Project Review on Implementation of
Responsive Web Design on SharePoint 2013

HAMK
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Master's thesis

Business management and entrepreneurship

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ABSTRACT

Häme University of Applied Sciences has undergone a major web renewal project: all degree programmes and different departmental subsites were migrated or rebuilt by implementing responsive web design onto a Share-Point 2013 platform. The aim of the HAMK website is to provide current and correct information in a clear and accessible format at the same time providing the best possible user experience.

The purpose of this thesis was to provide a comprehensive preview on the process of implementing responsive web design on SharePoint 2013 while also taking into consideration the future trends of web development. The thesis also contains concrete proposals for short-term and long-term further development of the www.hamk.fi website. In the theoretical frame of reference the website renewal project implementation method is also briefly elaborated. The thesis topic idea is based on my personal experiences during the implementation of the project.

The empirical study was conducted during the years 2014 and 2015 with the help of an expert interview, theories on SharePoint 2013 technology and responsive web design methodology, and future prognoses of web development made by field experts.

The current and very near future trend seems to be that responsive web design is the minimum for a website nowadays. Based on my research seeking future-friendly web development solutions, focusing on the mobile-first approach and implementing agile development projects are the recommended direction for HAMK. These factors are to take into consideration regardless of the technology or content management system used for website implementation. If HAMK follows my short-term development recommendations on mobile strategy and starts the content improvement process in the near future, then tuning into a deeper mobile-first mindset is going to be much easier with the major renewal project which will be due later on.

Keywords Responsive web design, SharePoint 2013, Scrum, web development.

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TIIVISTELMÄ

Hämeen ammattikorkeakoulun (HAMK) uudistetut www-sivut julkaistiin vuoden 2014 alkupuolella. Uudistuksessa kaikkien koulutuksien ja eri yksiköiden julkiset sivustot siirrettiin tai rakennettiin uudelleen Microsoftin Sharepoint-alustalle. Sivustokokonaisuus toteutettiin toimimaan responsiivisesti. Uudistuksen yhtenä tärkeimmistä tavoitteista oli tarjota käyttäjille ajankohtaista ja olennaista tietoa entistä selkeämmin ja käyttäjäystävällisemmin.

Tämän opinnäytetyön tarkoituksena oli esittää ja dokumentoida responsiivisen web-suunnittelun toteutusta SharePoint 2013 -alustalle sekä tutkia lähitulevaisuuden web-kehityksen trendejä ja suuntia. Lisäksi opinnäytetyö sisältää konkreettisia lyhyen ja pitkän aikavälin kehitysehdotuksia HAMKin julkisen sivuston kehittämiseen. Opinnäytetyön teoreettisessa viitekehyksessä on lyhyesti esitetty verkkosivujen uusimisprojektissa käytetty projektinhallintamenetelmä. Opinnäytetyön idea heräsi omista kokemuksista kyseisen projektin avainhenkilönä.

Opinnäytetyön empiirinen työ on toteutettu vuosien 2014 ja 2015 aikana. Tutkimukseen tarvittavan tiedon saamiseksi on toteutettu asiantuntijahaastattelu, tutkittu alaan liittyvää kirjallisuutta sekä asiantuntijoiden näkemyksiä web-kehityksen tulevaisuuden suunnista.

Opinnäytetyö osoittaa sen, että responsiivinen web-suunnittelu on kohta minimitaso, joka millä tahansa julkisilla sivuilla tulisi nykyään olla. Tutkimuksen tuloksena voidaan esittää, että suositeltu kehityssuunta HAMKin julkisille sivuille on implementoida ratkaisuja, jotka ovat myös tulevaisuudessakin käytettäviä. Nämä ratkaisut edellyttävät mobile-first -ajatustapaa sekä ketterien menetelmien käyttöä kehitystyössä. Mainitut kehityssuunnat on otettava huomioon riippumatta verkkosivujen teknologiasta tai sisällönhallintajärjestelmästä. Mikäli HAMK toteuttaa esittämäni lyhyen aikavälin kehitysehdotukset, sitä helpompaa tulevien isompien kehitystöiden toteuttaminen on.

Avainsanat   Responsiivinen web-suunnittelu, SharePoint 2013, Scrum, web kehitys

Sivut   60 s. + liitteet 3 s.

LIST OF ACRONYMS

ASP.NET	Open source server-side Web application framework
CMS	Content Management System
CSS	Cascade Style Sheets
JS	JavaScript
HTTP	Hypertext Transfer Protocol
HTML	Hypertext Markup Language
PEST	Political, Economic, Social and Technologica
RWD	Responsive Web Design
QR	Quick Response
UI	User Interface
W3C	World Wide Web Consortium

CONTENTS

1 INTRODUCTION TO THE TOPIC OF THE THESIS

The first chapter of the thesis describes the background and structure of the thesis. This thesis is commissioned by the Communications unit in Häme University of Applied Sciences (HAMK). HAMK is a higher education institution with over 7,000 students from around 70 different countries and a staff of 650 people. HAMK offers bachelor-level and master-level degree programmes, double degree programmes with partner universities, professional teacher education and continuing education programmes. International activities at HAMK include international education, research and development projects as well as mobility. HAMK has around 100 partners all over the world. (About HAMK, 2014.)

1.1 Background

Over the past years the role of different portals and content management systems (CMS) has rapidly increased as web content management is becoming more and more a shared responsibility within the organization. One of the core requirement of any CMS is that it allows its users to easily edit different type of site content. Since 2006 HAMK has used Oracle Portal AS10gR2 as a content management platform. Since Oracle announced on their Lifetime Support Policy that the premier support in the case of this portal version ends on Dec 2011, HAMK came to the conclusion that current portal was in a process of reaching the end of life phase and the need for change was critical (Lifetime Support Policy: Our Commitment to Deliver a Superior Ownership Experience, 2010).

In the beginning of 2013 HAMK launched a project with the purpose to replace Oracle Portal AS10g platform with another platform. Oracle Portal platform had been in use as a public website and intranet platform for over eight years. Before starting the actual project, a preliminary project was conducted. During this phase a project team explored the possible alternatives and solutions for replacing Oracle Portal. As a result, HAMK decided to implement Microsoft SharePoint platform for their public website and intranet.

The aim of HAMK public website is to provide information in a clear and accessible format at the same time providing the best possible user experience. If the web user is happy they are more likely to engage with the website and build the confidence towards the institution. Nowadays for universities in Finland catching the attention of prospective students around the country has become a huge marketing challenge. At HAMK the value of a good and distinguishable public website is recognised.

A useful, attractive and functional university website can encourage prospective students to apply to the institution. At the same time the website helps create and maintain university brand. With HAMK, renewing and redesigning the website meant a total new look and feel: in addition to a functional website HAMK was aiming for a modern and distinguishable website with strong visual elements that displays its content flexibly across multiple devices.

As the author of this study I was a key member of the preliminary website project and also operated as project manager, product owner and developer for renewing Oracle Portal and implementing Microsoft SharePoint for the organisation's public web site. I have had the privilege to work with a number of talented colleagues and our HAMK partners during the implementation of this project.

This work is focused on providing a comprehensive preview on the process of implementing responsive web design on SharePoint 2013, while also taking into consideration future trends of web development and possible upcoming recommendations on the further development. Most of the research is based on my experience while implementing the project.

The research on the responsive web design implementation on SharePoint 2013 has been conducted by collecting general information from books and reliable internet sources as well existing information and documentation related to the project main focuses. Another important source of information for conducting this study has been an expert on SharePoint and responsive web design who has also operated as organisation's consulting partner for this project.

1.2 Objectives, research questions

The purpose of this study was to document the implementation process of responsive web design combining it with SharePoint 2013, pros and cons of it, potential barriers and difficulties with possible solutions. The study also aims at proofing some of the benefits for organisations recognising the importance of investing on developing and implementing new web practices. Another point of view for this study is to seek solutions for the next www.hamk.fi development and identify the necessary skills for achieving it. The study also emphasizes the role of agile development in order to achieve better solutions and results.

The main and sub questions for this study were:

- What are the challenges of implementing responsive web design on SharePoint 2013 platform?
  - What were the possible problems that occurred and possible alternatives for solutions?
- Which are pros and cons of implementing responsive web design methodology?
  - Why should it be a web standard nowadays?

- What would be the next step for ww.hamk.fi development?
  - What necessary skills are required in order to achieve it?

1.3 Research strategy, methods and scope

This part contains research objective, analyses implemented and scope of the thesis. It also provides the strategy and methods under which the research is conducted. Study was conducted using a case study and action research methodologies. The research scope was limited to www.hamk.fi public website; the organisation intranet was left out of the scope.

To find answers to my questions I have focused on theories regarding SharePoint 2013 technology, responsive web design methodology and future prognoses made by field experts on web development. In order to acquire experts opinions about the topic in research and to add critical aspects, a qualitative interview have been conducted. The data collected during this research is based on qualitative research methods, such as interview with HAMK partner in the role of an expert, and as well as on my own personal observation.

The biggest part of the study is analysing in retrospective the implementation of RWD and SharePoint 2013. The data used for analysing in retrospective was mostly the information gathered during the project team work and the data of project team sprint retrospective meetings for over 20 sprints. During these sprint retrospectives of a scrum process, the team highlighted and discussed three main questions: "What was good or positive in the last sprint?", "What was bad or negative in the last sprint?" and "What could be improved in the next sprint?". In retrospective meetings the team took a look at the previous sprint and reflected on how to improve their processes in order to become more effective and how to improve quality.

By implementing retrospective approach it was possible to provide a review and a report on what and how implementation is conducted. In this case the retrospective approach offered a way to evaluate project outcomes and make recommendations for the future. From the retrospective point of view some of the outcome-based measures of success for this project are: whether the resulting service was actually used (use), whether the project helped prepare the organization for the future (learning), and whether the project improved efficiency or effectiveness of the client organization (value) (Project retrospectives: Evaluating project success, failure, and everything in between, 2005).

1.4 Structure of the thesis

The thesis is structured so that it shows the whole process of the research. The research contains four main sections: the theory, the implemented project, the forecast of upcoming development and conclusions of the research. Below, are briefly shown the main themes of each part of the research.

- The first part contains:
    - the background of the study, the objectives of the research and the implemented research method.

- The second part contains:
    - theoretical part, which creates an overall understanding of the research method. It contains the presentation of web renewal project, it's project method and definition, content management platform solutions and in particular SharePoint platform, general and case study related information for responsive web design methodology. This part also contains statistical data on revenues, web traffic and usage on mobile devices such as smartphones and tablets.
- The third part contains:
    - documentation and elaboration of the process and the project of combining responsive web design with SharePoint 2013 including pros and cons, challenges and alternative solutions. The process is described by implementing action research methodology. The third part is the most comprehensive part of the research.
- The fourth part contains:
    - analyses on upcoming web development in general by implementing PESTE analysis, and the concrete proposals for short-time and long-time HAMK website development.
- The fifth and last part contains:
    - conclusion of the research.

The conclusions of the study are based on the data collected and the documented experience during the implementation of the project.

2   THEORETICAL FRAMEWORK

This chapter presents the theoretical frame of theories used in the research. The chapter also contains some of my personal insights among the theory. The primary focus will be in describing briefly the management method of the case project, SharePoint as a website platform, the fundamentals of responsive web design, and the planning and development process of a website. In the first part of this chapter 'Web renewal project' I am elaborating the project management of the case project and not so much the content of the project.

In part one I am sharing my experiences on implementing a project management methodology different to the one used in previous projects. Part two then gives an overview on the organisation's needs regarding content management platforms, their features and also the platform choice for HAMK. Part three describes the development of a website by concentrating on one design and implementation methodology called responsive web design.

2.1   Web renewal project

Häme University of Applied Sciences has undergone a major web renewal project: all degree programmes and different departmental subsites were migrated or re-built onto a SharePoint 2013 platform. The process of redesigning a website from planning to publishing is a major project, especially in cases like www.hamk.fi where the number of website user sessions reaches over 2 million annually. This shows the need for a suitable project management method and tools in order to reach the goals set for the project.

Globally the demand for better, faster, newer software and web products has increased radically since the last century. However, the process for web services development has not evolved at the same pace. By using outdated management and development approaches projects have been dealing with huge problems that are not at all trivial. The growing problems have been recognized and therefore, a lot of work has been done in general on modernizing the project management. (Holzner, Lester & Moreira 2010, 12–13.)

HAMK's previous software or web development projects were implemented mainly by using waterfall project management methodology. This methodology is a linear approach which contains the sequence of phases such as: 1. Requirements, 2. Design, 3. Development, 4. Integration, 5. Testing, 6. Deployment. The name of waterfall comes from the fact that you move to the next phase only after the prior phase is complete. For example the design phase must be reviewed and approved by the client before the next phase can begin which in this case is development. The waterfall methodology used to be the most common project management approach in software development before agile methodology in year 2008 surpassed it. (Holzner et al. 2010, 10–11.)

As the demand for better web services and faster results has constantly increased, the need for the change in project management field has become very important. The project team of SharePoint 2013 implementation and the renewal of www.hamk.fi project came to the conclusion that there was a need for modernized project management methodology. The team decided a project of this kind and size is optimal for piloting modernized methodology. The testing of the new methodology in this project was to show whether the selected methodology meets the needs and expectations the organisation had for the outcomes of the project. Since agile scrum methodology was gaining huge popularity in Finland and also globally, the team followed an IT department project manager's recommendation and decided to pilot the methodology.

2.1.1 Definition of the project development

Agile methodology is based on an empirical control method: the steps taken during the project are based on the realities observed in the project itself. Agile project management contains several methodologies. HAMK deployed a methodology named 'scrum'. Agile is all about the rapid delivery of an application in complete functional components. Scrum is currently the leading agile development methodology used widely by companies around the world. (Saddington 2012, xxi–xxii.) During the implementation of this project, the Scrum framework was not totally implemented by the book. Slight adaptations were made because this was one of the first pilot cases of the project and implementing exactly by the book and recommendations would have been a more challenging and time-consuming process.

In the Scrum approach, we the team worked together very tightly in order to focus on business priorities in releases. These releases were composed of many sprints with an incremental improvement of the website after each deployment. Iterative development was a continual process of evaluation, planning, setting requirements, analysis, implementation, and testing.

This approach includes three main roles presented in Table 1:

Role	Responsibility
PO = Product Owners	Set the priorities of the software product
the Team	Whose members build the product
Scrum Master or Project Leader	Who oversees the process and removes impediments to success.

Table 1   Scrum roles

(Saddington 2012, xxi–xxii.)

Personally, I had two roles during the implementation of Scrum. I was a product owner and the member of the team in a developer role. Owning two roles was at times a bit of the challenge, since my developer role was a time-consuming one with huge responsibility. The developer role suited my everyday job without additional problems but the product owner role proved some extra challenges. At times I noticed that the product owner's role was not getting attention as much as needed. Also in some cases I was not in the position to make business decisions so I had to seek help form higher-level decision-makers. Overall, the decision-making process went well even though it was a bit time-consuming.

Our scrum team was a very successful combination of experts and unique individuals. The role of the team during this project was very crucial. The team members worked together and utilized their varying experiences and talents in this project. Leaning on the results of renewing the www.hamk.fi project, this team can be recognised as a high-performance team. The team utilised the Asana teamwork platform to organise the project, releases, and tasks. In addition to the Asana service there are different collaborative tools for agile scrum teams; they can be found in www.agilescout.com/best-agile-tools.

One challenge was the fact that some of the team members were also involved in other development projects in the organization. Sometimes we were faced with the difficulties of prioritizing the project. Our experience confirms that in upcoming projects this issue will need much more attention in the very beginning phase of the project.

In order for the team to constantly communicate, agile offers a daily scrum option. A daily scrum means morning meetings that facilitate team communication, foster teamwork, disclose details of the project work, and highlight items for review, action, or execution. In our project we implemented Scrum meetings only twice a week which turned out to be enough. This kind of meeting is conducted standing up for a reason: it shouldn't last for more than 15 to 20 minutes. (Saddington 2012, 25.) We also implemented the standing-up recommendation, but because of the fact that we had only two meetings in a week, our meetings lasted for 30 minutes. Whenever we had an issue that needed more attention, the meeting was extended. During these meetings the team members reported on what they were doing, planning to do and whether there were any problems or obstacles in completing the tasks.

Questions to go through during the retrospective meetings are: what happened during the last iteration, what went well, what can we celebrate as a success, what did not go so well, and how can we improve the next sprint. (Saddington 2012, 85–88.) After every sprint we had retrospective meetings as the scum framework requires. These meetings enabled the entire team to talk about the latest sprint. Reflection was very important since in these meetings we found things that worked well and those that needed improvement.

As part of scrum framework the product backlog is a list of all the tasks the team is going to complete during the project. (Saddington 2012, 39.) We started building out the product backlog by entering the requirements one at a time and breaking them out into different tasks. The product backlog requires constant maintenance, but when we got it as ready as it could be at that stage, the team was ready to estimate and task out work for a sprint. In the Asana platform we didn't manage to actually find the suitable functionality for the product backlog listing. This is something that requires more testing and maybe some other agile team collaboration platform would be a better option from the product backlog point of view.

2.1.2   Experiences summarized on project implementation method

I found this approach to be very beneficial for organisation's information technology projects. The agile method proved to be a good choice as the project management model for the website renewal project. One of the key benefits that the project team noticed during the implementation of scrum is that business users noticed very quickly the value delivered. We released solutions to website users as quickly as possible. After the phase of release, we then incrementally improved them. Implementing this methodology also meant that the product and process evolves and is defined more thoroughly during the project.

However, there were some challenges:

- unsufficient resources for a rapid testing and feedback cycle
- educating other users on the agile approach and small releases as opposed to 'completed' products or services
- implementation of agile also meant organizational change at some extant
- other projects competing from the same resources; the need for project prioritisation
- refusing tasks that were outside the project's scope.

Both of these approaches waterfall and scrum have their own issues. Regardless, my recommendation for upcoming projects is to implement them by using scrum either by the book or using an adapted version. In my opinion this approach works best for our organisation since the striving for 'agile' action overall is declared in the organisation strategy HAMK 2020. When adapting scrum, in our experience the organisation needs to take into concideration the following:

- team should be together in one place or utilize an online solution
- team must be empowered, as autonomous as possible
- team must be motivated
- effective team leader / ScrumMaster
- iterative approach needs to be accepted in the organization

- experienced developer required as a team member
- customer involvement or representative needed.

(Holzner et al. 2010, 59–62.)

Through this project and the team, I learned to adapt better practices in business transformation and scrum development. I gained experiences in working as product owner and hope to be able to further develop myself in that role in upcoming projects. I would like to learn more on how to prioritize work by value. The implementation of some kind of a value matrix could be helpful in determining what features ought to be developed first. All in all I feel that this definitely is the right direction for developing project management skills in Information Technology and Communication field.

2.2 Content management system by organisation's requirements

The purpose of a content management system (CMS) is to make it easier for organisation to manage web content. Content management systems are especially helpful when a variety of people contributes to the website. One of the most important features of CMS is the possibility to involve people in making a website without requiring them to be technically proficient, allowing them to concentrate on the substance. In most of the cases the only thing that contributor needs for CMS usage is an Internet connection to contribute to a given site. The process of editing the content through content management system goes so: the contributor logs on to the CMS and add the content by typing it, uploading a document or image, and publishes the page. The CMS administrator can log on; create a new user; and allow new participants to add, change, or delete content. (Kelsey. T 2011, 4-7.)

The process of choosing the right CMS for the organisation requires research work since the chosen CMS needs to meet the requirements of the organisation. Licensing fees, easy editing, security etc. are to be taken into the consideration while making the decision. Easy editing is in most cases one of the most important requirements. For creating and modifying the content, CMS offers different kind of templates. These templates can also be created to support the organisation brand in a chosen manner. Choosing a CMS for a large organisation is an even more challenging process, because of its large amount of data and possible wide requirement specifications.

2.2.1 Content management systems

There are very many CMS platform solutions for the organisation to choose. Some of them are open source (usually does not requires license fee) and some closed source (usually require license fee). Some of the most popular CMS platform alternatives are:

- Liferay
- Drupal
- Microsoft SharePoint (not a pure CMS)
- Joomla
- Wordpress.

Liferay is well-known platform amongst big companies and organisations but. Drupal, built explicitly for external websites, is the platform gaining a significant enterprise adoption. (Drupal vs. Sharepoint: Choosing the right platform for your site, 2014.) Microsoft SharePoint was initially build for document management and is more known as a content collaboration solution focused on team sites and not so much content management but with the release of the 2013 version, the platform has become a competitor for others CMS platforms. These are, for example, some of the factors that organisation needs to go through when making a decision about choosing the CMS platform. In some of the cases blending two different CMS platforms could be an option.

In HAMK's case, Microsoft SharePoint was chosen as publish website platform, and the decision was made during the preliminary project. The project team explored different options for upcoming public website and intranet platform. The aim was to explore best possible alternatives and solutions from the functional and most economical point of view. In order to meet the presented requirements as a result, the project team recommended Microsoft SharePoint 2010 platform.

2.2.2 Why SharePoint 2013 as website platform?

Choosing the SharePoint platform met also one of the most important requirements: straightforward web content management and easy-to-use functionalities. The university public website content is being updated by over 100 people. That said, it is very important for the content production process to be as straightforward as possible. Factors that makes web content management platform straightforward and easy to use are, of course, not the same for everyone. It might be impossible to make all users satisfied with one choice, but in HAMK's case SharePoint's ribbon user interface being similar to other Microsoft Office software proved to make the implementation easier for content contributors.

Very soon after the SharePoint 2010 was installed for use, the project team made the decision to reinstall the newest version of SharePoint, namely 2013. The decision was approved by the project control group. The project team, after consulting a SharePoint expert, came to the conclusion that making the change at the initial stage of the project is more profitable and rational than trying later to migrate from SharePoint 2010 to 2013. The project team and the control group realised that this decision meant that project schedule was going to lag but saw the version update worthwhile.

2.2.3   What is SharePoint 2013?

SharePoint 2013 is Microsoft product which is a browser-based collaboration, content management, and extensible platform. Platform can be used to build among others:

- team sites for collaboration,
- blog for a person or team to post ideas,
- project site for managing and collaborating on a project,
- product catalog site for managing product catalog data,
- publishing site for branding internet-facing site or large intranet portal.

(SharePoint, 2014.)

In this research SharePoint 2013 and its use is analysed from the public website point of view. HAMK's public website is built on SharePoint 2013 publishing site template, on-premises implementation. SharePoint version update from 2010 into 2013 brought along quite many new web content management features for publishing sites. These new features improved and simplified the process of web content management. One of the improved features and very much utilized during the project is branding public website.

In the previous versions of SharePoint, branding a public website required specific technical expertise. As a SharePoint platform heavy user I also have experience on creating branded website by using SharePoint 2010 and I am able to confirm that in SharePoint 2013 the branding process has been considerably simplified.

In addition to SharePoint On-Premises, Microsoft also has SharePoint Online for cloud. SharePoint Online can be purchased in the cloud as a standalone offering or as part of an Office 365 suite where you can also get access to Exchange, Lync, the Office clients, and web apps. Integration possibilities and advanced functionality are much more advanced with SharePoint On-Premises. The SharePoint Online version tends to be used more for implementing intranets. (Office, 2014.)

2.2.4   Maintaining the website content

The renewed HAMK website - www.hamk.fi - was published in the beginning of February 2014. During the year 2014 our team has been training those staff members who were responsible for maintaining the content of public webpages. The spontaneous feedback of website content editors turned out to be very positive. The most frequently used comments have been:

- very easy to edit page content
- the ribbon is familiar from other Office applications and offers experience with needed settings
- quick content editing experience

– WYSIVYG (What You See Is What You Get) experience, while editing content appears similar to the saved and published result.

A minor problem has been identified at the end of the content editing process. Users tend to forget to publish the page after making the changes and saving them. As part of publishing infrastructure, publishing the page is a very important phase of content management. In order for the changes to be available to all the users, the editor needs to finalize the process by publishing the page. We are trying to resolve this identified problem by offering instructions of different levels and in different formats. One of the user-friendly instruction formats that we have been working on is screen capture videos. By offering instructions in video format divided in small themes, we aim to facilitate content management so that the editor will not have to spend too much time on figuring out how different features work.

2.3 Responsive web design

In today's world when browsing in the internet, people use devices (desktop, tablet and mobile) of different types and sizes. At the same time they have a wide range of different browsers in use, such as Internet Explorer, Firefox, Chrome, and Safari. There are great migrations going on from the dominance of desktop computers to tablets and mobile smartphones. (Migration trends will be covered briefly later on.) With this kind of rapid growth and technologies continuously evolving there is a huge need for organizations and companies to develop their websites. (Overfield, Zhang, Medina & Khipple 2013, 21-22.) One of the options towards this kind of development is implementing responsive web design methodology that adapts to the capabilities of a specific browser or device.

Described briefly, responsive web design means that the same content of a certain website will be displayed differently, based on the screen resolution of the browser and device. From technology point of view, this means that there is one HTML code for the page regardless of the device accessing it. The page is then presented in different ways by using CSS media queries. These queries specify which CSS rules apply for the browser displaying the page. Responsive web design had its ground-breaking release in 2011, and since then it has remained a fundamental resource for any web developer. The term itself was coined, and developed, by Ethan Marcotte. Below are a few illustrative images on how the same webpage is displayed on different devices. (Responsive Web Design, 2011.)
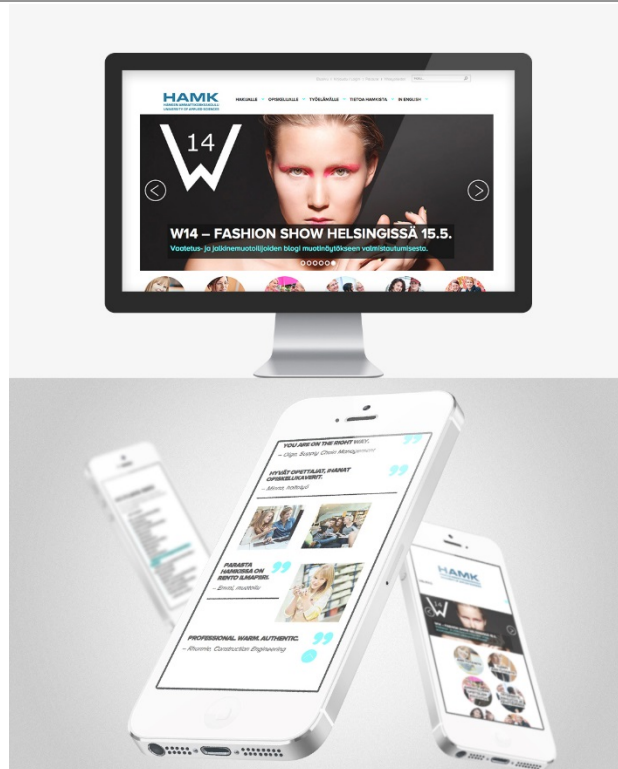
Figure 1   Design of HAMK.FI (Myllyaho, 2014)

An expert interview conducted with Jussi Martikainen of Blue Meteorite (interview 1st of December 2014) as part of this research, showed that now-adays all web platforms are already used or going to be used in a very near future with mobile devices. If we would have to come up with one reason for why not to implement responsive web design, than it would possibly be a case where the service is targeted to a really specific user group which for some reason are using the service with only one kind of device. However, quite often it is found out that online services and other information systems are actually being used for much longer period and also for other purposes than originally planned. (Martikainen, interview 1st of December 2014.)

2.3.1   Statistics on platforms and browser trends

Below are shown a few statistics on platform and browser trends in Finland during the last two years. This was the period when HAMK was working on developing responsive public website. These statistics are provided by StatCounter Global Stats.
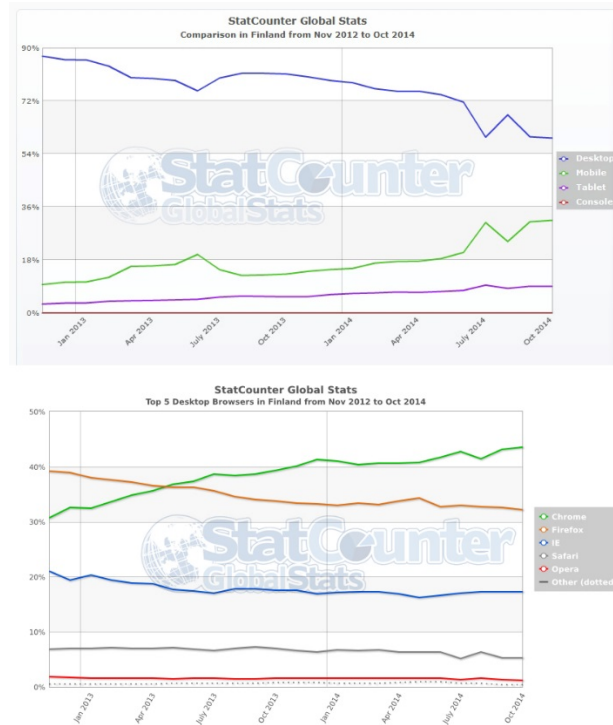
Figure 2   Platform and top 9 Browsers comparison in Finland (StatCounter Global Stats, 2014)

As can be seen in figure 2, during the period from Nov 2012 until Oct 2014 in Finland desktops' reach falls, mobiles' reach rises. Also if we compare for example iPhone or Android default browser usage Oct 2013 and Oct 2014, the increase is very evident.

Figures above are also the evidence that in order for businesses and organisations to stay up-to-date, they should adapt their marketing strategy to mobile mindset. It is a great opportunity for businesses to benefit from the latest web practices such as responsive web design and mobile first strategy. As figures shows, web capable devices are aggressively entering the market like never before.

Figure below taken from a study conducted by eMarketer.com shows the forecast growth of global smartphone audience around the world. According to eMarketer smartphone adoption is to continue on a fast-paced trajectory through 2017. (eMarketer, 2014)

Figure 3   Mobile Phone Users Worldwide, 2012-2017 (eMarketer, 2013)

Smart devices usage growth is a global phenomenon. According to Cisco, the share of smart devices and connections as a percentage of the total will increase from 21 percent in 2013 to more than half, at 54 percent, by 2018, growing 3.8 fold during the forecast period. (Cisco VNI Mobile, 2014.)
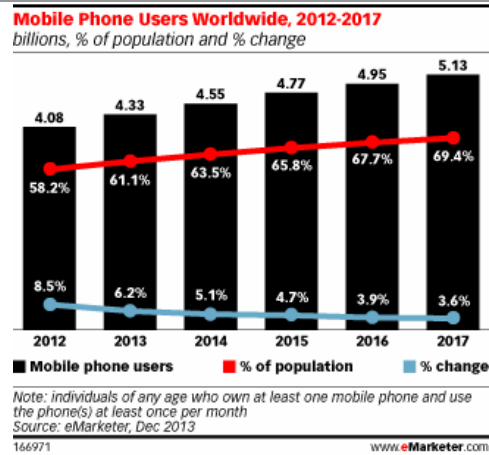
3   CASE STUDY: RESPONSIVE WEB DEVELOPMENT ON SHAREPOINT 2013

This chapter presents the research method in general and describes how it is implemented in this case study. The chapter also presents responsive web design methodology and the case study, which is implementing responsive web design on SharePoint 2013.

In part one I am sharing some of the general theory and my experiences on implementing action method as a research method. Part two then gives a comprehensive overview on the combining process of SharePoint 2013 and responsive web design. Part two also contains background information on the website renewal project.

3.1   Research method

This study was conducted by using a specific case study and action research method. This kind of research was possible due to my work role as the key member and one of the main developers in this project. Besides being a researcher, I have had many roles during the project; I am an employee of the organisation where the research is conducted and also I am a product owner and a developer of the www.hamk.fi website renewal. This kind of involvement seems to be typical in action research.

I chose this approach because I participate in this project both as a project team member and as researcher. In action research the researcher takes an active part in the research and often is a part of the community where the research is conducted. The different actions and interventions during the project were regularly documented. There were occasional time gaps between the project and the research log, and this proved to be somewhat challenging with the action research method. It was not possible every time to implement those two hand in hand. I found action research as an interesting, but at some stage challenging method.

The whole project was 'learning by doing' - what action research method is all about. As the researcher my main role was to facilitate learning during the processes of testing and implementation. Also documenting the process was a main task. In this case being the action researcher, I brought on theoretical knowledge and practical experience to this problem-solving process. As action research is typically an iterative research process, it was very suitable method because the implementation of the project was carried out iteratively as well.

3.1.1   Action research in general

Action research refers to a specific way of understanding and managing relationship between theory and practice, the researcher and the object of reseach. This kind of work could be referred to a dialogue between theory and practice. The objective of action research is to describe or understand and explain reality. In addition, action research aims at improving the current

situation. Unlike other research methods, the action researcher is concerned to create organizational change and at the same time study the process. In the action research process, in order to answer the research question, new knowledge is required, and the process is not handled alone but with others. (Greenwood 1999, 10.) While conducting this study, a lot of new knowledge was indeed required from me and the rest of the team as the whole work was carried out in a team. In action research, the knowledge is put directly in the real action.

Collaborative work between the participants and the researcher/s is a very important part of action research. Roles and relationships must be clear and active. Also the mutual support is very important. There can be various types of collaborative work between a practitioner/researcher and students/clients and colleagues in the researcher's field of professional practice. The involvement of participant-researchers gives access to very valuable knowledge since they are 'insiders' and pose the needed valuable information. When this knowledge is published, it is available for the others to use. (Somekh 2005, 7.)

As action research facilitates powerful learning for participants through combining research with reflection on practice, self-understanding is inevitable during the process. It is important to understand one's personal values and assumptions and their possible affect in research findings. As data collection, its analysis and interpretations will all be mediated by researcher's sense of self and identity, the quality of the action research depends upon the reflexive sensitivity of the researchers. Action research also inevitably involves powerful personal-professional learning for the participant/researcher. (Somekh 2005, 7-8.)

In practice the action research process goes in the following way: The researcher (A) and the 'researched' (B) are jointly involved in addressing an issue (X). Action research is the process of different kind of learning:

- learning about something
- learning how to do something
- learning with and from other person.

Action research process consists at least two analytically distinct phases. Phases are presented below in Figure 4. The first phase is all about the clarification of the initial research question while the second phase deals with the initiation and maintenance of the change. In the first phase, the biggest challenge is to search for good question. This phase could contain obstacles. In action research, the way people relate to each other in order for them to achieve a desired outcome, shapes a theory of action about solving problems. (Greenwood 1999, 11, 33, 34.)

Phase 1
- clarify the initial research question

Phase 2
- initiate and maintain the change
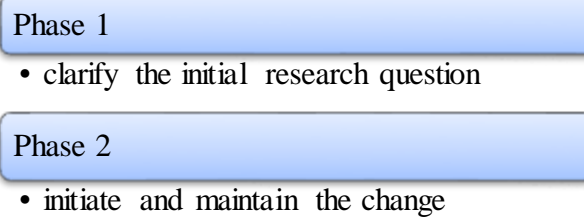
Figure 4   Analytically distinct phases of the Action Research

In action research there are many different implementation steps. Some of them are:

- collecting data about the topic
- analysing the data
- planning and introducing action strategies to bring about positive changes
- evaluation of those changes through further data collection
- analysis and interpretation.

All of these steps are part of the research and the actual action process. They function holistically rather than as separate steps. (Somekh 2005, 6.)

3.1.2   Action research in this study

The figure below shows the process of implementing action research in this case study. The continuous nature of the process can also be seen in the Figure 5. In a role of an action researcher, I was constantly observing, analysing, learning, designing, testing, assessing, adjusting and implementing.

Figure 5   The process of action research implementation in case study

The first step of this action research project was to focus on the case study: considering different topics of interest and importance to me and the organisation, selecting a specific topic, narrowing the topic, developing a research question with careful consideration, identifying subtopics surrounding the main question, etc. It was important to take time and really think through the research 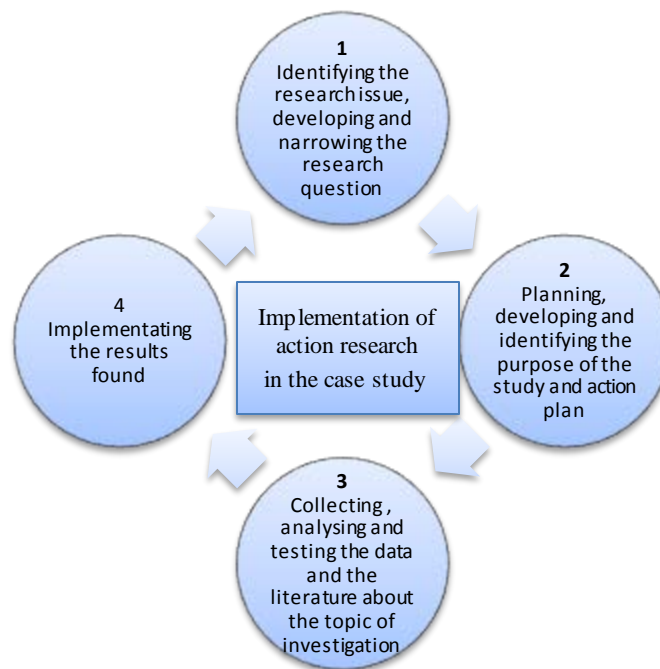questions, because the ideas leading to these questions were important. Also they directed the flow of my project through a thorough investigation of questions of importance to me and my work. The second step was to consider the research question and sub-questions and analyse them more deeply. Slight changes on research question were made during this phase. Another important step of this phase was the planning, developing and identifying the purpose of the study. While analysing the purpose of the study it was utterly important to plan the research which would answer the research question set. The thesis plan was completed as the result of this phase. (Alber 2010, 1-5, 25-28.)

The third step was to analyse and test the collected data and literature. The data collected was organised, compared and categorised. Reviewing related literature and expert interview results helped me to understand more deeply the field of my study and at the same time shape the action research project. When the data was analysed and sorted out, the next step was to present analyses and findings by utilizing different figures and tables. The final step of the action research project was to implement the findings of the study at the same time analysing the changes in myself and my professional views. (Alber 2010, 67-71, 137-142.) During this step, conclusions were drawn from the findings, and future recommendations were made. Also briefly examining how findings where in the same line, partially in the same line, or not at all with the authors I cited. In addition, considering how my thinking has changed as a result of conducting this study was a part of this step.

A huge help for me as a researcher was the 'Toolkit for Action Research' book. The author preferred the book to be used in college classes and professional development settings and in addition to individuals conducting field studies and theses. I have successfully used some of the questions presented in the frames in this book to guide me on developing and also narrowing different stages of the research work. The toolkit for Action Research helped me to:

- consider the topics of my professional interest
- look broadly at my research area
- write my thesis plan
- write a research question and sub-questions
- understand the connection between the research questions and the purpose of the study
- write the report.

(Alber 2010, 1-2.)

3.2   Combining SharePoint 2013 and responsive web design

During the past few years web technology has evolved considerably. It seems that change is the only constant thing in web technology. Responsive web design is all about developing a web site that is resolution and device independent while SharePoint platform is about functionalities and enhanced web content authoring and publishing. Combining these two giant technologies seems to be a good solution to offer the best possible user experience- yet quite a challenge as an implementation to conduct.

SharePoint 2013 includes many new features that enable the implementation of responsive web design which makes the platform support rich and attractive websites. These features include better HTML5 support and enhancements to the Client Object Model, among other things. SharePoint 2013 also made it possible for web designers without explicit knowledge of ASP.NET to brand SharePoint websites. (Overfield et al. 2013, xxxl.)

> *"Empty your mind, be formless. Shapeless, like water. If you put water into a cup, it becomes the cup. You put water into a bottle it becomes the bottle. You put it in a teapot it becomes teapot. Now, water can flow or it can crash. Be water my friend."*
>
> *Bruce Lee* (Overfield et al. 2013, 17.)

3.3   Designing process of responsive www.hamk.fi

The design of www.hamk.fi at the time of the change process had been in use for almost four years. It was very obvious that the change was very much needed. Graphic designer Marko Myllyaho in cooperation with HAMK web team redesigned www.hamk.fi site layout and its appearance. (Appendix 1). At that time the current HAMK website was considered outdated, too cramped and very static and also referring to HAMK 2020 strategy, student is the centre of all activities was not adequately highlighted. By radically renewing the look of the website, the team desired to emphasize the soul of the university, the students and their everyday university life.

The usability of the website on tablets and other mobile devices needed development. The design of the new site was built to be responsive so that it adapts to different devices as well as possible, (Appendix 2). In order to redesigning the HAMK website, important elements of modern web design - such as unique typography, grid layout, large responsive images, different hover effects, in-depth videos, and strong colors - were used. HAMK's website color scheme was also renewed and freshened up.

The goal was to find a way to be informative yet not boring, so that there would be a balance between official and formal, and everyday informal information. Collaboration with graphic designer Marko Myllyaho worked perfectly as he was able to understand fully what the HAMK web team was aiming for, and to that he also added his expertise and creativity.

3.4 Content editing process during the renewal

Many responsive web design experts point out that going responsive does not mean that website content problems will be fixed as a result. The content is the core of any website, more so than a modern or fancy design. (Responsive Design Won't Fix Your Content Problem, 2013.) HAMK's responsive web design project was partly also a content editing process. However, not every single page was revised and restructured as going through the whole content, making wide structure changes, editing and checking processes would have been too huge a project. At this point realistic decisions were made on what part of content the focus should be on, within the limits of resources.

The goals for editing the content were to unify the texts and to produce comparable content on the education offered. After editing, the content had to be more concise, accurate, possible to browse, easy to read, call to action, easy for search engines to consume etc. It should provide the users with a consistent message and support the brand. In order for the user to gain seamless experience, the content had to work in harmony with the design and information architecture.

The content editing work was done in cooperation amongst HAMK Communication Team, HAMK staff in Degree Programmes, and an external web content expert. The steps that were conducted from the content editing point of view were:

Step 1	• Content to be edited was chosen
Step 2	• Content was edited by external web content editor in order for it to be suitable for web
Step 3	• Creating a combination of instructions and a guiding page templates
Step 4	• Content was published
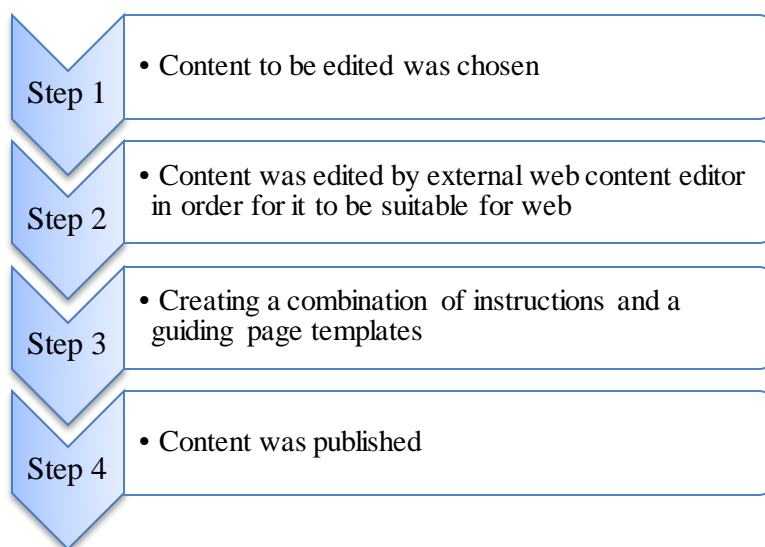
Figure 6   Simplified content editing process

HAMK has tens and tens of content creators who design, create, manage, and distribute information. Creating a combination of instructions and a guiding page templates for them was an important step towards content unification. From the content point of view, responsive design is one way to make the content fit on user's screen and make it readable. However, this kind of implementation does not respond to the need of offering content in different mode for other than desktop devices.

3.5   Responsive public website as part of organization's brand and marketing

Analysing in retrospective, it was the right decision for www.hamk.fi to go responsive. At HAMK, the rise of responsive web design was acknowledged at its early stage. The plans for working on the next responsive website were started in 2011-2012. During the year 2014 responsive implementation in Finland has been growing hugely: In the fall of 2013 I conducted a small-scaled study by browsing different Finnish higher education institution's websites in order to check their possible RWD functionality.

During the year 2013, it seemed that HAMK is going to be among the very first ones on the higher education sector to implement RWD technology. When the same small-scaled study mentioned in the previous paragraph was repeated in February 2014, the results were quite different. Only a few months after the first check about six other higher institution's websites had gone responsive. One can say that responsive web design was the buzzword of 2013 and 2014.

While making a research on RWD during 2011-2012, it was notable that the approach was much more known and in use abroad. The whole approach actually seemed to be reaching Finland a bit later than other countries, even with the mobile web business growing at a furious pace.

The new HAMK website is scalable to different screen sizes from mobile devices to widescreen desktops. After the website was published, spontaneous feedback has mainly been very positive. The site has drawn praise from students and partners alike. According to comments, the website is regarded as very visual, attractive, and modern, and users are able to reach its content much more easily. The website has been benchmarked and the implementation team has been interviewed by other institutions.

By going responsive HAMK also took a step towards improving the mobile marketing strategy. Nowadays it is possible to use QR (quick response) codes in HAMK's print advertisements and offer a quick way for users to reach www.hamk.fi website using their mobile phone to scan the code. Marketing through one URL also simplifies the marketing process.

3.6   User traffic analysis

Analysing user traffic of the website is very crucial for making development decisions. Especially in responsive web development process user data for designing and planning media queries is very important. User traffic data shows information on browser, screen resolution, screen dimension, devices etc. This is very important information for RWD implementation. Data shows us whether or not the traffic is distributed among browsers, screen resolutions or devices as expected, and gives us the directions on the required changes. Referring to web trends in general, the users' desktop / tablet / mobile behaviour on website should have an influence on university's marketing strategy.

Mobile / Tablet device details of www.hamk.fi during 2013 (365 days)

Figure 7   Device Category & Mobile Device Info (Google Analytics, 2014)

Sessions during the year 2013 for www.hamk.fi can be seen in Figure 7. The number of sessions reached 2 million. The figure also shows the different devices used to browse website.

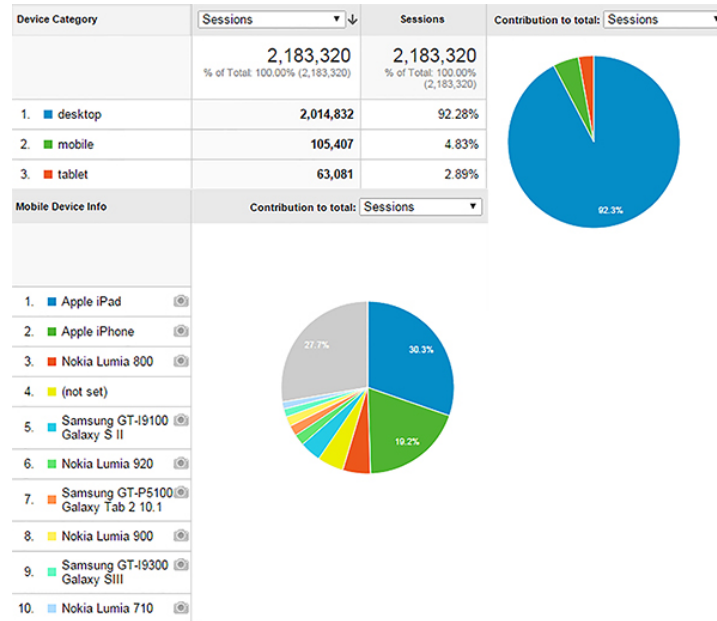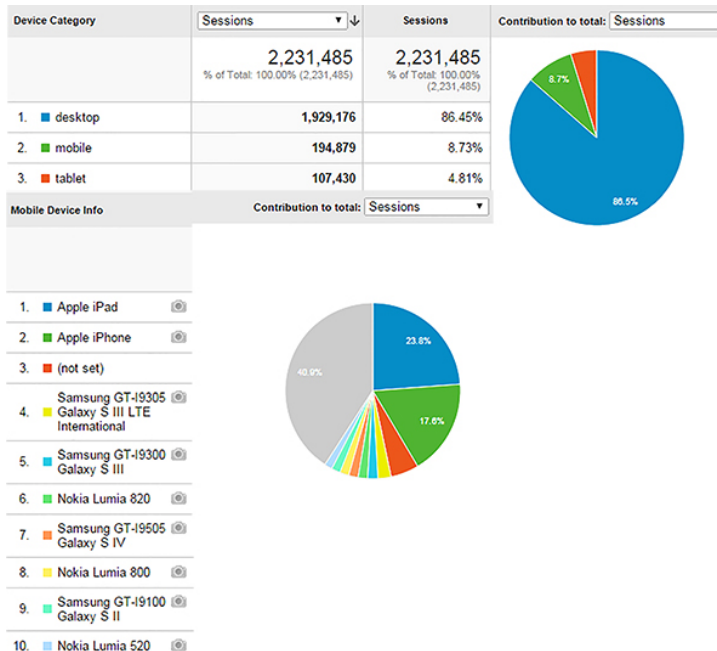Mobile / Tablet device details of www.hamk.fi during 2014 (365 days)

Figure 8   Device Category & Mobile Device Info (Google Analytics, 2014)

Sessions during the year 2014 for www.hamk.fi can be seen in Figure 8. The number of sessions reached over 2 million. The figure also shows different devices used to browse website. The share of mobile users, even though at this point quite low, was doubled comparing to year 2013.

In 2014 www.hamk.fi started to increase its reach of tablet and mobile audiences. A clear mobile and tablet usage growth can be seen already during the first month of year 2015: mobile and tablet sessions on www.hamk.fi were near 20% out of all sessions. Of course, the growth was not only caused due to the www.hamk.fi became responsive, but also because of the general mobile usage trends in Finland.

From a user traffic analysis prospective the responsive www.hamk.fi also meant that there was no need to track analysis for both desktop and mobile sites. Site analytics tools like Snoobi and Google Analytics offer reporting options for multiple devices. With Snoobi, for example, it is possible to create a segment report for tablet and mobile devices, and by monitoring one single report it is possible to track and analyse the whole data.

3.7   Main ingredients for responsive web design

Branding a website mean that logos, fonts, colours, graphics make up the general look and feel of the website. In addition, branding for SharePoint means certain specific objects like master pages, page layouts, CSS, JS, web parts, etc.

In order to implement successful responsive web design, there are three fundamental ingredients needed. These ingredients are:

- Fluid grid → building designs on a grid so that it is possible to adjust to different environments.
- Flexible media → e.g. images are able to grow or shrink to fit with a flexible grid column.
- Media queries → allows to apply different styles on different screen width values.

(Overfield et al. 2013, 24-25.)

In www.hamk.fi these responsive web design ingredients are implemented as described in the following chapter.

3.8   Fluid grids, flexible layouts

Working on the fluid grid is one of the most important working phases of responsive web design implementation. While developers previously used HTML tables to design websites, nowadays tables are considered obsolete. The grid system is mainly used for aligning and organizing elements in a desired visual way. It is combination of margins, rows, and columns. Developers can build a grid system by themselves from scratch which is quite a tedious task, or use different prebuilt and well-supported grid frameworks developed by others and offered through the internet.

There are a few prebuilt responsive frameworks available, such as Responsive Grid System, Twitter Bootstrap, and Skeleton (Overfield et al. 2013, 24-25). These models can be found by searching with keywords "responsive

grid", and as these frameworks ease our learning curve, why not make the most of them? At the time when the project team worked on the responsive implementation of www.hamk.fi, there were not very few responsive frameworks available on the internet. The grid system used for www.hamk.fi implementation is Responsive Grid System developed by Graham Miller and licensed under a Creative Commons Attribution 3.0 License.

When implementing the responsive www.hamk.fi our goal was to implement relative units for measurements as much as possible; e.g. 'width: 80%' as opposed to 'fixed width: 840px'. By implementing relevant units it is possible, for example, to ignore a possible horizontal scroll bars to the page. In www.hamk.fi the layout design was the starting point for the grid system.

3.9   Screen sizes, media queries

In RWD methodology CSS 'media queries' are used to detect the device and its resolution and enable the creation of a responsive experience for the user. Media queries is a W3C CSS3 standard. With media queries it is possible to filter different resolutions, for example, and change styles based on the characteristics of the device rendering the content, including the display type, width, height, orientation and resolution. (GoogleDevelopers. 2014.)

In order for us to accommodate all the different screen sizes and browsers for www.hamk.fi user interface (UI), we developed two CSS style sheet documents: one for the main parts of UI with its media queries and another for the mega menu component and its media queries. Another way to accomplish the same outcome would have been to create different style sheets for each screen size.

Having one CSS style sheet to handle all media queries is not advantageous, since it forces mobile devices to download and process the whole style sheet document. On the other hand, having multiple CSS style sheets linked, the page downloading process increases the number of HTTP requests on every page load. One of the alternatives to handle CSS style sheet implementation is to first create a basic style sheet without media queries, the main functionality of which would be for the fluid grid to scale in a basic use. The second step would be creating and linking a style sheet that would handle media queries. (Overfield et al. 2013, 21-22.)

Breakpoints of www.hamk.fi UI are much based on design. The HAMK website is made responsive by making use of queries such as min-width, max-width, min-height and max-height. Media queries used for implementing responsive www.hamk.fi are implemented by using the @media rule. Screen width features for www.hamk.fi are starting from 330 px to 1366 px:

- @media screen and (min-width: 1280px) and (max-width: 1366px)
- @media screen and (max-width: 330px).

As it can be seen from above, a media query contains two components which are media type (screen) and media feature (max-width). The breaking point for www.hamk.fi mega menu component to become responsive is when the screen resolution is 767px and lower. The media query implementation for this breaking point is @media only screen and (max-width: 767px).

A prediction was made on screen resolution used for browsing www.hamk.fi during 2014 leaning on the general recommendations and a small amount of user data. This prediction, compared to the actual user data (Figure 9), turned out to be quite realistic. The resolutions show the display's maximum precision and how common the different screen sizes are among your visitors.
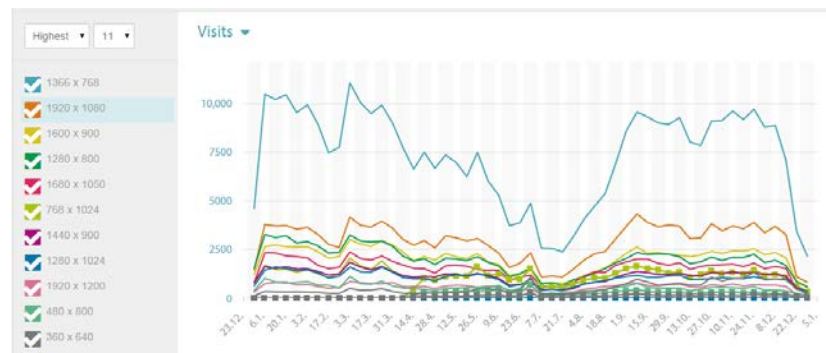
Figure 9   Screen resolution for browsing www.hamk.fi used during 2014 (Snoobi, 2014)

For the first time in SharePoint history the SharePoint 2013 offers a mechanism as an alternative to media queries. This new capability is called device channels and it is a mechanism that allows to define a number of channels which are than mapped to devices using user agent matches or custom logic. After this, different SharePoint master pages, templates, layouts or panels are associated to each channel. In www.hamk.fi responsive implementation, device channels are not used. The reasons why a feature offered by SharePoint for mobile sites is not used in www.hamk.fi include:

- device channel is mapped to devices (user agents) - but the number of devices is increasing constantly. It would have been very heavy to try and handle them all
- another possible unmanageable feature would be handling viewport widths, since there is no standard on that
- we would have different master pages to maintain for all different device channels, which again would have been extra work as compared to fewer master pages.

(Overfield et al. 2013, 161-163.)

Even though device channels have not been used in www.hamk.fi, they could be useful in cases when are building a site for a specific browsers or devices; for example creating a newsletter targeted at iPad users.

According to Martikanen (Martikainen, interview 1ˢᵗ of December 2014.) he has not witnessed any of their SharePoint responsive implementation cases to use SharePoint 2013 out-of-the-box device channels solution so it seems that this solution is not that popular even amongst SharePoint companies.

3.10 Flexible media

Before responsive web design came along, any content (text, images, or video) was design to be suitable for a fixed-width experience. Nowadays we should take into consideration how media is going to be viewed on different viewports. Designing media for a responsive website means that media is mostly styled differently for desktop comparing to tablet users. For example text size for a link could be smaller for desktop users whereas the same link would be bigger and styled towards a clickable button for tablet users. When planning text size for different viewports it is recommended as a best practise to start with a base font size on which all the other font sizes are proportioned. In www.hamk.fi case the base font size is defined "100%/1.4;". The same goes with images or video which are not shown in the same way to desktop and tablet users. (Overfield et al. 2013, 28-29.)

Font resizing for different viewports is a much easier process than resizing images or video. The aim is that as the browser window narrows, the images will scale to fit. A problem our team encounted was the fact that added images are using fixed width by default: When the container is resized smoothly but the image width is fixed, the image will not resize to fit the container. A fix for this could be to define the maximum width of image to 100%. (Overfield et al. 2013, 28-29.)

Relative units should be used instead of absolute pixel dimensions. This approach works for targeted browsers that support the max-width property. However, present browsers are smart enough to also resize images proportionally. The approach of implementing relative units towards getting responsive images is implemented for all www.hamk.fi images. The same approach can be used for other media elements, such as video, and it has at www.hamk.fi been implemented in the front page video. (Overfield et al. 2013, 28-29.) There is also an approach called intrinsic ratios which calculates video height based on the width. It allows browsers to determine video dimensions based on the width of their containing block.

The 'max-width' solves the resizing problem for different media but will not fix the file size issue. The same file is loaded regardless of the device used. In some cases a very large media is hidden by using in CSS 'display:none', but this kind of approach is not 100% workable, since a mobile browser might still download the media before it hiding it. It is possible to create different media versions with different sizes for media queries but

this kind of implementation requires proper planning and quite a lot of effort in creating different media versions.

Website designs are going more and more visual. According to HTTP Archive 62% of the weight of the web is images (Interesting stats, 2014). In order to solve the responsive image problem, a few new pieces of markup have emerged. These markups are srcset, sizes, picture, and source (borrowed from audio and video). With these new attributes it is possible to serve each client with the source that best suits it. These attributes are quite new, but we see them worth trying and testing also in the short-term development of www.hamk.fi. The new markup allows sending different sources to different clients:

- srcset = offers multiple versions of an image to browsers
- sizes = pick the most appropriate source to load out of the bunch
- picture and source = ensures that certain sources will be picked based on either media queries or file type support.

(Responsive Images in Practice, 2014.)

3.11 Implementation steps for responsive www.hamk.fi

In Figure 10 below, simplified steps of implementing responsive web design on SharePoint 2013 are shown.

Pre-Building Responsive Layout
- seek suitable grid system
- seek suitable web site mega menu component
- seek suitable responsive gallery component
- implement static HTML & CSS on three main landing pages
- test, debug and fix usability

Implementation on SharePoint 2013 On-Premises
- create publishing site collection
- create custom content types and columns
- create custom masterpages, pagelayouts and apply them
- implement HTML, CSS and JS to masterpage and pagelayouts
- test, debug and fix usability

Content
- edit images
- evaluate content for usefulness and value
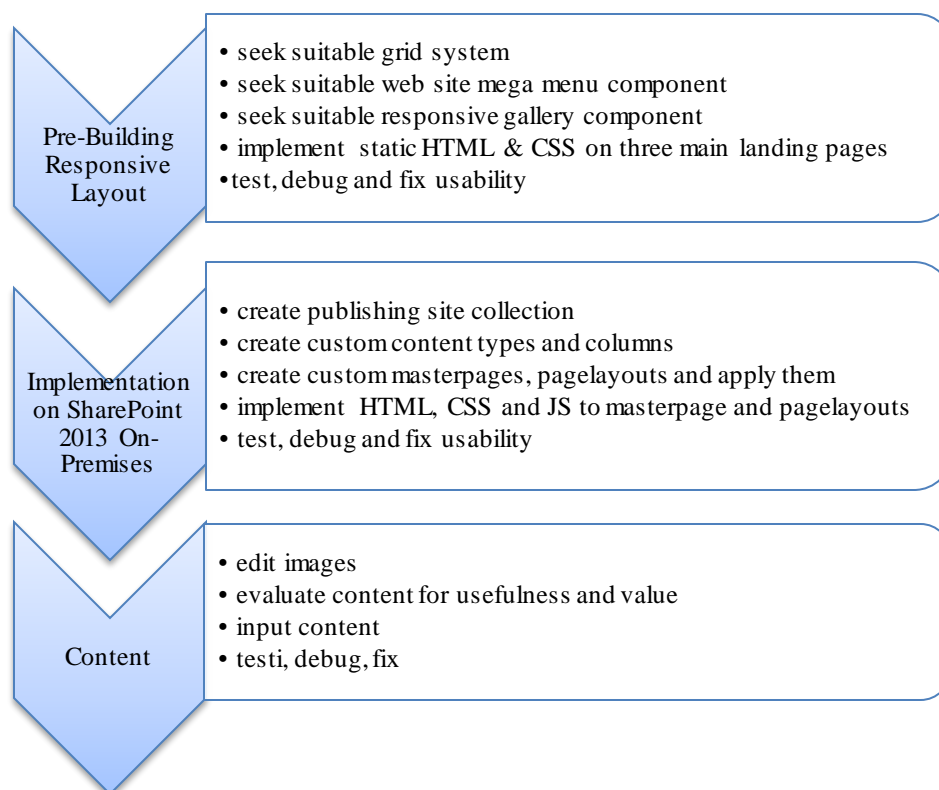- input content
- testi, debug, fix

Figure 10   Implementing RWD on SharePoint 2013

3.11.1 Pre-Building Responsive Layout

The first step contained implementing pure layout without involving Share-Point. In this way it was possible to create pure HTML&CSS implementation, perform tests and provide necessary corrections without having to deal with possible SharePoint limitations. Testing design on primary browsers and devices was one of the main points. Also at that time SharePoint was functioning only through organisation's internal network, so testing layout through SharePoint with tablets and mobiles that were not switched into external network was not an option. Seeking and performing tests for suitable grid system and others components was quite a time-consuming phase, since at the end of 2012 the availability of grid system and different responsive components was not as developed as it is nowadays.

SharePoint navigation as a default is not responsive-friendly, so components such as responsive navigation required some research work. The project team decided to implement a responsive mega menu theme/component named 'Responsive Mega Menu Complete Set' created by Pixelworkshop (Responsive Mega Menu Complete Set, 2014). The implementation of this theme to SharePoint 2013 was accomplished without major problems. The mega menu was branded with the styles that matched the website design.

The outcome of this phase were three main landing pages for www.hamk.fi. After they were done, it was easy to work with the other parts of the website since those landing pages could be used as templates. These landing pages are:

- hamk.fi front page
- the main page of subsites e.g. 'Applicants' page
- degree programme's main page.

For simulating CSS style sheet media queries, different media query diagnostic tools, devices and browser web developer features were utilized. During the working phase, the developing team noticed that these functions and features are not always reliable enough so in addition different devices were used: iPhone, iPad, Nokia Windows Phone, Samsung phone and tablet, Windows tablet, Jolla phone, LG phone. Some user data on mobile and tablet www.hamk.fi visits during 2010-2013 was also available although during that period there were not many mobile or tablet visits registered on our user analyser tool.

3.11.2 Implementation of responsive web design on SharePoint 2013 On-Premises

The second step concentrated on implementing the results of first step into SharePoint. First of all it was crucially important to get to know SharePoint 2013 and its functions in general. This step was difficult and laborious, because SharePoint 2013 itself as a platform was very new and there were not many instructions available on the internet on the platform. It was a huge challenge for our team to work on it and find proper recommendations and instructions. Additionally, at that time implementing responsive web design on SharePoint platform was new, so instructions were not available on that either. Basically this phase was full of testing, editing and modifying.

Figure 11 below shows the page model of a SharePoint 2013 and how it is put together. A SharePoint page includes three main elements:

- Master pages
  define the shared framing elements, may include elements such as the header and footer, top navigation, breadcrumbs, search box, site logo etc.
- Page layouts
  define the layout for a specific class of pages, a template for a specific type of page, such as an article page or a product details page.
- Pages
  created from a page layout, structured so that content authors cannot make changes outside of page field.

(Overview of the SharePoint 2013 page model, 2013)

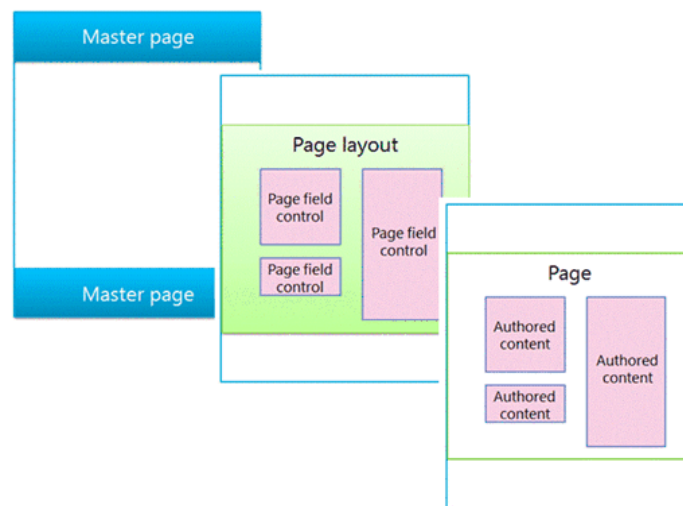
Figure 11   Master Page, Page Layout and Page in SharePoint 2013 (Overview of the SharePoint 2013 page model, 2013)

In order to clarify the design, master page design was divided into four major components:

- Header
  links and search box
- Top Navigation
  logo and mega menu
- Main Content
  vary based on the page layout
- Footer
  links, social media icons, logos, address information etc.

The process of creating a SharePoint Master page is shown briefly below:

Design	• Design master page areas
HTML	• Create HTML Design • Import it to SharePoint 2013 via SharePoint Designer
Convert	• Convert HTML to master page via design manager
Import	• Import CSS, JS and images
Publish	• Publish all imported files
Snippets	• Edit master page (HTML) and add snippets
Publish	• Publish master page
Apply	• Apply the master page to the site

Figure 12   Process on how master page was created in www.hamk.fi case

For implementing this phase and adding framework assets to SharePoint, it is possible to use tools like mapping a network drive to the SharePoint 2013 Master Page Gallery. In the case of www.hamk.fi SharePoint Designer was mainly used as an editor for browsing and editing the master pages, page layouts, CSS style sheet and Javascript files. The outcome of this phase from the layout point of view was master pages and page layouts that functioned responsively.

The process of creating a SharePoint Page layout is shown briefly below:

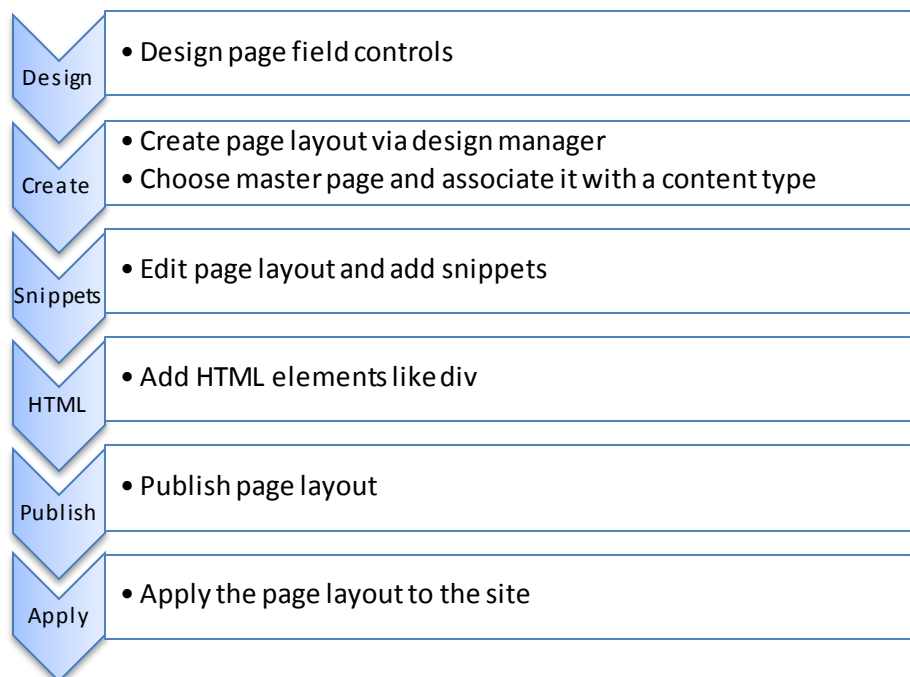|	
Design	• Design page field controls
Create	• Create page layout via design manager • Choose master page and associate it with a content type
Snippets	• Edit page layout and add snippets
HTML	• Add HTML elements like div
Publish	• Publish page layout
Apply	• Apply the page layout to the site

Figure 13   Process on how page layout was created in www.hamk.fi

3.11.3 Content

The third and the final step presented in Figure 10 contained moving content from old www.hamk.fi site to the new SharePoint site. While implementing this phase, we learned that some layout elements still needed improvement from the content management point of view, and that was done simultaneously. During this phase main focus was on page editing experience. In order to make sure that www.hamk.fi content editors can make updates effortlessly and without problems, the team pre-tested master pages and different level page layouts.

There are only three core ingredients for implementing responsive web design. However, implementing those on a wide website such as www.hamk.fi, was a huge and a challenging process. (The process itself is a never-ending learning experience.) The developing team performing implementations of this kind should be very comfortable with CSS style sheets, among other things.

Since all web browser do not provide the same functionality, patience and creativity is needed during the implementation. The need to support an endless number of devices is a huge challenge and also a continuous process.

3.12 Challenges and alternative solutions

During the process of implementing responsive web design to SharePoint master pages and page layouts, we encountered quite many challenges. As pointed out in the previous chapter, finding the solutions at that time was not an easy process as SharePoint 2013 was new to the market and not as many instruction were available as needed. However, the whole process was a great learning experiences. Below are some of the difficulties (gotchas) along with reasons or possible solutions found by our team.

3.12.1 SharePoint related difficulties

DOCTYPE

> Master page was created by converting the basic HTML-file into master page. This process turned out to be very easy and convenience to implement. However, there was a small problem with doctype -element. SharePoint conversion did not like the fact that doctype-element was written with lowercase. Conversion function likes uppercase, so the text needed to be written in uppercase e.g. <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd"[]>

IE Hacks

> Responsive grid framework came along with some IE Hacks e.g. <!--[if lt IE 7]><html class="no-js lt-ie9 lt-ie8 lt-ie7" lang="en"> <![endif]-->. SharePoint conversion process did not like those at all, it got confused and alerted for an error on master page. IE Hacks needed to be removed in order for the master page to work.

Ribbon

> The problem that we bumped into after adding responsive CSS style sheet was that ribbon appeared completely broken. This would have been a big problem for web site content editors so it needed attention. In order for the image to never fall outside of a given container in the responsive framework, every image was reset to max-width 100 percent. However this was the feature that in case of the ribbon just wreaks havoc. This problem was fixed by specifying images to no max-width and this way allow images to use responsive properties. (Overfield et al. 2013, 149-150.)

Embeded JavaScript

All JavaScript used for the website implementation should be implemented with a link to .js-file, instead of embedding code directly to a page. In cases were JavaScript code was embedded directly in the page, it got automatically commented out by SharePoint.

Current (vertical) navigation snippet

Current navigation structure snippet shows the structure of the website. In SharePoint 2013 for sharing the same navigation snippet across all pages, it is possible to add the snippet by using snippet gallery. It is possible to add navigation snippets only on master pages. From our website design point of view, it would have been much suitable and easier to implement if current navigation snippet would have been possible to add in the page layout.

Page layout is the page that contains all the content holders, so it would have been logical for the navigation snippets to be in use also in page layout's snippet gallery. Restyling it with CSS would have been less challengeable work. Since SharePoint did not offer this option, it needed customization. In our case use of JavaScript was required in order to reposition it in the part of the page by the design.

Another issue regarding this snippet was the fact that by adding navigation snippet to the master page as mentioned above, the snippet is shown on every page. In our case current navigation snippet should not be shown in the first page, so it had to be hidden by using CSS styles.

Override of SharePoint CSS

In many cases in order to style an element, snippet or some other SharePoint component overriding the default styles with custom CSS was required. By using different CSS IDs and element selectors it is possible to override the default styles applied to elements. Rule '!important' at the end of a value will override any other style declarations of that attribute.

For identifying specific attribute that need customization it is possible to use an HTML editor or a tool such as the F12 developer tools in Internet Explorer or Inspect element in Chrome to identify and override specific default styles.

References and file publishing

> References to CSS-stylesheets or JavaScript should not require authentication. It is recommended to use protocol relative reference like: //hamk.fi/responsive.css or /responsive.css. In publishing site of SharePoint, it is important to also remember to publish files edited. If they are not published, public users will not get to see changes made. When responsive files were imported to SharePoint, by the default they all had to be published. Just after this process anonymous users were able to see the changes.

Table 2   Some of the SharePoint 2013 related gotchas

3.12.2 RWD related gotchas

Element positions on website front page

> In order for us to get the layout to function as demanded, the grid system was modified. Some of the grid system values were adapted in order to reach the wanted outcome. The most challenging part of the whole grid system was www.hamk.fi front page. There where boxes are of a different heights and they should have been in the harmony with each other. By using the pure floats at the time the implementation did not offer the answer for this challenge.
>
> The solution was reached by implementing floats together with inline-block. The solution was offered by front-end developer Rasmus Floe from Denmark. (Rasmus Floe, 2014.)

Loading process of front page

> As nowadays responsive website is recognizable amongst the others from its large images, slideshows and big elements, it is almost inevitable that the file size of pages are increasing, elements are probably not loaded simultaneously and also at the same time loading time might be longer than recommended. This was just the case with www.hamk.fi front page. After front page was finalized, it was noticeable how elements were loading in different times. It was not a "pretty" thing to see while opening www.hamk.fi, so it needed attention.
>
> Some of the university social media elements where embedded in front page by using iframe-technique. These social media plugins slowed down loading process of the

other elements in the page, so it was very obvious that performance of these social plugins needed improvement.

In order for these elements to be loaded faster, iframes were replaced with another page. This page is located in HAMK server and by implementing it this way, HAMK will have the possibility to have an impact at some extant on downloading time of these social plugins. This way other elements on the front page will not have to wait for the onload event to answer for these few social plugins. Also the images of the front page are compressed by using Compression Software, in order to reduce their download time.

Table 3   Some of the responsive web design related gotchas

One way to manually brand SharePoint sites is the possibility to utilize a so called Starter Master Page. Starter Master Page helps the developer to create a SharePoint 2013 branding project. Starter Master Page contains some minimal HTML styling in order to accommodate some of the specific needs of SharePoint 2013 and are commented throughout. They are created by SharePoint professionals but intended for use at user's own risk. The Starter Master Page can be downloaded from CodePlex Service. (Starter Master Pages for SharePoint, 2013.)

Personally I think Starter Master Page package was very useful for SharePoint 2010 because in 2010 branding a SharePoint website was much more complex. In SharePoint 2013 the branding process has been simplified to the degree, with which in my experience, a developer can manage branding process without a Starter Master Page.

3.13 Iteration process of the development

As stated in Chapter 2.1.1 Definition of the project development, the project management methodology utilized during the implementation of SharePoint 2013 was Scrum Agile Methodology. Development in the Scrum method is confined to a regular, repeatable work cycle. This process is known as a sprint or iteration. In our case the development iterations lasted for four weeks. The figure below demonstrates the iteration process of developing www.hamk.fi during the project.
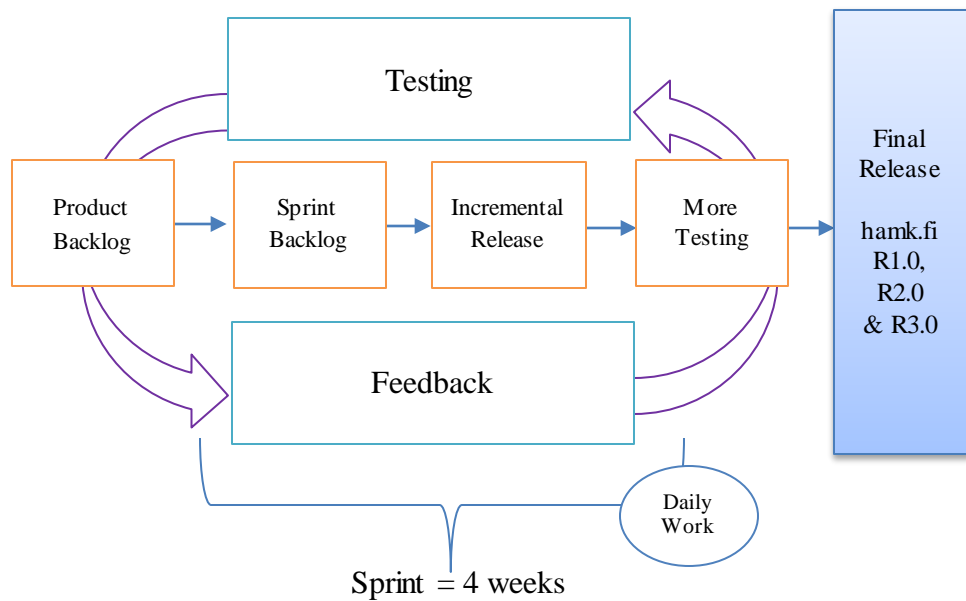
Figure 14   Iteration process for developing www.hamk.fi project

3.14 Pros and cons of implementing Responsive Web Design methodology

In Figure 15 below, a responsive web design methodology analysis is con-
ducted by implementing Force Field Analysis. Even though Force Field
Analysis is usually used as a decision-making technique, in this case its role
is to emphasize very clearly the pros and cons of this methodology. In cases
similar to this one where the decision to carry out a plan has already been
made, Force Field Analysis helps bring out the changes that need to be done
in order to improve the plan. The Force Field Analysis was created by Kurt
Lewin, who originally used the tool in his work as a social psychologist. In
the analysis all the factors (forces) for and against the decision or change
are listed. Each factor is scored from 1 (weak) to 5 (strong) based on its
influence. (Force Field Analysis, 1996-2015.)

The analysis in this case is utilized to consider how to strengthen the forces
that support the change and weaken the forces opposing it so that the change
is more successful. Forces for change are listed in a column on the left-hand
side and the forces against change in a column on the right-hand side. While
working on factors of the forces, some of the considered facts were: What
is the organisation going to benefit now that the change is implemented;
How will the change affect the recourses of the organisation; What will the
costs be; How will the change affect some of the processes; What are the
risks etc. (Force Field Analysis, 1996-2015.)

FORCE FIELD ANALYSIS: IMPLEMENTING RWD TECHNOLOGY

FORCES WORKING FOR CHANGE

FORCES WORKING AGAINST CHANGE

IMPLEMENTING RWD TECHNOLOGY ON SHAREPOINT

Content accessibility — 5

4 — Satisfying multi users risky

Screen size adjustment — 5

4 — Challenging & time consuming

Manage one set of content — 4

3 — Slow

Google Search Engine — 3

3 — Cost

Maintain one code base — 3

Prioritize content — 2

One URL & uniform visual appearance — 2

Future friendly — 1
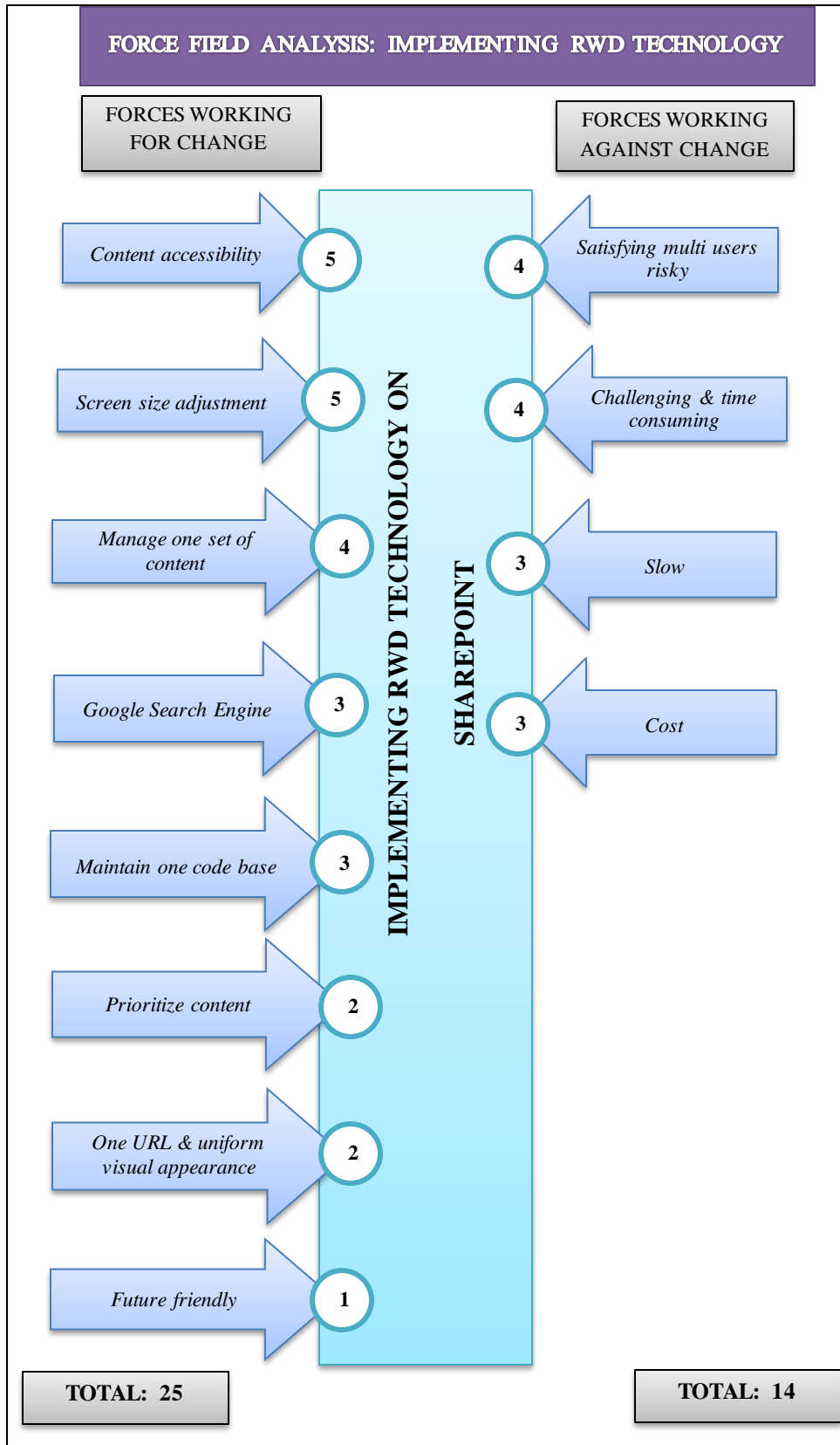
TOTAL: 25

TOTAL: 14

Figure 15   Implement Responsive Web Design (case HAMK.fi). Adapted content form (Inside the Rise of Responsive Design and Its Pros and Cons as a Mobile Strategy, 2013.), (The Anywhere Web - the pros and cons of responsive web design, n.d.)

By checking the score totals of both sides of above analysis, it is very clear that the driving forces for implementing responsive web design are much stronger than the opposing forces.

Next, I will briefly analyze how to weaken the forces opposing the change by strengthening some of the forces that support the change, resulting in an even better result.

- Minimize (*Satisfying multi users risky* -2) by investing on developing user interface and content (*Prioritize content* +1) and (*One URL & uniform visual appearance* +1).
- Minimize (*Challenging & time consuming* -2) by investing on web standards and making it easier for future (*Future Friendly* +2).
- Minimize (*Cost* -3) by investing on one version of the website (*Manage one set of content* +1), (*Maintain one code base* +1) and (*Use one URL* +1).
- Minimize (*Slow* -2) by investing on developing as light, standard and adaptive codebase as possible by increasing the score (*Content accessibility* +1).

The factors of the forces presented in the Figure 29 above will be elaborated below.

Content is accessible across most devices.
Website adjusts to the size of the screen that is viewing it.

> Use of different devices has been increasing tremendously during the last couple of years. There has to be a way to meet these demands, otherwise the organisation is losing its position in the world of Web.

Manage one set of content rather than multiple versions.

> Content editing is composed in only one place and CSS is used to change how the page is rendered on the devices. It is of course also a time saving process for the organisation. Also the risk of forgetting to implement the changes in more than one place is minimized.

Google Search Engine favors RWD websites.

> Responsive design is Google's recommended design pattern:
> - It is easier for Google's algorithms to assign the indexing properties to the desktop and mobile content under a single URL and

---

- Google can discover the content more efficiently as Google don't need to crawl a page with the different Googlebot user agents in order to retrieve and index all the content. (Recommendations for building smartphone-optimized websites, 2012.)

Time and money saved, much simpler to maintain one code base.

Changes need to be conducted only in one place. In other words maintaining and updating the code only once is much more simple process than having to perform it in many different places. The situation could also be in some cases that different programming language would have to be used.

Content is the King

Because of the fact that the same content is shown in different screen sizes and devices, it makes the implementer to really think about the value of content and priorities for it. While different devices have different screen resolutions, planning the length and order of the content is very important. The default requirements are that the content needs to be more concise, scannable and easy to read.

Marketing only one website and URL address is cheaper &
Uniform visual appearance.

It is obvious that having only one URL in use, makes it easy for users to interact with the website. At the same time maintaining one URL is cheaper than having more than one.

Different visual elements are broadly the same in different devices. They are just scaled to the appropriate size. This is essential from the branding point of view.

Future friendly

The global trend of tablet and mobile is not going to disappear. On the contrary, many predictions shows that it is going to evolve very rapidly. Starting with implementation of the Responsive Web Design is the step towards upcoming Web trends. Investing time and effort in order to implement RWD will make it easier later on to jump to another upcoming technique.

One channel to multiusers

Satisfying both desktop and mobile users with one and same UI is risky. This because of the fact that mobile using experience differs many times quite a lot comparing to desktop. Offering one responsive web design implementation may harm the user experience.

Slow service

RWD sites are generally slower when processing on a smart device. So this is a risk to be acknowledged. In addition, there are still some outdated devices with old browsers which are risky to use for responsive websites. The oldest browsers migh not even load the website fully.

Resources are required

The implementation of responsive web design is not a simple project so it can also be an expensive project. Appropriate recourses are needed in order to achieve a successful project. Implementation requires a lot of testing, and patience and repeats are really required during the process.

Table 4   Force factors in more details

There could be times when a responsive solution is not right for a certain special case. Responsive may not be the best solution for everything and it is far from easy implementation, but one needs to remember that once the foundation is set, the ongoing maintenance costs decrease over time. Separate mobile websites have several additional reoccurring costs. Also when analyzing, for example, a case with also different language versions the production and maintenance of many different sites conducted to serve users using different devices, could get exponential and cost a lot.

3.15   Other options to serve mobile users

When we plan and develop sites or apps to mobile users an important question to consider is what our mobile objectives are. What action is expected from users and what kind of user experience do we want to deliver to them? In addition to responsive web design, there are few ways to serve mobile users:

- separate (stand-alone) website for mobile.
- mobile apps for different platforms (iOS, Android, Windows).

It has been predicted that separate websites for mobile users are going to die during the year 2014. The standard for web is and going to be responsive web design and it is also driven by huge companies as Google, Apple and Microsoft. This trend seems to have been predicted well since the base of responsive website is in a huge growing phase at both global and domestic level. (Responsiiviset sivut - verkon minimistandardi, 2014.) While responsive web design implementations are going to be functional also in the future, separate mobile sites might constantly need code updates as the device base is growing. The change seems to be the only constant thing in web world, and web designers need to constantly evolve their knowledge on design methodologies.

3.15.1 Mobile site

Another approach to serve mobile users has been to create a separate mobile website which is commonly on a different domain for mobile users. This approach used to be popular until it became uneconomical because the same code base typically wasn't used for both sites (desktop and mobile devices). (Overfield et al. 2013, 21-22.) Also in some cases the development costs were higher. HAMK used to have a stand-alone mobile site m.hamk.fi, but identified the same problems on maintaining separate content and technique for mobile users. The undisputable pro of this kind of implementation is that they are planned and optimized exclusively for the mobile experience.

3.15.2 Mobile app

A mobile app is an application which operates on a smartphone or tablet. To cater for the needs of most users, there should be a mobile app for presenting information to customers on iOs, Android or Windows platform, or select out one or more platforms. These are difficult choices since mobile user trends are constantly changing. According to some experts the process of providing apps for all three platform could be very expensive and at the same time make the iterative developing process tedious. (Responsive Website or Mobile App: Do You Need Both? 2014.)

From a university point of view mobile app solution could be too expensive to implement. If for some reason an organisation's direction is for mobile app, the most important decision is the platform selection. The traffic flowing from different devices and user trends need to properly be analysed, and platform decision should rely on those factors.

Users have to install the mobile app on their device. This, however, is done only once since after that there are only possible updates that the user needs to load. As a benefit to mobile apps, businesses gets their own space on the customer's device. In a way the users are opening the door to business and showing their interest towards them by installing it. It may be more tempting for the user to open the site by clicking an app than to first open a mobile browser and write a website URL. Mobile app could be closed or inactivated by a user, but still gather very valuable data on user's preferences and behaviors. (Mobile Website vs. Mobile App: What's the Difference? 2004.)

4 FORESIGHT AND RECOMMENDATIONS STEPS ON HAMK WEBSITE DEVELOPMENT

Chapter four presents the near-future development possibilities for www.hamk.fi. With the help of a PEST analysis, the possible future factors are presented. These factors might have direct or indirect impact on the development of www.hamk.fi. The chapter also contains concrete short and long-term development proposals. The competences required to achieve these developments are also briefly covered in this chapter.

4.1 PEST on www.hamk.fi

The changes in web environment are able to create great growth opportunities for organisations, but also at the same time cause significant threats. Through a PEST analysis it is possible to widely analyse the political, economic, socio-cultural, and technological changes in business environment. It helps understand the big picture, the forces of change and the opportunities that they present. The analysis is implemented for www.hamk.fi website for this exact purpose. The aim is to predict at a very wide and general level the future factors that might have a straight impact in one way or the other on the www.hamk.fi website. In this research PEST is used for brainstorming and predicting by using expert predictions of the changes happening around web development: opportunities arising from each of these changes, threats or issues that could be caused by them. (PEST Analysis, 2014.)

POLITICAL	ECONOMIC
- Copyrights - Acts and decrees that regulate Universities of Applied Sciences - Political instability - Internet regulation - Infrastructure (internet broaband) - Wars and conflicts	- Domestic & international trend - End-user drivers - Education export - Tuition fees - Inflation - Spesific industry factors - Intake of students at HAMK - Funding, grants ect. - Finance in general - Performance-based funding - Rising competition - Increasing unemployment rate emphasizing the need for education

SOCIO-CULTURAL	TECHNOLOGICAL
- Lifestyle trends - Information and communications at domestic and global level - Opinions and attitudes of target groups - Brand and image - Marketing and publicity - Educational paths - Demographics - Ethical issues - Work ethics / career attitude - Basic and higher educations - Education policy - Quality work audit	- Web development and trends - Competitive development - Technology access, licensing, patents, security - Maturity of technology and adoption - Innovation - R&D (fund) → projects, innovation - Skilled recources - Common systems and platforms amongst the higher education sector - Open data

Table 5   PEST analysis on www.hamk.fi. Adapted content form (Pest Analysis - Social Media Company)

In table 5 PEST analysis, there are some of the factors that could have a small or a big level influence in the upcoming HAMK website implementation and further development. The current www.hamk.fi was published in the beginning of 2014. Nowadays the technology and web development is changing and evolving very fast. If we assume that www.hamk.fi website renewal is to come during 2017-2018 then some of the factors stated in the above analysis could have a huge impact in the way the website is going to be implemented. The paragraphs below demonstrate one of the possible factors of change out of each field presented in table 5.

During the last couple of years there have been some big changes in the sector of Finnish Universities of Applied Sciences. It is very much possible that this phase of changes is going continue during the next five years to come. In the analysis the "*Acts and decrees that regulate Universities of Applied Sciences*" factor from the "*Political*" point of view could have a big impact on the upcoming www.hamk.fi website. This kind of factor could have an impact in the scope of the website. The number of degree programmes could be reduced and this could lead to minimizing also the website and the amount of the information offered. This kind of prediction could even have an impact in choosing the next university website platform. Why invest on a big platform when things could be handled through a simple and small CMS platform? Or in the contrary there could be some signs of university fusions, which would also have a big impact on choosing the right platform to answer the requirements for large data.

From the "*Economic*" point of view the factor of "*Increasing unemployment rate (emphasizes the need for education)*" in the current global economic difficult phase could be very much realistic. This kind of scenario could have a straight impact on the scope of the website. Increased demand means more resources. Another impact could be in choosing the next university website platform. If the case is so, then one of the platform requirements could be the capability of handling big amount of data.

In the "*Socio-cultural*" point of view the "*Demographics*" could have a big influence on the www.hamk.fi website. Through statistics the regional demographics describe the characteristics of the people living in an area. Population aging has been identified as one of the essential problems facing the developed countries, including Finland. It is expected that in Finland only the age-group of 65-years old and older is growing and the others will diminish. (Labour Market Participation of Immigrants in Finland and its Regions 2012, 1-2.) This means that the number of university age people is going to decrease during the upcoming years.

While the amount of the applicants is going to decrease, the competition for applicants amongst the universities is to increase. More and more investments are needed for a university to attract applicants with a modern and informative website. On the other hand, this could also have the effect that while the demand is decreasing, the role and the width of the www.hamk.fi is to be examined.

When looking from the "*Technological*" point of view, the factor "*Common systems and platforms amongst the higher education sector*" could be a realistic scenario by years 2017-2018. This kind of direction during the last couple of years has been very noticeable in the higher education field in Finland. In the www.hamk.fi website case, this could mean that the website is being managed from the joint platform with other universities of Finland. For this kind of operation, less resources could be required form HAMK but for implementing and managing this kind of a big project it is very crucial that the experts and resources are ensured. The www.hamk.fi differentiation from the other universities' websites could be seen as a challenge. A shared platform could offer many opportunities, but at the same time it could limit the functionality of the website because of some joint decision made.

4.2 www.hamk.fi short-term development proposals

Even though the www.hamk.fi website was launched about one year ago it doesn't mean that the journey is finished. On the contrast, this is perhaps the most important part of a www.hamk.fi website's life cycle since the aim is to develop the website into a better service for users. The development team understands that the life cycle of a website keeps going far beyond the initial launch. Now that the website has been functioning for over a year, reviewing and analyzing the traffic data deeper and implementing the required developments are an important phase.

The best practices of search engine optimization and general web development should also be taken into consideration while development is carried on. By continuously implementing progressive improvements on the site's functionality (device, orientation, platform, screen size etc.) it is possible to make sure that the website offers the best possible service.

As user behavior is changing and evolving, the www.hamk.fi website must stay tuned and be able to answer to the requirements set by its users. Minor changes are needed constantly but referring to the general development of web environment, the next www.hamk.fi website total renewal (Release 4.0) could be ahead in 2-2½ years' time. Until that short-term development should be implemented in small iterations and by applying scrum framework. The development areas could be as follows:

- invest time and effort into analyzing the website traffic
- investigate and react on google ranking algorithm for mobile friendly websites
- make adaptations based on website traffic → adaptive design
- revise the content towards a mobile first content strategy
- website visual facelift / light redesign.

4.2.1 Mobile-first content strategy

Mobile device usage is growing tremendously each year. It is estimated that approximately half of all internet searches take place on mobile devices already now (The future of digital 2014, 2014). In the www.hamk.fi case, the year 2015 could be the time to start changing the content into a mobile-first approach. By doing this now, the next website renewal project would be easier since the general trend is very clearly towards the `mobile first` approach.

Content should be mobile-optimized in order to serve the users needs and at the same time extend the time visitors spend with www.hamk.fi content, engaging to the university. The work should then be continued to cater for www.hamk.fi desktop visitors' needs. By conducting the content improvement through the mobile-first approach, the workload will be reduced and at the same time the content creation process would be sustainable into the future. (How to Create a Mobile-First Content Marketing Strategy, 2014.)

By analyzing and using the exact keywords coming from mobile visitors it is possible to make content more relevant to that certain www.hamk.fi target audience. Another improvement step on the content of www.hamk.fi could be by the `touch friendly` direction. When revising and redesigning the content, different mobile interface guidelines could be utilized in order to achieve the best possible outcome. The iOS Human Interface Guidelines, for example, are one option to implement. (How to Create a Mobile-First Content Marketing Strategy, 2014.)

Mobile-optimized content should also include the following considerations:

- Focus should be on website's headlines
  write headline that grabs a reader's attention, because the headlines appears first.
- Invest on the first one or two paragraphs
  the mobile environment is likely to shift the focus on these first, few crucial paragraphs.
- Look for opportunities to defer less necessary content
  for example, instead of embedding the content a link to another screen could be an option.
- Use micro-videos
  a mobile-first approach to video requires paying close attention to the rise of micro-video. Services like Vine, with its six second limit, are a good example of this kind of implementation. Videos are becoming easier to produce, and easier to share everywhere.

> (10 Steps To Creating A Mobile-Optimized Content Marketing Strategy, 2013.)

4.2.2 Adaptive design

Adaptive design is an option for further development of responsive website after its launch. While responsive web design is the latest design principle amongst web design methodologies, adaptive design have been around for some time and for a while even dominated. These two methodologies are closely related. The driving factors behind adaptive design are analytics and usage patterns of the website. (Overfield et al. 2013, 24-25.) After a website is launched, it is possible to adapt the website even more by researching and studying analytic data such as feature detections, device APIs, performance, touch optimization, platform optimization etc.

The concept of adaptive design is that the server detects the device used and determines what should and shouldn't be sent to the user. With the help of the analytics data it is possible to fix and develop all the identified possible issues regarding certain device or browser. As web developer's developing process never stops, it is very important to keep track and study the way website users handle the website and perform the needed improvements. (Overfield et al. 2013, 24-25.)

4.2.3 Visual facelift

During the one-year life cycle of www.hamk.fi, the feedback for its appearance has been very positive so there doesn't seem to be a need for extreme facelift. I would suggest keeping same visual direction and perform small facelift type of actions on the appearance until the next total website renewal. The improvements could be concentrated only on www.hamk.fi front page or the first page. The elements on the first page could, for example, focus more on the mobile direction in other words more videos as an option to text and images.

In favor of simplicity of the www.hamk.fi front page some of the non-essential design elements could be removed. While going through web design trends for 2015, one option mentioned in many cases is hiding the main menu regardless of the viewport size as a default (hiding the menu under a certain button as is done in responsive sites). This allows more space for visual purposes, and the front page design would be more clean and functional although it will require one more click from a user. This could be one option for www.hamk.fi to get the current top navigation bar space area cleaner. In the current www.hamk.fi, the main menu is hidden into responsive menu at a certain viewport. Another element that that pairs well with large background images and videos is Ghost Buttons which is a small and stylish element with hover animation (Bootstrap Ghost Buttons, 2014).

4.3 www.hamk.fi long-term development proposals

The website long-term development in this case is referred to as the next www.hamk.fi renewal project (or Release 4.0). Since current website has been published approximately one year ago, one could assume that this kind of a big renewal could be implemented in the beginning of 2017, the planning phase of which should start in 2016. As we move into a more mobile-driven landscape, as a website renewal project slogan I would recommend *'Embrace mobile-first as the new mindset in everything we do'*.

While examining the future prediction of web, the common theme in many of them is mobility and the way the world is heading towards it. Especially "phablets" (large phones and smaller tablets) are very current. Also flat design implementation is increasing and for some companies it already is the default design method. For the others it seems, that is going to be in to do list.

If HAMK follows my earlier recommendations on mobile strategy and implements the content improvement to serve mobile users during the near future, then tuning into a deeper mobile-first mindset is going to be much easier during the upcoming renewal project.

4.3.1 Near-future web trends

If a website was designed and published 3-5 years ago, it is probably no longer a competitive one. The current and very near future trends seem to be that responsive web design is the minimum for a website nowadays. Behind the web environment scenes a lot of growth and changes are happening. The keyword for this growing industry seem to be a less complicated building process of websites. It is inevitable that designing and implementing website tools are evolving in an intelligent way, less coding is needed and other tasks are automated. Lately the rise of website generators has been very noticeable. It is predicted that during the upcoming years the amount of generators aiming to replace web designers and coders is going to continue.

Experts predict that the overall current trends are going to evolve. Huge typography, high quality images and videos with mobile-first mindset are still going to be in the main focus. Designs and content should first be implemented for the smallest viewport and then progressively enhanced to larger viewports. (Web Design Trends That Will Rule 2015, 2015.) Creative web design offers a chance for the public or private sector to stand out.

Some of the trends and predictions for web design during the 2015 are:

Currently there is a wave of services that auto-generate design output. An example could be The Grid - Websites That Design Themselves. According to The Grid team, there is no more need for coding and no templates usage since The Grid analyzes the content and automates design decisions. The Grid uses artificial intelligence (AI) to build a tailor-made website. It also detects faces in photos and crops images to fit any size on any display. The layout changes as content is added and it adapts to look great and work flawlessly regardless of the device the visitors are using to reach the website. Some say The Grid might be the biggest web thing in a long time but it remains to be seen how and at what extend it will evolve. (Join the evolution, 2015.)

It is also suggested by many Web Designers that the year 2015 is going to be the rise of UI Animation (video backgrounds, animated GIFs and simple icon animations). The prediction includes a sharp increase in the tools for creating UI animation. (2015 Trends and Predictions for Web Design, 2014.)

Card Design implementation is also increasing where content is broken down into individual components. Web pages and destinations in web design are gradually falling behind. The direction is a completely personalized web behavior built on aggregation of many individual pieces of content. The rise of Card Design is due to rise of mobile technologies, different screens sizes and shapes. This kind of design implementation is clean, simple and contains a lot of versatility. It is driving the web away from many pages of content linked together towards individual pieces of content aggregated together. The functionality of aggregation depends on the users' interests and preferences, location, their friends' interests and preferences and the eco-system of targeting advertising. (Why cards are the future of the web, 2015.)

While planning the upcoming renewal of www.hamk.fi the role of SEO (Search Engine Optimization) should be emphasized more than ever before. One of the reasons is the fact that mobile-friendly pages are more important nowadays. Google, for example, adds the 'mobile-friendly' label shown under the URL in the snippet to their mobile search results. The aim is to serve mobile users as well as possible. Google has announced that as from 21 April 2015 mobile friendly design will become a ranking signal, and this kind of change is going to have a significant impact on search results. It is possible for the site admin to check the mobile-friendly state of the website through Google Webmaster tools. Currently, www.hamk.fi seems to be in a good mobile-friendly state as Figure 30 below shows. (Finding more mobile-friendly search results, 2015.)

However, I would recommend for the current www.hamk.fi make sure why 'mobile-friendly' label is not shown in mobile search results. This could be a short-term development.

Figure 16   Mobile-Friendly Test on www.hamk.fi

Open data according to some web environment experts is also going to transform the web during the near future. Digital spaces are going to become more and more open. It is also predicted that public and private sector are going to open their content during the 2015. (10 web design trends that will change everything in 2015, 2015.) By doing this, there will be a tremendous change in the web environment. Open data can lead to innovation solution at a national and global level.

Instead of clicking, one-page scrolling websites are being implemented. Scrolling seems to be in nowadays and it is predicted that this trend is going to continue and even rise during the near future. 'Everybody Scrolls' research conducted by Rebecca Gordon of Huge shows that people scroll and they don't mind doing it. The experts of Huge according to this research, recommend that designers should choose cues for scrolling based on the content and the overall design. (Everybody Scrolls., 2015.) In the case of www.hamk.fi this kind of solution could be difficult to implement on the front page because of the large amount of data to present. However, this kind of implementation could be utilised in degree progammes pages.

Above are just some of the potential development proposals from the current and future web trends point of view. The evolving of the field during the upcoming 2-3 year remains to be seen: it seems that every year there are new innovations and many near-revolutionary things are being published in this field. The university web team should constantly be following the field and the new trends that are likely to emerge in the upcoming years.

4.3.2   Options on upcoming platform solutions

As stated before, the current www.hamk.fi website is implemented on SharePoint 2013 on-premises platform. By 2017, when the next renewal is most likely going to be implemented, it is obvious that this version of Share-Point platform is not going to be current anymore.

The platform options for the upcoming www.hamk.fi website would naturally start with Microsoft technology as it is what HAMK is currently implementing. As Microsoft has very clearly stated for some time now that their direction is cloud, it is obvious that this kind of statement could not be ignored.

HAMK is currently implementing their intranet on SharePoint Online (Office 365) so having the public www.hamk.fi website on the same platform would be an option. However, according to Microsoft's announcement they are deprecating the public website offering in both SharePoint Online and Office 365. This announcement excludes SharePoint Online as a platform option. Microsoft is going to offer continued support for the clients that are already using this feature until at least March 2017 but for new clients, Microsoft recommends creating a public website using a third-party offering that Microsoft makes available in Office 365. (Public Websites in Share-Point Online and On-Premises, 2015.)

Microsoft has officially made an announcement that the next SharePoint on-premises version will be launched by the end of this year and will be called SharePoint Server 2016. During 2015 they are planning to continue and roll out new innovation within Office 365 and get closer to the next on-premises server release. Their aim is to continue and work on adding new features to Office 365 which ultimately may trickle down to SharePoint on-premises users. The idea presented from Microsoft about the next SharePoint platform is that to some extent the service is going to be blended with cloud services. It remains to be seen how SharePoint Server 2016 is going to respond to organsiation's demands. (Evolution of SharePoint, 2015.)

In addition to Microsoft options as a platform solution, there are different kind of platforms that could as well serve HAMK. Among strong platform or CMS candidates are for example Liferay and Drupal. Liferay is nowadays quite a popular web publishing platform amongst the public sector in Finland, and Drupal is gaining a significant enterprise adoption nowadays.

4.3.3 Competence management approach to support web development

Trends and statistics are clearly showing that print ads are falling out and that Google is bigger than all newspapers. The direction is very clear - and it is digital. The HAMK 2020 strategy emphasizes the importance of digitalization that enhances competitiveness, and boosts and renews the activities of the university. It is very clear that learning, developing and understanding digital competences is crucial for any business or organization today. It is very much possible to stand out in the harsh competitive world by utilizing these digital competences. In order for an organisation to achieve this point, it is important to invest on its digital competencies.

The need for a mobile-first mindset is required in order to just stay current. Ensuring that a website responds to this mindset is not just a technical fix but also a change in people's attitude towards marketing and online content. In order to achieve this mindset all aspects of the process should be taken into consideration: the way the website is structured, the content provided and delivered. To be able to design the content strategies that properly encompass the needs of website users regardless of the device, Information architect skills & competencies are required in the project team.

The upcoming renewal of the www.hamk.fi website should also be implemented by agile methodology, scrum framework. Taking into the consideration that the project team is going to be blended from different departments of the university, prioritizing the project is very important. Amongst the project team the experiences and knowledge of agile methodology is required in order to have the successful implementation. Product owner and scrum master are required in the project team.

A competence of graphic web designer is also required for upcoming new www.hamk.fi. The graphic designer should be able to take into consideration the predicted future web trends and make sure site design is going to be future-friendly. The designer should be able to cooperate well with the university web team, in order to be able to see what the main requirements of users are. Together with the project team, the designer should plan and implement the design for upcoming www.hamk.fi website. The team and the designer should also consider the implementation of different ready website themes and templates to be purchased or even free of charge.

Depending on what is going to be the upcoming platform choice, the website requires technical developer and technical assistant competences. These competences could be amongst the project team and organisation staff, or if the platform is outsourced then the competences will come from the provider. The developer should be in any case be focused on future-friendly web solutions, and the mindset of implementations and solutions should follow the mobile-first direction.

The essential factors in the success of the digitalisation process of an organisation include acquiring the skills necessary for successful project implementation, user experience, search engine optimization, visitor analytics, content strategy, social media integration, and digital marketing. These factors should especially be taken into account at the design stage of the new website. The designers, developers and teams that are able to manage and master proper, modern and future-friendly websites are going to stand out in this business.

5 CONCLUSIONS

The main goal of the research was to emphasize the importance of maintaining a current website. This is done by implementing responsive web design methodology, supporting multiscreen functionality, seeking future-friendly solutions and bearing in mind the mobile-first mindset. These factors are to take into consideration regardless of the technology or content management system used for website implementation.

Based on the research questions, I consider that the objectives were met very well. The research also proved the importance of responsive web design and the fact that the methodology should nowadays be a web standard. While big companies and organisations utilise different content management system platforms for their public websites, most of them do not have responsive themes and templates readily available. Therefore the need for creating own, branded responsive template arises.

The three outcome-related criteria from retrospective approach point of view are:

- Use – the project's resulting website www.hamk.fi is being actively used by its target groups. As the result of the implementation of responsive web designon SharePoint 2013, the website was utilized as originally intended.
- Learning – the project increased project team knowledge in technical and project management perspectives. This knowledge is going to help prepare and implement future projects.
- Value – the project, when implemented, will directly result in improved efficiency for website users.

From project manager's, team member's and project control group process-centric perspective, the project was very successful. The retrospective approach in this research was also a learning experience which opened the big picture and provided tools for continuous improvement in processes, procedures, and organisation culture. It also stressed the need for pausing and reflecting accomplishments before getting to the stage of developing the next big release.

The research also documents the implementing process of responsive web design combining it with a SharePoint 2013 platform case. One of the main significances of the study is that it triggers the planning for the implementation of the next www.hamk.fi. The research offers new perspectives and concrete proposals on short-term and long-term website development.

As universities in Finland are competing for applicants, many studies have shown that a university's website is a very important channel for applicants. If the site is built with a genuine intention to meet the applicant's needs and if the applicants are clearly the main target group of the site, it might attract the applicants for more interest towards the university.

Nowadays, browsing the internet with phablets and other mobile devices is everyday life for young people. As the social media channels and other services they frequently use are mobile-friendly they will by default assume that also those websites that are needed for other purposes, such official information on education options, have the same functionality. Universities should be able to answer their assumptions and demands and also make themselves stand out among their competitors, that is other universities.

The study brought up a significant amount of interesting subjects to get further acquainted with. One example is a web trend called auto-generation of design output implementations. In the future could there really be no need for coding and template usage since there are services to analyse the content and automate design decisions without a web designer? It sounds outstanding that with the help of artificial intelligence this is going to be possible. And brings forth questions: How will Google search react on implementations of this kind and will they have an impact in rank of Google results? While demos of The Grid look impressive, it remains to be seen how well all of this works in practice: how intelligence it really is and how will it fulfil the requirements of a large data website.

As a conclusion of this work one can say that even though implementing responsive web design on an organisation's platform - in this case Share-Point 2013 - might be a complex process it is worth all the work. The main reason is that implementations like this are future-friendly. It is also very important to remember that designing the website responsive is a never ending job which will never be perfect. Nowadays, however, it seems that you either are responsive or out: more and more Finnish universities are making their websites responsive.

I see this thesis to be very helpful for organisations that are considering responsive web design implementation on SharePoint 2013. HAMK, however, should concentrate during 2015 on short-term developments and very soon start to plan the next big renewal of their website.

During the thesis process, it also became clear that change is the only constant thing in web development. I came across many challenges that designers and developers are going to face, and they are not everyday tasks but rather questions like How are we going to be able to provide support for services and devices that haven't been even invented yet? To tackle these changes, universities need strong competences which could be in-house or outsourced. Solutions should be future-friendly and investments digital-first. As a conclusion: a very important part of web development is capturing the trends, focusing on what is important for the company and developing on these.

The whole thesis process was a process of self-assessment for me, too. Because I was the key developer of current www.hamk.fi website while conducting this research I also had the opportunity to reflect on my work and consider what should be done differently in order to aim and achieve the best possible result. For me, web development is a never-ending learning experience since change is an inevitable and continuous process in the field. Developers should be able to adapt, respond, and deliver, and the best way to achieve this is to be agile and implement development in small iterations.

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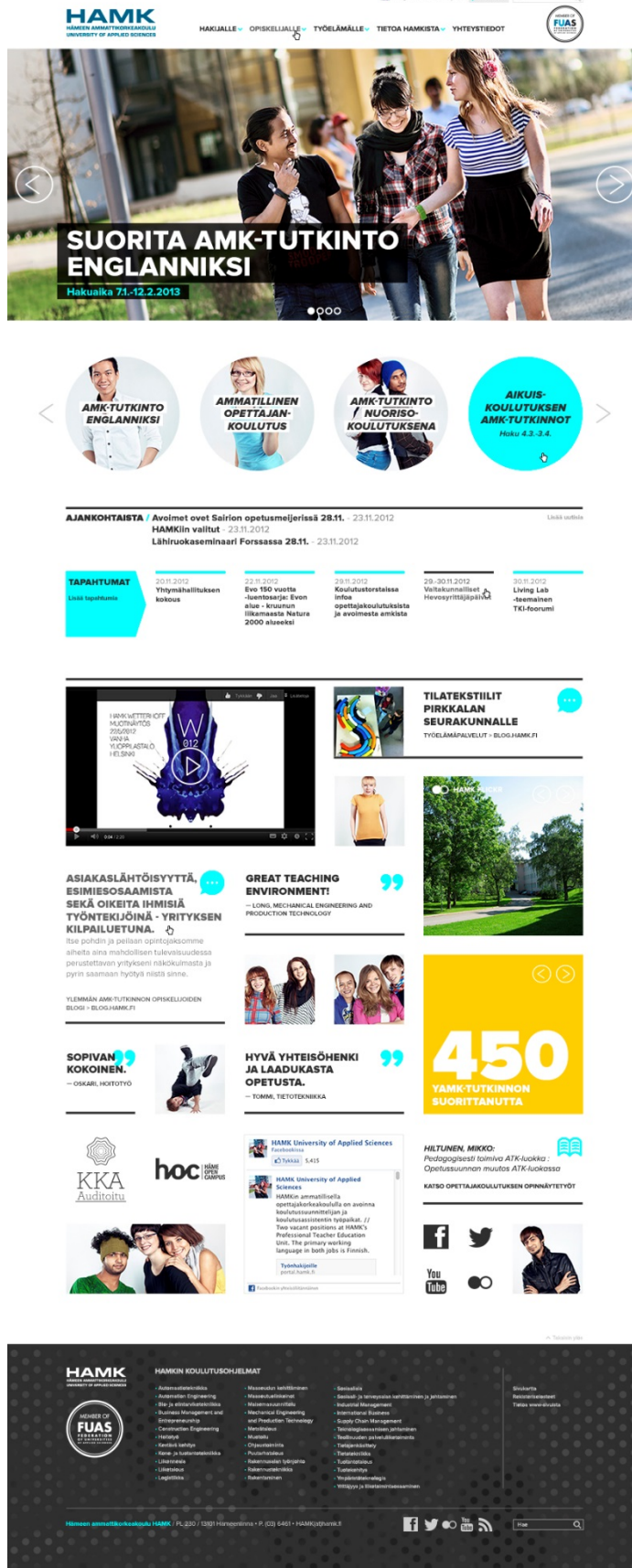
HAMK.fi mobile version of the front page design (Myllyaho, 2013)

Appendix 3

Questions used in the interview

Blue Meteorite interview / Jussi Martikainen 1.12.2014

- In what cases your company would recommend to your partner that Responsive Web Design should be implemented?

- What are challenges that you would highlight on implementing Responsive Web Design on SharePoint 2013?

- Are these potential challenges tend to be solved?

- What would you consider to be pros and cons of this RWD Methodology?

- Based on your company experience, how popular this kind of implementation is currently in Finland?

- www.hamk.fi is now responsive, what should be done next? What would be your suggestions for hamk.fi development for upcoming three year period?