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1. Introduction

Web development is a field that rapidly evolves, and web developers continuously need to keep themselves updated of new techniques and trends regarding the subject. The visual design and functionality of websites has gone through a great change since the early beginning of webpages, and the number of users on the Internet has increased immensely. Most companies, or organizations today, present themselves, and their products or services with the help of websites. Many of these sites include and various types of Internet services that for example enable online purchases, online ticket booking etc. Website browsing is an essential part of the contemporary lifestyle, which stresses the need for efficient and proficient techniques concerning web development.

There are an enormous number of websites on the Internet today [1], which suggests the need of good web development techniques that can enable websites to differentiate themselves amongst all other sites, and become successful or popular. In order for a website to be successful, or popular, various approaches are possible and different aspects can be considered. The process of increasing the success rate of a website in practice can vary and depend on various factors such as the type of content on the site, the reputation of the organization to whom the website belongs to, the design of the site etc. In summary, a careful planning process of websites is preferable.

In addition to the various amount of factors and aspects that can be regarded when developing a website, people today largely use other devices than desktop computers to browse on websites, such as smartphones and tablets. Between January 2009 and January 2012 the Internet access through mobile devices has increased from 0.7% to 8.5% [2]. This rapid increase could be regarded as an indication on that effort should be put into the development of mobile webpages. The increase of mobile browsing has brought new challenges to the field web development and introduced needs for new ideas and methods that cope with the features of mobile devices. Therefore, the results when developing a website should preferably not only work, and be useful on computers, but that also be suitable for a mobile format

1.1. Problem Description

Issues regarding the presentation and structuring of information often arises in the field of mobile web development. Ideally, the information should be presented and structured in such a way that it enhances the experience of visiting users. Hence, the layout and structure of a website's information can be crucial to its success. This issue can evidently aggravate in relation to the amount of information presented.

An extension of this issue is to how to present hierarchal information. Information structured in a hierarchal manner on a website takes shape in such a way that all information available on the site cannot be viewed at once, and in order to view certain information, navigation through a predefined hierarchy is necessary. The navigation is usually managed by clicking on certain web elements, such as links or buttons, in a certain order. How to display and convey the navigation is crucial to finding certain information, and if this task is complicated, or poorly visualized, the appreciation or success rate of the website will probably suffer.

The problem of visualizing the navigation through hierarchal information can be even more tangible on mobile websites in comparison to desktop websites. Websites presented on a computer screen, which is substantially larger than the screen on mobile devices, can display more content at once, and thus be able to provide a more comprehensive overview of the information. The desktop website can also more easily visualize the navigation through information hierarchies.

On mobile devices the challenge lies in finding ways to present the navigation structure, and make it understandable how navigation through the hierarchal information is performed. This should in ways that are efficient and intuitive, and which does not affect the user experience in a negative way.

The problem that this thesis aims to analyze is how the navigation in a hierarchal information structure can be presented in a mobile interface. A user experience point of view will form the basis for the analysis.

1.2. Purpose and Goal

The motivation, or purpose of this thesis, is the possible benefits that web developers can gain from a deeper analysis of the problem. And since the significance of the problem, with a high probability, will increases with the growth of mobile of web browsing, a deeper insight could also be beneficial to future studies regarding the matter.

The goal of this thesis is:

- To investigate the issue stated above, taking in regard theories on user-experience.
- To develop prototype(s) of a solution.
- To user-test the prototype(s)
- To analyze the result of the user tests and draw conclusions.

1.3. Limitations

The concept of, and use of the term mobile devices in this thesis will be limited to mobile phones that have Internet access and mobile browsing abilities. Mobile phones that fulfill these requirements can also be referred to as “Smart phones”. Another system that also falls under the categorization of mobile devices is the "Tablet", such

as the "iPad". An analysis of the problem on tablets could be of interest as well, but the screen size of tablets does not differ as much from desktop computer screens as the mobile phone, and therefore the problem is not as obvious.

Another limitation of this thesis is the hierarchal information depth at which mobile website navigation becomes an issue. This thesis will not focus on, or try to find any particular depth at which the problem occurs, but instead focus on aspects and concepts regarding the issue, such as how and why it is problematic.

1.4. Previous Work

2. Introduction to Mobile Web

2.1. Mobile Web Sites

Mobile web sites are web sites browsed to from mobile devices. Interaction with mobile websites is affected due to substantial differences between desktop computer browsers and mobile device browsers. The screens of mobile devices are much smaller than computer screens and have more imprecise input in the form of human fingers, in contrast to desktop-friendly web pages that that have precise input with the help of a mouse. These differences have also pushed web developers to find new ways of approaching the design of web pages, if they are to be suitable for mobile phones as well as desktop computers.

2.2. Mobile Adaptation of Web Pages

The reduced screen size and different input on mobile devices, compared to desktop computers, affects not only the design and display features of websites, but also how users interact with the sites. Gupta et al describe two main transformations regarding how a mobile web page can be displayed in a mobile browser: a linear approach and direct migration [3]. With direct migration a website will appear in the same way on a mobile device browser as it does on a desktop computer, which means that no transformation to the desktop web page is performed. Consequently, text, images, links and other web elements will be appear small on the mobile device's screen. It will be more difficult to read texts and interpret images due to their small size, and more challenging to click on links because human fingers might be relatively larger than the links themselves. The typical behavior of users viewing untransformed, or non-adapted mobile websites is to zoom in and out in order to see and understand specific content get an overview of the information available.

With the linear approach the website is transformed to match the reduced screen size of mobile phones in such a way that the different web page areas (areas with different web elements such as text or images) are presented after each other in a linear list. The linear list is displayed as a single column, which fit easily inside small screen of

the mobile phone. With this approach it is not required that users scroll horizontally or zoom in and out to access the available information. Instead, they only need to either to scroll down vertically, or click on appropriate sized links, which better suits the way people usually interact with their mobile phones.

2.2.1. Difficulties with Mobile Adaptation of Web Pages

Incentives to adapt mobile web pages to the features of mobile phones exist, but the adaptation can be rather challenging. The reduction in screen size is extensive and introduces limitations on how much information that can be displayed at once. A lot of web pages have rich content that do not fit all at once on a mobile device, and as Gupta et al mentions, an analysis of the content should be made to determine how the desktop website should be adapted to the mobile format [3].

The design of a mobile adapted website can impose various difficulties. Seeholzer and Salem, Jr explains some of these with the help of the results of a user study [4]. From the results they point out the risk of users feeling disappointment towards mobile websites due to pared-down features in comparison to desktop websites. They also emphasize that when users access pared-down mobile websites they might often feel that they were not on the Internet. The reason for this is the lack of functionality and a dynamic experience. This shows that it is important to not only consider that the amount of information presented on the reduced screen of a mobile device will be significantly smaller when developing a mobile website, but to also take into account the changes in the functionality or dynamic features.

2.3. Mobile Information Architecture

The success rate of mobile websites, and the experience for visiting user can be enhanced if consideration is put into how the content of the sites are structured and organized, which can be referred to as the websites' information architecture [5]. Information architecture can affect both the appearance of websites, as well as their usability, why it is an important part of the web development process.

2.3.1. Definition of Web Information Architecture

Morville et al. describes the definition of web information architecture with the help of the following outline:

- The structural design of shared information environments
- The combination of organizations, labeling, search, and navigation systems within websites and intranets
- The art and science of shaping information products and experiences to support usability and findability
- An emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape

The main focus of information architecture is how the information on websites is managed. An important notice to take from the outline above is that management of information not only comprises the actual structure, or the layout of information, but that is also takes into account how information can support usability and findability, as well as how typical non-digital principles can be applied to the digital world. However, Morville et al. explains, information architecture is not graphics design, software development or usability engineering, but instead something in the areas between these principles. The work involved within the field of information architecture could be exemplified in a way that it deals with questions on why certain information is needed, the structure of the information, or how the usage of information could support usability, and not on questions regarding what colors web elements should have, how the information structure should be implemented in terms of code, or how the usability of a website is tested. By existing in the areas between the mentioned principles, web information architecture forces communication and collaboration among them to provide a better result.

2.3.2. Web Information Architecture on Mobile Devices

Web information architecture deals with several aspects ranging from the layout of a website to how information can support a site's usability. When developing mobile websites additional challenges are introduced, and new ways of thinking are required. Smaller screens means less space to show information. Consequently, websites that are user friendly and designed in an appropriate way for desktop computers can be worsened when stripped down to fit a mobile device. Therefore, it is preferable to expand the principles of web information architecture to include aspects of mobile format when working with mobile web development.

Mobile information architecture consists of four elements: representation, structure, navigation and content [6]. The way information is presented visually, i.e. the layout and design of the information, is what the representation element refers to. Representation affects the ability for users to make use of the presented information. It also includes how well websites take advantage of the small screens of mobile devices as well as the variety of situations where mobile devices can be used. The structure element points to how the content on mobile websites is organized. Content in this context is compromised of not only text or images, but also includes all other web elements such as links, menus, labels etc. The organization of content can for example include appropriateness of the order of menu sequences or the relevance of labels and text. Mobile websites have lesser screen space to display the large amount of information that a desktop website usually contain, which emphasizes the need for an adapted structure so visitors can make best use of the site. The third navigation, is about how people navigate themselves through information on mobile websites as well as how the navigate to other external websites. A subcomponent of the navigation deals with how easy it is, or how intuitive it is to learn the different navigation procedures on a site. Navigational aspects of mobile websites are of importance due to the fact that mobile devices have different input facilities. The fourth and last element of mobile information architecture, content, points to the relevance of the information on websites taking in regard the different contexts that information is presented in. Content also involves a subcomponent that refers to the

effectiveness in the presentation of information. The effectiveness includes how reliable the information is, and the frequency of which the information is being updated. Content is of importance because the relevance of the content can differ due to different contexts.

2.4. Mobile Web Design

3. Theory

3.1. User-Experience

3.2. Mobile Website Navigation

4. Methodology

4.1. Web Development Tools

4.1.1. HTML

4.1.2. CSS

4.1.3. Javascript

4.2. Implementation

4.3. User Tests

5. Results

6. Discussion and Conclusion

7. Bibliography

[1] The size of the World Wide Web. http://www.worldwidewebsize.com

[2] StatCounter Global Stats. Mobile vs Desktop Browsing. http://gs.statcounter.com/#mobile_vs_desktop-ww-monthly-201210-201210-bar

[3] Neha Gupta, Saba Hilal. Extraction of Web Content to Adapt Web Pages for Mobile Devices. *IJCSI International Journal of Computer Science Issues, Vol 8, Issue 2, March 2011*

[4] Seeholzer Jamie, A. Salem, Jr. Joseph. Library on the Go: A Focus Group Study of the Mobile Web and the Academic Library. *College & Research Librariesvol. Vol 72 no. 1 9-20 January 2011*

[5] Morville Peter, Rosenfeld Louis. Information Architecture – for the World Wide Web. *Sebastopol: O'Reilly Media, 2007.*

[6] Hoyoung Kim, Jinwoo Kim, Yeonsoo Lee. An Empirical Study of Use Contexts in the Mobile Internet, Focusing on the Usability of Information Architecture. *Information Systems Frontiers 7:2, 175-186, 2005*.