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The Users

The Users
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The users' perspective and preference on three user interface website design patterns and their usability

A qualitative study



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Subject: Degree project at Master Level

Level: Master

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Перспективата и предпочитанията на потребителите на *три модела за дизайн* на потребителския интерфейс и тяхната използваемост



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ABSTRACT

This study is qualitative and interpretive in nature. It examines the perception of 6 people aged 23-32 with decent experience in using the Web on the usability of three user interface website design patterns. These patterns are the 'hamburger' icon (an icon used primarily in mobile websites and apps that shows a hidden navigation when clicked), CAPTCHAs (a task that users have to complete to continue browsing a webpage to prevent automated software operating on the webpage) and returning to the homepage. It searches for the characteristics that they desire to see in those three user interface design patterns and the actions that those patterns represent. The participants are reached through interviews and observations and the research pinpoints that although experienced Internet users find the user interface elements relatively usable some usability factors can be worked upon in the chosen design elements and pinpoints what users would want to see changed, the actual changes they want and the problems they actually encounter with the current status of the three (3) design patterns and their usability. More noticeably, the research pinpoints that a "Homepage" button would be more usable than "Home" button which is the de facto standard as of this moment and it shows that the 'hamburger' icon is usable enough amongst experienced users, contradicting the research pinpointing that 71 out of 76 fail using the icon (Fichter and Wisniewski, 2016) probably due to the participants' experience with technology, but other, preferable alternatives to the 'hamburger' icon are revealed from the participants which are in line with the current literature. CAPTCHAs are confirmed as a 'nuisance' (Pogue, 2012) and the need for CAPTCHAs which are quick to solve emerges which is what forms the perception of usability of the participants.

Keywords

usability, captcha, hamburger, icon, homepage, website design pattern, qualitative, user interface

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List of abbreviations

CAPTCHA - Completely Automated Public Turing test to tell Computers and Humans Apart

UI/ui – user interface

HTML – Hypertext Markup Language

MVC – Model/View/Controller (a software architecture)

UPT – Usability Problem Taxonomy

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1 INTRODUCTION

This chapter provides an overview of the topic, its purpose, structure, objects of examination and highlights some reasons for conducting it in the first place

1.1 Background

The Web contains more than 1 billion websites with nearly 3 billion users who "surf" through them (Internetlivestats.com, 2016). It is only expected that users want to find what they are looking for quickly and effortlessly (Montero et al., 2002, p.1).

To help the users, user interface design patterns have emerged which are recurring solutions that solve common design problems (Toxboe, 2016) and the recurring principle in design patterns is to achieve a usability boost for the users (Montero et al., 2002, p.1)

Usability itself has been historically defined in different ways. It is defined in ISO 9241-11 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" (Jokela et al., 2003, p.54). A usable system essentially includes the following components: high user satisfaction and high efficiency and effectiveness (Jokela et al., 2003). However, the system's usability would depend on the context in which it is used, the goal of the user, the task at hand and the user's environment of use (the hardware, software and materials that the user disposes with) (Jokela et al., 2003).

Examples of patterns are the 'hamburger' icons that we use to reveal navigation in most websites today or the website's logo or home button which moves us back to the starting page/homepage of a given website.

Figure 1: The website design patterns examined in this study

The circles in Figure 1 show the different website design patterns under examination in this study. Circle 1 shows a "hamburger" icon; the icon indicates that clicking on it will show the website's navigation. It is typically shown on small screens such as smartphones and tablets due to their low amounts of screen real estate and the need to save space that comes from this.

Circle 2 shows the logo of Amazon which when clicked would return the users to the homepage. Circle 3 shows a popular CAPTCHA in which the users have to type the words from the image to proceed with accessing the web resource.

According to Johansson et al. (2015, p.1), website design patterns help websites to become accessible to all computer users and please them all. However, Montero et al. (2002, p.1) asserts that design patterns in websites originate from intuitions and not from research. Should this be the case today, the usability boost of the website design patterns may be ambiguous. This lack of research can be confirmed by looking at the history of the hamburger icon. Its earliest use can be traced to the interface design for the Xerox Star personal workstation in 1981 by Norm Cox and research was not undertaken on its usability qualities (Alday, 2014) (Quora.com, 2014) (Vimeo.com, 2013) - "the hamburger, which looks like a list, seemed like a good way to remind users of a menu list" (Campbell-Dollaghan, 2014).

In line with this trend, we believe that researching the ways users feel about the design patterns currently in use in websites, the effects of those patterns on their usability and examining what users actually desire can be beneficial to the research community and all people involved with websites such as users or developers in general. Such a research can pinpoint if current design patterns are serving their purpose of enhancing usability and it can pinpoint if, how and in what ways the design patterns can be ameliorated.

In this study, I will focus on the hamburger icon mentioned above, CAPTCHAs which are user interface patterns meant to prevent bots from posting content such as comments on websites by requesting the user to type a text from an image and the 'return to the homepage' pattern. The latter does not have any icon itself nowadays as users are expected to click on the website's logo to get returned to the homepage or they are presented with a button which states "Home".

Recent research (Fichter and Wisniewski, 2016) (Pogue, 2012), has shown that those three design patterns probably have poor usability but yet are used in highly popular websites and apps such as Amazon and TechCrunch. This research can serve to confirm/disconfirm this discovery, expand the available knowledge on the reasons of their poor usability and can pinpoint ways to create more usable design patterns in the future.

Figure 2: The hamburger icon in popular website TechCrunch

Figure 2 shows the presence of the 'hamburger' icon in a popular technical website called TechCrunch.

1.2 Purpose of the study

User interface (UI) design patterns in websites are very common. Twitter Bootstrap is a UI library which is used by millions of website out there. It allows technology designers to create websites with pre-made UI components.



They just pick the UI component that they want through an HTML element and class and the UI component appears on the page. It contains a lot of components such as slideshows, styled tables, panels, buttons, forms, icons and so on. It essentially allows easy and rapid inclusion of design patterns in any website. Twitter Bootstrap is used by 11% of the global 10,000 most visited websites and it is used by 15.3% of the million most visited websites with the trend being that more and more websites are using Bootstrap for their user interface (Trends.builtwith.com, 2016). Though, Twitter Bootstrap is not the only source of UI components for websites, there are many other alternatives available out there such as Zurb Foundation, UI kit and so on.

The usage of website design patterns will most likely continue to rise (Trends.builtwith.com, 2016) so research into the users' desires and their viewpoint regarding the actual usability effects of the current design patterns should come naturally. Involving the users' when building a sys-

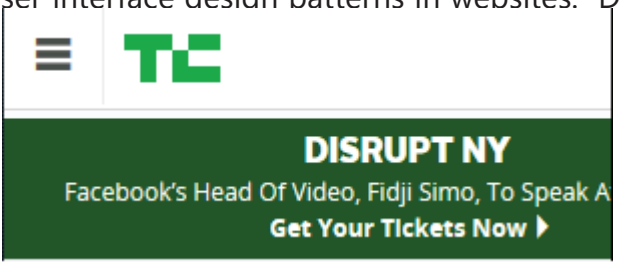
tem (collecting user requirements) is seen as very important and evidence exists to the usefulness of that practice (Shneiderman, 2006). This research seeks to find how users perceive the current design patterns in terms of their effects on their usability and what kind of characteristics users want the design patterns to have. This can have the effect of determining whether design patterns are regarded positively by users which can potentially reduce the stage of gathering user requirements due to the awareness that users find them satisfactorily. It can also pinpoint characteristics that users find lacking in current design patterns and pave the way for changes in that field or find characteristics that were neglected in the past and influence the future generation of user interface design patterns in websites.

The web involves a diverse user base focusing on different aspects of it. Some access the web using screen readers (visually impaired), some use it to find information, connect with others, others use it to shop, work, learn new skills and so on. This research cannot possibly capture the diverse user base of the World Wide Web and focuses mostly on young (between their 20s and 30s) long-time Web users who use the web in the most common way – visually through a web browser such as Mozilla Firefox or Chrome.

1.3 Topic justification

The topic has been somewhat neglected in the past and this research can potentially reach unexplored conclusions. When searching Google Scholar for articles that contain both the words *design patterns* and *usability* in their title (**intitle:"design pattern" intitle:"usability"**), Google only returns 2 pages of results while most of them do not focus on websites at all but on other specific types of applications. The study may create new knowledge to guide further research in fields such as website design, us-

ability, user experience and human-computer interaction design by analyzing the user's standpoint on the usage of user interface design patterns in websites. Despite the



wide acceptance and usage of website design patterns (mentioned above) many users still experience trouble using and navigating websites, such as older adults (Barros, Leitão, & Ribeiro, 2014) so involving the users with the design patterns (of which every website is composed) can be beneficial for enhancing the patterns' usability and enhancing the existing design patterns.

1.4 Aim and research questions

This research focuses on two questions:

How do experienced young web users perceive the current usage of (user interface) website design patterns in regards to their usability?

How do experienced young web users describe their desired characteristics of design patterns to enhance usability?

Therefore, the study aims to find out the answers to questions such as how the user interface design patterns in-use in websites affect usability, in the perception of the users. The research further aims to understand what characteristics of user interface design patterns in websites the users want to see more to achieve better usability. To exemplify the goals of the second question, the research

can pinpoint how the users actually want the icon that opens up the website's navigation to look like, how it can be made more user-friendly and what exactly needs to be ameliorated. The research focuses on the so-called 'hamburger' icon, the 'return to homepage' pattern and CAPTCHAs incorporating experienced Internet users of slightly varying age.

1.5 Scope and Limitations

Due to a distance between the researcher and some of the potential participants in the study - the observations will occur online with the help of a video conferencing and screen sharing tools. Extracting and interpreting as accurately as possible the usability perspectives and characteristics of design patterns of users are crucial for this research. The interviews with the participants will be semi-structured with some predetermined questions and a topic to discuss that can fluctuate based on the participants' responses. The interviews are going to be recorded to be used in the analysis later on. Due to the lack of a natural setting in the interview, the users' direct experience would not be accessible as what people say often differs from what people actually do. This is why an observation will also take place in which the users' direct experience would be analyzed.

The research maintains an interpretive view. It is assumed that understanding the effects of the design patterns depends on the meanings and worldviews attached to them by the participants.

The research will include a rather homogenous group of participants – all of them are from Bulgaria, at a relatively young age (23-32 years old) with a decent history of Internet and Web usage and either possess some form of

higher degree or are in the process of getting one. This will have an impact on the answers and perspectives of users which will be accounted for.

1.6 Structure of the Thesis

This thesis starts with an introduction. The introduction gives an overview of the research questions, aims and objectives of the study. After the introduction, I am going to present a glimpse of the previous research in the field of design patterns, usability and users (Section 2). Research on usability and the usability of the examined website user interface design patterns is going to be examined. In Section 3, the theories underlying this research are going to be revealed and focused upon. Section 4 focuses on the methodology behind the research as well as the data collection methods and the ethical considerations of the research. Section 5 presents the results of the research and shows the findings of the research. Section 6 discusses and analyzes the findings and strives to discover new and useful patterns in the results of the observations and the interviews. Finally, Section 7 concludes the research and focuses on possible future works in the area.

2 LITERATURE REVIEW

This chapter reviews literature on what CAPTCHAs, the 'hamburger' icon, returning to the homepage represent, on usability and the factors affecting it and the chapter summarizes recent research on the usability of those three user interface design patterns.

CAPTCHAs are words (sometimes actual words and sometimes just a collection of random letters) that are visually distorted in a graphic (Pogue, 2012). Their purpose is to stop automated bots from registering in websites, posting comments and so on. In other words, their goal is to keep the "Good guys in, bad guys out..." (Pogue, 2012, p.23). According to Pogue (2012), CAPTCHAs have merely replaced one public nuisance with a second one. The words are often too distorted and humans struggle reading them (Pogue, 2012). Furthermore, blind people are incapable of achieving the required task. (Pogue, 2012). Alternative forms of CAPTCHAs were invented but Pogue (2012) points out that they always exclude certain parts of people. For example, listening to a garbled audio is not suitable for people with hearing issues and CAPTCHAs which require users to answer simple questions may seem impossible to complete by non-English speakers which use a translator to view a website (Pogue, 2012).

The hamburger icon's purpose is to open sliders when clicked (Fichter and Wisniewski, 2016). It is used in a number of popular apps and web designers are under the im-

pression that if people are not aware of it - they will learn it (Fichter and Wisniewski, 2016). It's main purpose of use is to free up some of the screen real estate on mobile devices and it is presumed to provide "a clean, uncluttered look" (Fichter and Wisniewski, 2016, p. 76) of websites.

Returning to the homepage using the website's logo has become a widely accepted practice used by an infinite number of popular websites such as Amazon and PayPal. It is documented as a design pattern that enables users to quickly navigate to the main page (Toxboe, 2016). However, a recent study has shown contradictory results regarding the pattern's usability (Fichter and Wisniewski, 2016).

Website design patterns may sometimes emerge from the intuition of the one building the system (Montero et al. 2002). This is sometimes confirmed by research that comes after the establishment of the pattern which concludes that the pattern is not usable enough. Fichter and Wisniewski (2016) write on new developments, approaches and methodologies related to emotional design, storytelling and understandable icons and mention recent developments in the usage of the homepage return patterns and the 'hamburger' icon. They discuss the hamburger icon and the homepage return patterns and pinpoint existing research which shows their bad usability as presented at the San Diego UXPA conference by Danielle Coole and Mike Ryan (Fichter and Wisniewski, 2016). To illustrate, many pages disregard homepage icons and use the website's logo as a link to the homepage (Nielsen, 1999) (Fichter and Wisniewski, 2016) (Ux.stackexchange.com, 2010). However, research showed that only 77% of users managed to successfully return to the homepage using the website's

logo while 98% managed to do it if there is a 'Home' option in the website's navigation (Fichter and Wisniewski, 2016). Furthermore, results from six usability tests lead to the conclusion that users largely fail to complete browsing tasks when the task involves a step with a 'hamburger' icon (Fichter and Wisniewski, 2016). In fact, 71 out of 76 participants did not manage to complete the tasks that involved the 'hamburger' icon (Fichter and Wisniewski, 2016). This reveals how important it is to get the users' perception on the current design patterns and retrieve information from them regarding the ways to optimize current and future design patterns.

Usability (along with usefulness) can be considered essential to the main goals of any computer system (Harms & Adams, 2008). However, usability is difficult to define due to the fact that a person's technological usability depends on a myriad of factors (Shultz and Hand, 2015). To start with, the capacity of the device that the user is using and the software and hardware on it may affect the usability of an application as perceived by the user (Shultz and Hand, 2015). Along with that, the specific setting, user and task may affect the overall usability (Shultz and Hand, 2015). Factors are even fine user details such as age, nationality and culture (Shultz and Hand, 2015). There have been numerous attributes that a usable system must have proposed in previous research. Shultz and Hand (2015, p.66) propose the following definition: "the degree to which the user perceives acceptable learnability, efficiency, and satisfaction when using the [website] technology". Learnability is measured by the degree of easiness involved when a user completes a task for the first time (Chowdhury and Chowdhury, 2011). Efficiency refers to the speed with which users can accomplish certain tasks in a technological prod-

uct (Chowdhury and Chowdhury, 2011) and satisfaction refers to the user's satisfaction with the given technological product (Chowdhury and Chowdhury, 2011). One can measure the satisfaction of users' by asking them about their opinion on the quality and uniqueness of the system or asking how its different features feel compared to its market competitors (Chowdhury and Chowdhury, 2011). Other attributes, not mentioned in the previous definition, have also emerged in different studies such as the ones presented by Alonso-Rios et al. (2010, p.65): "knowability, operability, efficiency, robustness, safety and subjective satisfaction". Evidently, usability is subjective and the perceptions of those attributes depend on the user, situation and task (Shultz and Hand, 2015) which is why a qualitative, interpretive research is particularly suitable.

When retrieving the users' perception regarding the chosen design patterns in the interview, special attention has to be paid to their context of use and goals (Chowdhury and Chowdhury, 2011) and the user, in particular. It is important to stress that the usability attributes differ between users due to various factors such as age, gender, capabilities, background, personality, work, technological skills and so on (Chowdhury and Chowdhury, 2011). An interpretive research may be particularly suitable to capturing the subjective factors involved in forming the user's usability perspective.

The intertwining of two research methods: interviews and observations is purposeful. It aims to capture both the users' subjective and objective usability. A website, or a design pattern, might be perfectly usable in terms of a set of objective criteria but a user may still experience it unusable in his/her subjective point of view for a myriad of reasons

such as the appearance of distracting elements or problematic wording of links (Thielsch, Engel and Hirschfeld, 2015). Therefore, a distinction has to be made between the experienced usability by the users and the objective/ real usability of a website. This is further revealed in a recent study on CAPTCHAs which shows that users preferred CAPTCHAs with digits for being the quickest and effortless to solve although the objective measurements pinpointed that they were not (Bursztein et al., 2014)

Details about the participants needs to be also taken into account when analyzing the usability. This research focuses on young (23-32 years old), experienced Web users. On average, speed and ability to accomplish a task in the Web declines with age, with estimates of 0.8% drop per year from age 25 to 60 (Nielsen, 2008). After 65 years of age, users need drastic changes for websites to be usable (Nielsen, 2008). However, this research does not focus on such users who may experience special needs in terms of usability and the participants appear to be all in an age where their capabilities are similar in terms of that factor. Interestingly enough, income is also a factor for the speed and ability to use a website, with the higher the income – the less time it takes to accomplish a task (Nielsen, 2008). Nonetheless, the participants were not asked about their income in this research to take this factor into account.

Another fact worth considering is the education of the intended users. Websites involve reading and understanding text which can be an issue depending on the user comprehension and literacy level (Badre, 2002). Therefore, participants with lower level of education need a different text/form of presentation that is appropriate to their level of education (Badre, 2002). For example, non-technical

users visiting a technical website may need to see content with technical jargons omitted and a simpler vocabulary (Badre, 2002). In this study, all participants either have some form of higher education or are working on it.

There are a range of studies covering the examined website design patterns in different contexts. Griffen (2015) carried out a research on the 'hamburger' icon when combined with long pages and older adults. A number of issues emerged from that particular set of participants – such as the need to scroll back to the top of the website where the 'hamburger' icon is quicker, a number of the participants confused the option to go deeper into the website (the 'hamburger' icon) with other buttons and icons present on the assigned website which had rather different purposes and a number of users were unfamiliar with the icon (Griffen, 2015). The older adults give several recommendations for the icon - the introduction of a visual hint for it, the possibility for the icon to be always visible at the top part of the webpage or entirely removing it and having an always visible menu (Griffen, 2015).

Finn and Johnson (2013) have found out that returning to the homepage might be a challenge even if there is a clear "Home" button on the page for people above 45 years old and it would be beneficial to determine how experienced and young Web users cope with the task.

Furthermore, the culture of the user and the designer may have an effect on the usability of a given website as users that have the same cognitive style which the web designer who crafted the website has are more likely to find the website likable and usable (Dinet et al., 2013). A major way that cultures differ is their perceptual processes

(Nisbett and Miyamoto, 2005). Westerners are inclined to regard things in a context-independent analytical perspective while Asians regard things from a context-dependent, holistic perspective (Nisbett and Miyamoto, 2005). This is a variable that may be taken into account when examining website design patterns from a multi-cultural level though the participants in the research are expected to be culturally alike due to their birth and life in a single country (Bulgaria) and for the most part in the same city.

Importantly, the young age of the participants in this research will certainly have a positive effect on their usability. It has been estimated that satisfaction and usability decline amongst older adults along with the users' spatial ability, performance and disorientation levels (Wagner, Hassanein and Head, 2014). Therefore, a decline in perceived/objective usability is expected should older users are included, possibly with the addition of different desired characteristics.

3 THEORY

In this chapter, the theories underlying this research, related to usability, human-computer interaction and methods for acquainting oneself with a user's usability are going to be revealed and focused upon.

3.1 Human-computer interaction

Most people carry out computerized tasks with ease, relying solely on their intuition but there is still a lot of people who experience trouble using computers (McKay, 2008). Using computers is actually complicated, it often requires all fingers of both of our hands and using them properly depends on several of our senses (McKay, 2008). There are people who think with the help of visual images while others think through speech or words (McKay, 2008). This basically pinpoints that some users will remember better if they are shown visual material while other will remember better if they are shown textual material (McKay, 2008). In terms of user interface patterns in websites, this would mean that the usability of the patterns would somewhat depend on the cognitive preference of the user. Not only does the term "good website" differs between user groups but an efficient and effective website may not be a "good website" if it does not please the aesthetic preferences of the given user (Sørum, Andersen and Vatrapu, 2012, p.698). The visual appearance has an important role in usability as websites may have around 50 milliseconds to impress the users and make them stay (Lindgaard et al., 2006). Therefore, the satisfaction of the users' from the examined design patterns has to take

into account their opinion about the design pattern's current visual appearance.

Human-computer interaction principles require software to be "functional, direct and easy to use" (Bian, Jin and Zhang, 2010, p. 718). The system itself should bring the user emotional happiness upon interaction and it should be "reasonable, efficient and consistent" (Bian, Jin and Zhang, 2010, p. 718). For example, a consistent website does not change its visual appearance sporadically across webpages (Bian, Jin and Zhang, 2010). Finally, the given system should be safe and stable (Bian, Jin and Zhang, 2010). A safe and stable system would allow the user to reverse his/her action and attempt to reduce the costs of an error (Bian, Jin and Zhang, 2010). For example, the WordPress platform for website creation allows users to bring back deleted pages and posts. In our context, when a user clicks on the hamburger icon on his/her smartphone and a lengthy navigation pops on the screen - it is a good idea to be able to hide the navigation again, possibly by clicking on the same icon again. Those are factors that can be taken advantage of when evaluating the usability of the chosen design patterns.

3.2 Usability

Traditional usability testing's purpose is to get to know the users and how they are interacting with a given website (Sørum, Andersen and Vatrapu, 2012) and this research has such elements (performing observation, getting to understand users) in it, although it does not represent a usability test in its essence. Tests have shown that users which possess prior experience with a given system typically give higher usability scores when asked to rate

the systems - with a difference from first-timers from 6% to 15% (Orfanou et al., 2015). Therefore, we may expect that users who have little knowledge and experience of the chosen patterns find them unsatisfying and possibly in need of change. That is why we take into account the user's experience with technology and the actual knowledge of the user of the patterns - so we would be able to interpret their viewpoint better and in the proper context of their worldly experience.

The ISO standard 9241-11 notes efficacy, effectiveness and satisfaction as the most important factors that affect the usability of a system (Khan et al., 2013). Different usability models include different number of factors but in most models efficiency, effectiveness, satisfaction and learnability are considered crucial (Khan et al., 2013). To assess those major factors, the models typically rely on sub-factors which have different metrics and which contribute to the factor which they represent usability and in that way to the overall usability of the system (Khan et al., 2013).

In ISO 9241-11, satisfaction is presented as consisting of a freedom from discomfort for the user and a positive attitude of the user towards the specified system (Jokela et al., 2003) and qualitative methods are particularly useful to retrieve this factor. In it, efficiency is described as measurable by a comparison of the resources that the user inputs with the accuracy and completeness with which specific goals are achieved within the system (Jokela et al., 2003) for the analysis of which the observation is particularly relevant. Essentially, the satisfaction of the user can be understood simply by asking the user what he thinks about the system's ease of use (Usabilitynet.org, 2016) which is one of the aims of the interviews. Effectiveness can be analyzed by checking

if the user can actually use the target system (or design pattern) to complete their desired task - or in other words - if they can "do what they want to do" (Usabilitynet.org, 2016) which our observation is supposed to reveal.

Testing the usability of icons generally requires knowledge of how findable they are or whether users can find them on a webpage, how recognizable they are or whether users can understand what the icon does by looking at it, how attractive they are or whether users find the icon aesthetically pleasing and whether users know what will happen once they click on the desired icon (Bedford, 2016).

According to the Technology Acceptance Model, the perceived usefulness and ease-of-use of a system (and websites) affects users in deciding whether to use that system (Chuttur, 2009). If the website is useful, users may still use the website if it is not easy to use as long as the perceived usefulness outweighs the handicap in ease of use (Chuttur, 2009). The model is relevant because usability is essentially this – how easy it is for a person to use a system or a website and because users can use a website even if they find its usability unsatisfactorily (at least in the initial uses). Therefore, users may have initially found a certain website/design pattern easy to cope with but its usefulness may have forced them to work with it initially.

The interview questions themselves would be based on the most popular division of usability factors (the questions can be seen in Appendix B). Namely, those factors are **ease of learning or learnability** which specifies the extent to which the system is easy to learn both for beginners and users with experience, **task efficiency** which is the extent to which the system is efficient for the regular user, **ease of remembering** which is the extent to which the system is

easy to remember, understandability which is the extent to which the user understands the nature and purpose of the system and the **subjective satisfaction** of the user with the given system (S. Lauesen and H. Younessi, 1998).

3.3 Theoretical framework

To come up with meaningful conclusions from the results of the interviews and the observations we need to be able to identify the global usability problems of the chosen design patterns, the problems that share common characteristics and we need to be able to identify trends and patterns in the resulting data. The usability problem taxonomy can help us to achieve the goals mentioned above (Keenan et al., 1999). The Usability Problem Taxonomy (UPT) is "a taxonomic model for classification of usability problems detected on graphical user interfaces with textual components" (Keenan et al., 1999, p.73). UPT lets us classify the usability issues into two components; those related with the **task** to be achieved by the user (the functionality/purpose of the design pattern) and those related to the **artifact** (the design pattern) (Keenan et al., 1999). The artifact component itself contains three categories - language, manipulation and visual looks while the task component is split into two categories - task-mapping and task-facilitation (Keenan et al., 1999). Each of these categories consists of subcategories as shown in the figure below. The categories are mutually exclusive and a problem may only be assigned to one at a time (Keenan et al., 1999). There are two primary components (the artifact component and the task component) which are divided hierarchically into five other categories (Keenan et al., 1999). The artifact component itself consists of three categories and the task component contains two categories. Each of these categories is then

divided into subcategories and two of the subcategories contain further subcategories (Keenan et al., 1999). The categories contained in the artifact component examine potential difficulties which the users encounter when interacting with separate user interface items (Keenan et al., 1999). The categories that exist within the task component examine issues that users might land upon when moving through tasks (Keenan et al., 1999). In other words, they deal with issues emerging from the specific way in which the task is structured in the given system/website (Keenan et al., 1999).

Figure 3: An adaptation of the Usability Problem Taxonomy (UTP) (Keenan et al., 1999, p.74)

UTP can help us classify and analyze the qualitative data collected from the interviews and the observations. On the one hand, it will be used to detect, classify and help in analyzing the existing usability problems of the three (3) chosen design patterns. On the other hand, it will help us in classifying and analyzing the user's preferences when it comes to the desired characteristics of design patterns.

The interview questions in the study will try to extrapolate different usability problems related to those factors and later classify them with UPT and extract themes in the end from the resulting classification and the resulting categories.

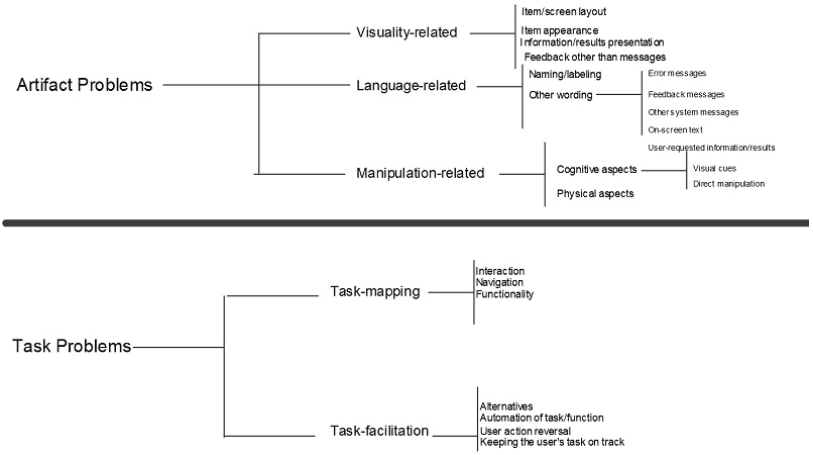
Qualitative researches typically suffer from low standardization of strategies for data analysis which leads to difficulties in replicating results across studies and UPT can be considered as a means for combatting this flaw (Georgsson and Staggers, 2016) and it can further help researchers structure, code and analyze their results (Georgsson and Staggers, 2016)

4 METHODOLOGY

This chapter is going to focus on the methodological tradition and approach behind the research as well as explain the data collection methods, methods of data analysis and briefly present the ethics and the standards followed for the credibility and the transferability of the work.

4.1 Methodological Tradition

Most of the research in the field of Information Systems can be classified in three research philosophies or paradigms – positivist, critical and interpretive (Mingers & Willcocks). Researchers always launch projects with certain assumptions in mind regarding the information that they will gather from the research and how they are going to gather it (Creswell, 2009). Those assumptions may be known as paradigms, philosophical assumptions, epistemologies and ontologies (Creswell, 2009). Researchers make differing claims about the nature of knowledge itself (ontology) and the ways that we can collect that knowl-



edge (epistemology) (Creswell, 2009).

Positivist researches in the field have been moving to the term 'postpositivism', recognizing that it is not possible to be 'positive' about knowledge assertions when the studied subjects are human behaviors and actions (Creswell, 2009). Thus, Positivism views reality as objectively given and affirms the absolute truth of knowledge (Creswell, 2009). On the other hand, interpretive researchers assume that reality and knowledge are socially constructed instead (Creswell,

2009). In understanding the world, we develop subjective meanings of our experiences which are directed towards different objects and things (Creswell, 2009). Those meanings may vary and differ and so the interpretive researcher searches for the complexity of views instead of narrowing down the meanings into a few ideas or categories as in positivism (Creswell, 2009).

The research is qualitative and interpretive in nature. As Klein and Myers (1999) point out - interpretive researches are capable of providing valuable insight into phenomena involving information systems. The interpretivist paradigm and the qualitative methodology that follows are particularly suitable to what is examined in this research because the aim is to generate findings for which values and subjective human experiences are of substantial importance (De Villiers, 2005). Namely, the perspective of different users on website design patterns and their ideas for improvement. In qualitative studies, the results that emerge depend on the questions that were asked to the participants. Thus, in line with interpretivism, the findings originating from this research are subjective and it is possible for the research results to collide with different studies on the same topic (De Villiers, 2005).

4.2 Methodological Approach

The qualitative nature of this research is particularly suitable as it can shed light on why the chosen design patterns are usable or not instead of just revealing their usability status (Anderson and Aydin, 2005). Thus, the qualitative orientation may explain the user's behavior with respect to those website patterns, and reveal what the users consider a 'success' or a 'failure' in terms of usability, instead of as-

suming what 'success' or 'failure' is for the user (Anderson and Aydin, 2005). Thus, the nature of this research focuses also on 'how' is usability affected by those design patterns within the perspective of the users and 'why' those design patterns have certain usability effect on them which is best examined by interpretive research as such deeper understanding of the subjective perceptions and beliefs of the participants cannot be arrived at by quantitative research (Myers and Avison 2002).

Qualitative, interpretive research focuses on uncovering meanings that are assigned to different phenomena and events and does not strive to create predictions and cause and effect conclusions (Willig 2008). Considering that the research aims to find the users' perspectives and preferences on the given website design patterns interpretive research appears particularly suitable.

Thus, the study holds an interpretative philosophical standpoint and aims to arrive at an enhanced, deeper understanding of the chosen design patterns and potential usability issues, remedies and areas of improvements surrounding them.

Furthermore, this research aims to answer 'how' users perceive the usability of the chosen website design patterns, 'why' they perceive them as they do and 'how' they would want them to appear like and not 'how many' users perceive the website design patterns in a certain way and is therefore best examined from a qualitative perspective (McCusker and Gunaydin, 2014).

Combined with the fact that there were no specific studies located covering what young, experienced Web

users thought on those website design patterns and what they want them to be like is another reason for taking a qualitative orientation. Quantitative studies are best undertaken when the researcher is already aware of what he/she is seeking and in mature phases of research projects (McCusker and Gunaydin, 2014) and this is not the case. Furthermore, quantatitive analysis often omits contextual details which are best captured by qualitative research and outputs data in the form of statistics (McCusker and Gunaydin, 2014) whereas the sought output in this study is information in the form of potentially undiscovered ideas for the amelioration of the website design patterns, potentially undiscovered flaws in terms of usability and other information that can potentially be unknown and not necessarily quantifiable.

4.3 Research setting

There were 6 participants in the research of young but slightly varying age (from 23 to 32). They all participated both in the interview and the observation part of the study. The sample size was deemed sufficient to provide a diverse set of views on the subject-matter (research has shown that five (5) to eight (8) users can pinpoint 80 to 85% of the existing usability problems of a system with the observation technique that the researcher has employed (Georgsson and Staggers, 2016)). The participants were acquaintances of the researcher and so they were reached by a *convenience* method.

Below is a list of the participants and their background (the names have been purposefully changed to protect the confidentiality of the participants):

Penyo - a 32 year old male from Bulgaria that currently resides in Belgium. He is currently doing a PhD and uses

the Internet since 1995. Thus, he started using it some 21 years ago. He also spends from 5 to 10 hours on the Internet every day.

Pesho - a 24-year old male from Bulgaria who has a Bachelor's in Computer Technology and has used the Internet for around 11-12 years. He spends around 8 hours per day in the Internet.

Alex - a 24 year old male from Bulgaria that is currently about to finish his Bachelor's degree. He has been using the Internet since 1999 (from about 17 years) and he spends from 5 to 15 hours in the Internet daily.

Smith - a 25 year old male Bulgarian living in the UK which has a Master's degree and around 10 years of experience with Internet. He currently spends around an hour per day in the Internet but used to spend much more.

Mariah - a 23 year old female from Bulgaria who has been using the Internet from around 10 years and spends up to 8 hours per day in it. She is currently doing her Master's degree.

Angelina - a 24 year old female from Bulgaria who has a Bachelor's degree and uses the Internet from around 9-10 years.

4.4 Data collection methods

Data was collected through semi-structured interviews. The interviewees were asked open-ended questions regarding their perception on the chosen website design patterns. The interviews occurred through Skype and were recorded through a computer application. The decision to record the interviews occurred due to the inability of the researcher to recollect the entire conversation, the decrease of focus which occurs when taking notes and the probability of mental exhaustion when having to listen closely to the interviewees (Crang & Cook, 2007, pp.

81-82). The interviews were conducted in English and so no translation was required but transcriptions were made to help with the analysis. The participants were interviewed one by one. Firstly, the consent form was shown and signed. Afterwards, a short casual conversation ensued - as Crang & Cook (2007, pp. 68-69) point out stepping into the conversation gradually is desired. The interview questions were inserted into the conversation in an order that seemed natural during the conversation (revealed in Appendix B) and any unexpected questions and requests for clarifications that seemed natural during the conversation were asked.

Some similarities exist between the participants in terms of age (participants are relatively young, ranging from 23-32 years old), education (all have or are working upon some form of higher education) and nationality (all are Bulgarian of origin). Albeit a limitation by itself, the participants are still relatively heterogeneous in terms of worldviews, type of degree/specialty followed, place of residence and even age, to some extent. One reason for this limitation is the nature of the sampling, the convenience method brings forward as participants the people who are easiest to reach. Also, all participants except one have not followed a technical degree but have relatively long history of exposure to the Internet and the Web, in particular which can still lead to a fruitful examination of the perspectives and preferences of mostly non-technical experienced and English-speaking Internet users on the examined design patterns.

Demographic questions were also asked initially (shown in Appendix B) which gave the researcher the chance to get a better understanding of the audience and place the answers of the participants in an appropriate context (Hall et al., 2013)

An observation also took place. The observations took place entirely online with the help of screen-sharing and VoIP technologies such as Skype. The users were asked to review and sign a consent form. After that, they were sent a document which contained an URL that users had to visit and a task that the users had to achieve when they find themselves at the given URL. The tasks involved actions that necessarily required the user to use one of the three chosen design patterns in this research to successfully complete. The Think Aloud usability assessment was utilized to retrieve data about the usability problems encountered and the identified problems were classified using UTP and interpretations followed. Think Aloud is a popular usability assessment method which is used to find out what the users are thinking and experiencing when they are in the process of completing a task on a system (Georgsson and Staggers, 2016). The method requires users to talk aloud during their interaction with the given system sharing their opinion and stating what they are trying to achieve when doing the pre-determined tasks (Georgsson and Staggers, 2016). The interference with the user as he/she is performing the tasks is kept minimal (Georgsson and Staggers, 2016). The goal of the method is to get an insight on how users actually experience the given system and on their decision-making process (Georgsson and Staggers, 2016). Think Aloud provides highly detailed data which enables researchers to only involve a few subjects - it has been determined that five (5) to eight (8) users can pinpoint 80 to 85% of the existing usability problems of the system (Georgsson and Staggers, 2016) and this is the reason for its selection. The method will be used along with the interview to grasp an insight on the actual usability problems when the users are required to take advantage of the chosen design patterns. The observation was expected not to take more than 10-20 minutes per person. The observation questions can be seen

in Appendix C.

Another reason why qualitative research is deemed suitable for the objects of examination is that qualitative research can lead to the collection of detailed information and an in-depth understanding regarding the situation/ case of interest (Yilmaz, 2013). The semi-structured interviews can bring up unexpected issues to light and can lead to more thorough understanding of the perspectives and the desires of the participants when it comes to the chosen design patterns because the researcher does not pre-determine and standardize the categories of analysis (Yilmaz, 2013) and because interviews allow the researcher to become familiar with the experiences of the participants without predetermining their position on the object of examination (Yilmaz, 2013) which can lead to quality data.

4.5 Data analysis

A thematic analysis was chosen to analyze the data. A thematic analysis usually involves the researcher preparing transcripts, reading and re-reading the transcripts the a few times, to identify recurring ideas or potential omissions, a process known as 'coding' after which the extracted codes are abstracted into themes (Rosenthal, 2016). Thematic analysis ideally involves uncovering three to five themes and so triangulation may be necessary to make a decision on the final set of themes that will be used (Rosenthal, 2016). To complement the independent thematic analysis, the Usability Problem Taxonomy model is used to classify the data into categories and subcategories which will be compared with the independent thematic analysis in order to come up with a finalized, reasonable and trustworthy themes. The first step in analyzing the data is transcribing it as without transcriptions, an in-depth analysis is hard to

achieve (Rosenthal, 2016) so transcriptions of all interviews and observations were prepared by the researcher in a word-processing program. The next step involves reading and re-reading the transcripts in order to locate concepts that repeat themselves and frequently has to do with the researcher marking comments made by the participants and taking notes (Rosenthal, 2016). I have strived to follow this step and some of the extracted interviewee' comments and ideas/concepts are revealed into the findings section where they were grouped into themes. The final step involves the researcher abstracting the codes that he or she has found into themes (Rosenthal, 2016). The codes were sifted through and were reduced to only six themes. Due to the qualitative nature of the research, a discovery process is strived for and no predefined measures or hypotheses are initially presented (Schutt, 2001) although previous literature is reviewed in order to set the proper background and compare and contrast the resulting findings.

The Usability Problem Taxonomy model is used to organize and/or classify different usability issues in order to facilitate analysis (Keenan et al, 1999). UPT allows for classification using direct observations, which makes it a suitable addition to the research (Keenan et al, 1999). Its structure is based on the notion that usability issues should be divided into artifact perspective and task perspective. The former perspective focuses on the ways in which the user examines, views, reads, understands, or manipulates the different parts of the user interface while the latter focuses on issues emerging when the user progresses through different tasks that involve the user interface (Keenan et al, 1999). An assumed contribution of UPT in terms of this research is its ability to give a new perspective on what the problems surrounding the usability of the chosen design patterns are and its ability to present a different approach

to identifying problem clusters (Keenan et al, 1999). UPT was used to evaluate the usability of a diabetes mHealth system and initially 50% of the usability problems were detected, followed by an addition of 29% during the post-interviews with the participants (Georgsson and Staggers, 2016). This makes the framework suitable for this research as it can bring a new perspective on the horizon and help identify usability issues stemming from the design patterns and the observation of the users.

4.6 Validity and Reliability

To maintain the reliability of the research, the interviews and the observations were recorded and transcribed verbatim. Afterwards, the transcriptions were checked for possible mistakes. Due to a personal connection of the researcher with the participants some additional measures to ensure validity were also employed - two separate information gathering techniques were utilized to identify themes (interviews and observations) and the extracted themes were shown to the participants so that they can confirm that the analysis correctly represents what they have said (Creswel, 2009)

4.6.1 Internal Validity/Credibility

Internal validity tackles the issue of how compatible the research findings and reality are. In other words, it examines how accurately the results depict reality. However, the qualitative, interpretive viewpoint of this study assumes a plurality of world views which makes the original understanding of internal validity unsuitable. Therefore, it is best to talk about “credibility” or how credible the research findings are considering the gathered data (Meriam

and Tisdell, 2015, p.242).

To ensure the credibility of the research, a strategy for adequate engagement in data collection will be maintained and differing worldviews would be examined. Despite the commonalities amongst the participants (nationality, age group, education) the participants' differ on many levels, in differing degrees, such as worldviews, interests, type of higher degree/specialty, place of residence, Internet usage time, experience with technology, age. This increases the credibility of the research as the findings would not be coming from a single source/perspective (Meriam and Tisdell, 2015, p. 245)

Another manner in which the credibility of the research is by deciding how many people need to be interviewed in order to grasp fully the understanding of the participants of the phenomena under examination (Meriam and Tisdell, 2015, p. 246). To achieve this, I collected data until the data felt saturated in the sense that I kept landing upon the same information when a new participant was included.

4.6.2 External Validity/Transferability

The application of a research findings in different situations is known as external validity, or generalizability. In the case of qualitative studies, it is more appropriate to talk about transferability (Meriam and Tisdell, 2015, p. 256) where the application of the study to different situations is in the hands of the reader. The way to ensure that a level of transferability is maintained in a qualitative study is to provide readers with detailed, contextual information so that they can decide upon the study's transferability (Meriam and Tisdell, 2015, p. 256). This has been strived for in this research by elaborating about the research setting, the participants involved in the study and by backing up the study's findings with quotes from the participants' re-

sponses (Meriam and Tisdell, 2015, p. 257).

4.7 Ethical considerations

A research should be undertaken with attention to certain rules of ethical conduct (Lichtman, 2010) which are followed in this study. The behavior that is strived in this study can be summed into "do good and avoid evil" (Lichtman, 2010, p.54). The following points have been paid attention to in terms of ethical conduct:

1. Do not cause harm

Should any potential harms emerging from the research be envisaged, the participants reasonably expect to be informed of them (Lichtman, 2006). I envisage no harms to the participants from the research but I will remain vigilant and stop the interview or observation without undue delay should an adverse reaction emerges (Lichtman, 2010, p.54).

2. Provide informed consent

Participants in such a research have a reasonable expectation that they will be informed about the nature of the research so that they can decide whether to hop in or not (Lichtman, 2006). That is why the participants chosen for the interviews were provided with a consent form which they could read and sign before the actual interview and observation (the consent form can be seen in Appendix A).

They were informed that the interview and the observation are entirely voluntary and that they can withdraw from participation before or during the actual interview. The participants were also informed that the audio con-

tents of the interviews are going to be recorded and that the recordings are not going to be shared with third-parties but will only be used for the purposes of the current research.

3. Provide a sufficient degree of confidentiality and privacy

No names and personally-identifiable data of the participants were shared with someone other than the researcher, his supervisor and his examiner. Keeping the privacy and the confidentiality of the participants by removing potentially identifying information is naturally expected by the participants and an explicit permission from the participants is typically necessary should such information be publicly available (Lichtman, 2006).

4. Avoid unsuitable behavior

The participants' personal lives, space or time would be respected. Participants would be informed of the time that the study could take and their personal space would not be intruded as the interviews and observations would take place entirely online with no requirement for their physical location. Special attention would be paid not to touch upon subjects which could be sensitive for the participants (Lichtman, 2010, p.57).

5. Findings

In this chapter, I will focus on the findings of the research resulting from the thematic analysis and I will briefly cover some of the specific usability problems that were found with the chosen website user interface design patterns

5.1. Themes

The extracted themes will be mentioned below, backed by excerpts from the interviews of the participants, reflections from the observations and author comments giving the context and the reason behind the extracted theme. The names of the participants have been changed in order to preserve their confidentiality.

5.1.1 Usability issues surrounding the "Home" text

Four of the six participants stated that the text "Home" for returning to the homepage is not the best option, and three of them were not explicitly asked to compare "Home" and "Homepage" but were asked what kind of text they would like to see for that action.

Penyo stated that 'homepage' is the most suitable text as 'home' is vague:

Interviewee: I think the best would be if it states homepage because home is a little bit strange, I mean it should say exactly homepage, so you should be sure that you go to the

homepage because home you can go to a special section for home interior, for example, and you may not want to do so.

Pesho believes that the button Home may be hard to relate for some users and it should be known as Start page or Starting page:

"Because in computers it's homepage but usually It should be called the starting page, the start page, but we call it homepage which is different so maybe they may not relate the button home with the starting page..."

In line with the previous participant who thought 'Home' is confusing, Pesho thinks that the text label is vague and is not satisfied with the given naming which could lessen the usability due to low "information scent" or efficiency/ accuracy (as Penyo stated about the Home button - is it the "Home interior" page?)

Mariah believes that the text "Homepage" is a better alternative than "Home" as the former "sounds better" to her:

"…. I mean, maybe 'homepage' would be better.

Researcher: Can you think of why you think so?

Interviewee: Well, maybe because websites have so many different menus and each menu goes to a different thing and at the end you might find yourself a little bit confused and if you want to go to the homepage you would press the button that says so.

Researcher: Yes, but I mean why 'homepage' is better than 'home', can you…

Interviewee: Well, actually, there isn't a reason why that I could explain. It just sounds better to me."

Thus, using the text 'Home' to pinpoint a link to the homepage may bring forward information scent and rec-

ognition issues.

5.1.2 Substitute 'the hamburger' icon with text for greater usability

Two (2) of the six (6) participants think that the 'hamburger' icon is confusing and makes no sense while all six (6) agree that the icon, or action, could be made better.

Four (4) out of the six (6) participants stated that a text-based alternative for the 'hamburger' icon would be the way to go while 3 of them explicitly stated that '**Menu**' is the clearest and the most user-friendly way to inform the user about the presence of the hidden menu.

Penyo is of the opinion that a text Menu would be much more suitable for opening up the navigation. He further believes that the picture does not imply and is not related to the activity that is performed upon a click on the icon which is:

Interviewee: I think the best solution is to use a picture that implies the activity related to the icon. The picture should be clear and should not be confusing.

The participant understands implicitly the need for recognizable, easy to learn icons with good information scent and believes the icon is not doing its job.

According to him, the 'hamburger' icon does not look like a part of the website:

Interviewee: And if you put the text Menu – a small text Menu – or something like this so that the people can see also text because sometimes it should have only these lines and people can't think that it is a part of the site but it is not special menu.

Hence, according to him, the icon may not only have problems with its recognition easiness and its information scent but it is also hard to find and locate because the icon, as placed in a website, may look like it is nothing of interest.

Pesho states that he has no idea why they designed the icon like that and that he did not understand it at first:

"...because I really do not know the origin of the three lines and the navigation just do not ring a bell when I look at it. I did not understand it at first."

"I really do not know why did they design it like that."

He believes a much better alternative would be an icon that is relatable (we can put this to the recognition part of the icon's usability) to the user such as the gear icon (shown for Settings), a ship or a compass which would "ring a bell":

"Yeah, if the icon was not three lines but it was the settings icon. For example, the gear wheel it would have been a lot easier."

The participant implicitly states that the 'hamburger icon' has low learnability because it is not recognizable (Bedford, 2016):

"I have understood it by experiencing it but I have not understood it by its looks."

This pinpoints that the icon is not only hard to recognize but also has issues with the "information scent" (Bedford, 2016) or the user's awareness of what happens upon the icon's click, according to this particular participant.

Alex believes that a Menu text would be more convenient, easier and logical but he also believes that the 'hamburger' icon is now widely used and has turned simple for

him, most likely due to his extensive usage of the icon.

"If it is written "Menu" it will be convenient, of course, but that's something which is now very common and it's a simple menu"

"Probably if a menu button is … it would be easier and it would be in written form so you can just know where the menu is and click on it."

The 'Menu' text seems like the first enhancement to the icon that came into his mind. It is possible that several of the participants specifically focused on the "Menu text" because they believe that such a text would increase the learnability, recognition and information scent of the task because whenever a user sees it - he would know what he can do with it.

Smith first stated that the 'hamburger' icon is very recognizable (and so usable) but then thought and came to the opinion that it is not evident what it does as there are no "clues" that it is a menu icon. Thus, his experience with the icon has lead him to initially believe that the icon is self-explanatory but after reflecting on this - he realized that it was really not. The experience with it had just given the icon a status of a tool that he uses in his daily browsing and was transformed to be perfectly usable.

"Researcher: I see. Do you have something else that you would prefer, that you think would be, that you would like more?

Interviewee: I don't know, I think it's very recognizable.

Researcher: I see, you think it's recognizable. Do you think it's easy to learn and why do you think so. I mean to learn what the icon does?

Interviewee: If you look it like that, if you haven't seen what it is doing before, normally I wouldn't understand what it does. Like, it doesn't have any clues that it's a menu icon."

Mariah thinks the 'hamburger' icon is easy once you get the hang of it but initially it is not very recognizable. She also believes that using words is more user-friendly and adding a text "Menu" would make it more recognizable for her and others.

"Researcher: Yeah. How easy do you think it is to learn what the icon does and why?

Interviewee: Uhm, it might be actually pretty easy because once you see it many times on different sites and you click on it – you usually get the concept. I don't know, maybe at first I didn't know what it did but when I started using more and more Internet and more websites I saw that the button pretty much does the same thing in every site.

Researcher: Yeah, but you think at first is difficult or? What do you think?

Interviewee: Yeah, maybe at first, maybe the first couple of times that you see it but after that you get used to it, after that it's pretty recognizable but at first not so much.

Researcher: Yeah, I think so. So, what changes you have in mind for the icon to be easier to understand and use, at least in the beginning. To be more recognizable.

Interviewee: To be more recognizable, well, I think that maybe just, for example, if it is in a little square and inside the square it says Menu or something like this, usually it's more user-friendly if people click on words that they understand. So maybe if it is not just the symbol or an icon and it says an actual word – then it would be more recognizable."

Angelina believes that the clearest way to trigger a navigation would just be to write what the button will do with text although she pinpoints text other than "Menu":

"The most clear way to mark an additional settings menu or whatever menu is to just write it - other options or

additional or whatever. The written is the most clear way for the user to find out what they are searching for".

Otherwise, they do not have problems with using the icon and find it usable enough:

Pesho stated:

"it's easy to get it but I do not know if people who are not used to smartphone usage, who do not use smartphones a lot, will get it because getting the menu could be kind of difficult.", Alex stated "...If it is written "Menu" it will be convenient, of course, but that's something which is now very common and it's a simple menu. "and this process repeated itself in a slightly different way across the participants.

5.1.3 Dissatisfaction with CAPTCHAs

Three (3) of the six (6) participants expressed very negative wording towards CAPTCHAs in general while all six (6) participants were dissatisfied to different extents and were of the opinion that they slowed them down and had a negative effect on their experience.

Penyo has seen both CAPTCHAs which are okay to handle and CAPTCHAs which has forced him to abandon a website entirely:

"Researcher: And how do you think that a CAPTCHA affects your speed when dealing with websites?

Interviewee: Sometimes you can find CAPTCHA that is extremely complex to understand, to see the signs. I mean and because of this you may need to spend a lot of time trying to guess the combination and as a result you may simply decide to skip the site and go to another site – and not use the site. Because I have several similar cases, I saw a

CAPTCHA – it was complex. I, perhaps, tried to find the right number for 5 times or 6 times – it was not possible to do so and at the end I said "sorry, goodbye, I am not going to stay in this site". So, it is very important to have good CAPTCHA."

Pesho also thinks that some CAPTCHAs are difficult (those with noise in the picture):

"Interviewee: But there are some CAPTCHAs which have noise in the picture and sometimes they are very difficult to discern.

Researcher: So, you think CAPTCHAs affect your speed negatively, yes?

Interviewee: Yes, for sure."

Smith finds the CAPTCHAs with letters and numbers to be often "*very hard to recognize*" and he even stated that he hates them:

"Researcher: And how do you think it affects your speed when dealing with websites?

Interviewee: I hate it.

Researcher: You hate it. So it's not easy to complete the different CAPTCHAs?

Interviewee: Sometimes it's easy but there are some very, very difficult ones. You can easily mistake the words or numbers."

Maria admits that CAPTCHAs can not only slow her down but also distract her from her tasks:

"And when you are at work, you have an agenda that you have to follow so these kinds of things may slow you down or may even distract you?"

Angelina finds them boring and confusing and finds them quite negative:

"Interviewee: They're just boring (CAPTCHAs).
Researcher: You find them boring?
Interviewee: Yes, and frustrating, when you have to work… Usually, it happens to me at work."

On CAPTCHAs in general, **Alex** states that he finds them "...disturbing, annoying and I do not like it [them]. " (speaking about CAPTCHA).

Thus, the participants perceive CAPTCHAs as having a mostly negative effect on their usability due to their low efficiency and low perceived satisfaction.

5.1.4 The usable type of CAPTCHA is the shortest to complete

Three (3) of the six (6) participants explicitly stated that they preferred the quickest CAPTCHAs while the rest did not mention why exactly they found certain types of CAPTCHAs easy.

Mariah explicitly states that she would prefer the CAPTCHAs which require less time to complete:
"I don't know, maybe the thing that you have to type and click the least, that's what you need."

Alex explicitly states that wants a CAPTCHA that takes minimal amounts of time:
"Researcher: So, what do you think is annoying with pictures, is hard?
Interviewee: Because you are losing so much time to focus on the picture and to figure out which one exactly you have to select. Because sometimes they are asking about 3 photos or from 9 photos you have to select the photos with

water in them and you have to look in all 9 photos in order to figure out which ones you should neglect.

Researcher: Yes, that's interesting. And, can you think of some ways that would ease the completion of such CAPTCHAs?

Interviewee: Say it again?

Researcher: Can you think of some ways that would ease the completion of such CAPTCHAs?

Interviewee: Well, I think that by clicking on something only it would be very effective in terms of time. It would be a faster way.

Researcher: Yeah. And which CAPTCHAs did you find easy, satisfying and quick to complete. Like the easiest?

Interviewee: The easiest is by clicking on something like "Do you agree with the terms" and then press submit and continue."

Smith also declared that he prefers the CAPTCHAs which take less time:

"Researcher: So, why did you like it the most?

Interviewee: Because it's quicker and I don't have to repeat it. Sometimes I enter a normal CAPTCHA, I make a mistake and after that I have to retype the password or some other information.

Researcher: And, it takes more time, yeah?

Interviewee: Yeah."

CAPTCHAs which entertain such as the ones where you have to select a particular photos from a larger set of photos were only explicitly preferred by Penyo (one (1) of the six (6) participants) and Mariah stated that they are entertaining but would prefer the shortest ones, in most cases (for example, when she is at work).

Hence, users associate the satisfaction (and usability) of CAPTCHAs mainly with one factor - efficiency or ease of use/completion which itself depends on their recognizability. There are many different types of CAPTCHAs and each differs from the other so learnability is not something to strive for.

5.1.5 A lack of characteristics of CAPTCHAs that are equally usable

One (1) of the participants preferred having a simple arithmetic to solve, three (3) prefer the letter and numbers but (1) one of those three (3) prefers real-life objects to be shown while the second stated that real-life objects are very hard complete and two (2) prefer the "innovative" CAPTCHAs - the first prefers ticking a box while the latter prefers sliding down or left. Thus, it can easily be seen that at the moment there is no single type of CAPTCHA which could be shown to users and satisfy a diverse user base.

Penyo preferred CAPTCHAs with letters and numbers which are not "signs" like objects from real-life and are not stretched/blurred or rotated:

"Researcher: Yes, I see. And so, this is the easier is where you only have to reverse, or, the easiest CAPTCHA that you have done?

Interviewee: It is important that the CAPTCHA shouldn't be a photo. It should be simply a sign. It shouldn't be a photo

Researcher: But, what do you mean a sign. If it's not a photo…

Interviewee: A sign, for example, you can see here. There is a CAPTCHA. Okay, I am going to show, yeah?

Researcher: Yes, okay.

Interviewee: I am going to show you, so you can under-

stand the thing I would like to say.

(The interviewee shows photos of CAPTCHAs (which are photos) but do not look like a photo – just letters/numbers that are only slightly rotated on a clear background)

Figure 4: Type of CAPTCHA that is preferred by the participant Penyo

(Figure 4 shows the CAPTCHA which Penyo has shown as an example of a CAPTCHA which he personally prefers)

Interviewee: It should be, I think, like this…

Interviewee: You see, you can see it. It shouldn't be. Let me show you…

Researcher: Yes, I understood completely.

Interviewee: Yes, something like this, or like this.

(Interviewee shows CAPTCHAs which look like photos taken from a street/house number)

Figure 5: Type of CAPTCHA that is difficult for the partcipant Penyo

(Figure 5 shows the CAPTCHA that Penyo has shown as an example of a CAPTCHA which is difficult to complete)

Researcher: It shouldn't be something like this, yeah?

Interviewee: Yes, because sometimes you cannot see it. And it also shouldn't be too complex. I mean, the signs shouldn't be too complex, like this for example. You can see here. This is now a problem. You spend a lot of time and sometimes you can make mistake because it is misleading."

Pesho also believes that numbers are a better choice for CAPTCHAs in terms of users, that CAPTCHAs with noise are difficult. However, the easiest CAPTCHA should contain a real-life alternative (like a car's number, a picture of dogs and so on):

"but it's very easy for a person because we have gotten used to discerning them (CAPTCHAs with pictures from real-life) in real-life and it's just easy. You just see a number, a

car's number and you can say what the numbers are. I really like them."

On the other hand, **Alex** is of the opinion that the CAPTCHA where you have to tick a box is the best choice followed by the letters and numbers:

Interviewee: Well, I think that by clicking on something only it would be very effective in terms of time. It would be a faster way.

Researcher: Yeah. And which CAPTCHAs did you find easy, satisfying and quick to complete. Like the easiest?

Interviewee: The easiest is by clicking on something like "Do you agree with the terms" and then press submit and continue.

Smith also likes the "innovative" CAPTCHAs which he explains as CAPTCHAs which require the user to slide left or right and perform such simple tasks. He finds them better because they are quicker to complete (and thus have higher efficiency) and because in ordinary CAPTCHAs (with letters and numbers which you have to fill) you can easily make a mistake and often in such case you would have to retype some information (such as a password in a form). He finds the CAPTCHAs with letters and numbers to be often "*very hard to recognize*" and he even stated that he hates them. He thus deems the CAPTCHAs with letters and numbers as very unsatisfactory as satisfaction is explained in ISO 9241-11 as consisting of a freedom from discomfort for the user and a positive attitude of the user towards the specified system (Jokela et al., 2003) and both are lacking with Smith:

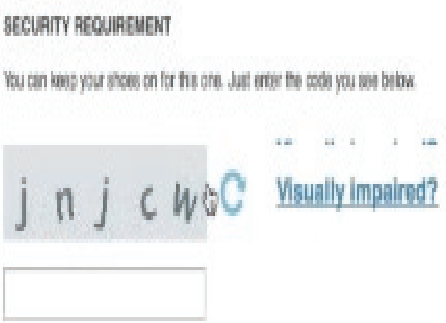
"Researcher: And how do you think it affects your speed when dealing with websites? (CAPTCHAs)

Interviewee: I hate it.

Researcher: You hate it. So it's not easy to complete the

different CAPTCHAs?

Interviewee: Sometimes it's easy but there are some very, very difficult ones. You can easily mistake the words



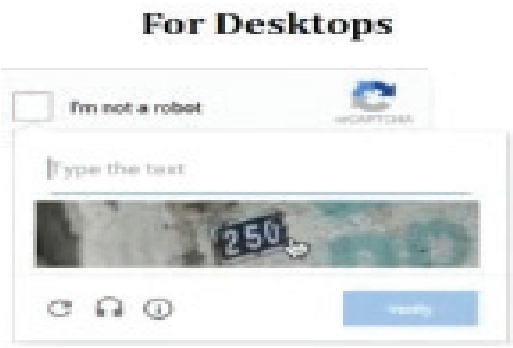
or numbers.

Researcher: Yes. And can you think of some ways that would ease the completion of such CAPTCHAs?

Interviewee: I have seen some other innovative methods like just to drop or slide with your mouse.

Researcher: And.. Can you tell me about the CAPTCHA that you saw and found very good for you. I mean you liked it a lot, like what characteristics did it have, what did you have to do and why did you like it?

Interviewee: Okay. When you have just numbers you can easily mistake. Because sometimes there's like a back-



ground noise and numbers – you cannot see what is the number – it's very hard to recognize. But if it's clear numbers

– it's much easier.

Researcher: So, about the innovative methods – you have pictures and you have to select only a couple of them.

Interviewee: Yeah, it's alright. But I like the most the thing that you have to just slide it to the left or to the right. Have you seen it?"

Mariah sometimes like the ones in which you have to select photos but usually prefers the letters and numbers:

"Interviewee: Well, for entertaining the pictures are better but usually there's more of them and there are couple of questions in a row so I don't like that one. It depends if I am looking to be entertained, I would prefer the pictures but if I am in a hurry, I am at work and I am doing something very important I would rather take the numbers and letters."

Angelina, on the other hand, prefers CAPTCHAs which ask for simple arithmetic:

"Researcher: So which type would you prefer if you have to choose (type of CAPTCHA)?

Interviewee: I think where I have to calculate some math."

5.1.6 Lower objective usability due to numerous ways of returning to the homepage

Although in the interviews, the participants state that the current ways of returning to the homepage are satisfactorily and usable some problems emerged during the observations reliant upon the Think Aloud method.

In the interviews, Pesho stated that clicking on the logo is very easy:

"Researcher: I see, that is awesome. And what actions do you ideally want to take to return to the homepage of

a website. What would the most suitable for you that you would like the most?

Interviewee: Well, clicking the label is just very simple. It does not require any other action than simply dragging the mouse and clicking this on any given website.

Researcher: It's about clicking the logo, yes?

Interviewee: Yes, it's easy."

Alex stated that no changes are necessary and the clicking on the Home button is usable enough for him but he made a mistake and did not realize it during the observation:

"Interviewee: But usually I am clicking on the home button.

Researcher: And what actions do you ideally want to take to return to the homepage of a website? Like what would have been the most suitable, interesting, satisfying and easiest for you?

Interviewee: I am satisfied like that"

Smith also stated that no changes are necessary and the current patterns are usable (satisfying) but he made the same mistake in the observation:

"Researcher: I get it. And what actions do you ideally want to take to return to the homepage of a website? What would be perfect for you?

Interviewee: I'll just click on the icon.

During the observation, Penyo tried to return to the homepage of PayPal by clicking on the browser's back button. However, this did not return him to the homepage as it was not the previous website that he visited. Two (2) of the participants (Alex and Smith) clicked on the Home button instead of the logo in the last observation task (the

BBC website) and this brought them to the homepage of the news section of BBC and not on the homepage of the entire website and they did not realize that without help. Upon realization, in line with the Think Aloud instructions they followed, some of the participants were really surprised that they did not actually go to the website's homepage. So, it appears like "Home" does not always mean that you will be redirected to the website's homepage like if you click on the website's logo but even experienced users are not aware of this. This pinpoints a potential difference between the actual usability and the perceived usability and shows that the usability of returning to the homepage may be lower than expected due to the differences between the different methods for returning to the homepage.

Therefore, the mixture of ways to return to the homepage of a website may lead to lower usability than the perceived one.

5.2 Themes summary

The inappropriateness of the "Home" text was a recurring idea within the data analysis. Some of the participants explicitly declared their unhappiness with the naming of the button, while others implicitly brought this up by talking about the 'Homepage' instead of the 'Home'. The most repeated pattern was for it to be named 'Homepage' as 'home' can mean something related to one's physical home such as home interior though other alternatives were presented by the computer science major who proposed the concept of a 'start' or 'starting page'.

The participants had no trouble interacting with the 'hamburger' icon which some of them themselves attribute

to their experience with technology and websites in general. This pinpoints that the 'hamburger' icon is perfectly usable amongst experienced Internet users and contradicts past studies exploring the lack of usability of the 'hamburger' icon which is most likely due to the nature of the participants – young and experienced Internet users who are online every day. Though, when the participants were probed and reflected upon the issues – they unanimously got to the conclusion that the 'hamburger' icon does not represent what it does and that better alternatives exist such as a simple "Menu" text. They implicitly pinpointed learnability and 'information scent' issues with the icon as it is used nowadays and one of the participants unknowingly came up with a findability issue of the icon by stating that it may not look like it is a part of the website, even less a special menu (Bedford, 2016). The main idea is that a better solution exists out there that is not the 'hamburger' icon.

Another recurring idea that participants share is that CAPTCHAs are a pain for their usability. Some of the participants find them boring, others distracting and most hard to complete. Though the participants expressed their desired characteristics of CAPTCHAs in different ways and even pointed to different and conflicting forms of CAPTCHAs it emerged from the thematic analysis that the participants associate their usability with the efficiency of completing the CAPTCHA. That is, the desired CAPTCHA is the one that takes the least to complete.

Returning to the homepage was perceived as perfectly usable by the participants but the observation revealed a flaw and contradiction between their actual and perceived usability. The multiple ways to return to the homepage confused three of the six participants which took the

wrong action and did not complete the task without guidance. Thus, the slight differences between the ways to the return to the homepage are unknown, to some extent, to even experienced Internet users and further study in the field may be carried out to explore this phenomenon.

5.3 Usability problems of the chosen design patterns according to UPT

The UPT classification brought forward helped to come up and analyze most of the issues with the examined design patterns. The issues mentioned below emerged from the analysis.

Two (2) issues were identified with the 'hamburger' icon during the UPT classification. The first issue is related to the naming of the pattern which is part of the artifact component and its language subcategory and the second is related to the appearance of the object which is part of the artifact component and is related to the subcategory of visual appearance.

1. The analysis of the participants' viewpoints pinpoints that the 'hamburger' icon may need a text naming it 'Menu' or something similar. Thus, there probably is an issue related to the Artifact component, the Language category and the Naming/ labeling field.
2. Four of the six participants have stated that the icon is not relatable in one way or another. Namely, Pesho, Penyo, Smith and Mariah. Thus, The icon should imply the activity related to the icon and it should be more recognizable. Therefore, there is a strong reason to believe that there is an issue that has to do with the Artifact component,

the Visualness category, and related to the Object appearance.

Two (2) issues were also identified for the current ways of returning to the homepage:

1. The perspectives of the participants pinpoint that the text 'Home' may be confusing as it can mean a lot of things such as home interior and participants who mentioned the text button as a way of returning to the homepage preferred "Homepage". Therefore, the naming of the pattern may also be ambiguous. Thus, the issue has to do with the Artifact component, the Language category and is related to the Naming/labeling of the pattern.
2. One (1) of the participants explicitly stated that there should be a link that says homepage which will take you to the homepage while other three (3) took this as granted and Angelina did not think of clicking on the logo as a way to return to the homepage, she thought of just searching for the "Home" button. Though, too many alternatives also confused the users as revealed in the observation. Therefore, second issue has to do with the abundance of alternatives to return to the homepage and the subtle differences between them. Thus, it is related to the Task component, it affects the category/goal of Task-facilitation, and is related to the Alternatives field

Three (3) issues were identified with the different CAPTCHAs:

1. The participants have strong beliefs that some CAPTCHAs are hard to understand. This has to do with the Artifact component, the Visualness cate-

gory and is related to the Object appearance.

2. Some of the participants have brought up the issue that some forms of CAPTCHAs are boring to interact with, they could be made more entertaining through the use of pictures. This can be arranged into an issue dealing with the Task component, the Task-mapping category and is related to the Interaction with the pattern.
3. The participants are brought up the viewpoint that some CAPTCHAs are distracting and confusing and the users can lose focus on what they are actually doing when completing the CAPTCHA. This can be grouped into the Task Component, the Task-facilitation category and is a detriment to the Keeping the user on track goal.

6. DISCUSSION

In this chapter, I discuss the resulting findings in line with the theoretical basis of the research, I pinpoint how and why they answer the research questions of the research and I compare the findings with some of the existing literature on the topic

6.1 Answers to the research questions

The research questions posed at the beginning of the research were:

1. How do users perceive the current usage of (user interface) website design patterns in regards to their usability?
2. How do users describe their desired characteristics of design patterns to enhance usability?

The research questions were answered individually for each of the three (3) chosen design patterns in the interviews and the observations.

In terms of the first research question, It became evident that the experienced participants perceive the 'hamburger' icon as relatively usable/easy but had in mind ideas to increase that usability for them and for less experienced users because the 'hamburger' icon has low learnability as it does not represent properly what it stands for (its information scent is lacking besides learnability). Thus, their usability accrued with the help of experience which negated the effects of the low learnability. Their usability was confirmed during the observation where they were aware

of the process that they have to undergo to complete the tasks with the icon and did not hesitate. In terms of the second research question, the majority of the participants confirmed that a text-based alternative would be the most desired alternative and the majority pointed towards a text named "Menu"

In terms of the CAPTCHAs, the first research question was answered in *themes* 3 *and* 4. Generally, the participants found CAPTCHAs to have low satisfaction and associated satisfaction and usability with the efficiency that they could achieve in the task which varies from CAPTCHA to CAPTCHA. As regards to the second research question, each participant described the desired characteristics of a CAPTCHA in a different or slightly different way which is revealed in the *5th theme*.

Concerning returning to the homepage, although participants perceived the current ways usable (satisfying, easy and efficient) as shown in theme 6 they struggled with all the ways that they could return to the homepage and three (3) of them took the wrong path without realizing it (in terms of the first research question). Concerning the second research question, the majority of the participants have suggested that 'homepage' is a better alternative than 'home' (*theme 1*) as a characteristic of the design pattern for returning to the homepage (The home button). Some other ideas were presented but were not shared amongst the majority of the different participants.

6.2 Discussion of perceived usability

In recent literature, returning to the homepage has been depicted as relatively successful with 77% of users

in a recent test being able to return to the homepage using the logo and 98% managing if there is a "Home" option (Fichter and Wisniewski, 2016). This research has shown that the abundance of methods to return to the homepage may confuse users because clicking "Home" does not always return to the real homepage of the website like the logo does. The participants were not aware that the two methods could provide different results prior to the observation and three (3) out of the six (6) participants did not return to the real homepage successfully. Thus, although all of the participants perceived returning to the homepage as usable they ended up with unexpected results which surprised them and have shown possible gaps. The difference between perceived/subjective and objective usability is only expected (Holden and Rada, 2011). That is why the inclusion of a method to gather the subjective usability of the users (interview) and their objective usability (observation) was undertaken during the study. Objective usability can differ and does not always coincide with the subjectively perceived usability of the users (Holden and Rada, 2011).

Concerning the 'hamburger' icon, a recent research has shown that 71 out of 75 participants failed to achieve tasks that required the use of the 'hamburger' icon (Fichter and Wisniewski, 2016) but all six (6) participants managed to complete the given tasks and perceive it usable, likely due to their extensive experience with the Internet and the use of technology. The majority have pinpointed though that the icon has low information scent, recognition and learnability due to its non-relatable looks and have thought of ways that would make it more usable when a user is first meeting the icon. The 'hamburger' icon seems to be thought of as efficient, effective and satisfying once you get the hang of it but hard in the beginning which

can be attributed to its low learnability. The decrease in user experience after an introduction of a hidden navigation accessible with a button such as the 'hamburger' icon was also confirmed by Pernice and Budiu (2016). In their tests, desktop content discoverability from a hidden menu was 23% lower than having a visible menu. They also argue that this drop in discoverability is due to low information scent, low salience (the icon is hard to notice at times and on larger displays), low familiarity with using the icon, amongst other reasons. The participants in this research also touched upon these issues and a probability for their success with using and knowing the icon is their high familiarity with the icon. A thing that was omitted from the discussion with the participants is their mobile usage as desktop-only users theoretically may be less experienced and familiar with the 'hamburger' icon despite their experience with the World Wide Web as a whole.

Regarding the CAPTCHAs, the participants find them a detriment to their usability of the website in general. They pinpoint different characteristics/types of the CAPTCHAs that are more usable for them but what those characteristics have in common is the desire to get done with the CAPTCHA quicker. A CAPTCHA may not have high learnability at this point as there are numerous types of CAPTCHAs and because every CAPTCHA shows a different thing due to its purpose so the participants have associated their satisfaction from that task with their efficiency in completing it and vice-versa. This confirms other literature on CAPTCHAs like Pogue (2012, p.23) who stated that CAPTCHAs have merely substituted one public nuisance (the 'bad' guys who abuse websites which CAPTCHAs try to stop) for another. Thus, in his words, CAPTCHAs have become a nuisance for the users. He also states that the words are often too distorted and humans struggle reading them (Pogue, 2012) which

was also mentioned by some of the participants.

6.3 Discussion of the desired characteristics of the chosen patterns

Most of the inputs from the participants regarding their desired characteristics match with what has been concluded in recent literature. For example, Fichter and Wisniewski (2016) state that if somebody that a web developer works require the usage of the 'hamburger' icon, then the least that can be done to increase the usability is to add the text "Menu" which was proposed by the majority of the participants. Other research has also concluded that the 'hamburger' icon has issues (though all 6 participants managed to cope with using it), for example, after removing it Spotify had a 30% increase in navigation hits (Archer, 2015) and recommending the 'hamburger' icon to be replaced or complemented with the text "Menu" (Archer, 2015) is not a unique result of this research.

The participant's desired text of "Homepage" and the one input of "Starting page" over "Home" is interesting as the current standard is to have a button with the text "Home", if there is such a button at all. This is exemplified in a few of the 'big' websites out there below:

Figure 6: A 'Home' button in the BBC website.

Figure 7: A 'Home' button in Twitter

Figure 8: A "Home" button in Snapchat.

Figure 7 and Figure 8 above show that the popular websites Snapchat, Twitter and BBC all use a "Home" button. Nonetheless, they are actually referring to what is seemingly more clearly expressed and known as "Homepage" (Dinet et al, 2013, p.81).

As it was mentioned above, culture can be thought of as a factor that affects usability (Dinet et al., 2013) and the main difference lies in cultures which are holistic and those which are analytical (Dinet et al., 2013). The perspective of the participants is expected to match the style of the web designers that crafted the websites as the analytical perspective is present in the United States of America and most parts of Europe while the holistic perspective is mostly present in countries located in the Far East such as China, Japan and Korea (Dinet et al., 2013). Therefore, the participants are expected to be in an area with greater usability due to cultural alikeness (usability is generally greater if the cognitive style of the web designer and the user are the same) (Dinet et al., 2013).

It is true that "Home" saves some of the screen real estate, especially on mobile devices, and this is a valid reason for simply "Home" to be preferred so further research may be necessary to weigh between these two contradicting factors. Still, "Home" either does not sound right, or seems like a source of confusion that may have a wrong information scent/misrecognition. The BBC website exemplifies this by confusing the users that it would link to the homepage of the website but it also leads to the "home" of the section that the user is in (like the news section). The existence of a problem with returning to the homepage has been discussed in a case of traveling websites with users over 45 years old (Finn and Johnson, 2013). In that case, returning to the homepage turned out difficult even when there was a visible Home button that returns users to the homepage and some websites did not have a Home button at all, assuming that the users can find a way (like changing the URL, going back in the browser's history, etc.) (Finn and Johnson, 2013). However, this study has shown

that the multitude of ways to return to the homepage may be tricky as some young, experienced Internet users may only know/use specific ways to return to the homepage which can have unexpected results.

The research shows that a single CAPTCHA cannot satisfy the usability requirements of every single user and so a further research may be necessary to pinpoint what the different majorities prefer. Though it is evident that the usability of CAPTCHAs, as perceived by the participants, is associated with their efficiency. A reason why the participants preferred different types could be that they are efficient at performing different tasks and not at the others which could be attributed to fine details such as background, gender, culture and personality (Chowdhury and Chowdhury, 2011). A recent research (Bursztein et al., 2014) has shown that the users' efficiency (accuracy and solving time) do not necessarily mean that the user would prefer the given CAPTCHA. The researchers found people to complete CAPTCHAs using Amazon's mechanical turk website which allows people to carry out certain tasks and get paid and also found people for several surveys which



indicated that users perceive digits as faster, easier and



likable although the research found out that English words were the ones completed with the highest accuracy and



speed (Bursztein et al., 2014). Therefore, quantitative analysis which grasps the actual efficiency of the users when entrusted with the task of completing different CAPTCHAs may be a better shot at understanding the objective user preference as clearly there is a difference between what the users perceive as quick and easy and what actually is quick and easy. Our current study can be seen as an illustration of this ambivalence of perception and reality – as participants gave varying and even contradicting types of CAPTCHAs as examples of quick, easy and likable which clearly were not the easiest and quickest to get around.

7. CONCLUSION

In this chapter, a few remarks are mentioned to conclude the research, the potential benefit and impact of the research is discussed along with the possibilities for future research on the topic.

This study sought to qualitatively research how experienced, young (aged 23-32) Web users perceive three commonly used website design patterns (CAPTCHAs, returning to the homepage, and the 'hamburger' icon) in terms of their usability and sought to find out in what ways those website design patterns could be made better by exploring what the participants desire for the actions the website design patterns represent. Attention was paid to ensuring that the research is performed in an ethical way.

The 'hamburger' icon was generally found unsatisfying and the majority of the participants proposed a text-based alternative, mainly pinpointing the text "Menu" which has already been proposed in past researches (Fichter and Wisniewsk, 2016). Nonetheless, the objective usability of the users as depicted in the observation turned out high in the observation where none of the participants struggled with accessing the menu hidden by a 'hamburger' icon.

The preference of CAPTCHAs revolved mainly around the ones that are the quickest to complete although users pinpointed different types as being easy and quick. As Bursztein et al. (2014) have determined in another research – users seem to have a false perception about which CAPTCHAs they complete the quickest and a quantitative ap-

proach may be better suited for such a case. Nonetheless, it appears from the research that the preference of CAPTCHAs and the subjective usability may depend on other factors such as the familiarity with different types of CAPTCHAs and possibly age/gender/education and so on as the participants gave differing answers although they all had ease and quickness of completion in mind.

In terms of returning to the homepage, a text/button "Home" appears to be undesired due to the possibility of confusion/low information scent and "Homepage" was proposed by some of the participants as a way to enhance the usability of that action although all of the users knew a way to return to the homepage. During the observation, the objective usability also seemed to be lower than expected as three out of the six participants confused the proper way to return to the homepage which can be attributed to the multiple ways of returning to the homepage and the fact that they have subtle differences in terms of functionality. For example, you can return to the homepage of a website by clicking on the browser's back button, by going to the domain's root in the URL address bar, by finding the website's logo, by finding a Home button, etc.

Generally, the research indicates that a text like "Menu" should be added should the 'hamburger' icon be used, 'Homepage' should be used instead of 'Home' with a clear indication of where the 'Homepage' would bring the user and CAPTCHAs need to evolve to be quick and effortless to complete, hopefully without sacrificing the level of security they provide. In terms of CAPTCHAs, the reCAPTCHA which only asks the user to tick a checkbox might be the way to go, although the users did not pick that as the preferred source, possibly due to their lack of experience with

it and this must be further explored.

7.1 Contribution

I have strived to contribute to the issues emerging from these three hotly discussed website user interface design patterns. Some light was shed on the usability of the 'hamburger' icon, CAPTCHAs and returning to the homepage as experienced by the average young user nowadays and potential changes that could enhance this usability were presented. An issue unexplored in past research is the lack of standards of returning to the Homepage of a website and the potential differences in handling that action between websites. As exemplified with the BBC website, some 'Home' buttons would actually link to the 'Home' part of the section that the user is currently browsing. Furthermore, 'Home' was found to bring issues for the users as it can mean different things to people such as a page leading to products or information related to their home, such as home interior and 'homepage' turned out to be less confusing. Past researches on the 'hamburger' icon which pinpoint that a "Menu" text is necessary were confirmed when taking into account the perspective of the interviewees' in the interviews but they did not encounter any practical issues in using it. The research and the conclusions herein may be useful to designers, web designers and developers, website owners, user experience and usability researchers, entrepreneurs of all sorts and to the general informatics community and can help to craft a better Web for the future.

7.2 Reflections

It was interesting to do this research and it gave me some interesting insights. It seems like the younger gener-

ation, at least in Bulgaria, has started using the Internet in its early days and the chosen participants, 5 of which are ordinary Internet users which do not work in the sphere of technology, cope with design patterns which are seen as contradictory without the mistakes that were expected (I expected the 'hamburger' icon to at least confuse one of them due to literature which shows that an actual majority struggled with it). Some of the participants were not very talkative and only replied with a few words so a thing that I would do differently is find a way to extract more useful information and try to find the right questions to get the people to open up and share more of what they experience, perceive and hope for in regards to the user interface elements.

7.3 Further research

One of the limitations of this study was that it only included people with a sound background in using the Internet and that it covered mostly people in their twenties. Further research can pinpoint the difference in usability between these people and people of older age or of little technological experience and compare or contrast their usability, their perceptions on usability and their desired improvements.

Factors that can drastically change the outputs of this research besides age and technological experience include the availability of Internet and the time the users spend online so the outcomes of variations in any of these factors can produce useful comparisons. For example, the difference in usability between people who are experienced in using the Web and the ones who are not can pinpoint the effects and the degree of change of experience on the perception of usability of the users.

Further research can also be carried out regarding the ways to return to the homepage, their differences and the user's actual usability with those techniques for returning to the homepage as there are some edge cases and slight differences between the ways which has troubled the participants in this research. Though, due to the qualitative nature of the research and the small number of participants involved, generalizations cannot be made which is why a quantitative research may be especially beneficial to pinpoint the seriousness of the issue.

As the 'hamburger' icon is mostly used in mobile environments, it might be fruitful to carry out future research which analyzes users who are only desktop users regarding their user experience with the icon. Desktop-only users may provide valuable insight into the user experience and usability of the 'hamburger' icon as they are likely to have good experience with technology but poor knowledge of the patterns found in the mobile web.

A mixed study on CAPTCHAs which examines objectively which are the CAPTCHAs that are the quickest to complete and which CAPTCHAs the users prefer after being shown versions of all common forms of CAPTCHA out there could be undertaken. Such a study could not only find which is the optimal CAPTCHA to show to users but it can pinpoint if users take into account some other factors than speed and accuracy when rating the different types and which could be a better choice. The current research did not show many different alternatives regarding CAPTCHA types and this possibly affected the participants' responses in terms of preferences as they might have had little experience with some of the types.

Dinet et al. (2013) pinpoint a number of studies which reveal that there is an important relationship between the culture of the user and the people behind its creation and that this relationship has a huge effect on usability. Therefore, culture appears to be a variable which could drastically change the perspectives and the preferences of the website users regarding the examined website design patterns, or any set of website design patterns and websites which could be further researched.

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APPENDIX A: CONSENT FORM

The research's title: The users' perspective and preference on 3 website design patterns (CAPTCHAs, hamburger icon and returning to the homepage) and their usability

The research's aim: To better understand what users think of 3 widely used design patterns and how the design patterns can be ameliorated

The research's benefits: The findings can serve the purpose of showing the actual usability impact of the chosen design patterns and particular ways to enhance them. Those findings can pinpoint if the chosen patterns have low usability and need to be avoided or not and it can pinpoint how to create better design patterns in the future. This can not only impact the actual participants but the wide Internet audience which uses websites regularly and is in a constant need of easier to use, learn and memorize user interfaces and which may struggle with using some of the established website design patterns.

Contacting the researcher: Ivan Dimov, id222ca@student.lnu.se, ivan@dimoff.biz

The research's description: You will be interviewed and asked questions regarding websites, their user interface and three (3) user interface elements that are found in many websites, in particular. A few demographic questions will also be posed to you initially. Before or after the interview, a short observation will take place where you are going to be given a handful of tasks and will have to think aloud - what you are doing, trying to do and so on.

Potential risk and discomfort: No risk or discomfort can be foreseen. Only your age, gender, education level, technological experience and country of birth will be utilized for the purposes of the research.

Your right to the information: Participation in the research is entirely voluntary. You can choose not to participate in the research at any point of time without having to provide any reasons for this decision. After participating, the themes that were extracted from your data will be shown to you to determine whether you believe that they correctly represent what you have communicated.

Confidentiality: The information which will be collected from the interviews will be used only for the purposes of the research and it will not be provided to any third-parties. The audio recordings of the interview and any notes or transcripts will be only accessed by the researcher and his supervisor and examiner.

Feedback and questions regarding the research: You can contact Ivan Dimov (the researcher) at any time by using one of the provided email addresses in this form.

- I have understood what the research is about and I chose to participate in it.
- I agree for my interview and observation to be recorded
- I am aware that my participation in this research is voluntary and that I can choose to withdraw at any time without having to provide explanations

Name of Participant Date

Signature

Name of Person taking consent. Date

Signature

APPENDIX B: INTERVIEW QUESTIONS

Demographic questions

1. What is your sex?
2. What is your age?
3. What is your highest level of education?
4. From how long do you use the Internet?
5. How many hours do you spend on the Internet daily?
6. What is your country of origin and the country you currently reside in?

Research questions

1. What do you usually do to return to the homepage of a website?
2. What actions do you ideally want to take to return to the homepage of a website?
3. How satisfied are you with the ways to return to the homepage of websites that you are using and why?
4. How easy do you think returning to the homepage of most websites is and why?
5. What changes may be made so that returning to the homepage is easier, faster and satisfying?

The hamburger icon is shown to the user

6. What does this icon do when used in a website or an application?

7. What icon do you think would be a better fit for the purpose of opening up the navigation and what would it

consist of and look like, if any?

8. How easy do you think it is to learn what the icon does and why?

9. How satisfied are you with websites which use the icon to show their navigation and why?

10. How do you think that the icon affects your speed when browsing through websites when compared to websites which do not use it and why?

11. What changes may be made to the icon to be easier to understand and use, according to you?

12. What do you think of the icon's visual appearance?

13. Can you briefly explain what do you think a CAPTCHA is, have you ever encountered such a thing in websites and if so, when and why?

14. How do you think a CAPTCHA affects your speed in dealing with websites?

15. How easy it is to complete the different CAPTCHAs?

16. What ways can you think of that would ease the completion of CAPTCHAs?

17. Tell me about the CAPTCHA that you saw and found easy, satisfying and quick to complete? What characteristics did it have, what did you have to do and why you liked it the most?

18. Do you have anything else to add or comment on the topic?

APPENDIX C: OBSERVATION QUESTIONS

Open https://www.paypal.com/bg/webapps/mpp/buyer-protection

- Return to the homepage of the website using only the provided user interface

Open https://en.m.wikipedia.org/wiki/Main_Page

- How would you login into Wikipedia without switching to the desktop website?

Open http://m.9gag.com/

- How would you select funny images on the given website?

Open http://smallseotools.com/plagiarism-checker/

- How would you check some text for plagiarism?

Open http://www.bbc.com/news/technology

- Return to the homepage of the website using only the provided user interface

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