used in order to help to understand what users do on travel websites and which features they commonly use. The questionnaire will also be used to get the demographic characteristics of the participants and their general experience with the travel websites. The interviews will be used to get information about how satisfied are the users with the websites and which features of websites users like and dislike (Nielsen 1993).

5.5 Participants

1. Questionnaire participants

The convenience sampling was used in order to select participants for the questionnaire. The participants were chosen because they are accessible and easy to recruit. Such type of sampling is more suitable for this qualitative research. Probability sampling is more suitable for quantitative studies (Preece, Rogers and Sharp 2011). The social network - Facebook.ie, was used in order to invite the participants. 55 people agreed to participate in the questionnaire. The sample for usability testing will be selected on the basis of the profile of a typical user. After the questionnaires will be filled out and sent back, the demographic characteristics of participants will be used to determine the most suitable participants for the test. The test users will be the individuals who completely fit the user's profile and who agree to participate in further

usability testing.

2. Test participants

Before the evaluation, it is important to establish a profile of a typical user. A user profile represents "the kind of people you want to gather data from" (Preece, Rogers and Sharp 2011). According to Nielsen (1993), the test users "should be as representative as possible of the intended users of the system". Therefore, the customer profile was identified by conducting the literature review. In accordance to the study made by Kamarulzaman (2010), a typical customer of online travel agents is female, between the ages of 25 and 44, with higher education, married or living with a partner, having household income ranging from 25,000 GBP (30,968 EUR) to 44,999 GBP (55,470 EUR), and with Internet experience ranging from 4 to 6 years. This profile of a typical user will be used to select participants for usability testing.

The choice of appropriate type of testing, i.e. between-subject or within-subject testing, will depend on the number of participants who completely fit the profile of a typical user and who are able to participate in the test. These types of testing require division of test users into different groups. Both approaches of testing are very useful when test users have to test several systems. In between-subject testing, separate systems are being tested using different group of users. In this case, each user tests only one system. In within-subject testing, separate systems are being tested using same group of users. In this case, each user tests all systems. When involving novice users, the test participants must be divided into several groups. A number of groups depends on the number of systems that need to be tested. Each group must have equal number of novice users. The first group of users must test the first system first, the second group must test the second system first, the third group must test the third system first, and so on. After that all the groups must test the rest of the systems (Nielsen 1993).

Ideally, the test must be designed in such a way that allows to test the websites with novice users. The novices are the users who never used travel websites and the expert users are already familiar with the system (Nielsen 1993).

In order to test the websites involving novices, between-subject testing will require at least 15 test users. This is because each website must be tested by a separate group of

users and each group must consist of at least 3 test users (Nielsen 1993) where 1 user must be a novice (Figure 5.2). Without involving novices, the same number of participants will be needed (3 expert users for each website).

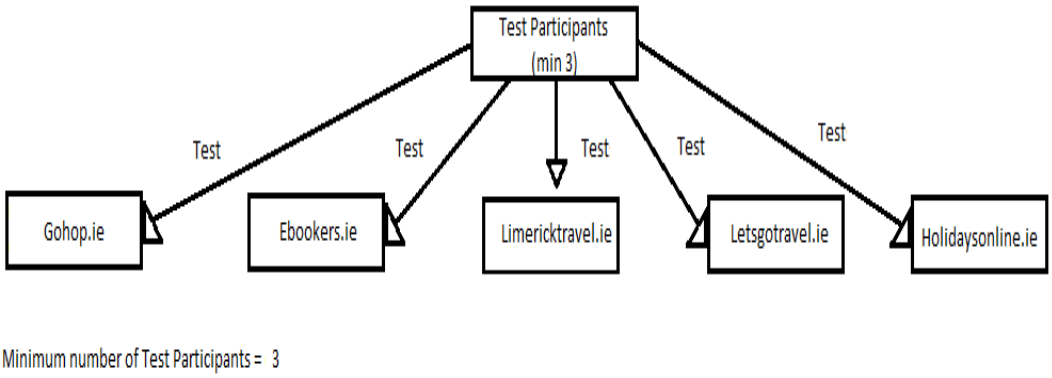

Figure 5.2: Minimum Number of Test Users (Between-subject Testing)

Within-subject testing will need less users. Performing the test with novices will require at least 5 test users(a minimum 1 novice user for each website). The first novice user will be testing the first website first, the second novice will be testing the second website first, and so on. After that all the novices will test the rest of the websites (Figure 5.3). To inspect the websites without involving novices, the test will require at least 3 test users as each website must be tested by at least 3 users (Nielsen 1993) (Figure 5.4).

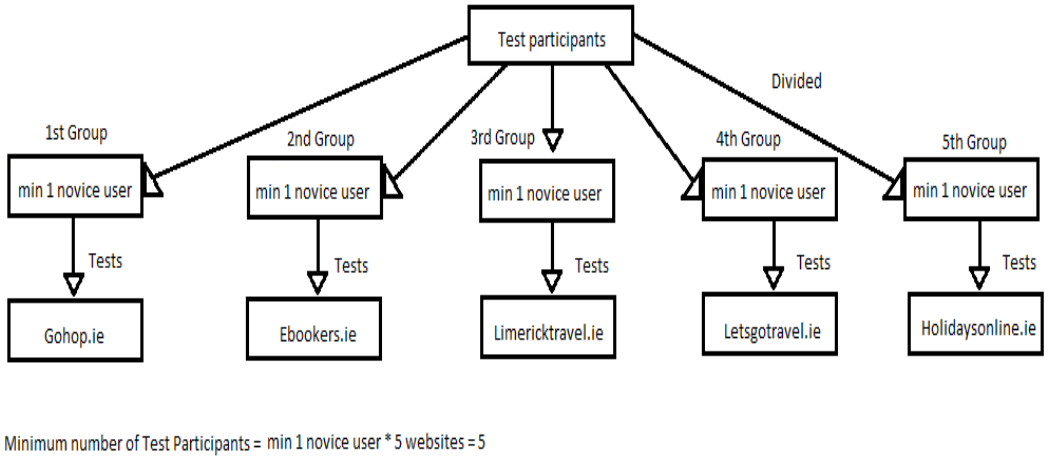

Figure 5.3: Minimum Number of Test Users (Within-subject Testing including Novice Users)

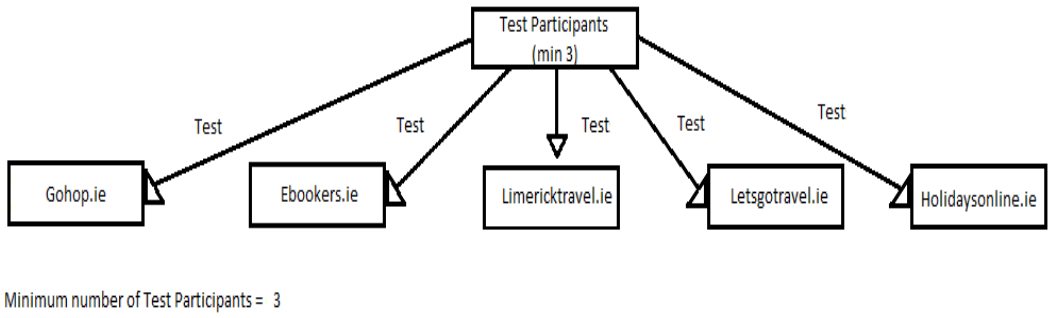

Figure 5.4: Minimum Number of Test Users (Within-subject Testing)

3. Pilot user

According to Nielsen (1993), pre-test that is performed before the actual test usually requires only one or two pilot users. These users may be not from the group of real test users. Accordingly, the pilot user will be recruited to take part in pilot studies: pilot pre-test questionnaire, pilot usability testing and pilot post-test interview. This user will also take part in the pre-test questionnaire. However, the participant will not take part in the real test and interview as he does not fit the profile of the typical user.

5.6 Test Tasks

The tasks for usability testing must be real. In other words the tasks must be designed in such a way that they represent real-life uses of the system which is being tested (Nielsen 1993; Dumas and Redish 1993, cited in Corry, Frick and Hansen 1997). Nielsen (1993) also states that when designing test tasks it is necessary to involve the most used elements of the system. Taking into account these arguments, the pre-test questionnaire will be used to to get information about what users do on travel websites and what elements of websites they commonly use. After the questionnaires will be collected and their results will be analyzed, the tasks can be designed.

5.7 Test Plan

Here is a list of attributes of the test plan:

- Well defined purpose of the test: To discover usability flaws and get understanding of how typical users interact with online travel systems.

- List of computer devices and other equipment that is needed for the test: Laptop, Tablet PC to use it as a voice recorder.

- Software that is required for the test: Voice Recorder app.

- Profile of test users: Female; between the ages of 25 and 44, with higher education; married or living with a partner; having household income ranging from 25,000 (GBP) (30,968 (EUR)) to 44,999 (GBP) (55,470 (EUR)); with Internet experience ranging from 4 to 6 years.

- Number of required test users: Minimum 3 users for the test.

- List of test tasks: Test tasks will be created in such a way that they represent real-life uses of the websites. The tasks will be created after analyzing the data collected from the pre-test questionnaire.

- Test material distributed to the users: Introduction to the project, i.e. short description of the project, purpose of evaluation and definition of the concept of usability. Test instructions that will be distributed to the users before the actual test will be carried out. Task instructions (the test tasks) that will be distributed to the users before each test session will be carried out. Test participants will also be asked to read and sign a consent form before the pre-test questionnaire and before the test.

- How the experimenter will be allowed to help the users: The experimenter will be allowed to ask a limited number of questions in order to prompt the users to think out loud.

- Data which is going to be collected after each test session: Data which is going to be collected after each test session: usability problems encountered by each user, time spent on each task and success of the completion of each task.

- Evaluation criteria which will be used: The evaluation criteria will consist of usability principles.

5.8 Usability Criteria

The criteria that will be used for results' analysis has been identified in sub-section 2.5. The criteria that will be used for results' analysis has been identified in sub-section 2.5. The websites' levels of usability will be measured according to usability attributes given by Nielsen (1993). They are:

1) Learnability - how easy is the system to learn and understand.
2) Efficiency - how quickly tasks can be performed using the system.
3) Memorability - how easy is to remember the system.
4) Errors - how good is the system's error prevention mechanism.
5) Satisfaction - how pleasant is the system to use.

The only exception is the principle of memorability. Memorability means how easy is to remember the system. This principle is difficult to measure by using usability testing

methods that involves users (Affordable Usability). It can be measured by using website analytics (Affordable Usability). Due to time constrains, this principle will be excluded from this evaluation.

The reason for this choice is that these principles are also similar to usability principles given by other authors such as Shneiderman (1998) and ISO 9241-11. The only distinction is terminology (Welie, Veer and Eliens 1999). Figure 5.5 demonstrates similarities between usability attributes that are proposed by different authors.

ISO 9241-11	Shneiderman	Nielsen
Efficiency	Speed of performance	Efficiency
	Time to learn	Learnability
Effectiveness	Retention over time	Memorability
	Rate of errors by users	Errors/Safety
Satisfaction	Subjective satisfaction	Satisfaction

Figure 5.5: Similarities between usability attributes (Welie, Veer and Eliens 1999)

5.9 Conclusion

Usability evaluation requires careful planning. Such planning must concern all aspects of the evaluation such as the stages of the evaluation, types of evaluation, the profile and a number of participants, etc. This chapter presented a detailed plan for the evaluation, that will be used as the basis for the subsequent sections.

6. PERFORMING USABILITY EVALUATION

6.1 Introduction

This chapter concerns the actual usability evaluation. It explains how the evaluation was carried out. The analysis of the sites using usability guidelines was performed before the evaluation involving real users. The chapter explains how pre-test questionnaire was created, distributed and how its results were analyzed. The questionnaire's key results are presented in this section. At the end of the chapter, the process of performing usability test and post-test interviews is discussed.

6.2 Performing Analysis by Using Webcredible Usability Guidelines

The evaluation of travel websites has been performed by using usability guidelines which were proposed by Webcredible. The guidelines are given in subsection 3.5. Using these criteria each of the five websites were evaluated under 24 headings (Table 6.1).

Some criteria were clear and simple to evaluate whereas others required a degree of interpretation. For example, the guideline "Support users who do not know exactly what they want" means that users must be able enter an approximate departure date or to search products based on the budget available. Another guideline "Provide well designed graphical calendar that enables users to determine their travel dates" means that a website must have a clear button to open the calendar, have a very easy way of closing the calendar, the calendar must have identical links for previous and next month in the same positions, the calendar should not close relevant date field and should be situated beside this field, etc.

		Gohop	Ebookers	Limericktravel	Letsgotravel	Holidaysonline
Provide easy search process	**1**	Not fully implemented (1.)	Not fully implemented (2.)	Not fully implemented (3.)	Good enough	Not fully implemented (4.)
	2	Good enough	Good enough	Not fully implemented (5.)	Not fully implemented (6.)	Not fully implemented (6.)
	3	Not fully implemented (7.)	Not fully implemented (8.)	Not fully implemented (9.)	Not fully implemented (10.)	Not fully implemented (11.)
	4	Not fully implemented (12.)	Not fully implemented (13.)	Not fully implemented (14.)	Not fully implemented (15.)	Good enough
	5	Not fully implemented (16.)	Not fully implemented (17.)	Good enough	Not fully implemented (18.)	Good enough
	6	Not fully implemented (19.)	Not fully implemented (19.)	Not fully implemented (20.)	Not fully implemented (21.)	Not fully implemented (22.)
for their manipulation	**7**	Good enough	Good enough	Good enough	Good enough	Good enough
	8	Not fully implemented (23.)	Not fully implemented (24.)	Not fully implemented (25.)	Not fully implemented (26.)	Not fully implemented (27.)
	9	Not fully implemented (28.)	Not fully implemented (28.)	Not fully implemented (29.)	Not fully implemented (29.)	Not fully implemented (29.)
	10	Not fully implemented (30.)	Good enough	Not fully implemented (30.)	Not fully implemented (30.)	Good enough
	11	Good enough	Good enough	Not fully implemented (31.)	Not fully implemented (32.)	Not fully implemented (33.)
	12	Good enough	Not fully implemented (34.)	Good enough	Not fully implemented (35.)	Not fully implemented (36.)
Provide clear search results	**13**	Not fully implemented (37.)	Not fully implemented (37.)	Not fully implemented (37.)	Not fully implemented (37.)	Not fully implemented (37.)
	14	Not fully implemented (38.)	Not fully implemented (38.)	Not fully implemented (38.)	Not fully implemented (38.)	Not fully implemented (38.)
	15	Not fully implemented (39.)	Not fully implemented (39.)	Not fully implemented (39.)	Not fully implemented (39.)	Not fully implemented (39.)
	16	Not fully implemented (40.)	Not fully implemented (41.)	Not fully implemented (41.)	Not fully implemented (42.)	Not fully implemented (42.)

	17	Good enough	Good enough	Not fully implemented (43.)	Good enough	Not fully implemented (44.)
Provide easy booking process	**18**	Good enough	Not fully implemented (45.)	Good enough	Good enough	Good enough
	19	Good enough	Not fully implemented (46.)	Not fully implemented (47.)	N/A	N/A
	20	Not fully implemented (48.)	Good enough	Not fully implemented (48.)	Not fully implemented (49.)	Not fully implemented (48., 49.)
	21	Good enough	Good enough	Good enough	Not fully implemented (50.)	Good enough
Make errors clear	**22**	Good enough	Good enough	Not fully implemented (51.)	Not fully implemented (52.)	Not fully implemented (51.)
	23	Good enough	Good enough	Not fully implemented (53.)	Not fully implemented (54.)	Not fully implemented (54.)
	24	Good enough	Not fully implemented (55.)	Not fully implemented (56.)	Not fully implemented (57.)	Not fully implemented (58.)

Table 6.1: Results of Websites' Evaluation Using Webcredible Guidelines

	Problem Description
1.	• The search form (start of the booking process) crosses horizontal fold.
2.	• The search form (start of the booking process) is not labelled. • It crosses horizontal fold. • It has unclear grouping of options. The input field for return date and the drop down list for selecting departure time require a swap (Figure 6.1). This is due to the fact that humans read from the left to the right. That is why it would be more natural to display departure time on the same row after departure date. • Some labels for text fields are missing (Figure 6.2 and Figure 6.3). • The search button does not have consistent appearance across different search forms.
3.	• The search form (start of the booking process) does not have consistent appearance across the website's pages. • The label of the search button is not consistent across different search forms.
4.	• The search form (start of the booking process) is not labelled. • The search form (start of the booking process) does not have consistent appearance across the website's pages.
5.	• The website does not provide flexibility with flight dates.

6.	• Lack of options for making special bookings. • The website does not provide flexibility with flight dates.
7.	• Forms for searching Flight & Hotel packages and hotels/apartments have no calendar for selecting return/check-out date (user must select a number of stayed nights).
8.	• Has no button to open the calendar. The calendar is opened by putting the cursor in a date text field.
9.	• Has no calendar to book ski or sun holidays. • Form to search hotels does not allow users to type in a date manually. • Forms to search hotels and city breaks have no calendar for selecting return/check-out date.
10.	• All forms (except the form for searching flights) have no calendar for selecting return/check-out date (user must select a number of stayed nights).
11.	• Forms to search holidays and flights have calendar that closes relevant date field (Figure 6.4). • The website has no calendar for selecting return/check-out date. • Clicking elsewhere on the page does not force calendar to close. It stays hidden behind other windows.
12.	• Labels for departure and destination text fields are not descriptive.
13.	• The website does not inform users immediately if a city or an airport name is typed incorrectly. The error message is displayed only after clicking the search button.
14.	• Labels for destination text fields are not descriptive. • The website does not inform users if a city or an airport name/number is typed incorrectly. The error message is displayed only after clicking the search button.
15.	• Labels for destination text fields are confusing and not descriptive. The same form two fields: one is called 'Departure airport'. It accept destination city and airport code. Another one is called 'Where would you like to go?'. It accepts destination city, airport name and airport code (Figure 6.5). • The website provide no help if the names are typed incorrectly.
16.	• The offers are positioned below the home page fold, thus are not visible when the page first loads.
17.	• The website does not clearly display cheap holidays or special deals on the home page.
18.	• Special sun holidays offers are positioned below the home page fold, thus are not clearly visible when the page first loads.
19.	• The website requires that users know exact destinations.
20.	• The website requires that users know exact departure date and destination place (exception is sun holidays search form - it only requires departure date).
21.	• The website requires that users know exact departure date and destination place.
22.	• The website requires that users know exact departure date.
23.	• No sorting or filtering mechanism for cars and transfers.
24.	• No filtering mechanism for cars.

	• The filtering functionality that is provided on the website is not quite obvious and may go unnoticed by website users (Figure 6.6).
25.	• No sorting mechanism for holidays and city breaks. • No filtering mechanism for holidays.
26.	• No sorting mechanism for holidays, accommodations and flights. • No filtering mechanism for flights.
27.	• Has no functionality to sort or filter the products.
28.	• Allows users to share information via email about hotels only.
29.	• Has no functionality to share pages.
30.	• Does not remember search criteria across sessions.
31.	• The website does not show the full price of offered holidays. The website uses 'Price from' label to indicate that extra charges might be applied.
32.	• The first steps of product's selection process indicates that price displayed is total. However, the website does not indicate what the price includes.
33.	• The website has no indication whether or not prices for holidays and flights are total.
34.	• Start of new search is not immediately obvious.
35.	• Holidays result page: the website does not allow users to start new search directly from results page.
36.	• Does not provide functionality that allows to search another holidays packages and flights directly from the results page.
37.	• The website does not display detailed information about airports.
38.	• The website does not provide a route map.
39.	• Do not display prices in multiple currencies such as local currency and currency of destination country.
40.	• Web page that contains information about flights is market as 'print friendly'. The rest of the pages are not market as 'print friendly'.
41.	• Web page that contains information about hotels is market as 'print friendly'. The rest of the pages are not market as 'print friendly'.
42.	• Websites pages are not market as 'print friendly'.
43.	• Confirmation page regarding holidays: • Total cost of the booking is not displayed. The website uses 'Price from' label • Does not indicate whether or not additional costs might apply • Confirmation page regarding hotels: • Total cost of the booking is not displayed. The website uses 'Basket price' label. • Does not indicate that additional costs might be applied
44.	• Does not indicate is the price total or not.
45.	• Displays contact number on some of its pages. For example, when booking flights there is no obvious contact number on the page relating to customer information and also on booking page.

46.	• Not all the costs are automatically excluded from initial price. For example, the Cancellation Insurance is automatically included in the price of a hotel. Similarly, Cancellation Insurance and Car Excess Reimbursement is automatically included in the price of a car hire.
47.	• Not all extra costs are clearly displayed. There is no indication that Insurance of holidays has extra cost (Figure 6.7). Not all costs are automatically excluded from initial price. Option for holiday's Insurance is automatically pre selected (Figure 6.7) and the holiday's Late Booking Fee is automatically included in the price.
48.	• Progress bar does not look like a progress flow.
49.	• Progress bar shows a current position in the booking process. However, the website does not name this position.
50.	• The access to the Terms and Conditions is not obvious and not very easy. If the user wants view this information during product selection process or booking process, he/she must return to the home page.
51.	• The website uses pop-up alert to show errors.
52.	• There are no appropriate error messages. When searching for flight without entering any information, website does not display what is wrong and how to correct it. Instead, website displays message saying "There are no flights available on the dates that you have selected. Please try other dates". Submitting the passenger details form without entering any information, leads to the message saying "Errors" (Figure 6.8).
53.	• Booking holidays: does not highlight the elements that need correction. • Booking city breaks: does not highlight the elements that need correction.
54.	• Does not highlight the elements that have to be corrected.
55.	• Some forms do not explain of what is wrong and have no explicit instructions how to fix it. The website simply highlights the elements that need correction.
56.	• Uses word 'error' by naming the error summary 'Error list'
57.	• Does not provide proper information on how to fix the error • Uses word 'error'
58.	• Uses word 'error' (Figure 6.9)

Table 6.2: Websites' Usability Problems

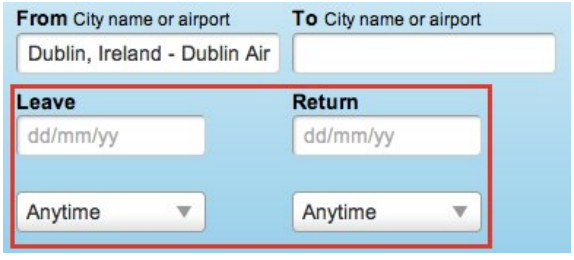

Figure 6.1: Ebookers.ie unclear grouping of options

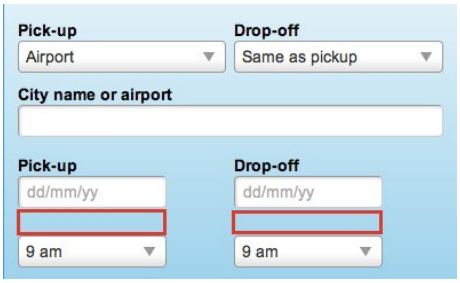

Figure 6.2: Ebookers.ie missed labels in form for searching cars

Figure 6.3: Ebookers.ie missed labels in form for searching flights

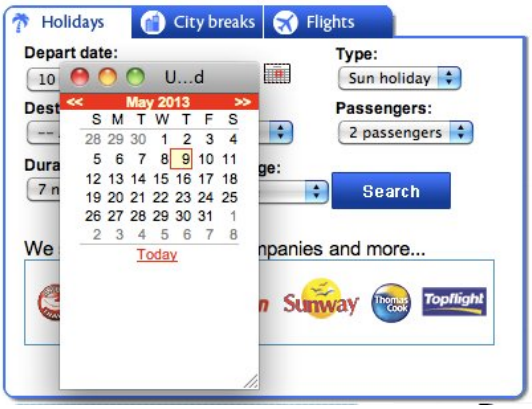

Figure 6.4: Holidaysonline.ie calendar closes relevant date field

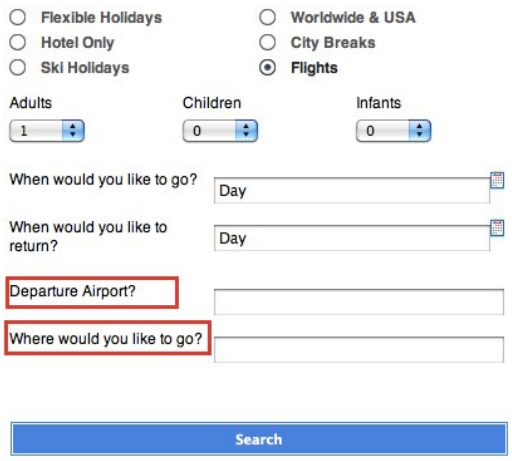

Figure 6.5: Letsgotravel.ie confusing labels

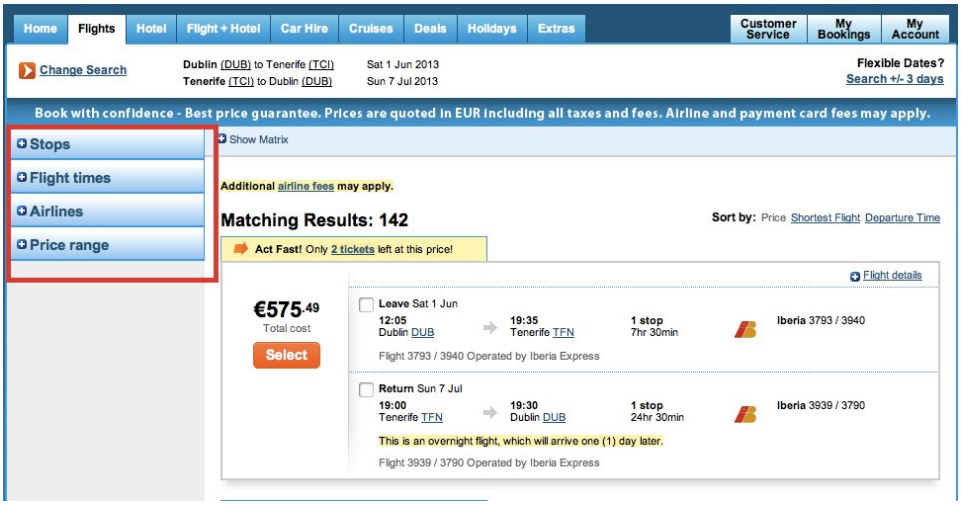

Figure 6.6: Ebookers.ie new search that is not immediately obvious

Figure 6.7: Limericktravel.ie problems with extra costs

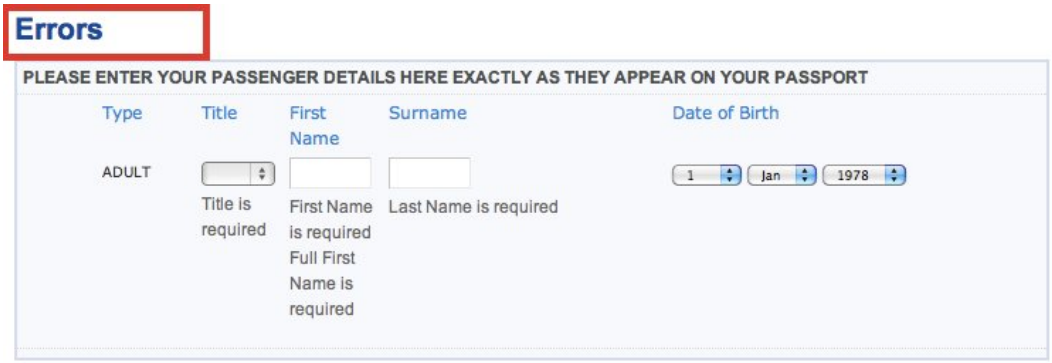

Figure 6.8: Letsgotravel.ie use of word 'Error'

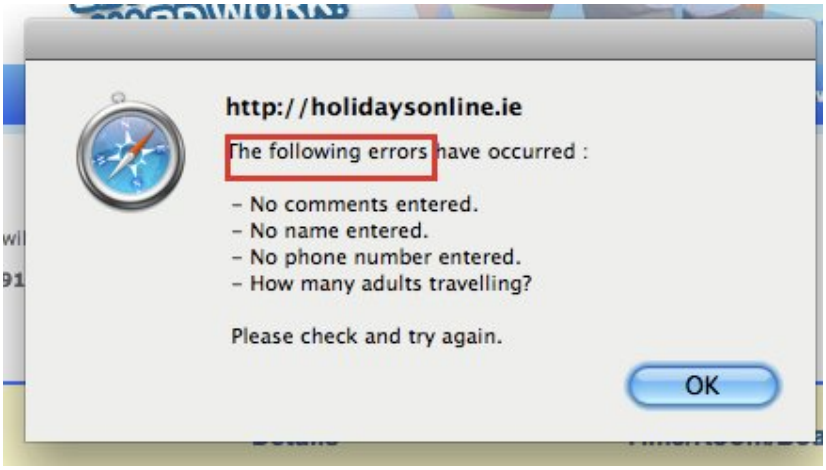

Figure 6.9: Holidaysonline.ie use of word 'Error'

The most usable website according to this evaluation is Gohop.ie as it implements 46% of all guidelines. The next is Ebookers.ie. It conforms to 38% of guidelines. Holidaysonline.ie and Limericktravel.ie have nearly equal usability scores. Holidaysonline.ie has 22% and Limericktravel.ie has 21%. The website that has the lowest level of usability according to this analysis is Letsgotravel.ie. It's usability score is only 17%. These results show that generally travel websites have a very low level of usability and there should be put a lot of effort into making them more user friendly.

The evaluation has shoved the weak sides of each website. According to the results, the websites are quite good at providing an easy booking process. All the websites scored well for this, except Letsgotravel.ie because it implements only one out of three

guidelines. Two websites, Gohop.ie and Ebookers.ie scored well for making websites' error messages easy to understand and providing clear error handling mechanism. Gohop.ie implements all the guidelines and Ebookers.ie conforms to two guidelines out of three. In general, the websites are bad at proving easy search process as well as providing clear results and an easy way for their manipulation. Also, only two websites out of three provide error messages that are simple and easy to understand as well as clear error handling mechanism.

There are 8 guidelines that were not fully implemented even by a single website. They are:

- provide a well designed graphical calendar
- support users who do not know exactly what they want
- allow users to easily change the order of search results
- allow users to easily share pages or email them to friends
- provide description of an airport
- provide a map that shows a route of a flight
- display prices in multiple currencies
- allow users to print pages in a format that is easy to understand and read

The following recommendations are the ones that were fully implemented by only one website (there are 5 such guidelines):

- make the first step of the booking process clear and obvious for users
- make the first step of the booking process flexible by allowing users to enter either an airport name or a city
- clearly display all extra costs and automatically excluded them from initial price (this guideline is not applicable to two websites, Letsgotravel.ie and Holidaysonline.ie, as they provide no extra options)
- include a well designed progress bar for the booking process
- describe clearly how to correct errors

The following recommendations are fully implemented by only two websites (there are 7 such guidelines):

- allow users to compare products across different websites

- allow users to make special bookings
- displaying cheap products such clearly on the website's home page and make their booking straightforward
- display full price or estimated price as early as possible in the booking process
- provide an easy way to refine the results and make the search of another product straightforward and obvious
- make error messages clear and understandable
- highlight elements that need to be corrected

The websites' problem areas that were identified during this evaluation were taken into account during tasks creation in order to assess them with the real users.

6.3 Creation, Distribution and Analysis of the Pre-test Questionnaire

6.3.1 Designing questionnaire

The pre-test questionnaire was created in order to collect participants' demographic data, their previous experiences with the travel websites and the data about the website's functionalities which are the most commonly used. Accordingly, designed questionnaire consists of the 4 parts:

1. Participant's personal information
2. Participant's demographic information
3. Participant's experience with the travel websites
4. What functionalities of travel websites the participant has used

The pre-test questionnaire is given in the Appendix A.

The pre-test questionnaire consists of the close-ended questions. This type of questions require respondents to choose an answer from the predefined list of options. Another type of questions is open-ended. These questions require participants to supply their own answers (Sawer 1984). The reason for choosing close-ended questions is that they

have higher response rate (Reja, Manfreda, Hlebec, Vehovar 2003). Furthermore, the data that is collected using close-ended questions is easier to analyze compared to the open-ended questions (Sawer 1984).

The questionnaire's design has involved three guidelines out of seven that were suggested by Maria and Auriat (2005):

1. Keep the vocabulary simple. This means that the questions should not contain complex words, acronyms, abbreviation, technical terms, etc.
2. Keep the questions short. This means that the questions should not be longer than 25 words. A question that is longer than 25 words should be broken into shorter sentences.
3. Avoid double-barreled questions. This means that a question must ask about a single thing.

6.3.2 Piloting questionnaire

Before distribution of the actual questionnaire, the questionnaire was pretested with the pilot participant. The purpose was to identify and remove mistakes and ambiguities that might be encountered by other participants. The pre-test helped to identify one grammatical mistake in Question 10. It also helped to ensure that the questions are clear and easy to understand. The pilot user will also participate in the actual pre-test questionnaire.

6.3.3 Distribution of questionnaire

After piloting the questionnaire and correcting the minor mistake, a distribution of the real pre-test questionnaire was started. The distribution was performed via e-mail. As recommended by ETSI (1991) and Liu (2008), before the evaluation all researches must first acquire a written consent of the participants. For this reason, the consent form that introduces the investigation, explains its purpose and explains what is required from the participants, was developed. Also, the consent form states that all personal information of the participants will remain confidential. 55 e-mails were sent asking to sign the consent form and fill in the questionnaire that were attached to these e-mails. The consent form is given in the Appendix B. The participants were given two

weeks to fill in and send back the questionnaire form. Several reminders were sent to those participants who did not complete the questionnaire. The responses were received from 44 participants. The questionnaire responses are discussed in the following sub-section.

6.3.4 Questionnaire results

The data got by using the questionnaires was analyzed by using Microsoft Excel to calculate the percentage values. The program was also used to draw the graphs. Before the data has been transferred to the program, some respondents were contacted in order to clarify the answers. 10 respondents were contacted in order to resolve the errors that were present in the names of the stated websites. 2 participants were contacted, as they did not indicate their income level. 1 participant gave contradictory answers.

1. Response rates

The questionnaire has been sent to 55 participants: 25 males and 30 females. The filled out questionnaire forms were received from 44 respondents: 19 males and 25 females (Figure 6.10). The response rate is 80%. According to Baruch (1999) and Dillman (2000) cited in Cook, Health and Thompson (2000), this is a good result. Baruch argues that the average response rate is approximately 55.6% and Dillman states that successfully designed questionnaires can get 70% response rate (Cook, Health and Thompson 2000). According to questionnaire results, males have slightly lower response rate than females. Males' return rate is 76% and females' return rate is 81% (Figure 6.11 and Figure 6.12).

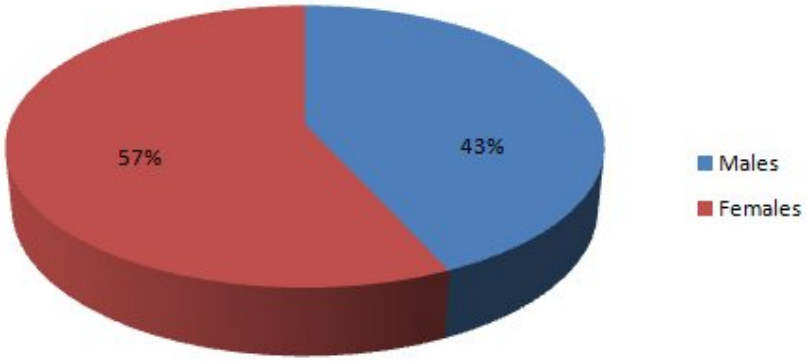

Figure 6.10: Gender of the Questionnaire's Respondents

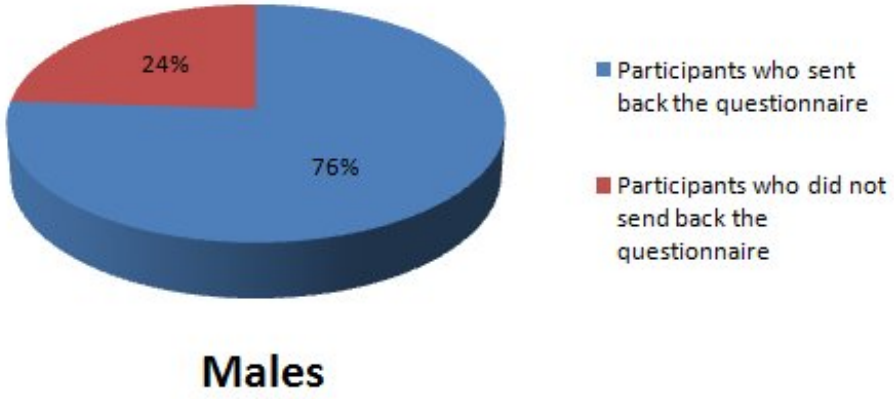

Figure 6.11: Response Rate (Males)

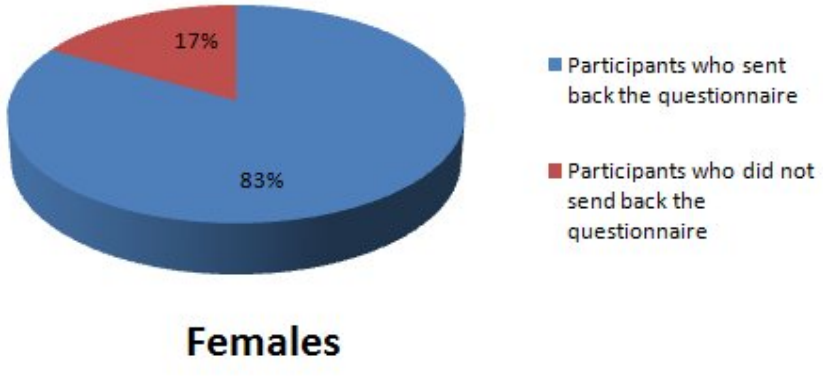

Figure 6.12: Response Rate (Females)

2. User profile matching

In accordance to Kamarulzaman (2010), a typical customer of online travel websites is:

- female;
- between the ages of 25 and 44;
- with higher education;
- married or living with partner;
- having household income ranging from 30,968 EUR to 55,470 EUR;
- having Internet experience ranging from 4 to 6 years.

43% of the questionnaire participants were rejected straight away, as they do not match the profile. This portion represents the males. Other portion of respondents (the females) was analyzed to determine who can be considered as potential participants for usability test. Out of the 25 female respondents, 8 people (32%) fully fit the profile. These people will be further contacted asking to give their consent to participate in the tests. 7 participants (28%) differ from the profile by only one characteristic. Out of these 7 respondents, 4 respondents differ by education level, 2 by income level and 1 by marital status. Other participants differ from the profile by several characteristics: 5 respondents (20%) - by having 2 distinct characteristics, 4 respondents (16%) - by

having 3 distinct characteristics, and only one (4%) by having 4 distinct characteristics (Figure 6.13).

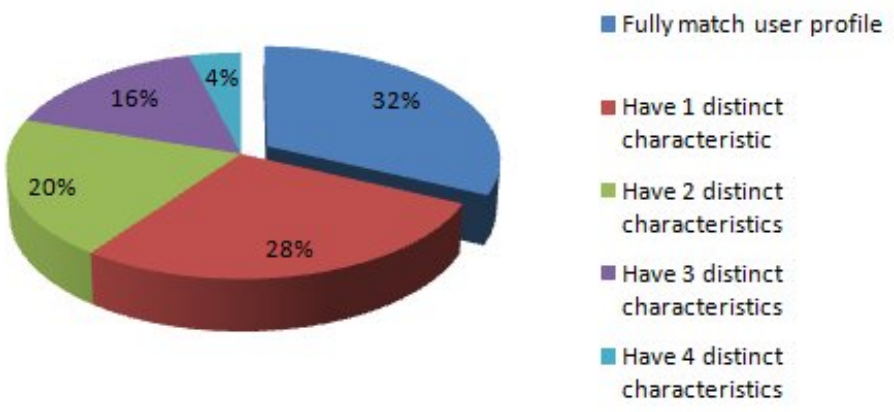

Figure 6.13: User Profile Matching

3. Respondents' experience with travel websites

8 people from all respondents (18%) have never used a travel website. Other respondents (82%) have used travel websites at least once (Figure 6.14). Women are more experienced with travel websites. 26% among the male respondents have no experience with travel websites (Figure 6.15). Among women, this figure represents only 12% (Figure 6.16). The results mean that the female represents a typical user of a travel websites. Such result is consistent with the result of Kamarulzaman (2010).

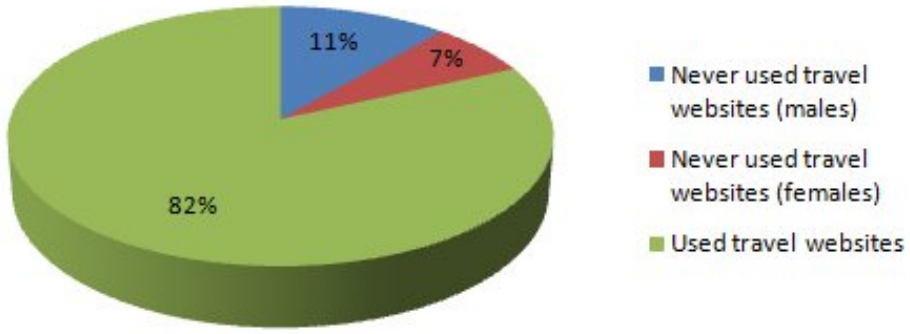

Figure 6.14: Users Experience with Travel Websites

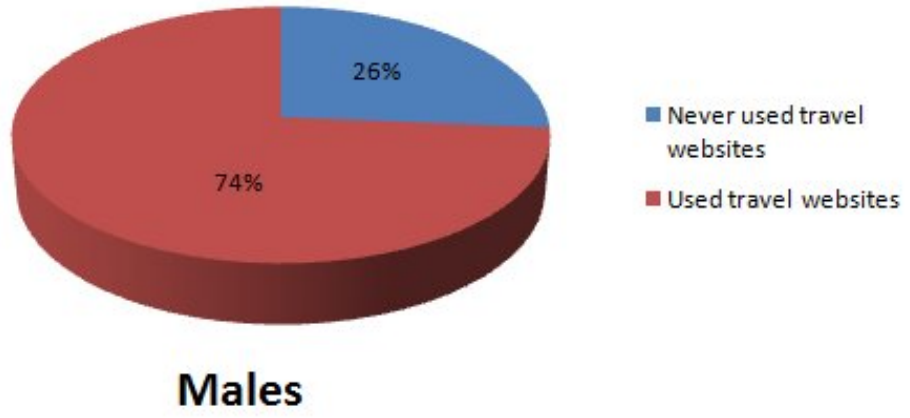

Figure 6.15: Males Experience with Travel Websites

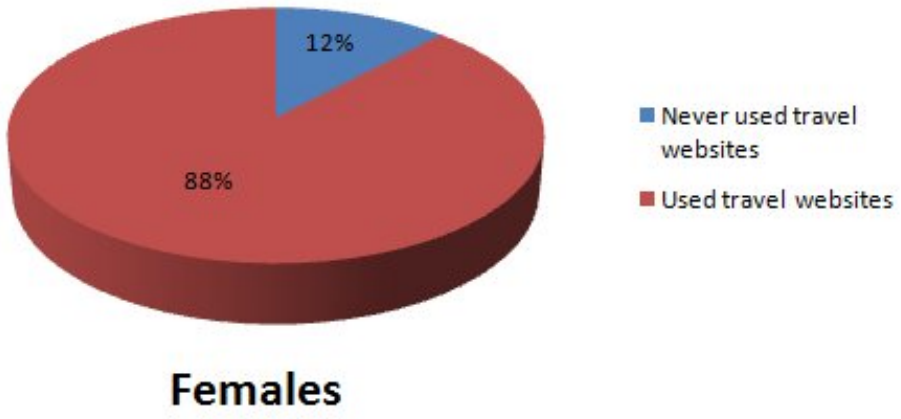

Figure 6.16: Females Experience with Travel Websites

4. Websites' users

The most popular website among the respondents is Booking.com. 13 people (36% of experienced respondents) have used this website. Other popular website is Ebookers.ie. 12 respondents who have the experience with travel websites said that they have used this website. 22% of the respondents (8 participants) use Holidaysonline.ie. 5 respondents (14%) used Gohop.ie as well as Alpharooms.ie (Figure 6.17). Each of the websites listed below were used by one respondent.

- Sunholidays.ie
- Clickandgo.com
- Thomsonholidays.ie
- Directholidays.ie
- Budgettravel.com
- Travelrepublic.ie
- Letsgotravel.ie
- Thomascook.ie
- Lastminute.com
- Holidaytravel.com

- Falcontravel.ie
- Alamo.com
- Edreams.com
- Holidaywatchdog.com
- Tripadvisor.com
- Thomson.co.uk

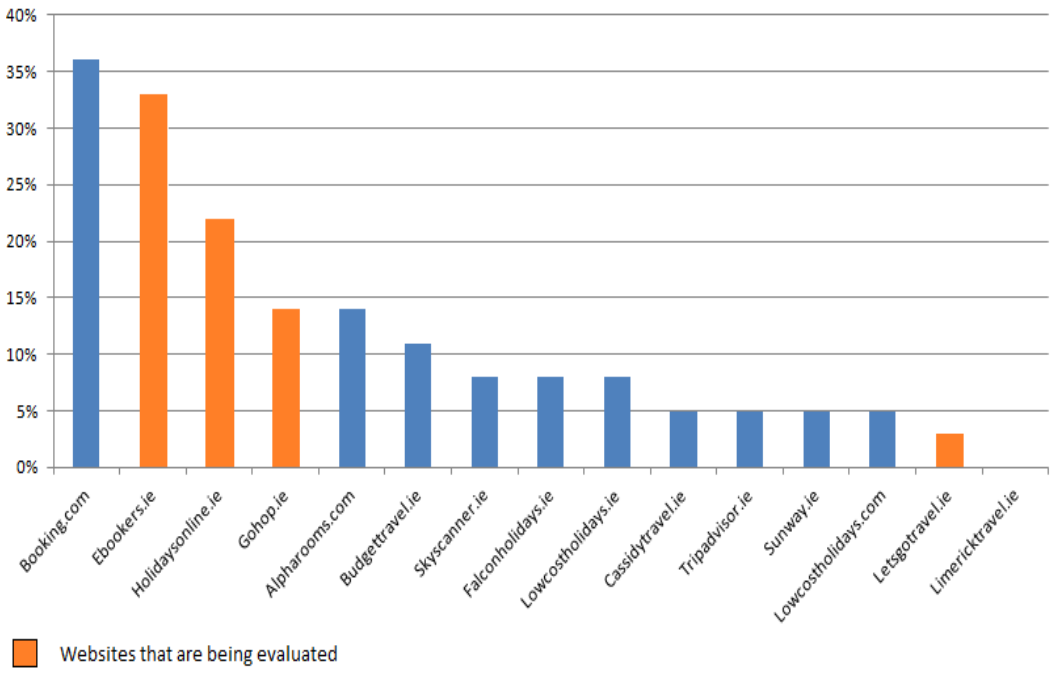

Figure 6.17: Websites Users

According to these results, the most popular website among the websites that are being evaluated, is Ebookers.ie. The next popular website is Holidaysonline.ie, followed by Gohop.ie. Only one person used Letsgotravel.ie. None of the participants have used Limericktravel.ie.

5. Usage of websites' functionalities

According to the results, the most commonly used functionalities are:

Searching for suitable holidays (for example, flight + hotel or flight + hotel + car) and

purchasing them online through a travel website
Searching for suitable hotel rooms and booking them online through a travel website
Purchasing holidays with discounts or special offers online through a travel website

22 people (61% of the respondents who have used travel websites) said that they use travel websites in order to search and purchase holidays. 21 people (58% of the respondents who have used travel websites) said that they use travel websites in order to search and book hotel rooms. 19 people (53% of experienced respondents) said that they use travel websites in order to buy holidays with discounts or special offers.

Other functionalities that are regularly used by the users are (Figure 6.18):
Searching for suitable flights and booking them online through a travel website
Purchasing last minute holidays online through a travel website
Renting a car online through a travel website

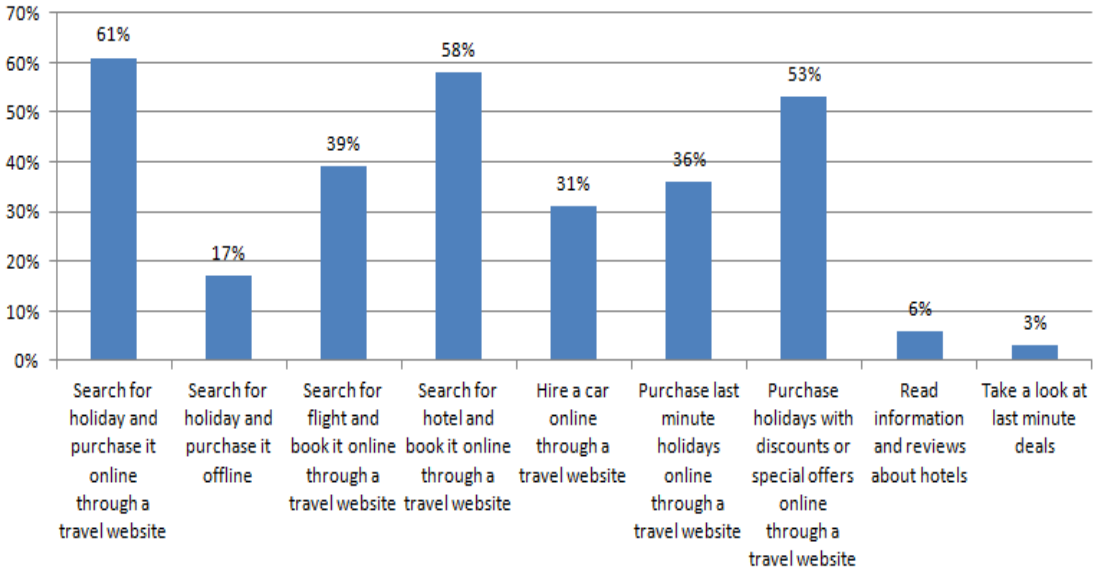

Figure 6.18: Usage of Websites' Functionalities

14 respondents (39% of experienced respondents) search for suitable flights and book them online through travel websites. 13 people (36% of experienced respondents) use travel websites to purchase last minute holidays. 11 people (31% experienced respondents) use the websites to hire a car.

The websites' functionalities listed above will be incorporated into tasks' design as they are the most regularly used. Only 17% of respondents said that they use travel websites to search for suitable holiday and purchase it offline (by booking by telephone or by going to the travel agency's office). 6% of respondents who are familiar with travel websites said they use these websites to read information and reviews about the hotels. And only 1 person (3%) used travel website to take a look at last minute deals (Figure…).

6.3.5 Questionnaire key results

One of the key results to this experiment, are the participants who were identified as the ideal candidates for usability test. 8 participants who fully match the user profile will be further contacted asking to give their consent to participate in the usability test. Ideally, the test must be designed in such a way that allows to test the websites with users who never used travel websites before. According to the results, 8 participants from all respondents have never used a travel website. The overlap between two groups of participants (people who fit the user profile and people who never used travel sites) will be determined (Figure 6.19).

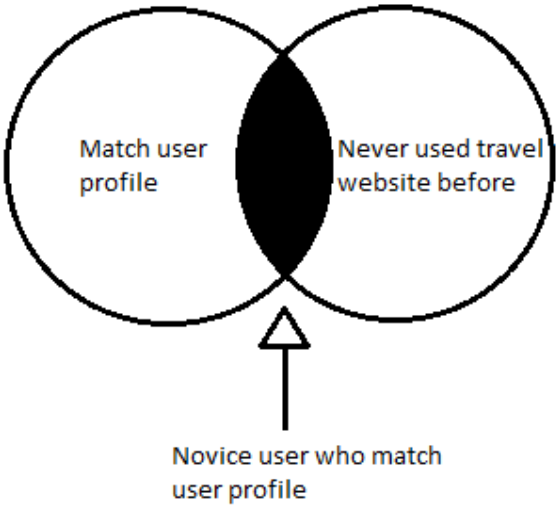

Figure 6.19: Overlap Between Two Groups of Respondents (people who match user profile and people who never used travel websites before)

The questionnaire results have shown that the websites that were chosen for evaluation have different popularity levels. One of the most popular websites that are used by the participants, is Ebookers.ie. The least popular websites are Letsgotravel.ie and Limericktravel.ie. Holidaysonline.ie and Gohop.ie have moderate level of popularity (Figure…). This means that the experiment encompasses a wide range of websites' popularity levels, from the most popular to the least popular websites.

In order to successfully implement usability, the websites must start with the most important functionalities. According to the results, these functionalities are: purchasing holiday packages, booking hotels and flights, renting cars, and purchasing last minute holidays and holidays with discounts or special offers. After improving usability of these critical features, the websites can move to the least important elements.

6.4 Performing Usability Test

6.4.1 Designing test tasks

The tasks' design is based on the results from the questionnaires that revealed that booking holidays, hotels and flights, hiring cars, and purchasing special deals, are the most popular functionalities. Accordingly, designed tasks incorporate the following functionalities of the travel websites:

purchasing holidays
booking hotels
purchasing flight tickets
renting cars
purchasing holidays with discounts or special offers (or last minute holidays)

Usability test will consist from directed tasks. These are specific tasks that direct users, i.e. users are given specific instructions (Jablonski 2002). The list of the tasks is given in Table 6.3. In Appendix C these tasks are presented in more detail. The tasks themselves are quite complicated. That is why they were divided into sub-tasks which in turn consist of several instructions.

Gohop.ie	
Task 1	Purchase holiday package
Task 2	Book hotel
Task 3	Purchase flight
Task 4	Rent a car
Task 5	Purchase last minute holiday
Task 6	Purchase cheap holiday
Ebookers.ie	
Task 1	Purchase holiday package
Task 2	Book hotel
Task 3	Purchase flight
Task 4	Rent a car
Task 5	Purchase last minute holiday
Limericktravel.ie	
Task 1	Purchase holiday package
Task 2	Book hotel
Task 3	Purchase flight
Task 4	Purchase last minute holiday
Letsgotravel.ie	
Task 1	Purchase holiday package
Task 2	Book hotel
Task 3	Purchase flight
Task 4	Purchase last minute holiday
Holidaysonline.ie	
Task 1	Purchase holiday package
Task 2	Purchase flight
Task 3	Purchase last minute holiday

Table 6.3: List of tasks

The test tasks are quite similar for each website. The minor differences between the tasks are due the differences between the variety of offered products and the websites' functionalities. For instance, task for renting a car on letsgotravel.ie was not designed, since this product is not offered on the website. Similarly, tasks for booking hotel on holidaysonline.ie were also omitted. One more test task that was leaved out is hiring a car on limericktravel.ie and holidaysonline.ie because the websites do not allow its users to rent a car directly on the website. Due to time constrains, it is not possible to test every feature provided by the websites. Thus, the tasks were designed only for the most important functionalities such as booking holidays, hotels, flights and special

offers, and renting car. For example, the functionality to book city break package on limericktravel.ie, letsgotravel.ie and holidaysonline.ie was omitted. Similarly, the functionality to book worldwide packages on letsgotravel.ie and holidaysonline.ie were not considered when designing the test tasks.

6.4.2 Designing post-test interviews

The post-test interview questions were created in order to collect participants' feedback and additional information after the test sessions (Rubin 1988 cited in ETSI 1991). Accordingly, designed questionnaire will collect the following information:

- General impression of the websites
- Websites' ease of use
- Websites' usability problems
- Satisfaction with websites
- Recommendations for improvements

As recommended by ETSI (1991), almost all of the interview questions are open ended. The post-test interview is given in the Appendix D.

6.4.3 Performing pilot study

The pilot test was conducted before the real test in order to reveal problems in the design of the test tasks. The pilot test also helped ensure that the tasks can be completed from the test computer. The same user who was also taking part in the pilot pre-test questionnaire, was asked to perform the pilot test. This test was performed in user's own environment. The test greatly helped improve the quality of the test tasks. Pilot user has found several design problems. First of all, the user has helped identify several mistakes (including grammatical errors). Secondly, he helped to identify some unnecessary instructions (to remove excessive details) and instructions that must be added. After the pilot test, necessary adjustments to the tasks were made (Table 6.4).

1. Correction of mistakes To remove grammatical errors and misspellings
2. Editing instructions To make the tasks more clear
3. Adding instructions To make the tasks more clear and complete. In this way user does not have to guess what he/she need to do
4. Removing instructions. To remove unnecessary guidance and instructions that give too much details

Table 6.4: Corrections for test tasks

After the pilot test sessions, the pilot interview was carried out with the same pilot user. The aim was to find design problems in the interview questions. The pilot user suggested to remove two unnecessary questions and also to add a missing rating 'Average' to the rating system used in question 8. These suggestions were incorporated into redesign of the interview.

The pilot user has helped to identify 2 unnecessary questions.

6.4.4 Selecting users

According to pre-test questionnaire results, 8 participants fully fit the profile of a typical user. All participants are experienced users who already have used at least one travel website. This means, that the test can not be performed with novice users. 8 participants were further contacted asking to take part in usability test. 4 participants said that they are able to perform the test tasks and answer the interview. Based on this, the experiment will be performed by using within-subject testing approach. The websites will be tested using same group of users, so each user will test all the systems (Nielsen 1993).

6.4.5 Performing usability test and post-test interviews

Before the test, the participants were supplied with relevant material. The users were given quick introduction to the project including short description of the project, purpose of the evaluation and definition of the concept of usability. The material also included test instructions that explained how the participants should perform the test

tasks. Also, the users were asked to read and sign the consent form. Test material, i.e. introduction to the project, test instructions and consent form, is given in the Appendix E. Before the start of the test, the participants had an opportunity to read the tasks and ask for clarification if it was needed.

According to Ricks and Arnoldy (2002), it is important to help users feel relaxed. If users are comfortable they will feel less nervous and thus can give more accurate comments and better feedback (Ricks and Arnoldy 2002). For this purpose, the test should be performed in such a way that is more convenient for users. In accordance to U.S. Department of Health and Human Services, there is no need to do a usability test in a formal usability lab. A test can be performed either in a formal lab with audio-visual equipment, or in a conference room (or user's natural environment such as home or work) with recording equipment, or in a conference room (or user's natural environment such as home or work) without any recording equipment (in this case an observer must take notes), or remotely asking a user who is located different place to perform test tasks (U.S. Department of Health and Human Services). According to the above, it was decided to perform the test in participants' own environments, i.e. their homes. Liu (2008) stated that the test that involves Think Aloud Protocol and which is performed in laboratory may reveal different data compared to the same test which is performed in formal lab. This occurs because users' behaviour may differ according to the test environment.

The test was performed individually with four users. A typical user tested 5 selected websites by performing the tasks which were given at the start of the test. An average time of each test including breaks between sessions is 2 hours. As the users were working on same computer, cookies used by each of five websites have been removed after each test. This helped ensure that the participants had equal circumstances (all the previously entered criteria was removed) when they started using the websites. Corresponding to the test instructions, the users were asked to go to each website and perform the tasks while thinking aloud. Users were asked to express their thoughts and comment their actions, to say about the problems which they were encountering during the exercises, and tell what they like or dislike on the website. The users were allowed to take short breaks between test sessions.

The test was done in a quiet room without disruptions. Although the tests were not performed in the same location, users were using the same machine, i.e. the laptop, the same browser and similar internet connection speed. The test participants were not given any help during task sessions. The users were asked a limited number of questions in order to prompt the users to think out loud and also to clarify users' actions and comments. The video recording was used in parallel with taking notes. For this purpose, the CamStudio software was used during the exercises. The software was utilized to record the screen of the computer along with audio.

The data recorded during usability test is mainly qualitative one. The following data were recorded:

- The participants' actions, i.e. how they complete the exercises and what they stuck on (usability problems), during the tasks completion were observed and noted down using pen and paper.

- All the comments about what the users think of the websites were also recorder on the paper.

- Another data that was collected after each test is the success and time of the completion of each test task.

Immediately after each test session, the users were asked the post-test questions regarding their satisfaction and experience with each website.

6.5 Conclusion

This chapter present the results of the analysis that has been performed by using usability guidelines. The results from this analysis will be used to identify important usability problems. This section described the process of performing the experiment. It provides a detailed description of how the pre-test questionnaire was created and distributed among the participants. The questionnaire results were analyzed in this chapter. It also describes how test tasks and interview questions were created, and how the test sessions were carried out. The results from the test and interview will be

discussed in the next section.

7. RESULTS AND ANALYSIS

7.1 Introduction

This chapter gives the results of the usability evaluation. Two types of results are presented in this chapter: results from usability test and results from interviews. Since this research focuses on qualitative data, usability problems associated with websites and recommendations for usability improvements will be discussed in his chapter. Also, the analysis of the results will be performed by using usability principles identified in section 5.8.

7.2 Results

7.2.1 Usability test results

1. Success of the completion of test tasks

All users had encountered serious problems that prevented them to complete the tasks. This means that these problems prevented the users to purchase travel products.

Gohop.ie has 4 uncompleted tasks (User 1 completed all the tasks, User 2 has 2 uncompleted tasks, User 3 has 1 uncompleted task and User 4 has also 1 uncompleted task). Two problems that prevented the users complete the tasks are the errors. Another problem related to the fact that the website did not give the search results despite the users have tried different search criteria in order to complete the task (Table 7.1).

Gohop.ie	
Error	When one of the users changed a number of passengers (selected 2 people instead of 1) by using 'Change your search' situated on results page, website displayed the error: "Sorry, we have been unable to find any availability to match your requested flights". At first when user selected 1 person, website has presented the search results. Only after she selected 2 people, the website informed that it has no holidays for

	this destination.
Error	After one of the users has selected the hotel, the website displayed: "Error selecting travel option: XML in bad format".
Problem	Two users could not complete the task because the website did not give the search results. In order to continue the task, users tried several other dates in different months, but the website did not give the results.

Table 7.1: Critical Problems of Gohop.ie

Ebookers.ie has 5 uncompleted tasks (each User has 1 uncompleted task, the exception is User 2 who has 2 uncompleted tasks). The users were faced with two types of errors. Also, one user could not find Last Minute Deals section (Table 7.2).

Ebookers.ie	
Error	When three users changed the search (by selecting 2 people instead of 1) on search results page, website displayed the error: "Sorry, ebookers.ie does not support flights for the location that you have selected. Please choose another location". At first when users selected 1 person, website has presented search results. Only after they have selected 2 people, website informed that it has no holidays for this destination. All previously entered criteria were remembered. Users wanted to complete the task and thus pressed search button again without changing any criteria. For two users website again did not give results. One user succeeded in her attempt and thus was able to complete the task.
Error	Two users were faced by the following: after they selected one of the last minute deals, the website displayed the error: "The page you requested has been removed or is no longer available".
Problem	One user did not find Last Minute Deals.

Table 7.2: Critical Problems of Ebookers.ie

Limericktrave.ie has 5 uncompleted tasks (User 1 has 2 uncompleted tasks, User 2 has 1 uncompleted task, User 3 has 1 uncompleted task and User 4 has also 1 uncompleted task). Two problems that prevented the users to complete the tasks are the errors. Other problem is the fact that the user misinterpreted the label on the search form (Table 7.3).

Limericktravel.ie	
Error	Three users were faced by the following: after entering passenger's details (title, initials and surname) and pressing 'Continue' button, the website displays the error: "Error Code 505, Error message 505".
Error	After entering passenger's details (title, initials and surname) and pressing 'Continue' button, one of the users encountered the following error: "The value "3@TWSGL" can not be converted to a number".
Problem	Three users were trying to find Ireland in the drop down list labelled 'Select Country' because they thought that this is the list where they must select their country of residence. They have not paid attention to the following message: "Please select country and input your postcode if you want us to look up your address". Since Ireland has no postal code, it was not in the list. One user did not complete the task as she was unable to find her country. Two users left this section and proceed further.

Table 7.3: Critical Problems of Limericktravel.ie

Letsgotravel.ie has 8 uncompleted tasks (each user has 2 uncompleted tasks). One problem related to the error. The users also could not find desired destination in the list provided by the website (Table 7.4).

Letsgotravel.ie	
Error	All users were faced by the following: when they selected preferred latest holiday deal, the website displayed the following error: "Sorry - there are no flights available on the dates you have requested on your search. Please search again".
Problem	Three users could not find Tenerife in 'Destination' drop down list. The reason for this is that before that the users have selected Spain from the 'Country' list instead of Canary Islands. As the result, 'Destination' list had no required destination. The field "Or enter destination" was unnoticed by the users. Thus the users could not complete this exercise.
Problem	One user thought that she must select her country from 'Country' drop down list which goes straight after 'Departure Airport' text field. The website provides no clarification regarding which country (departure or destination) must be selected. That is why the participant could not

	continue completing the task instructions.

Table 7.4: Critical Problems of Letsgotravel.ie

Holidaysonline.ie has no uncompleted tasks. Possibly this is because the website is quite simple and has no functionality to purchase travel products online (products can be purchased by calling company's office.

Two websites, Limericktravel.ie and Holidaysonline.ie, allows to select either 7 or 14 nights. According to the instructions, the users required to select 10 nights. The users deviated from the instructions by selecting 7 nights. Otherwise, they would be unable to complete the task.

Holidaysonline.ie does not allow to select 1 passenger for the holiday. According to the instructions, the users required to select 1 person during holiday booking process. Again, all users deviated from the instructions by selecting 2 passengers. Otherwise, they also would be unable to complete the task.

These two problems are also very serious and must be taken seriously by the websites' designers.

2. Usability problems, users recommendations and positive sides of the websites

Before the analysis, the problems, positive sides and recommendations related to each website were summed up in the following tables. The details of the tasks observations are given in Appendix G.

The users encountered 19 problems during tasks performance on Gohop.ie (Table 7.5).

Problems	Instead of allowing users to choose a return date, the website asks for a number of nights (users must calculate a number of nights).
	Website did not provide help when users incorrectly typed the name of the airline (they typed Aer Lingus as one word).

	After entering an airline name, 'Airlines' text field displays an airline code instead of airline name.
	'Filter my results' section is not well marked (it is too dull and is not eye catching enough).
	When changing the number of passengers by using 'Change your search', user noticed that the check box for choosing direct flights is unselected although she has selected direct flights during initial search (on the search form situated on homepage). The user had to re-select it.
	When changing the number of passengers by using 'Change your search', user noticed that the text field for choosing preferred airline is empty although she has entered the airline during initial search (on the search form situated on homepage). The user had to re-enter it.
	'Home Phone Number' text field is mandatory (some people do not have home phone).
	'Mobile Number' text field is marked by asterisk but this asterisk is not red. When pressing 'Book now' button, this field does not become highlighted meaning that the mobile number is not required.
	'You name' label does not specify what is required: first name or first name together with last name.
	Website is slow when it searches and updates results.
	The website was extremely slow when it filtered the results. The user had to make a page refresh.
	Website does not remember search criteria such as Departure and Destination.
	The menu bar does not contain 'Hotels', however it has 'Holidays' and 'Flights' that act as links to the search forms.
	Difficult to find where to enter a preferred airline on flights search form that is situated on the homepage (the location of this option is not well marked).
	Sorting is not well marked and not eye catching enough.
	Plus problems and errors that are provided in Table ...
Users recomen-dations	Make text in 'Filter my results' section more brighter by changing the font of the text or by choosing more brighter color.
	Make text field for entering a mobile phone mandatory (instead of home phone number).
	Add a field for entering return/check-out date or provide a calendar on all search forms.
	Make the label for name/surname more clear.
	Place Late Deals in more obvious spot.
	Place the link to 'Hotels' search form in the menu (in the same way the links 'Holidays' and 'Flights' are displayed).

	Provide the counties in the form of drop down list.
	In order to make sorting more clear, instead of providing only one option: Sort by price, the website should provide two options: Sorting by lowest price and Sorting by highest price.
Positive sides/comments	The website presents offered products in a clear and concise way.
	On the first step of the booking process is very easy to understand what products the website offers, e.g. flight, flight plus hotel package, flight plus car package, etc.
	It is more convenient to go to the flights search form via 'Flights' menu item, rather than to go back to the homepage and to select 'Flights Only' option".
	Flights search form provides a calendar for selecting a return date.
	'Change your search' functionality is highlighted in red.

Table 7.5: Problems, Recommendations and Positive Sides of Gohop.ie

19 problems were encountered by users on Ebookers.ie (Table 7.6).

Problems	Option for selecting time is not immediately obvious due to a missing label.
	Options for the time are hard to understand and very confusing.
	Difficult to understand the results on the results page that displays holidays due to a large amount of information.
	The error message: "Sorry, ebookers.ie does not support flights for the location that you have selected. Please choose another location", is not eye catching enough.
	Difficult to find where to select a non-smoking room.
	Instead of a full (or approximate) cost of booking, the results page that displays hotel rooms provides price per room per night.
	Sorting is small and not well marked.
	Filtering function is not well marked and not eye-catching.
	The website does not provide 'Home' button or link to homepage on every page (there is no link to homepage on 'Trip details' page).
	Difficult to find where to enter a preferred airline on flights search form that is situated on the homepage (the option is not well marked).
	As the website has no function to sort the cars by highest price, in order to select the most expensive car the user had to scroll down the page.

	Difficult to find Last Minute Deals.
	When users have selected 'Holidays' menu item, the website showed that is selected 'Deals' menu item.
	Some last minute deals do not have a price.
	Last minute deals are situated together with other offers.
	The page must be scrolled down in order to find the link to 'Last Minute Deals'.
	Plus problems and errors that are provided in Table ...
Users recomen-dations	Show the time in 24-hour clock format to make the ranges of time less confusing.
	Remove function for filtering hotels from the search form that is situated on homepage. One user said that it is unnecessary and only makes the form more cluttered.
	Display total cost of hotel booking.
	Even if the results are automatically pre-sorted by the lowest price, it is necessary to include sorting function (low to high and high to low).
	Display the time in 24-hour clock format.
	Provide a link to homepage on all pages.
	Place Last Minute Deals in a place that can be easily found (in some obvious place on homepage).
	Make information that is used on the website more clear.
Positive sides/comm ents	The website remembers previously entered search criteria.
	The website allows to select departure/check-in date and return/check-out date.
	Very convenient that calendar for choosing dates displays two months side by side.

Table 7.6: Problems, Recommendations and Positive Sides of Ebookers.ie

43 problems were encountered by users during task performance on Limericktravel.ie (Table 7.7).

Problems	Some users did not notice 'Sun Holidays' option on the main search form. This means the labelling that is used on the main search form is not clear.
	Holidays search form offers two similar destinations: Tenerife [Tenerife South] and Tenerife South [Tenerife South].

	'Departure' text field is situated at the end of holidays search form and goes after 'Destination' text field.
	Holidays search form does not allow select 1 person (the search form has no such option).
	Three users noted that Holidays search form allows to choose only 7 or 14 nights.
	Holidays search form has no calendar for choosing return date. Users must calculate a number of nights.
	The purple colour that is used on the website is irritating.
	Instead of the full name ('Destination') holidays search form uses 'Dest'.
	The list with destinations on holidays search form is too long.
	The pop-up window displaying holidays 'Booking Conditions' shows wrong information. On the search form the user has selected 3 adults, however the pop-up window displays 2 adults and 1 children.
	Some users do not know what means 'Initials'.
	The website provides two pages containing holidays search results (one page shows holidays, other page shows accommodations).
	The first page of holidays search results does not provide full information regarding holiday. It does not contain a Return date.
	No functionality that allows to change results directly on holidays search results page (users have to return back to homepage in order to change a search).
	The website does not remember previously selected search criteria (users must re-enter it). The exception is hotels search form.
	It is hard to find 'Hotels' in the left hand column on homepage because "all is mixed up".
	There is no option select check-out date (users must calculate a number of nights).
	Difficult to understand how to select hotel rooms on hotels results page because the content of this page is hard to understand. The page has no good contrast between different sections.
	Another user had a problem with finding sorting on hotels results page.
	'Accept & Close' button that is used to close information about cookies, must be placed in another location and must not look like the buttons on the search results page. When one of the user first saw this button she thought that it is for closing the hotels results page.
	Difficult to understand whether an age should be entered when making a hotel booking. The website has label 'Age' but does not have a text field for entering an age.

	'Telephone' text field is mandatory (some users do not have home phone number).
	'Post code' field is mandatory (some users do not know their post code).
	One user does not know what means 'Carrier'.
	Website did not provide help when users incorrectly typed the name of the airline (they typed Aer Lingus as one word).
	Instead of Limericktrave.ie logo, Letsgotravel.ie logo is displayed on some pages. Users were confused whether they are on the right website.
	Two users were looking for the function to change the search data on top of flights search results. The website provides this functionality at the right side. One participant said that all the websites usually display booking details at the right hand side.
	'Change request' button on flights search results page is not well marked and is not eye catching.
	Sorting function on flights search results page is not well marked.
	This sorting function is very strange. The users did not understand what means 'sort by air fares +' and 'sort by +'.
	It is difficult to understand how to select a flight.
	Flights reservation page is difficult to understand because "page contains too much information. The information is badly organized without any contrast between sections".
	The grouping of the fields ('Last name' followed by 'First name') on 'Reservation' page seems not intuitive.
	Unusual format for entering the date of birth without any symbols (dots or backslashes).
	'Reservation' page contains two fields for entering a post code. One user could not understand how to enter city instead of post code..
	One user does not know what means 'E-mail format'.
	'Reservation' page asks to select 'Delivery method', but it provides only one option.
	It is difficult to return to homepage because the website has no 'Home' button on all of its pages.
	When pressing the logo of the website in order to move to homepage, website displays the error: "404 Page Not Found. The page you requested was not found" (users had to re-enter website's address).
	It took some time for the users to understand where Last Minute Deals are situated. One user said that "Perhaps this is because the website itself is quite colourful, but the section of Late Offers is

	quite plain".
	Plus problems and errors that are provided in Table ...
Users recomen-dations	Provide a link/button to homepage on all website pages.
	Replace purple with other colour.
	Place 'Departure' before 'Destination' on holidays search form.
	Provide sorting and filtering functions directly on all search results pages.
	Supplement list of 'Destinations' on holidays search form with functionality for typing a destination manually.
	Provide 'Back' button.
	'Accept & Close' button that is used to close information about cookies, must be placed in another location and must not look like the buttons on the search results page.
	Change the name of 'Booking' button to 'Select' on flights results page .
	Place 'First name' field before 'Last name' on 'Reservation' page.
	Place options for selecting 'Round-trip', 'One-way' and 'Open-jaws' before 'Return date'.
	Instead of providing the sorting by price, the website must provide sorting by low to high price and high to low price.
Positive sides/comments	Hotels search form displays check-out date.

Table 7.7: Problems, Recommendations and Positive Sides of Limericktravel.ie

The users encountered 9 problems during tasks performance on Letsgotravel.ie (Table 7.8).

Problems	The website has no calendar for choosing return date (exception is flights search form). The users had to calculate a number of days. Everything is mixed up (filtering functionality, search results) on the hotels search results page. Hard to understand the information presented on this page.
	'Filter Results' button on hotels search results page is not eye-catching enough.
	Hotels search results page lacks function to sort results although the site automatically pre-sorts the results by lowest price. In order to

	determine whether the results are pre-sorted the users have to scroll down the page and compare the prices.
	Label 'Party Size' is confusing.
	One user had a problem with finding last minute deals. She commented that: "These are late offers, thus they must be very clearly marked".
	Plus problems and errors that are provided in Table ...
Users recomen-dations	Include sorting.
	Redesign text fields on holidays search form.
	One user recommended to very clearly mark the Latest Offers.
	Make 'Filter Results' button more clear. One user commented: "For example after I tick the box, the button can change brightness".
Positive sides/comments	Latest Offers are clearly visible.

Table 7.8: Problems, Recommendations and Positive Sides of Letsgotravel.ie

The users encountered 11 problems during tasks performance on Holidaysonline.ie (Table 7.9).

Problems	The search forms allow to select only 7 or 14 nights
	The website has no functionality to change a search directly on results page (users had to come back to homepage in order to change data).
	Holidays search form does not allow to book a holiday for only 1 person.
	The search forms do not have a field for entering a return date (users had to calculate a number of nights).
	The website has no sorting function.
	Holidays results page did not show that one of the users selected 2 passengers (the price shown was also for 1 person).
	Maximum number of passengers per booking can be only 5.
	The website does not allow to purchase products online.
	Plus problems and errors that are provided in Table ...
Users	Allow to select 1 passenger.

recomen-dations	Allow to choose a preferred return date.
	Provide calendar.
	Provide 'Search Again' function directly on search results page.
	Make a maximum number of passengers higher than 5.
	Allow to purchase the offered products online.
	Provide sorting.
	Plus problems and errors that are provided in section ...
Positive sides/comments	Selected data is not erased when pressing 'Back' button.
	The website provides several departure dates (not only the date that have been selected).

Table 7.9: Problems, Recommendations and Positive Sides of Holidasyonline.ie

3. Time of the completion of test tasks

The time of the completion of test tasks by the participants is presented in the following table:

Gohop.ie	User 1	User 2	User 3	User 4
Task 2	**07:05**	**06:30**	**12:18**	**11:03**
Task 3	**03:44**	**02:50**	**05:53**	**03:18**
Task 4	**05:38**	**08:11**	**08:00**	**06:20**
Task 5	**03:47**	**05:52**	**05:15**	**03:59**
Task 6	**00:35**	**01:19**	**01:10**	**00:22**
Task 7	**00:28**	**01:12**	**00:40**	**00:25**
Ebookers.ie	User 1	User 2	User 3	User 4
Task 2	**07:02**	**05:47**	**15:52**	**07:19**
Task 3	**03:48**	**04:20**	**04:03**	**02:52**
Task 4	**02:51**	**04:11**	**03:07**	**05:26**
Task 5	**04:10**	**03:40**	**04:39**	**04:50**
Task 6	**02:39**	**03:43**	**04:07**	**03:49**

Limericktravel.ie	User 1	User 2	User 3	User 4
Task 2	**10:02**	**16:10**	**15:57**	**07:02**
Task 3	**13:02**	**14:05**	**12:20**	**08:36**
Task 4	**12:18**	**13:10**	**15:31**	**10:24**
Task 5	**01:31**	**01:44**	**02:46**	**00:30**
Letsgotravel.ie	User 1	User 2	User 3	User 4
Task 2	**03:40**	**03:40**	**03:06**	**02:40**
Task 3	**07:50**	**05:12**	**08:10**	**10:36**
Task 4	**01:58**	**01:41**	**02:14**	**02:45**
Task 5	**01:14**	**00:54**	**01:16**	**01:18**
Holidaysonline.ie	User 1	User 2	User 3	User 4
Task 2	**02:42**	**03:10**	**03:05**	**03:04**
Task 3	**02:30**	**03:30**	**03:19**	**02:57**
Task 4	**00:20**	**00:21**	**00:04**	**01:30**

Table 7.10: Time of tasks completion

7.3 Post-test interview results

1. Gohop.ie

The users have different impressions of Gohop.ie. According to users' answers, in general Gohop.ie is not a bad website ("normal website"). One user said that the website is easy to understand since it "the products such as flights and hotels are presented in a clear way". For another user the usability is not so important. She said that if the website "will offer lower prices compared to other websites, she will use it despite the fact that it has few flaws". One more user was dissatisfied with the website. She said that Gohop.ie seems not fully developed. This is due to the fact that she got several errors and thus could not complete the tasks. According to this user, the website does not inspire confidence. She would not give important information such as credit card details. The user commented that she would never use this website.

Almost all users think that Gohop.ie is easy to use. However, the users said that they do not like the filtering function, the search form and the form for entering passengers' details. One user said that content in 'Filter My Results' section is very dull what makes this section monotone. Two users said that they did not like that they had to calculate a number of nights. One user said that she did not like that field for entering home phone number is mandatory. She also mentioned the fact that the website does not remember previously entered search data, e.g. departure and destination. The users also could not find where to enter a preferred airline and did not know how to enter a name (with surname or without it). Two users noted that the website becomes very slow when it searches for results.

The users recommend to:

- Make text in 'Filter my results' section more brighter by changing the font of the text or by choosing more brighter colour.
- Add a field for entering return/check-out date or provide a calendar.
- Make the label for name/surname more clear.
- Place Late Deals in more obvious spot.
- Make text field for entering a mobile phone mandatory (instead of home phone).

One user said that on the search form it is clear what products the website sells, e.g. flight, flight plus hotel package, flight plus car package, etc. Another users said that all functionalities that are offered on the website are quite easy to use.

The rate of the website is something between excellent and average (1 user finds the website excellent, 1 user said that it is good website and two users said that it is average website).

2. Ebookers.ie

The test users have different opinions about Ebookers.ie. Two users said that Ebookers.ie is not a bad website ("normal website"). These users also said that it is easy to use. The rest of the users said that they do not like the website. One user thinks

that the website is not straightforward in use because it is not easy to find obvious things. All the information that is presented on the website must be carefully read. The second participant said that the website is not difficult but also is not easy in use.

The users find that the options for time are not easy to understand. One participant mentioned that when she has selected 'Holidays' menu item, the website showed that she has selected 'Deals' menu item. The user finds it confusing. Two users said that they are dissatisfied that the link to homepage was sometimes unavailable and that Last minute Deals are hard to find. Test participants also said that website uses abbreviation which makes no sense to the users.

The participants recommended to:

- Provide a link to homepage on all pages.
- Place Last Minute Deals in a place that can be easily found (in obvious place on homepage).
- Make information that is used on the website more clear.

The users like that the website remembers previously entered search criteria and that the website allows to select departure/check-in date nd return/check-out date.

Only 1 user finds the website poor. 1 user said that the website is average and two users said that it is good website.

3. Limericktravel.ie

The users do not like the website. Three users said that they will never return to Limericktravel.ie. One user commented that she does not trust the website. Another one remarked that she had problems with every task. Three participants said that the website seems not fully developed and that it does not work appropriately. User 1 said that she does not like the purple color that is used on the website and that she finds that this colour is irritating. She also commented that the website has nothing noteworthy or interesting and that previous websites (Gohop.ie and Ebookers.ie) were much more interesting.

Three users stated that the website is difficult in use. One user said that in general the website is simple although some aspect are not straightforward to use.

According to the interview answers, the users do not like the search form. Participants also said that they do not like that there is no quick way to return to homepage thus the users sometimes required to re-enter website's address. One user could not find where to enter preferred airline. Another participant commented that the website displays the logo of Letsgotravel.ie instead of Limericktravel.ie on some of its pages what is confusing. The user first thought that entered the wrong website by mistake.

One of the users had problems during entering personal information. Other user had a problem during dates selection since the website allows to select only 7 or 14 nights. She said that the website lacks calendar. She also did not like a grouping of options (that 'Destination' goes before 'Departure').

The test participants recommended to fully redesign the website, because it does not fully operate. More particular recommendations are to:

- Provide a link/button to homepage on all pages.
- Replace purple with other colour.

All participants rated the website as poor.

4. Letsgotravel.ie

The majority of users said that they are dissatisfied that they could not find and book what was required. The users think that Letsgotravel.ie is quite simple and easy to use. However, they also state that this is irrelevant since they could not find required products. One user commented that not all aspects of the website are straightforward to use. She thinks that the search form on homepage was not easy to understand.

The users could not find required destination and could not book a last minute deals. One user commented that: "the website offers concrete offers, but when I selected one of these offers it was said that there is no such product". She thinks that it is strange. One user misinterpreted text field label. The users are dissatisfied that the website does

not work appropriately.

One user think that the website lacks sorting functionality. Another participant said that she did not like the search form and filtering. They recommend to:

- Include sorting.
- Redesign text fields on holidays search form.
- Make 'Filter Results' button more brighter.

According to answers, the website presents information in a clear way. The information is well separated what makes the website not monotone. The participants are satisfied that the Late Offers are clearly visible because they are positioned in the obvious spot. However, one user said that the information displayed on website could be more clear.

In general, the website is rated as average. Only one participant said it is poor website due to the fact that she could not find what she wanted.

5. Holidaysonline.ie

Two users said that they like Holidaysonline.ie. This website is pleasant in use and works really fast. Everything is clear, concise and has no advertising or unnecessary animations. One user said that she likes that the colours are not annoying.

Other two users said that the only plus of the website is that it is really easy to find the Last Minute Deals. One of these participants said that users can use this website if the they don't have predetermined departure and return dates since the website allows to select only 7 or 14 nights.

All users said that Holidasyonline.ie is straightforward to use. Some users even commented that it is extremely easy to understand and use. However, one user said that the fact that the website is simple is irrelevant since the website does not allow to book a holiday for 1 person.

All users said that they are really dissatisfied that the website allows to book holidays

and flights only for 7 and 14 nights. Three users think that the fact that the site does not allow select 1 user is a significant problem. One user also noted that a maximum number of passengers per booking can only be 5. She also remarked that Holidaysonlien.ie has no functionality to change search criteria directly on results page and that it does not allow to purchase travel products online.

The users said they do not like the search function. One user said that the site lacks sorting and 'Search Again' function.

The participants recommended to:

- Allow to select 1 passenger.
- Allow to choose preferred return date.
- Provide calendar.
- Provide 'Search Again' function.
- Make a maximum number of passengers higher than 5.
- Allow to make bookings online.

Two people said that they like that Last Minute Deals are placed in obvious spot and can be quickly and easily found. One user said that all features are very easy to use and thus the website can be used by people of any age.

Two users rated the website as poor. One user said that it is good website and another one said that it is excellent site.

7.4 Analysis

7.4.1 Analysis by using usability principles

The analysis is performed by using usability attributes given by Nielsen (1993) (see section 5.8).

1) Learnability means how easy is the system to learn, understand and use.

2) Efficiency means how quickly tasks can be performed using the system.

3) Errors means how good is the system's error prevention mechanism.

4) Satisfaction means how pleasant is the system to use.

Gohop.ie

1) Learnability

According to the test results, the learnability of Gohop.ie is good enough. The website is quite clear. It presents offered products in a clear and concise way. On the first step of the booking process it is easy to understand which products the website offers, e.g. flights, hotels, flights plus hotel packages, flights plus cars packages, etc. The functionalities that are provided by the website are quite easy to understand and use. According to the test results and interview answers, the experienced users of this website (1 user has used this website before) as well as the novice users did not have significant problems during learning and using this website. The users also had difficulties with finding the section where they could enter a preferred airline. The users also said that the sorting and filtering functionalities are not well marked. Few users had difficulties with entering their details, e.g. name and home phone. The critical problems that prevented the users to complete the tasks are the technical ones. Because of these problems, the users could not complete 4 tasks.

2) Efficiency

According to the results, the efficiency of Gohop.ie is good. The tasks on the websites were performed quite quickly. The problem of the system's slow response did not have an impact on the task completion time. The website did not require a lot of effort from the test participants. However, the users had to calculate a number of nights because the website does not allow to select a return date, what was quite difficult for the majority of the users. The users also had some problems with finding some features such as the section for entering a preferred airline and sorting.

3) Errors

The results show that the website does not conform to this principle. During completion of the test task, the users encounters several errors. Two of these errors were critical ones as the users did not complete the tasks because of them (Table 7.1). Two other errors were not significant. For example, when one of the users has entered all search parameters including Departure and Destination points and pressed the search button, the website displayed the error: "You must select a destination point". Another problem is that website did not provide any help when users incorrectly typed the name of the airline. It displayed a message saying that there is no results. These errors were easily recovered by the participants. However, the users were frustrated after these errors. One of the users was dissatisfied with the website because she got several errors. She said that the website seems not fully developed and that she would never use this website again. As test and interview results show, it is better to prevent the errors from occurring in the first place.

4) Satisfaction

The results indicate that satisfaction with Gohop.ie is good. In general, the users like the website and are pretty satisfied with it, despite several problems. The rating of the website is something between excellent and average. One user finds the website excellent, another user said that it is a good website and one more user said that it is an average website. Only one user said that she does not like the website, however her rating was also 'average'.

Ebookers.ie

1) Learnability

According to the results, learnability of Ebookers.ie is average. Two users (one of them has already used this website) said that the website is easy to use. The rest of the users used this website for the first time. One of these users said that the website is not difficult but also is not easy in use. Another user said that the website is not straightforward to use because it is not easy to find the obvious things. This means, that in general, the website's learnability level is average. The users do not like that the link to homepage is sometimes unavailable, that it is hard to find last minute deals and that the time ranges that are used to select departure and return time, are confusing.

One of the users said that she was really confused when the website displayed the error saying that there is no flight for the chosen location (Table 7.2). On the other hand, the users like that the website remembers previously entered search criteria and that it allows to select departure/check-in and return/check-out date. Two of the three critical problems that prevented the users complete the tasks were the errors. Because of these problems, the users have 5 uncompleted tasks altogether.

2) Efficiency

The efficiency of Gohop.ie is good. According to the results, the tasks on the websites were performed quite quickly and without much effort. The website saves users' time because it remembers previously entered search parameters. It also allows to easily select departure/check-in and return/check-out dates. One user noted that it is very handy that the calendar displays two months side by side. However, some users found that it is not easy to find the obvious things and that they must carefully read all information that is presented on the website in order to effectively use the site.

3) Errors

According to the results, the level of error tolerance of Ebookers.ie is poor. The users have encountered two types of errors and these errors were the critical ones. The users could not recover from these errors, thus they could not complete the tasks. These errors are presented in Table 7.2 One of the users was extremely frustrated that after she changed a search by selecting 2 people instead of one, the website displayed the error saying that there is no flight for the chosen location. She said that it is strange and very confusing that at first when she selected one passenger, the website displayed holiday packages for this destination.

4) Satisfaction

The results indicate that the overall satisfaction with Ebookers.ie is also average. Two users said that they do not like the website. Other two users also did not say that they like the website. They commented that the website is not bad. The rating of the website is somewhere between poor and good. One user finds the website average, another user said that this is a poor website and two users said that the website is good.

Limericktravel.ie

1) Learnability

Learnability of Limericktravel.ie is poor. All users have used this website for the first time and nearly all of them said that the website is not easy to use. Only one user said that in general the website is simple although some aspect of the website are quite difficult in use. Compared to other websites, the users had encountered a large amount of problems (Table 7.7). One of the users said that she had problems with every task. Three of the users recommended fully redesign the website. Two of the three problems that prevented the users complete the tasks were the errors. Because of these problems the users could not complete 8 tasks.

2) Efficiency

The efficiency of Limericktravel.ie is average. The users required some effort in order to complete the tasks because they had a lot of problems while they performed the tasks. However, a large amount of encountered problems did not significantly impact the task completion time.

3) Errors

The results indicate that Limericktravel.ie does not conform to this principle. The users have encountered three types of errors. Two errors were significant ones as the users could not complete the exercises (Table 7.3). One more error was: "404 Page Not Found. The page you requested was not found". The error was displayed when users pressed the logo Limericktravel.ie in order to return to homepage.

4) Satisfaction

According to the test and interview results, Limericktravel.ie does not conform to this principle. Three users said that they do not like Limericktravel.ie because it does not work appropriately. One user commented: "Is this the real website? It seems not fully developed". They said that they will never use this website again. One user said that she does not trust it. Another participant said that the website has nothing interesting or noteworthy, and that the previous websites were much more interesting. The rating of the Limericktravel.ie is 'poor'.

Letsgotravel.ie

1) Learnability

According to results, the learnability of Letsgotravel.ie is average. Users find the website quite simple and easy to use. In general, the website presents the information in a clear way. Only the hotels search results page has the content (filtering, search results) that is difficult to understand. Only one user finds the search form on homepage not so straightforward to understand. The users had only few problems. For example, they were dissatisfied that the website does not provide calendar for choosing a return date (exception is flights search form). They also did not like that they must calculate a number of nights. There were three serious problems that have prevented users to complete the exercises (Table 7.4). The users have 8 uncompleted tasks altogether (each user has 2 uncompleted tasks).

2) Efficiency

The efficiency of Letsgotravel.ie is good. Users performed the tasks quite quickly and without much effort. The website is clear. Thus, the users did not have to spend time carefully reading the information on website in order to successfully complete the tasks. However, the users required some effort in order to calculate a number of nights because the website does not provide a calendar to select return/check-out date.

3) Errors

The test results indicate that Letsgotravel.ie does not conform to this principle. All users have encountered one type of error. However, this error was the critical one since it prevented the users complete the tasks (Table 7.4).

4) Satisfaction

The results indicate that the overall satisfaction with Letsgotravel.ie is average. Although the users think that the website is simple, they are not satisfied with it. The reason for this is that they could not find and book what was required. For example, the participants could not find required holidays because they did not find required destination point in the provided list of destinations. They also could not book a last minute holiday because of the error that is explained in Table 7.4 Three users think that Letsgotravel.ie is an average website. Only one user rated it as 'poor'.

Holidaysonline.ie

1) Learnability

As the results indicate, the learnability of Holidaysonline.ie is excellent. All users said that the website is very easy to use. They commented that the website is pleasant to use, and that everything is clear and concise. One user commented that this website is for the people of any age. The users like that it is very easy to find last minute deals. The users have encountered only few problems during task performance. For example, the users did not like that there is no functionality to change a search directly on search results page, and that there is no sorting. They did not like the fact that the website does not have a field for entering a return date and users had to calculate a number of nights. These problems were not the serious ones. The critical problems, according to the users, are that the website does not allow to book a holiday for 1 person, and that a holiday (or flight) can be booked for only 7 or 14 nights.

2) Efficiency

The efficiency of Holidaysonline.ie is excellent. The users performed the tasks very quickly and without the effort. The website saves users' time because it remembers previously entered search parameters.

3) Errors

The level of error tolerance of Holidaysonline.ie is very high. Probably this is due to the fact that the website is quite simple. The users did not encounter errors during task performance.

4) Satisfaction

According to the test and the interview results, the users' satisfaction with Holidaysonline.ie is average. Two users said that they like the website. Other two said that they are unsatisfied with the site. Although they think that Holidaysonline.ie is very easy in use, they can not be fully satisfied with the site because of the two serious problems: the website allows to select either 7 or 14 nights and does not allow select 1 passenger (during holiday search). The rating of the website is somewhere between excellent and poor. One user finds the website excellent, another user said that this is a

good website and two users said that the website is poor.

The summary of conformance with usability principles is given in Table 7.10.

	Gohop	**Ebookers**	**Limericktravel**	**Letsgotravel**	**Holidaysonline**
Learnability	Good	Average	Poor	Average	Excellent
Efficiency	Good	Good	Average	Good	Excellent
Errors	Poor	Poor	Poor	Poor	Excellent
Satisfaction	Good	Average	Poor	Average	Average
Level of compliance to principles	Quite good	Average	Poor	Average	Quite excellent

Table 7.11: Websites' Level of Conformance to Usability Principles

7.4.2 Significant usability problems

To supplement the analysis, each of the 5 websites was evaluated in section 6.2 against 24 usability guidelines proposed by Webcredible (2006-2007; 2008; 2009; 2010; 2011). The results of the evaluation with real users were compared to the results of evaluation by using Webcredible guidelines. This comparison helped identify an overlap between 2 sets of flaws what in turn helped determine the most important usability problems of the websites.

According to the findings from the evaluation that was performed by using Webcredible usability guidelines, the websites have low level of conformance to 21 guidelines (section 6.2). According to the evaluation that was performed by involving real users, the users think that the following problems are the most important:

- Four websites do not provide a calendar for selection a return date.
- Three websites use unclear labelling.

- Three websites do not remember previously entered search data.
- Three websites have unclear first step of booking.
- Three websites have sorting function that is not well marked.
- Two websites have unclear search results pages.
- Two websites do not provide full price as early as possible in the booking process.
- Two websites do not provide an easy way in order to return to homepage.
- Three websites do not have last minute deals (late offers) in a place that is clearly visible.
- Two websites do not provide a functionality that allows to change search data directly on search results page.
- Two websites have no sorting.

By comparing the guidelines with low level of conformity among the websites to websites' general problems identified by users, the most important problems were identified:

- absence of well designed graphical calendar
- absence of functionality that allows to easily change search data directly on search results page
- absence of clear and well designed sorting and filtering
- unclear and not obvious first step of booking process
- not saving search data across sessions
- not displaying clearly last minute deals (late offers) on website homepage
- not displaying full price (or estimate) as early as possible in the booking process

These flaws are the most significant usability problems thus they should be seriously taken by websites developers.

7.4.3 Recommendations

In order to improve usability, the websites should first of all fix the most critical

problems. The critical problems of Gohop.ie, Ebookers.ie, Limericktravel.ie, Letsgotravel.ie and Holidaysonline.ie are presented in section 7.2.1. These are very serious problems because they prevented the users from purchasing travel products. After these problems will be solved, the websites developers can focus on problems that are not so critical, but are also very important. These problems were identified in section 7.3.2. Then developers can focus on the problems that are less important. These problems were identified during usability testing and the evaluation that was performed by using Webcredible usability guidelines. The recommendations were exclusively created for each website. These recommendations are presented in the Appendix F.

7.5 Research Validation

In order to show that this research is academically sound (Shenton 2004), the study was validated by using criteria for judging qualitative research that were proposed by Guba and Lincoln. These criteria are: credibility, transferability, dependability, confirmability (Trochim 2006).

1. Credibility

The credibility criteria means whether or not the findings from the research are congruent with reality (Merriam 1998 cited in Shenton 2004). As recommended by (Shenton 2004) in order to ensure credibility:

the area of usability was explored in detail and presented in the research

the well established usability evaluation methods (questionnaire, Think Aloud protocol and interview) have been used for the experiment

several usability evaluation methods have been combined in order to complement each other

the participants were given an opportunity to stop participation at any time. This ensured their honesty

the previous research have been examined and the research findings have been discussed in the context of previous research.

2. Transferability

The transferability means that the research results can be applied to other contexts (Trochim 2006). As recommended by (Shenton 2004), a background data that can be used to set up the context of the research must be provided. In order to ensure transferability, a detailed information such as a number of the participants who were involved in the experiment, a profile of test users, data collection methods, the questionnaire, the test tasks and the interviews questions are given in this research.

3. Dependability

The dependability means whether or not the same findings will be produced if the research is repeated in the same context, with the same methods and with the same participants (Shenton 2004; Trochim 2006). In order to ensure dependability, Shenton (2004) recommends to explain the process of the research in detail in order to give an opportunity for future researchers to repeat the research. For this purpose, the detailed plan of the experiment and detailed description of the execution of the experiment are given in this research.

4. Confirmability

The confirmability means that the research results can be confirmed by other researchers (Shenton 2004). According to Shenton (2004), to ensure confirmability, the reasons for decisions made should be given in the research. Thus the reasons for choosing particular evaluation methods, the reasons for choosing particular number of test users and the reasons for creating particular tasks for the test are given in this research.

7.6 Answers to Research Questions

1st R.Q.: How Ireland's websites conform to usability principles?

According to the results from the analysis with using usability principles, the best website is Holidaysonline.ie. While the website is quite simple and does not provide fancy features, it has the highest level of conformance with usability principles. The next best website is Gohop.ie. It has a good conformance with all usability principles (except the Error tolerance principle). The next websites are Ebookers.ie and Letsgotravel.ie. These websites equally meet the usability principles. The very low level of conformance to the principles has Limericktravel.ie.

It is quite difficult to determine a general level of conformance of Ireland's travel websites with usability principles since all the websites quite differently meet these principles. Nonetheless, a general level of usability of Ireland's travel websites is somewhere between average and good. Obvious is the fact that the websites are really badly comply with 'Errors' principle. The websites are bad at: minimizes the chances of making errors, providing good guidance on how to recover from errors and eliminating harmful errors (Nielsen 1993). The websites developers must put an effort into rising the conformance level to this principle. The recommendations that are provided in this research can be used for this purpose.

2nd R.Q.: How to improve these websites in order to increase their level of usability and to make them more satisfactory for the use of their typical customers?

In order to make the websites more successful by attracting new users and by making existing users more loyal, the websites must improve usability. The website that makes its users satisfied and enables them to easily find products and services that they need, is more prosperous because its customers are willing to return to the site and use it again (Safavi 2009b). In order to increase the level of conformity to usability principles, the websites must first solve the problems that prevent users to purchase products. Then websites' developers should focus on usability problems that are no so critical, but still very important. After these problems are solved, they can move to less important usability problems. The recommendations that were created for each website are presented in the Appendix F.

7.7 Conclusion

The results from the analysis indicate that in general, Ireland's travel websites' level of conformance is somewhere between average and good. The findings show that these websites are bad at conformance to 'Errors' principle. In this section the results of the evaluation with real users were compared to the results of evaluation by using Webcredible guidelines. It has helped to identify important usability problems of the websites. The recommendations for improvements were made on the basis of usability problems.

8. CONCLUSION

8.1 Introduction

This research has produced some interesting findings. The research helped to get an insight into how travel websites which are focused on Ireland's customer base implement usability principles and what can be done in order to rise travel websites' level of usability. This chapter gives an overview of this research, presents key findings in the context of previous research, gives experiment limitations and provides suggestions for future research.

8.2 Research Definition & Research Overview

This research uses qualitative approach. It focuses on usability evaluation of Ireland's travel websites by employing qualitative research methods. The purpose of the research was to get an insight into how easy and pleasant in use are Ireland's travel websites from the point of view of their typical users.

The objectives of the study are the following:

1) Conduct a literature review in order to explore the area of usability and its importance, and to establish a set of criteria for usability evaluation.

2) Conduct a literature review in order to identify a profile of a typical customer of online travel agents.

3) Conduct a literature review in order to explore the range of usability evaluation techniques and methods.

4) Conduct the experiment by applying appropriate usability evaluation techniques and methods.

5) Analyze the data gathered from the experiment by using the set of usability criteria.

6) Create recommendations for usability improvements by using the data gathered from the experiment.

8.3 Contributions to the Body of Knowledge

Usability plays an important role in making websites successful (Matera, Rizzo and Carughi 2006; Beaird 2007 cited in Gardner 2007). Usability is aimed at producing websites that are simple, natural and easy to use (Safavi 2009a). Websites that are clear and straightforward to use improve users experience (O'Connor 2011) and thus make the users more satisfied. The existing literature shows that a high level of interactivity, user-friendly design, and ease of use, ease of learning and ease of understanding have a positive effect on user's satisfaction with E-commerce websites (Lowry *et al.* 2006, Smith 2008, Jianchi and Xiaohong 2009).

A number of stakeholders such as software development companies, E-commerce businesses and end users, can benefit from usability. Software development companies can lower development, documentation and maintenance costs as well as make software development cycles shorter. Usability can help E-commerce businesses make their websites more successful and thus increase their sales. Usability can also help the companies to improve their competitive positions. Incorporation of usability into interface design leads to increased website's efficiency and end-user productivity (Donahue, Weinschenk and Novicki 1999). Usability is highly important for E-commerce websites since incorporation of usability into development process helps create straightforward and natural user interfaces (Safavi 2009a) what in turn has a positive effect on online shopping experience of end users (Zainudin, Ahmand and Nee 2010).

The researches that focused on usability evaluation of E-commerce websites demonstrate that usability of these websites is quite good but there is still a lot of room for improvement. The main problems are incomplete and unclear information, bad

display of important information, non descriptive messages, poor navigation, bad design of buttons and bad presentation of search results (Nielsen 2011; Peppa, Lysikatos and Metaxas 2012). The results of different researches that were focused on usability evaluation of travel websites are contradictory. Some researches found that travel websites are quite easy to use (Yeung and Law 2003; Carstens and Patterson 2005; Pan, Zhang and Smith 2011; Webcredible 2011), other discovered that these websites have low level of usability and are difficult in use (Maswera, Dawson and Edwards 2005; Smith 2008; Finn 2012).

The results from usability testing and post-test interviews were evaluated according to usability principles that were identified during literature review. The findings of this research show that different Ireland's travel websites have different levels of usability. For example, Limericktravel.ie has the lowest level of usability which is poor. Two of the websites, Ebookers.ie and Letsgotravel.ie, have average level of conformance to four usability principles. Gohop.ie is quite good at compliance. Only one website, Holidaysonline.ie, has quite excellent level of usability. A general level of usability of Ireland's travel websites is somewhere between average and good what is similar to the findings of the majority of previous researches.

According to the previous studies, the main problems of travel websites are: bad presentation of the search results and the lack of clarity (Carstens and Patterson 2005; Pan, Zhang and Smith 2011; Finn 2012), difficulty of finding website's home page, bad design of links, the use of terms that are confusing for users, bad website navigation, poor organization of website's content and difficulty of controlling website's menus (Finn 2012). The main problems that were identified in this research supplement the problems found by previous researches. According to the findings, Ireland's travel websites do not have: well designed graphical calendar, functionality that allows to easily change search data directly on search results page, clear and well designed sorting and filtering. These websites have unclear and not obvious first step of booking process. They do not remember search data across sessions, do not display clearly special offers such as last minute deals on homepage and have a problem with displaying a full price (or estimate) as early as possible in the booking process.

The recommendations for usability improvements were specifically designed for each

website. Some recommendations are the same as the recommendations that were made by previous studies, for example, make pages less cluttered by removing unnecessary information and useless functionalities (Carstens and Patterson 2005; Pan, Zhang and Smith 2011), improve a speed of travel websites (Yeung and Law 2003) and provide a way to make special searches based on the individual needs of users (Carstens and Patterson 2005).

8.4 Experimentation, Evaluation and Limitation

Two types of usability evaluation techniques were used for the experimentation: usability testing and usability inquiry. Among the methods of usability testing, Think Aloud method was chosen for the evaluation. Among the methods of usability inquiry, the preference was given to questionnaires and interviews.

Before the usability test, the pre-test questionnaire was distributed among 55 participants. The pilot questionnaire was run with the pilot user before the actual questionnaire was sent to the participants. The responses were received from 44 participants. 8 participants who fully match the profile of a typical customer were further contacted asking to give their consent to participate in the usability test. 4 participants agreed to participate in the test. All test participants were experienced users (users who have used travel websites before).

Before the actual usability test and post-test interview, the pilot test and pilot interview were performed with the pilot user. The test was performed in users' environments in order to make the test more natural. The test tasks were designed on the basis of the questionnaire results in order to ensure that the tasks represent the real uses of travel websites. The tasks asked the users to search and select travel products, as well as enter passengers details. The users were not asked purchase products, i.e. complete transactions. Immediately after test, the users were asked post-test questions.

The results from the usability test and post-test interviews were evaluated by using usability principles that were proposed by Nielsen (1993). One principle

'Memorability' was excluded from the analysis as this principle is difficult to measure by using usability testing that involves users (Affordable Usability).

Limitations:

- The users knew they are being watched (Think Aloud method was used for the test).
- The usability test was limited to four users.
- The usability test was limited to experienced users (users who have used travel websites before).
- Users tested only few aspects of travel websites.
- Users were not asked to complete transaction.
- Principle 'Memorability' was excluded from analysis.

8.5 Future Research

The findings are important for improvement of travel websites. However, the usability test was based on a few test users. It would be valuable to perform usability test with more users. A larger group of test users could produce different results. The results could be also different if novice users (the users who never used travel websites before) will be involved. One more limitation was that the users did not test every aspect of travel websites. The future research could focus on different areas of travel aspects, for example, test less popular aspects of travel websites, e.g. to book transfers on Gohop.ie or book cruises on Ebookers.ie. As the users were not asked to complete transactions, future research can ask users to make bookings by paying for the products on the website.

The future research may also use other principles for the evaluation in order to see how Ireland's travel website conform to different usability principles. As questionnaire results showed, the websites used in this research have different popularity levels ranging from the most popular (Ebookers.ie) to the least popular (Limericktravel.ie). The future research may use different set of travel websites. For example, the study can focus on only very popular websites or on only unpopular ones.

8.6 Conclusion

This chapter have presented an overview of the research and presented the key findings in the context of previous research. The chapter showed that the findings are also similar to the findings of the majority of previous researches that focused on travel websites and various E-commerce websites. Based on the limitations of this research, the recommendations for future research were suggested.

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APPENDIX A

Pre-test questionnaire

Questionnaire form

This questionnaire is prepared for the project for Dublin Institute of Technology. All information will be used confidentially only for this research.

Personal information:

1. Name:

2. Surname:

Demographic information:

3. Age:

4. Gender (Male or Female):

5. Education level (Secondary; Higher/Third-level or other (please specify)):

6. Marital status (Single, Married or Living with partner):

7. Household Income - combined income from all family members from all sources (€) (< 30 000; 30 000 - 55 000 or > 55 000):

8. Internet experience (< 4 years; 4 - 6 years; > 6 years):

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9. Have you ever used travel websites (websites of travel agencies/tour operators):

10. Have you used any form the following:

- gohop.ie
- letsgotravel.ie
- limericktravel.ie
- ebookers.ie
- holidaysonline.ie

11. If yes, please specify which one:

12. Have you used other travel websites:

13. If yes, please specify the names of the websites:

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14. If you have ever used a travel website, please specify what did you do on the website (Please, enter a letter corresponding to your option. You can select multiple options. If you never visited a travel website, ignore this section):

a. Search for suitable holiday (for example, flight + hotel or flight + hotel + car) and purchase it online through a travel website

b. Search for suitable holiday (flight + hotel or flight + hotel + car) and purchase it offline (by booking by telephone or by going to the travel agency's office)

c. Search for suitable flight and book it online through a travel website

d. Search for suitable hotel room and book it online through a travel website

e. Hire a car online through a travel website

f. Purchase last minute holidays online through a travel website

g. Purchase holidays with discounts or special offers online through a travel website

h. Other (please specify):

APPENDIX B

Consent form

Usability evaluation consent form (test)

Please read and sign this form.
The study is prepared for the project for Dublin Institute of Technology and seeks to evaluate Ireland's travel websites such as gohop.ie, ebookers.ie, limericktravel.ie, letsgotravel.ie and holidaysoline.ie. The purpose of the study is to find out how Ireland's online booking systems conform to usability requirements and to provide recommendations on how to improve the websites in order to make them more satisfactory for the use of their regular customers. By participating in this study, you are contributing to improving these websites.

In this usability evaluation you will be asked to:

- Participate in the usability testing and perform certain tasks on the websites
- Participate in the interview

Participation in this study is voluntary. All personal information will remain strictly confidential. The findings will be used to help improve the websites. However, at no time will your name or any other identification be used. You can withdraw your consent to the study and stop participation at any time.

I have read and understood the information on this form.

Subject's signature (name and surname):

Date:

APPENDIX C

Test tasks

Session 1 (gohop.ie)

Task 1

1.1	Instructions: • Visit www.gohop.ie using any Internet browser. *You have completed the task. Proceed to task 2.*

Task 2

2.1	Instructions: • Start search of Flight & Hotel package on website's homepage. • You are planning to go from Dublin to Tenerife. • You need Flight & Hotel package only for you (1 person). • You need only 1 room. • You would like to leave from Dublin on 13th of July 2013. • You plan to return from Tenerife on 23rd of July 2013. • You need only non-stop (direct) flights. • You want to fly only with Aer Lingus. *Complete the steps above and press Search button. Proceed to 2.2*
2.2	Instructions: • You have changed your mind. Now you need a holiday package for 2 people (you and your partner). • You still need 1 room. • Filter holiday packages. You want 'Self Catering' board basis. • Sort holiday packages by lowest price (low to high). • Select the cheapest holiday package. *Complete the steps above. Proceed to 2.3*
2.3	Instructions: • You need 2 standard baggages (15 kg). • You also need the cheapest shuttle transfer for you and your partner (2 people).

	Complete the steps above and press the button to go to the next step of booking process. Proceed to 2.4
2.4	Instructions: • Enter details into 'Guest and Passenger Details' section. • Enter details into Contact Details' section. • (Do not enter any information into 'Payment Details' section). • Agree that you have read Terms and Conditions. *You have completed the task. Proceed to task 3.*

Task 3

3.1	Instructions: • Start search of hotel on website's homepage. • You plan to go to Tenerife on 13th of July 2013. • You plan to return from Tenerife on 28th of July 2013. • You need 1 room for you and your partner (2 people). • You also need 1 room for your friend (1 person). *Complete the steps above and press Search button. Proceed to 3.2*
3.2	Instructions: • Filter hotels. You need 5 stars hotel. • Sort hotels by lowest price (low to high). • Select the cheapest 5 stars hotel. *Complete the steps above.* *You have completed the task. Proceed to task 4.*

Task 4

4.1	Instructions: • Start search of flight ticket on website's homepage. • You need 1 ticket from Dublin to Tenerife. • You plan to leave from Dublin on 15th of August 2013. • You plan to return from Tenerife on 22nd of August 2013. • You want to fly only with Aer Lingus.

	Complete the steps above and press Search button. Proceed to 4.2
4.2	Instructions: • You have changed your mind and now you need 2 tickets from Dublin to Tenerife. • Make sure the flights are sorted by lowest price. • Select the cheapest flight. *Complete the steps above.* *You have completed the task. Proceed to task 5.*

Task 5

5.1	Instructions: • Start search of a car on website's homepage. • You need a car in Tenerife from 15th of August 2013 till 23rd of August 2013. • You need a car around 14:45. • Your approximate drop-off time is 11:00. *Complete the steps above and press Search button. Proceed to 5.2*
5.2	Instructions: • Your drop-off time is changed. Now it is 12:00.. • Select the most expensive car. *Complete the steps above. Proceed to 5.3*
5.3	Instructions: • You need: 1. cancellation protection 2. navigation system • Enter details into 'Driver details' section • Agree that you have read information about car hire. • (Do not enter any information into 'Contact Details' section). • (Do not enter any information into 'Payment Details' section).

	Complete the steps above. *You have completed the task. Proceed to task 6.*

Task 6

6.1	Instructions: • Search last minute deals that are offered on the website. • Select any last minute holiday. *Complete the steps above and press Search button.* *You have completed the task. Proceed to task 7.*

Task 7

7.1	Instructions: • Search cheap holiday deals that are offered on the website. • Select any cheap holiday. *Complete the steps above and press Search button.* *You have completed the task.*

Session 2 (ebookers.ie)

Task 1

1.1	Instructions: Visit www.ebookers.ie using any Internet browser. *You have completed the task. Proceed to task 2.*

Task 2

2.1	Instructions: • Start search of Flight + Hotel package on website's homepage. • You are planning to go from Dublin to Tenerife. • You need Flight + Hotel package only for you (1 person). • You need only 1 room. • You plan to leave Dublin on 15th of August 2013. • You would like to leave from Dublin around 7 in the morning. • You plan to return from Tenerife on 22nd of August 2013. • You want to leave from Tenerife around 11 in the morning. *Complete the steps above and press Search button. Proceed to 2.2*
2.2	Instructions: • You have changed your mind. Now you need holiday package for you and your partner (2 people). • You still need 1 room. • You want the shortest flight. Update the results to show only non-stop (direct) flights. • Sort hotels by lowest price (low to high). • Select the cheapest Flight + Hotel package. *Complete the steps above. Proceed to 2.3*
2.3	Instructions: • You are happy with booking details. • You do not need a car. *Complete the steps above and press the button to proceed to the next step of booking process. Proceed to 2.4*
2.4	Instructions: • You do not need Travel insurance. • You want to book a non smoking room. • Enter passengers' details. *Complete the steps above and press the button to proceed to the next step of booking process.* *You have completed the task. Proceed to task 3.*

Task 3

3.1	Instructions: • Start search of hotel on website's homepage. • You plan to go to Tenerife on 13th of July 2013. • You plan to return from Tenerife on 23rd of July 2013. • You need 1 room for you and your partner (2 people). • You also need 1 room for your friend (1 person). *Complete the steps above and press Search button. Proceed to 3.2*
3.2	Instructions: • Filter hotels by Hotel Stars. You need 5 stars hotel. • Sort hotels by lowest price (low to high). • Select the cheapest 5 stars hotel. *Complete the steps above.* You have completed the task. Proceed to task 4.

Task 4

4.1	Instructions: • Start search of flight ticket on website's homepage. • You need 1 ticket from Dublin to Tenerife. • You plan to leave from Dublin on 15th of August 2013. • You would like to leave Dublin around 7 in the evening. • You plan to return from Tenerife on 22nd of August 2013. • You want to leave from Tenerife around 11 in the evening. • You want to fly only with British Airways. *Complete the steps above and press Search button. Proceed to 4.2*
4.2	Instructions: • You have changed your mind and now you need 2 tickets from Dublin to Tenerife. • You want a shortest flight. Sort results by shortest flight. • Filter flights by price. Maximum what you are willing to pay for the ticket is € 1 000. • Select the shortest flight. *Complete the steps above.*

	You have completed the task. Proceed to task 5.

Task 5

5.1	Instructions: • Start search of a car on website's homepage. • You need a car in Tenerife from 15th of August 2013 till 23rd of August 2013. • You need a car around 14:45. • Your approximate drop-off time is 11:00. • Enter your age. *Complete the steps above and press Search button. Proceed to 5.2*
5.2	Instructions: • You are going to Norte Los Rodeos airport (TNF). • Your drop-off time is changed. Now it is 12:00. • Sort cars by price. • Select the most expensive car *Complete the steps above.* *You have completed the task. Proceed to task 6.*

Task 6

6.1	Instructions: • Search last minute holiday deals offered on the website. • Select any last minute holiday. *Complete the steps above.* *You have completed the task.*

Session 3 (limericktravel.ie)

Task 1

1.1	Instructions: • Visit www.limericktravel.ie using any Internet browser. *You have completed the task. Proceed to task 2.*

Task 2

2.1	Instructions: • Start search of sun holiday package on website's homepage. • You are planning to go from Dublin to Tenerife. • You need sun holiday package only for you (1 person). • You would like to leave from Dublin on 13th of August 2013. • You plan to return from Tenerife on 20th of August 2013. *Complete the steps above and press Search button. Proceed to 2.2*
2.2	Instructions: • You have changed your mind. Now you need a holiday package for 3 people (you, your partner and your friend). • Select the cheapest holiday with 'Half board' basis. *Complete the steps above. Proceed to 2.3*
2.3	Instructions: • You need 1 double room and 1 single room. • You do not need insurance. • Enter your details. *Complete the steps above and proceed to the next step of booking process.* *You have completed the task. Proceed to task 3.*

Task 3

3.1	Instructions: • Start search of hotel from website's homepage.

	• You plan to go to Tenerife on 13th of July 2013. • You plan to return from Tenerife on 23rd of July 2013. • You need 1 room for you and your partner (2 people). • You also need 1 room for your friend (1 person). *Complete the steps above and press Search button. Proceed to 3.2*
3.2	Instructions: • Filter hotels. You need 5 stars hotel. • Sort hotels by lowest price (low to high). • Select the cheapest 5 stars hotel. (Remember that you need 2 rooms). *Complete the steps above. Proceed to 3.3*
3.3	Instructions: • Enter details. *Complete the steps above. Proceed to 3.4*
3.4	Instructions: • Enter your details. • Agree that you have read Terms and Conditions. • (Do not enter any information into 'Payment Details' section). *Complete the steps above.* *You have completed the task. Proceed to task 4.*

Task 4

4.1	Instructions: • Start search of flight from website's homepage. • You need 1 flight ticket from Dublin to Tenerife. • You need one way ticket. • You plan to leave from Dublin on 15th of August 2013. • Search flights offered only by Aer Lingus. *Complete the steps above and press Search button. Proceed to 4.1*
4.2	Instructions:

	• You have changed your mind. Now you need 2 tickets from Dublin to Tenerife. • Filter results to show only non-stop (direct) flights only. • Sort flights by lowest price (low to high). • Select the cheapest flight ticket. *Complete the steps above. Proceed to 4.3*
4.3	Instructions: • Enter details (your details and details of the 2nd passenger). • (Do not enter any information into 'Payment' section). *You have completed the task. Proceed to task 5.*

Task 5.

6.1	Instructions: • Select any last minute holiday deal offered on the website. *Complete the steps above* *You have completed the task.*

Session 4 (letsgotravel.ie)

Task 1

1.1	Instructions: • Visit www.letsgotravel.ie using any Internet browser. You have completed the task. Proceed to task 2.

Task 2

2.1	Instructions: • Start search of flexible holiday package on website's homepage. • You are planning to go from Dublin to Tenerife. • You would like to leave from Dublin on 13th of July 2013.

	• You plan to return from Tenerife on 23rd of July 2013. • You need holiday package for you and your partner (2 people). • You need only 1 room. *Complete the steps above and press Search button. Proceed to 2.2*
2.2	Instructions: • You have changed your mind. Now you need a holiday package for 1 person only. • Filter holiday packages. You want accommodation only with 'Self Catering' board basis. • Select the cheapest holiday package. *Complete the steps above. Proceed to 2.3*
2.3	Instructions: • You need 1 baggage. • Enter your details into 'Passenger details' section. Also enter your address and contact details. • (Do not enter any information into Payment Details section). *Complete the steps above.* *You have completed the task. Proceed to task 3.*

Task 3

3.1	Instructions: • Start search of hotel on website's homepage. • You plan to go to Tenerife on 13th of July 2013. • You plan to return from Tenerife on 26th of July 2013. • You need 1 room for you and your partner (2 people). • You also need 1 room for your friend (1 person). *Complete the steps above and press Search button. Proceed to 3.2*
3.2	Instructions: • Filter hotels. You need 5 stars hotel. • Select the cheapest 5 stars hotel. *Complete the steps above.*

	You have completed the task. Proceed to task 4.

Task 4

4.1	Instructions: • Start search of flight ticket on website's homepage. • You need 1 ticket from Dublin to Tenerife. • You plan to leave from Dublin on 15th of August 2013. • You plan to return from Tenerife on 22nd of August 2013. *Complete the steps above and press Search button. Proceed to 4.2*
4.2	Instructions: • You have changed your mind and now you need 2 tickets from Dublin to Tenerife. • Make sure the flights are sorted by lowest price. • Select the cheapest flight. *Complete the steps above.* *You have completed the task. Proceed to task 5.*

Task 5

5.1	Instructions: • Search last minute deals offered on the website. • Select any last minute holiday. *You have completed the task.*

Session 5 (holidaysonline.ie)

Task 1

1.1	Instructions: • Visit www.holidaysonline.ie using any Internet browser. *You have completed the task. Proceed to task 2.*

Task 2

2.1	Instructions: • Start search of sun holiday on website's homepage. • You are planning to go from Dublin to Tenerife. • You need holiday package for you and your partner (2 people). • You would like to leave from Dublin on 13th of July 2013. • You plan to return from Tenerife on 23rd of July 2013. • You are willing to pay any price for the holiday package. *Complete the steps above and press Search button. Proceed to 2.2*
2.2	Instructions: • You have changed your mind. Now you need a holiday for 1 person. • Select the cheapest sun holiday package. *Complete the steps above.* *You have completed the task. Proceed to task 3.*

Task 3

3.1	Instructions: • Start search of flight ticket from website's homepage. • You need 1 ticket from Dublin to Tenerife. • You plan to leave from Dublin on 15th of August 2013. • You plan to return from Tenerife on 28th of August 2013. • You are willing to pay any price for the holiday package. *Complete the steps above and press Search button. Proceed to 3.2*
3.2	Instructions: • You have changed your mind. Now you need a flight ticket for you and your partner (2 people). • Select the cheapest flight ticket. *Complete the steps above.* *You have completed the task. Go to task 4*

Task 4

4.1	Instructions: • Select any last minute holiday deal offered on the website. • Select the cheapest holiday. *<u>Complete the steps above</u>* *You have completed the task.*

APPENDIX D

Post-test interview

1) What is your general impression of the website?

2) Was the website easy to use?

3) What problems did you have using the website?

4) How in your opinion these problems can be solved?

5) What website's features you like? Why?

6) What website's features you do not like? Why?

7) How in your opinion the website can be improved?

8) Rate the website (Poor, Average, Good, Excellent).

APPENDIX E

Test material

Introduction to the project

Title of the project: "Usability evaluation of Ireland's travel websites". Usability means how easy is the system to use.

The purpose of the study is:
1) To find out how Ireland's online booking systems conform to usability requirements
2) To provide recommendations on how to improve the websites in order to make them more satisfactory for the use of their regular customers.

By participating in this study, you are contributing to improving these websites.

The websites that are being tested:
gohop.ie
ebookers.ie
limericktravel.ie
letsgotravel.ie
holidaysonline.ie

The experiment for this project consists of 3 parts:

1. The questionnaire (that you have already filled in).
2. Performing the test tasks.
3. Short interview at the end of each test session.

Test instructions

The test consists of 5 sessions. During each session you will test one website by performing certain tasks (the tasks will be given to you shortly).

Your aim is to perform the stated tasks while thinking out loudly (you should express your thoughts and comment your actions, say about the problems which you are encountering during the exercises, and tell what you like or dislike on the website).

You can take a break between the sessions.

At the end of each session you will have a short interview

You can stop completing the tasks at any time.

APPENDIX F

Recommendations

Gohop.ie	
Critical problems that should be fixed first	When one of the users changed a number of passengers (selected 2 people instead of 1) by using 'Change your search' situated on results page, website displayed the error: "Sorry, we have been unable to find any availability to match your requested flights". At first when user selected 1 person, website has presented the search results. Only after she selected 2 people, the website informed that it has no holidays for this destination.
	After one of the users has selected the hotel, the website displayed: "Error selecting travel option: XML in bad format".
	Two users could not complete the task because the website did not give the search results. In order to continue the task, users tried several other dates in different months, but the website did not give the results.
Recommendations on how to fix significant problems (they should be solved after the critical problems)	Provide a well designed graphical calendar for choosing a return/check-out date on all search forms.
	Make the 'Airlines' text field clearly visible on 'Flight Only' search form.
	Save all search data across sessions.
	Clearly mark the sorting function.
	Make sorting function more clear on flights results page. Instead of providing only one option: 'Sorted by price', the website should provide two options: 'Sort by price (low to high)' and 'Sort by price (high to low)'.
	'Filter My Results' section is too dull. Make it more brighter (possibly, change the font of the text or choose more brighter colour).
	Display Late Deals clearly on website's homepage and make their booking straightforward.
Other recommendations	Provide a help when users incorrectly type a name of the airline.
	When users enter a preferred airline, do not display an airline code (display an airline name).
	Make sure all entered search parameters are maintained in the 'Change your search' section. For example, the parameters for airline and direct flights are not maintained.
	'Mobile Number' text field is marked by asterisk but this asterisk is not red. When pressing 'Book now' button, this field does not

	become highlighted meaning that the mobile number is not required.
	Make text field for entering a mobile phone mandatory (instead of home phone number as some people do not have a home phone).
	Make label 'Your name' more clear as it does not specify what is required: first name or first name together with last name.
	Insert the link 'Hotels' (the link to hotels search form) in the menu (in the same way links 'Holidays' and 'Flights' are displayed).
	Provide the counties in the form of drop down list.
	The search form (start of the booking process) crosses horizontal fold. Redesign it.
	Make labels for departure and destination text field more descriptive (they must specify what can be entered: a city, an airport code, etc.).
	Position the offers above the page fold. The offers should be immediately visible when the page first loads.
	The website requires that users know exact destination. Support the users who do not know exactly what they want. For example, allow users to search travel products by available budget.
	Provide sorting and filtering mechanisms for cars and transfers.
	Allow users to easily share pages or email them to friends.
	Display information about airports.
	Provide a route map.
	Display currencies in several currencies such as local currency and currency of destination country (as well as euro and US dollars if appropriate).
	Allow users to print pages in a format that is easy to understand and read.
	Display progress bar in the form of process flow.
	Improve system response.

Ebookers.ie	
Critical problems that should be fixed first	When three users changed the search (by selecting 2 people instead of 1) on search results page, website displayed the error: "Sorry, ebookers.ie does not support flights for the location that you have selected. Please choose another location". At first when users selected 1 person, website has presented search results. Only after they have selected 2 people, website informed that it has no holidays for this destination. All previously entered criteria were remembered. Users wanted to complete the task and thus pressed search button again without changing any criteria. For two users website again did not give results. One user succeeded in her

	attempt and thus was able to complete the task.
	Two users were faced by the following: after they selected one of the last minute deals, the website displayed the error: "The page you requested has been removed or is no longer available".
	Display Last Minute Deals clearly on website's homepage and make their booking straightforward.
Recommendations on how to fix significant problems (they should be solved after the critical problems)	Clearly mark the sorting and filtering functions (the filtering functionality is not quite obvious and may go unnoticed by website users).
	Allow users to sort the cars by highest price (the sorting must include two options: 'low to high' and 'high to low').
	Add labels for leave time and return time as well as pick-up time and drop-off time.
	Make options for time easier to understand (possibly, show the time in 24-hour clock format).
Other recommendations	Make the option for narrowing the search to preferred airlines clearly visible on 'Flight only' search form.
	Make results on holidays results page easier to understand by removing unnecessary information.
	Make error messages that appear on homepage (e.g. the message "Sorry, ebookers.ie does not support flights for the location that you have selected. Please choose another location") more noticeable.
	Remove function for filtering hotels from the search form that is situated on homepage. One user said that it is unnecessary and only makes the form more cluttered.
	When users have selected 'Holidays' menu item, the website showed that is selected 'Deals' menu item.
	Provide the prices for all Last Minute Deals.
	Separate Last Minute Deals from other offers.
	Position Last Minute Deals above page fold (the page must be scrolled down in order to find the link to 'Last Minute Deals).
	Display total or approximate cost of hotel booking on the hotels search results page
	Provide 'Home' button or link to homepage on every page (there is no link to homepage on 'Trip details' page).
	Make the option for selecting non-smoking room more noticeable.
	Re-design the search form: • Label the search form. • It should not cross the horizontal fold. • It has unclear grouping of options. The input field for return date and the drop down list for selecting departure time require a swap.

	This is due to the fact that humans read from the left to the right. That is why it would be more natural to display departure time on the same row after departure date. • The search button should have consistent appearance across different search forms. For example, there should be only one button labelled 'Search' on all search forms.
	Provide a clear button to open the calendar.
	If a city or an airport name is typed incorrectly, the error message is displayed only after clicking the search button. Inform users about this immediately.
	The website requires that users know exact destination. Support the users who do not know exactly what they want. For example, allow users to search travel products by available budget.
	Allow users to easily share pages or email them to friends.
	Display information about airports.
	Provide a route map.
	Display prices in several currencies such as local currency and currency of destination country (as well as euro and US dollars if appropriate).
	Allow users to print pages in a format that is easy to understand and read.
	Make sure that a contact number is displayed on all pages.
	All extra costs must be automatically excluded from the total price. Not all the costs are automatically excluded by the website. For example, the Cancellation Insurance is automatically included in the price of a hotel. Similarly, Cancellation Insurance and Car Excess Reimbursement is automatically included in the price of a car hire.
	The website must explain of what is wrong and must provide explicit instructions how to fix it. Some forms don't do it. The website simply highlights the elements that need correction.

Limericktravel.ie	
Critical problems that should be fixed first	Three users were faced by the following: after entering passenger's details (title, initials and surname) and pressing 'Continue' button, the website displays the error: "Error Code 505, Error message 505".
	After entering passenger's details (title, initials and surname) and pressing 'Continue' button, one of the users encountered the following error: "The value "3@TWSGL" can not be converted to a number".
	Three users were trying to find Ireland in the drop down list labelled 'Select Country' because they thought that this is the list where they

	must select their country of residence. They have not paid attention to the following message: "Please select country and input your postcode if you want us to look up your address". Since Ireland has no postal code, it was not in the list. One user did not complete the task as she was unable to find her country. Clearly mark this message. Separate it together with 'Select Country' drop down list from the rest of the content of this section.
Recommendations on how to fix significant problems (they should be solved after the critical problems)	Provide a well designed graphical calendar for choosing a return/check-out date on all search forms. Allow users to book holidays for any number of nights.
	Also allow users to type a date manually.
	Provide sorting function and no filtering mechanism on holidays results page.
	Clearly mark the sorting function on flights and hotels results page.
	Make sorting on flights results page clear (users do not understand what means 'sort by air fares +' and 'sort by +').
	Provide full labels. Replace label 'Sun' by 'Sun holidays'. Replace label 'Dest' on holidays search form by 'Destination'.
	Make labels for destination text fields descriptive (they must specify what can be entered: a city, an airport code, etc.).
	Use clear labels. Replace 'Carrier' by 'Airline'.
	Insert 'Departure' text filed before 'Destination' text field.
	Save all search data across sessions.
	Make the section Late Offers more noticeable.
	Provide functionality that allows to change search data directly on holidays results page (in order to change results, users have to return back to homepage).
	Inset options for selecting 'Round-trip', 'One-way' and 'Open-jaws' before 'Return date'.
	Allow users to sort the flights by price (the sorting must include two options: 'low to high' and 'high to low').
Other recommendations	The search form should have consistent appearance across the website's pages.
	The search button should have consistent appearance across the search forms. For example, the button should be labelled 'Search' on all search forms.
	Provide flexibility with flight dates.
	Allow to select 1 passenger on holidays search form.

	Provide a link/button to homepage on all pages.
	Replace purple with other (more pleasant) colour.
	Supplement the list of 'Destinations' on holidays search form with functionality for typing a destination manually. 'Destinations' list is too long.
	'Accept & Close' button that is used to close information about cookies, must be placed in another location and must not look like the buttons on the search results page.
	Change the name of 'Booking' button to 'Select' on flights results page .
	Place 'First name' field before 'Last name' on 'Reservation' page.
	Fix the following problem. Holidays search form offers two similar destinations: Tenerife [Tenerife South] and Tenerife South [Tenerife South].
	Fix the following problem. The pop-up window displaying holidays 'Booking Conditions' shows wrong information. On the search form the user has selected 3 adults, however the pop-up window displays 2 adults and 1 children.
	Provides the results on one page. The website provides two pages containing holidays search results (one page shows holidays, other page shows accommodations).
	Include a Return date in the first page of holidays search results.
	Make the content in the left hand column on homepage more organized. It is hard to find 'Hotels' there because "all is mixed up".
	Provide a good contrast between different sections on hotels results page (difficult to understand how to select hotel rooms because the content of this page is hard to understand).
	Fix the following. It is difficult to understand whether an age should be entered when making a hotel booking. The website has label 'Age' but does not have a text field for entering an age.
	'Telephone' text field should not be mandatory (some users do not have home phone number).
	'Post code' field should not be mandatory (some users do not know their post code).
	Provide a help if users incorrectly type a name of the airline.
	Fix the following. Instead of Limericktrave.ie logo, Letsgotravel.ie logo is displayed on some pages. Users were confused whether they are on the right website.
	Fix the following. Two users were looking for the function to change the search data on top of flights search results. The website provides this functionality at the right side. One participant said that all the websites usually display booking details at the right hand

	side.
	Clearly mark 'Change request' button on flights search results page.
	Sorting function on flights search results page is not well marked.
	Make it more obvious how to select a flight.
	Make flights reservation page more clear. It is difficult to understand because page contains too much information. The information is badly organized without any contrast between sections.
	The grouping of the fields ('Last name' followed by 'First name') on 'Reservation' page seems not intuitive.
	Replace unusual format for entering the date of birth without any symbols (dots or backslashes) with other format, e.g. DD/MM/YYYY.
	Provide one field for entering a post code on 'Reservation' page (difficult to understand how to enter city instead of post code).
	Explain what is 'Initials' and 'E-mail format'.
	'Reservation' page asks to select 'Delivery method', but it provides only one option.
	Fix the following error. When pressing the logo of the website in order to move to homepage, website displays the error: "404 Page Not Found. The page you requested was not found" (users had to re-enter website's address).
	If a city or an airport name is typed incorrectly, the error message is displayed only after clicking the search button. Inform users about this immediately.
	The website requires that users know exact departure date and destination place (exception is sun holidays search form - it only requires departure date). For example, allow users to search travel products only by available budget.
	Allow users to easily share pages or email them to friends.
	Display information about airports.
	Provide a route map.
	Display prices in several currencies such as local currency and currency of destination country (as well as euro and US dollars if appropriate).
	Display full prices of products as early as possible in the booking process.
	Allow users to print pages in a format that is easy to understand and read.
	Confirmation pages regarding hotels and holidays do not indicate whether or not additional costs might apply.

	Clearly display all extra costs (there is no indication that Insurance of holidays has extra costs).
	Automatically exclude all extra cost (option for holidays insurance is automatically pre-selected and holiday Late Booking Fee is automatically included in the price).
	Display progress bar in the form of process flow.
	Do not use pop-up alert to show error messages.
	Highlight all elements that need correction.
	Never use the word 'ERROR' (error summary is named 'Error list').

Letsgotravel.ie	
Critical problems that should be fixed first	All users were faced by the following: when they selected preferred latest holiday deal, the website displayed the following error: "Sorry - there are no flights available on the dates you have requested on your search. Please search again".
	Three users could not find Tenerife in 'Destination' drop down list. The reason for this is that before that the users have selected Spain from the 'Country' list instead of Canary Islands. As the result, 'Destination' list had no required destination. The field "Or enter destination" was unnoticed by the users. Thus the users could not complete this exercise.
	One user thought that she must select her country from 'Country' drop down list which goes straight after 'Departure Airport' text field. The website provides no clarification regarding which country (departure or destination) must be selected. That is why the participant could not continue completing the task instructions.
Recommendations on how to fix significant problems (they should be solved after the critical problems)	Provide a well designed graphical calendar for choosing a return/check-out date on all search forms.
	Provide sorting function on holidays, hotels and flights results page.
	Provide filtering mechanism for flights.
	Make the section Late Offers more noticeable.
Other recommendations	Make 'Filter Results' button more noticeable.
	Make content on hotels results page easier (separate the content such as filtering functionality, search results).
	Replace label 'Party Size' by 'Number of Passengers'.
	Add more options that allow users to make special bookings (for example, add 'Non-stop flights' option, allow to select a preferred airline, etc.).

	Provide flexibility with flight dates.
	Fix the following. Labels for destination text fields are confusing and not descriptive. The same form two fields: one is called 'Departure airport'. It accept destination city and airport code. Another one is called 'Where would you like to go?'. It accepts destination city, airport name and airport code.
	Provide help if the departure or destination is typed incorrectly.
	Position 'Special sun holidays offers' above the page fold (they are not clearly visible when the page first loads).
	Allow users to make special bookings. The website requires that users know exact departure date and destination place. For example, allow users to search travel products by available budget.
	Save all search data across sessions.
	Fix the following. The first steps of product's selection process indicates that price displayed is total. However, the website does not indicate what the price includes.
	Allow users to easily share pages or email them to friends.
	Display information about airports.
	Provide a route map.
	Display prices in several currencies such as local currency and currency of destination country (as well as euro and US dollars if appropriate).
	Allow users to print pages in a format that is easy to understand and read.
	Progress bar must show the name of the current position.
	Provide an easy access to the Terms and Conditions (if the user wants view this information during product selection process or booking process, he/she must return to the home page).
	Fix the following. There are no appropriate error messages. When searching for flight without entering any information, website does not display what is wrong and how to correct it. Instead, website displays message saying "There are no flights available on the dates that you have selected. Please try other dates". Submitting the passenger details form without entering any information, leads to the message saying "Errors".
	Highlight elements that have to be corrected.
	Provide proper information on how to fix error.
	Do not use word 'Error'.

Holidaysonline.ie	
Critical problems that should be fixed first	The search forms allow to select only 7 or 14 nights.
	Holidays search form does not allow to book a holiday for only 1 person.
Recommendations on how to fix significant problems (they should be solved after the critical problems)	Provide functionality that allows to change search data directly on search results page (in order to change results, users have to return back to homepage).
	Provide a well designed graphical calendar for choosing a return/check-out date on all search forms. Allow users to book holidays for any number of nights.
	Provide sorting and filtering mechanisms.
Other recommendations	Label search form (start of booking process).
	Display on holidays search results page how many passengers are selected. Also show the full price.
	The search form should have consistent appearance across the website's pages.
	Make a maximum number of passengers higher than 5.
	Add more options that allow users to make special bookings (for example, add 'Non-stop flights' option, allow to select a preferred airline, etc.).
	Provide flexibility with flight dates.
	Make sure that calendar for selecting dates does not close relevant date fields (the calendars on holidays and flights search forms close date fields).
	Fix the following. Clicking elsewhere on the page does not force calendar to close. It stays hidden behind other windows.
	Allow users to make special bookings. The website requires that users know exact departure date. For example, allow users to search travel products only by available budget.
	Allow users to easily share pages or email them to friends.
	Indicate whether or not the prices for holidays and flights are total.
	Display information about airports.
	Provide a route map.
	Display prices in several currencies such as local currency and currency of destination country (as well as euro and US dollars if appropriate).
	Allow users to print pages in a format that is easy to understand and read.
	Display progress bar in the form of process flow.

	Progress bar must show the name of the current position.
	Do not use pop-up alert to show error messages.
	Highlight elements that have to be corrected.
	Do not use word 'Error' in error messages.