



TAMPEREEN TEKNILLINEN YLIOPISTO
TAMPERE UNIVERSITY OF TECHNOLOGY

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THE USER EXPERIENCE OF DIGITAL NEWS: READING AND
AUTHENTICATION ON BROWSER OPTIMIZED VERSIONS AND
DIGITAL REPLICAS

Master of Science Thesis

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ABSTRACT

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Even though both user experience (UX) and digital news are relatively old concepts, still there are multiple definitions used in the literature even today. The long-term UX of digital replicas and browser optimized versions of digital news with or without authentication is not studied earlier in real life with actual users. Thus the goal of this thesis was to clarify ambiguity in the terminology of UX and digital news, and to examine how users experience digital replicas, tablet browser optimized versions and a Next Media –key authentication method in a real usage context over a longer period of time.

This thesis consists of a literature review, two semi-long user evaluation studies (one with 15 and one with 17 actual users) in real context of use which used both questionnaires and interviews as data gathering methods, and one heuristic evaluation (5 usability experts). In the literature review issues related to definitions of user experience and digital news were explored. The user evaluation studies were conducted to find out the UX of the two digital news forms and the authentication method in a real context of use over time. The heuristic evaluation was used to determine the usability issues between three different tablet browser optimized versions in order to give ideas for their future development.

The results revealed that both the browser optimized versions and the digital replicas are user's favorite ways of reading digital news due to similarities to traditional print newspapers. The Next Media –key has potential for becoming liked and widely used authentication method for digital news and should be developed further. The overall UX of these versions, and the usability of the tablet versions, could still be improved even though the UX increased over time. Temporal aspect of digital news reading usage context revealed the newest viewpoints. Overall the longer term UX studies are worthy.

The results of this thesis could be used by all media companies who publish digital news content in order to provide their readers good UX and thus benefit financially. The terminology of UX and digital news were also presented according to today's knowledge. In future studies it would be interesting to continue examining long-term user experience of digital news and the Next Media –key so that optimal solutions for both of them could be found.

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TAMPEREEN TEKNILLINEN YLIOPISTO

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Käyttökokemus ja digitaaliset uutiset ovat suhteellisen vanhoja konsepteja, mutta niistä on edelleen kirjallisuudessa käytössä monia määritelmiä. Aiemmin ei ole tutkittu näköislehden ja selainoptimoidun version pitkäaikaista käyttökokemusta tunnistautumisineen tai ilman, todellisessa elämässä eikä varsinaisilla käyttäjillä. Täten työn tarkoituksena on selventää käyttökokemukseen ja digitaalisiin uutisiin liittyvää termistöä, ja tutkia kuinka käyttäjät kokevat näköislehden, selainoptimoidun version ja Next Media –avain tunnistautumismenetelmän todellisen elämän käyttöympäristössä pidemmällä aikavälillä.

Työ koostuu kirjallisuuskatsauksesta, kahdesta pitkähköstä käyttäjäarvioinnista (15 ja 17 varsinaista käyttäjää), joissa kummassakin aineistonkeruumenetelminä oli kyselyitä ja haastatteluja, ja heuristisesta arvioinnista (5 käytettävyysasiantuntijaa). Kirjallisuuskatsauksessa kartoitettiin käyttökokemuksen ja digitaalisten uutisten määritelmiä. Käyttäjäarvioinnit toteutettiin kahden digitaalisen uutisten version ja tunnistautumismenetelmän käyttökokemuksen selvittämiseksi todellisessa käyttökontekstissa ajan kuluessa. Heuristisella arvioinnilla määritettiin kolmen tabletin selaimelle optimoidun version käytettävyysongelmia jatkokehitystä varten.

Tuloksena selainoptimoidut versiot ja näköislehdet ovat käyttäjien suosikkeja digitaalisten uutisten lukemiseen johtuen niiden samankaltaisuudesta perinteiseen painettuun sanomalehteen. Next Media –avaimella on potentiaalia tulla pidetyksi ja laajasti käytetyksi digitaalisten uutisten tunnistautumismenetelmäksi ja sitä pitäisi kehittää eteenpäin. Yleisesti näiden versioiden käyttökokemuksessa, ja tablettiversioiden käytettävyydessä, on parantamisen varaa, vaikka käyttökokemus paranikin ajan kuluessa. Digitaalisten uutisten lukukontekstin ajallinen puoli toi uusinta tietoa. Kaiken kaikkiaan pidempiaikaisten käyttökokemustutkimusten tekeminen kannattaa.

Digitaalisten uutisten kustantamot voivat työn tuloksilla parantaa lukijoidensa käyttökokemusta ja hyötyä siten rahallisesti. Työssä esitettiin myös tämän päivän tietoa termeistä käyttökokemus ja digitaaliset uutiset. Tulevissa tutkimuksissa olisi mielenkiintoista jatkaa digitaalisten uutisten ja Next Media –avaimen pitkäaikaisen käyttökokemuksen tarkastelua, jotta optimaaliset ratkaisut löytyisivät.

PREFACE

This thesis was made at Tampere University of Technology, at the department of Pervasive Computing. It was part of the research carried out in the Next Media programme by TIVIT, with Keski-Pohjanmaan Kirjapaino Oyj and Alma Media Oyj as partners.

I am grateful that Keski-Pohjanmaan Kirjapaino Oyj and Alma Media Oyj made this study possible by providing the participants and the test versions of the digital news (tablet browser optimized versions and digital replicas) for the studies. Also I want to thank Magnus Melin from Technical Research Centre of Finland (VTT) for implementing the authentication method, the Next Media –key, for the second study.

I want to thank the thesis examiner Satu Jumisko-Pyykkö and my supervisor Heli Väättäjä for guidance and support through the multiple phases of the study. I also want to thank all my work and study colleagues for assistance and motivation throughout my studies.

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Tampere, Finland, on April 8th, 2015.

Emilia Pesonen

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TERMS AND ABBREVIATIONS

Aalto	An abbreviation for the Aalto University in Finland.
AL	An abbreviation used for “Aamulehti” which is one of the newspapers of the media company called Alma Media Oyj.
Authentication	Includes both identifying yourself to a web service, for example to an online shop, and gaining the access after successful verification for its services, for example for ordering its products.
Browser optimized version	The print newspaper’s content presented up-to-date on web site so that the form and the content may differ in order to make it more suitable for browsing with computer or mobile devices including subcategories and navigation elements (e.g. menu bars).
Computer	A general word for computer (could mean either laptop or desktop). Includes both laptop and desktops if otherwise is not said.
Digital news	A collection of news offered via Internet which may include multimedia elements. Many forms exists e.g. digital replica or browser optimized version.
Digital replica	A digitalization of the print newspaper: it maintains the same form and content. One form of digital news. It could be read with computer or mobile devices.
IL	An abbreviation used for “Iltalehti” which is one of the newspapers of the media company called Alma Media Oyj.
KP	An abbreviation used for the newspaper called Keskipohjanmaa published by the Keski-Pohjanmaan Kirjapaino Oyj.
KPK	An abbreviation used for the Keski-Pohjanmaan Kirjapaino Oyj (The media company publishing the newspaper of Keskipohjanmaa).
Long-term	Duration is at least a couple of weeks if not even months or years in a study. Many ways to measure it exists e.g. longitudinal or cross sectional study.
Metropolia	An abbreviation used for the Metropolia University of Applied Science in Finland.
Mobile device	A handheld or portable devices including smart phone, tablet and laptop.
NM –key	An abbreviation used for the “Next Media –key” which is a concept for one authentication method for ordering and consuming multiple digital news products.

NU	An abbreviation used for the “Nokian Uutiset” which is also one newspaper of the media company called Alma Media Oyj.
SD	An abbreviation used for the Standard Deviation.
Short-term	Duration is less than a day in a study.
Tablet	Tablet computer. Mobile device. Internet connection via 3G or Wi-Fi.
Tablet version	A term which means the tablet browser optimized version made of newspaper. One form of digital news. Specifically made for tablet’s browsers.
UX	A short form of the term user experience.

1 INTRODUCTION

Overall in the past year the use of smartphones and tablets has increased significantly with fewer people using computers for news according to Reuters Institute's Digital News Report (2014 p. 8). In Finland the news reading via smartphones and tablets is growing fast but the majority still uses computers as the main source for digital news and nowadays 49% get news on at least two digital devices (Reuters Institute 2014 pp. 9, 30-31). In addition the online delivery of news is considered important in Finland due to the sparse population and long distances in physical distribution (Reuters Institute 2014 p. 30). Thus in order to stay updated with the need for digital news so that both the media companies and the customers would be happy, it is important to study the user experience of digital news.

User experience (UX) is formed when a person interacts with a product and it is influenced by user's personal qualities, product qualities and context of use (Jumisko-Pyykkö 2011 p. 22, Roto et al. 2011, Olsson 2012 p. 19, Salminen 2013, Väättäjä 2014 p. 8). In nature the UX is overall subjective, situated, complex and dynamic (Hassenzahl & Tractinsky 2006). *Digital news* is a collection of news delivered via Internet which may include multimedia elements (Ihlström & Åkesson 2004, Shapira et al. 2009, Chung et al. 2010 and Karlsson & Strömbäck 2010). From the literature it could be derived five different forms of digital news used today which were however described by 11 different terms depending on the presenter (see Table 3). Both of these concepts are relatively old, around 20 years, according to Alben (1996) and Ashton & Cruickshank (1993) but still there is room for clarification in their overall terminology.

The two forms of digital news used in this thesis are digital replica, which is more suitable for laptop or desktop computers, and browser optimised version, which could benefit more devices with smaller display like tablet computers. *Digital replica* is the earliest form of digital news (firstly introduced at 1993 by Ashton&Cruikshank) and it is similar to a standard print newspaper uploaded onto a website by using for example PDF technology so that there is no personalized content or layout. Instead one of the newest forms of digital news is the *browser optimized version* (no definition found in literature) in which the content is presented up-to-date on website so that the content and layout are more suitable for a browser of some certain device, including subcategories and menu bars as navigation elements.

Authentication is a process where a person's identity is verified so that a rightful user can then access the resources allowed to him/her (Neuman & Ts'o 1994, Rhodes-Ousley 2013 p. 167, Koskinen 2014). In the case of digital news the rightful users are news consumers, and the resources are the digital news products they have purchased.

The novel authentication method designed for purchasing and consuming multiple media products, also possibly from several media companies, is called “Next Media –key”. It, like most systems, relies on password authentication even though it does not offer very good protection (Rhodes-Ousley 2013 p.187), if the user is not careful and not to follow instructions given to make the password strong enough (Koskinen 2014).

In *long-term UX* studies the data is collected over time, for example over a week or even a year (Courage et al. 2009, Vermeeren et al. 2010). It is important to measure over time because the product life cycle’s UX could be predicted more reliable than in momentary UX study and thus more money is saved (Kujala et al. 2011, Roto et al. 2011). The long-term UX studies are increasingly recognized (Courage et al. 2009), but still truly longitudinal studies are missing and only over several weeks are examined (Bargas-Avila & Hornbæk 2011). A *longitudinal study* covers a particular period of time within-subjects and thus it is more suitable for long-term studies (von Wilamowitz-Moellendorff et al. 2006), than for example a cross sectional study in which only one point of time is covered between subjects causing probably errors in the results due to an interpersonal variation (von Wilamowitz-Moellendorff et al. 2006, Karapanos et al. 2010).

Earlier UX studies over time about digital news with or without authentication in a real life context of use with actual users do not exist according to my best knowledge. However five studies (Althaus&Tewksbury 2002, d’Haenens et al. 2004, Ihlström&Lundberg 2002, Tewksbury&Althaus 2000 and Vaughan&Dillon 2006) were examined further because they studied digital news over time. They were quite similar in their approach and lacked external validity because being mainly laboratory studies. So there is no earlier knowledge about the long-term UX of digital news in real life.

Thus the goals for this thesis were: 1) to clarify the ambiguity in the definitions of UX and digital news, 2) to examine how tablet browser optimized and digital replica forms of digital news are experienced by users in a real life usage over a longer period of time, and 3) to examine the users’ experience of the novel authentication method for ordering and consuming multiple digital replicas via one username authentication in a real life usage over a longer period of time. The theoretical background was studied in the literature review and then two user evaluation studies with diary like daily questionnaires, background and final questionnaires and final interview were conducted to gather data about the semi-long-term UX of two digital news forms and the Next Media –key authentication as widely as possible within the resources of this thesis.

The structure of this thesis is as follows. In chapter 2, the UX is defined and how to evaluate it is described. Similarly in chapter 3, the digital news is defined, the authentication methods for consuming them are presented and finally the related earlier studies are examined. The theory is summarized in chapter 4. Then the two studies that were conducted in this thesis are explained in chapters 5 and 6. Study 1 includes both a heuristic and a user evaluation of three tablet browser optimized forms of digital news. Study 2 includes only a user evaluation similarly with the study 1, of digital replicas of three newspapers and an authentication method. The results of the two studies are sum-

marized in chapter 7. Finally the results of the thesis are discussed and suggestions for future work is presented in the conclusion in chapter 8.

2 USER EXPERIENCE

The goal of this chapter is to introduce and define the term “user experience” (UX) according to current knowledge and due to its importance, to also describe its evaluation methods. The focus of this thesis is on longer term UX so the emphasis of the evaluation part is on long-term UX.

2.1 What is UX?

Even though user experience (UX) has been studied and used in the academic and industrial world of Human-Computer Interaction (HCI) for almost two decades (first definition is from 1996 presented by Alben) it still doesn't have a single, all viewpoints inclusive, “a grand unified theory”, definition (Salminen 2013, Olsson 2012 pp. 30-31, Roto et al. 2011). Thus first there are the most known definitions for user experience. After that a couple of the newest definitions of UX derived from relevant literature are used for summarizing the current understanding. Then its components and the most important parallel terms sometimes confused to understand as synonyms for it are clarified. Finally there are some reasons for why UX is important to study.

First ISO standard (ISO 9241-210:2010) defines the user experience as a “*person's perceptions and responses that result from the use and/or anticipated use of a product, system or service*”. While Hassenzahl and Tractinsky (2006) underline that the UX is a consequence of a user's internal state, the characteristics of the system and context of use. For example user's predispositions, expectations, needs, motivation and mood, system's complexity, purpose, usability and functionality, and the environment's organizational or social setting, meaningfulness of the activity and voluntariness of use, all affect the UX (Hassenzahl & Tractinsky 2006). So the UX is overall subjective, situated, complex and dynamic (Hassenzahl & Tractinsky 2006).

Nowadays Salminen (2013) summarized definition of the UX by using eight sources: 1) All About UX 2013, 2) Nielsen Norman Group 2011, 3) Hassenzahl and Tractinsky 2006, 4) Alben 1996, 5) Usability Professionals Association 2010, 6) Forlizzi and Batterbee 2004, 7) Hassenzahl 2008, and 8) International Organization of Standardization 2010. According to him the user experience is formed by interacting with a product or service and it consists of user's perceptions and emotions. Almost the same definition has been given by Albert & Tullis (2013 p. 5) who considered that the UX includes individual's entire interaction with the thing and also thoughts, feelings and perceptions that it results.

Väättäjä (2014, p. 8) saw the UX a little bit broader: it is user's impressions and reactions that are affected by the user's interaction with the system, the tangible outcome of

the system use, the activity within which the interaction exists and the usage context. Also she defined the term specifically for the area of mobile newsmaking as follows: *“User experience is the consequence of motivated action and interaction with the system that has goals specified by the user, organization, and other stakeholders, as well as by the circumstances within which the activity takes place. The experiential components of user experience include the user’s impressions and reactions related to the system, the tangible outcome of system use, the impacts of the system, and overall evaluative judgments. The characteristics of the user, system, the context of use and the tangible outcome can contribute to user experience.”* (Vääätäjä 2014, p. 91).

In addition Olsson (2012 pp. 9, 30) understands the UX as end user’s subjective experience formed by interacting with an interactive technological artifact but it is also dynamic and has different characteristics (e.g. emotional, sensory, aesthetics, instrumental) and different time spans (anticipated, momentary, episodic and cumulative; See chapter 2.2.1). Very similarly it was defined by Hartson & Pyla (2012, pp. 5, 19) who saw the UX as the totality of effects user feels internally after interacting with a system, a device or a product in the context of use and it is influenced by usability, usefulness, emotional impact during the interaction which involves seeing, touching, thinking and admiring the system, the device or the product, and its presentation also before any physical interaction and savoring the memory afterwards.

In summary the user experience (UX) is formed by interacting with a product (device or service) and it is influenced by product qualities, a context of use and a user’s personal qualities. Depending on the specific areas of HCI (e.g. mobile newsmaking) for which the UX is being monitored, there can be some differences in the extent of definition. Next the three components of the UX are clarified more precisely.

2.1.1 Components of the UX

The factors which may influence a person’s user experience can be divided into three main categories: 1) the user’s state, 2) the system properties and 3) the context around the user and system, which have been the same for couple of years now (Vääätäjä 2014 p. 8, Salminen 2013, Olsson 2012 p. 19, Jumisko-Pyykkö 2011 p. 22, Roto et al. 2011). They help to identify the reasons behind a certain experience but the UX itself cannot be described by describing those (Roto et al. 2011).

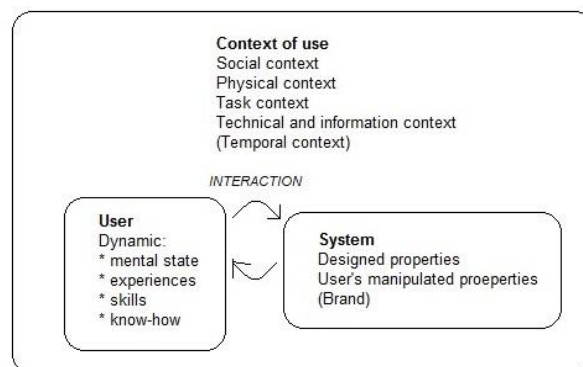


Figure 1. Summary of components of user experience.

Context of use – means the circumstances where the activity takes place. It mostly refers to four context components: Social (e.g. working with other people, culture), Physical (e.g. using a product on a desk vs. on a bumpy road, artefacts), Task (e.g. surrounding attention demanding tasks, multitasking) and Technical and information (e.g. other products, Internet connection) context (Roto et al. 2011, Väättäjä 2014 pp. 92, 94). Fifth component is mostly also included in the model: Temporal (for example time of usage, duration) context, together with subcomponents and properties which are magnitude, dynamism, patterns and typical combinations (Jumisko-Pyykkö 2011, p. 32, Väättäjä 2014 pp. 92, 94).

User – is a person controlling or manipulating and experiencing the system (Roto et al. 2011, Jumisko-Pyykkö 2011 p. 31, Väättäjä 2014 p. 92). Person is as dynamic as the UX including person's motivation for using the product, their mood, current mental and physical resources and expectations (Roto et al. 2011). Other aspects of the user are prior experiences, limitation and capabilities like skills and know-how (Väättäjä 2014 pp. 92, 94, Olsson 2012 p. 19).

System – Basically refers to the user's perception of the system properties which include 1) The properties designed into the studied system, 2) The properties that user has added or changed in the system or that are consequential of its use (Roto et al. 2011, Olsson 2012 p. 19). Roto et al. (2011) also include third aspect: Brand or manufacturer image. These properties include for example things like functionality, aesthetics, designed interactive behavior, responsiveness, a picture of user's children on his/her phone, scratches or a worn look after it has been used for some time, sustainability and coolness (Roto et al. 2011). In addition for example efficiency, materials, usability, mobility, purpose of use, usefulness, content, originality and innovativeness are included in the aspects of system (Olsson 2012 p. 19).

2.1.2 Parallel terms

Here a few important parallel terms are clarified and shown in relation to each other. Before the user experience (UX) when discussing about the human-computer interaction (HCI) there was the usability (Salminen 2013). Some old and new papers use even the User-centered Design (UCD) as synonym for the UX (Bargas-Avila & Hornbæk 2011). In addition there is the quality of experience (QoE) next to the UX (Jumisko-Pyykkö 2011 p. 32).

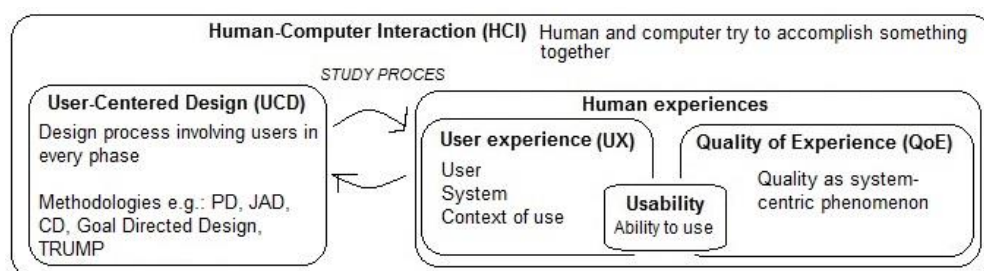


Figure 2. Relations between the parallel terms of UX.

Whenever a human and a computer are trying to accomplish something together it is called the **human-computer interaction** (Hartson & Pyla 2012 p. 9). The **usability** is aspect of HCI (Hartson & Pyla 2012 pp. 9-10). It is much narrower than the UX and its qualities are mostly objective (Salminen 2013). The UX and the **quality of experience** are different although they are partly working under the same phenomenon which is called human experiences (Jumisko-Pyykkö 2011 p. 32). It emphasizes the influence of produced quality characteristics on the user or quality is described as a system-centric phenomenon (Jumisko-Pyykkö 2011 p. 32). Finally the **user-centered design** is a HCI design process involving actual users in every phase.

Usability – affects the UX (Salminen 2013), or it can be seen as determinant of the UX (ISO 9241-210:2010). The usability is defined as the “*extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*” (ISO 9241-11:1998). Usually it means the ability of a user to use the thing in order to carry out a task successfully (Albert & Tullis 2013, p. 5). It could be referred as pragmatic and non-emotional component of the UX including both objective measures, subjective opinion measures and qualitative data about usability problems involving characteristics such as ease of use, productivity, learnability, retainability and pragmatic aspects of user satisfaction (Hartson & Pyla 2012 pp. 6, 10, 20).

Aspect	Usability	User experience
Refers mainly to	A product quality: products have properties that make them usable	Person's experiential outcome of interacting with the product
Scope	Efficiency and effectiveness of use and task completion	More comprehensive, covering also experiential and emotional aspects
Assessment	Objective (e.g., objective goodness of the product)	Subjective, based on the way people experience and judge products
Dynamics	Relatively persistent	Inherently dynamic
Goals	Do-goals	Be-goals
Design focus	Removing negative factors in design (e.g., problems, barriers, frustration, discomfort)	Creating positive outcomes of the interaction (e.g., stimulation, appeal, joy, excitement) and surpassing user expectations
	“Now it's no longer adequate just to avoid bad experiences, we have to find methods for designing good ones” (Blythe et al. 2003)	

Figure 3. Central differences between the usability and the UX (Table 2 in Olsson 2012 p. 26)

In addition the usability is neither equivalent to “dummy proofing” which insults and demeans both user and designer, nor “user-friendliness” which misdirects away from the importance of user performance in terms of user productivity (Hartson & Pyla 2012 p. 10). Also the usability is more than just visual design or usability testing (Hartson & Pyla 2012 p. 10).

User-centered design – also known as the UCD, is cyclic process with multidisciplinary approaches which involve users actively in the whole development process from planning to design and development (ISO 13407 1999). The UCD is used for clear understanding and to remove unusable design solutions effecting on the Human-Computer Interaction (HCI) as soon as possible (Sillanpää 2008, Olsson 2009, Vredenburg et al.

2002). In addition the UCD betters both the HCI and usability issues and the business aspects (Vredenburg et al. 2002, Olsson 2009).

There are a couple of UCD methodologies out there: Participatory Design (PD), Joint Application Design (JAD), TRUMP and Goal-Directed Design (Olsson 2009). Four most common ones according to Sillanpää (2008) are ISO 13407 model, Contextual Design (CD), PD and Goal Directed Design. However these are not more thorough included in this master thesis due to the focus on evaluating the user experience not designing for it.

2.1.3 Why UX?

The user experience (UX) is increasingly important part of a product. For example in the health industry poor usability could mean the difference between life and death (Albert & Tullis 2013, p. 5). In addition the products and evolution of technology will likely become even more complex in the future if we do not pay close attention to the UX (Albert & Tullis 2013 p. 6). Vääätäjä (2014 p. 12) summarized from literature that for example overall evaluative judgments, acceptance, usage behavior and preferences are incorporated in the consequences of the UX.

On the other hand it is important for the advancement of the field also. By having concepts and frameworks in order to exchange knowledge, educate people, build hypothesis and plan empirical research (Olsson 2012 p. 31). By carrying out empirical research in the field of the UX the frameworks and methods are refined further (Olsson 2012 p. 31). Also by understanding users' expectations it makes it easier to outline products and envision how its characteristics could contribute to the UX as well as target to specific experiences in the design (Olsson 2012 p. 31).

2.2 Evaluating UX

Like in any other research there are some basic things to consider before choosing from lots of existing methods for evaluating the user experience (UX). The reliability and the validity are among the most relevant terms when a good research method is characterized (Jumisko-Pyykkö 2011 p. 34). Participants have major impact on the findings of a study (Albert & Tullis 2013 p. 58). A class of experiment tells about the overall nature of a study. User experience evaluation means an investigation of how users experience the product under the evaluation. First the basic concepts of conducting a study are covered, then knowledge of evaluating UX is shared and finally due to the focus of this thesis, more profoundly the term "long-term UX" and its evaluating practices are described.

Reliability is about the question whether the results of a study are repeatable which in other words means if the operations of the study can be repeated, and both transparency and replication relates to that (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 98). For example transparency could be ensured by documenting and clarifying the research procedures about how the study was conducted, and replica-

tion by storing the collected and created materials so that they could support future use (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 pp. 98-99). Reliability could be increased if multiple researchers could participate on the research design, data collection, analysis and making conclusions phases of a study so that the impact of one researcher with his/her background was minimized (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 99).

Validity – There are different kinds of validity (construct, internal, external and ecological) but basically it is about the consistency of the conclusions of the research (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 99). Construct validity is about the quality of conceptualization or operationalization of the relevant concept which deals with whether the correct measures have been used and an accurate observation of reality is gained (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 99). Internal validity means creating causal relationships between conditions or variables (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 100). External validity deals with generalizability of the results beyond the specific context examined in the study (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 100). Ecological validity is about whether the research findings are applicable to natural settings or generalizable to the real world (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Vääätäjä 2014 p. 100).

Participant selection – is affected by the type of the study and influence of the external validity of the results, for example by the amount of them or their know-how related to study subjects (Jumisko-Pyykkö 2011 pp. 36-37). First identify recruiting criteria by segmenting participant types so that you know if the specific person is eligible to participate in the study, for example you may recruit a certain number of new participants and then those who have experience with the existing product (Albert & Tullis 2013 pp. 58-59). Then the amount of participants needs to be figured out, this number is affected by many factors like diversity of the user population, the complexity of the product and the specific goals of the study (Albert & Tullis 2013 p. 59).

In a formative study about 6-8 participants works well, but if distinct groups exist, at least 4 from each of them (Albert & Tullis 2013 p. 59). For a summative study 50-100 representative users from each distinct group, but if subtle changes are measured then at least 100 from each group (Albert & Tullis 2013 p. 59). If needed as low as 30 participants is okay but then the generalization of the findings will be difficult due to the variance in the data (Albert & Tullis 2013 p. 59). It is common to analyze UX metrics (see later on in this chapter) with fairly small sample sizes like fewer than 20 participants (Albert & Tullis 2013 p. 14).

Classes of experiments – Four different classes of experiments have been addressed by Jumisko-Pyykkö (2011 p. 36) in the field of quality of experience but they are described so high level that their basic idea could also be applied to the UX studies. The classes include two laboratory and two field based studies (Jumisko-Pyykkö 2011 p. 36). They also differ by their properties of controllability, focus, replicability, length, product readiness, interpretations of causal effects and design (Jumisko-Pyykkö 2011 p.

36). According to my best knowledge these could also describe the properties of the UX studies so depending on the research questions and the goals of the study, the right class of experiment could be found in the Figure 4 by comparing properties, pros and cons.

Table 3 The classes of experiments and their properties (P5).

CLASSES OF EXPERIMENTS	PROPERTIES	
1. RANDOMISED EXPERIMENTS IN CONTROLLED LABORATORY CONDITIONS <i>'units are assigned to receive the treatment or alternative condition by random process' and the experiment takes place in controlled laboratory circumstances.</i> + accurate control of variables and replicable experiments - limited realism, lack of ecological context, unknown level of generalizability, needs replication in field conditions <i>Example: Quality evaluation in controlled viewing conditions (light, angle, distance, ITU).</i>	↑	↑
2. RANDOMISED EXPERIMENTS WITH ANALOGUE CIRCUMSTANCES OR SIMULATIONS <i>'laboratory experiments that deploy simulations and emulations of real-world conditions to increase the generalizability of results'</i> + similar to 1), can also take into account some aspects of context (walking speed, light, tasks) - similar to 1), limited number of context characteristics can be studied at a time, some characteristics impossible to simulate (social context, weather) <i>Example: Quality evaluation while walking, navigating and under pricing schemes.</i>	Realism vs. Control Focus: Use vs. Usability Replicability: Hard vs. Easy Length: Long vs. Short-term Product readiness: High vs. Low Interpretations of causal effects Design: Hard vs. Easy	
3. QUASI-EXPERIMENTS <i>'units are not assigned to the conditions randomly' and 'an experimental intervention is carried out even full control over potential causal events cannot be exerted'.</i> + have their experimental nature, conducted in the field, enabling one to draw conclusions about the causal effects, but the threats of quality need to be explicitly expressed, aspects of use can be revealed parallel to system-oriented (usability) factors - special care in instrumentation (e.g. data-collection tools during the experiment, existence of moderator), relatively demanding to design and carry out. <i>Example Quality evaluation in the potential contexts of use including the natural social environment, such as traveling by bus or while waiting at the railway station.</i>		↓
4. NATURAL EXPERIMENTS <i>'the cause cannot be manipulated and the measurements are typically 'after the fact' contrasting naturally occurring events'</i> + possible to explore behavior in natural settings, absence of visible elements related to the observation (people, instrumentation) in order to preserve self-determinism of the user, possible long term and spatially widely distributed studies - cannot draw conclusions on causal effects, inaccuracy, low precision and control <i>Example: Field study about mobile TV use.</i>	↓	

Figure 4. The classes of experiments and their properties as they were addressed by Jumisko-Pyykkö (2011 p. 36)

User experience evaluation means an investigation of how users experience the product under the evaluation. Web page “All about UX” lists altogether 84 methods and 29 of them were categorized specifically for the long-term UX (2014). Because the UX is dynamic, subjective and hard-to-quantify in nature its holistic evaluation is challenging and it seems that no single method can be used (Olsson 2012 p. 29).

UX methods - In empirical studies of the UX three most popularly used data collection methods are questionnaires (half of them self-developed), semi-structured interviews and live user observation (Bargas-Avila & Hornbæk 2011). Half of the studies are qualitative, a third quantitative and the rest (17%) use both (Bargas-Avila & Hornbæk 2011). Neither interviews nor questionnaires are UX-specific methods (widely used in other research areas also) but allow studying the UX at general level while many UX-specific methods (e.g. AttrakDiff [<http://attrakdiff.de/index-en.html>]) often focus on certain aspects, smaller details (Salminen 2013).

UX metrics – in other words measurable or quantitative attributes. In the field of the UX they are measurements like task success, user satisfaction and errors are metrics among others (Albert & Tullis 2013 pp. 6-7, Hartson & Pyla 2012 p. 378). They can be objective, performance-oriented and taken while user is doing tasks, or they can be subjective basing on rating or score computed from questionnaire results (Hartson & Pyla

2012 p. 379). All the UX metrics should be 1) reliable so that using the same set of measurements each time, things are measured in comparable way, 2) observable directly or indirectly, 3) quantifiable which means it can be turned into number or counted somehow and 4) they should represent some aspect of the UX in a numeric format (Albert & Tullis 2013 p. 7).

The UX metrics provide insight for example of the magnitude of the problem and thus can be used as a key ingredient in calculating, making business decisions and ROI, and with their help you can reveal patterns that are otherwise difficult to see (Albert & Tullis 2013 pp. 8-9). New, self-created or tailored metrics are strongly encouraged with the fact that the more metrics you collect and analyze, the better you will get (Albert & Tullis 2013, p. 9). Also Olsson (2012 p. 30) noted this by saying that *“any model of the UX should be contextualized to a specific context, time span and types of experience”*.

In summary there are lots of methods for measuring the dynamic, subjective and situated user experience (UX) but whatever is used the validity, the reliability and the participant selection needs to be addressed. Most popular methods are not UX-specific but with questionnaires, semi-structured interview and live user observation allow studying the UX in general level without smaller details. With the reliable, observable and quantifiable numeric UX metrics something objective or subjective about certain aspect of the UX in other words of the interaction between the user and the product can be revealed. Measuring and analyzing more metrics is better than less and also tailored, contextualized or even self-created UX metrics are encouraged to use.

2.2.1 Long- vs. short-term UX

Time is a significant factor, which alters the way individuals experience and evaluate products, for example impact of novelty in the user experience (UX) showed a sharp decrease after the very first week of use (Karapanos et al. 2009). In the **short-term studies** the user data is collected only at one point of time for example a two-hour-usage test (Vermeeren et al. 2010), and respectively in the **long-term UX studies** the user data is collected over time, for example over a week or even a year (Courage et al. 2009, Vermeeren et al. 2010). The long-term UX is needed because the actual experience of usage will be the core of the UX but this doesn't cover all relevant UX concerns (Roto et al. 2011). First here are classifications of time periods in the field of the UX, then a short history of evaluating the long-term UX and finally some comparison between different methods for measuring it and tips for choosing the right methods.

Classifications of time – One of the first classifications of time in the context of the human-computer interaction (HCI) are 1) micro, 2) meso and 3) macro perspective which are then understood as the long-term UX classifications (von Wilamowitz-Moellendorff et al. 2006). The **micro perspective** is like a usability test lasting about an hour and it is questionable whether the time period covered is long enough to really witness changes in behavior or judgment (von Wilamowitz-Moellendorff et al. 2006). The **meso perspective** had already then become rare with like observing users for five weeks even though the results hint at dynamic processes (von Wilamowitz-

Moellendorff et al. 2006). The **macro perspective** has the idea to map the whole product lifecycle with a scope on years of use and are nearly non-existent other than focusing on remote usability with “report incident buttons” (von Wilamowitz-Moellendorff et al. 2006). Today the micro perspective would be similar to the short-term, and meso and macro to the long-term UX.

Nowadays these categories are only little bit different and there are multiple names for them. First the focus in the time spans of the UX can be divided into four categories: 1) Anticipated, 2) Momentary, 3) Episodic and 4) Cumulative UX (Roto et al. 2011). The **anticipated UX** is like imaging experience mainly relating to the period before first use but on the other hand it can also relate to any of the other three time spans because person may imagine a specific moment during the interaction, a usage episode or life after taking a system into use (Roto et al. 2011). The **momentary UX** is experiencing on a specific change of feeling during interaction while the **episodic UX** reflects on an experience which is like appraisal of a specific usage episode (Roto et al. 2011). Finally the **cumulative UX** recollects multiple periods of use, in other words they are views on a system as whole, after having used it for a while (Roto et al. 2011).

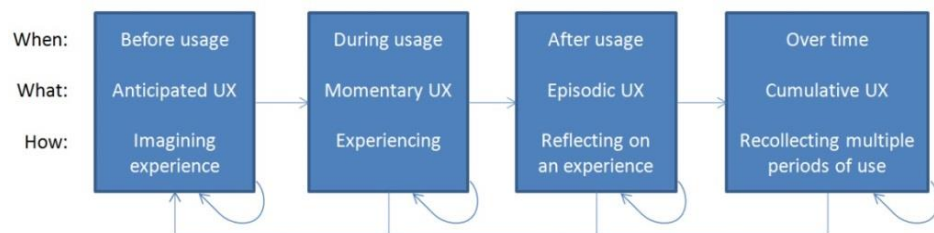


Figure 5. Time spans of UX (Roto et al. 2011).

Also Vermeeren et al. (2010) used similar classification for experience periods, when studying 96 different methods for evaluating the UX, as follows: 1) **Before usage** which is prior to interacting with a product/service, 2) **Momentary** which is like a snapshot, 3) **Single episode** in which design features are explored by user in order to address a task goal, 4) A typical test session, also known as **short-term usage**, for example one hour in which user performs some tasks and 5) **Long-term usage** in which the user interacts with a product/service in everyday life. Actually the only difference is that Roto et al. (2011) had only one category for describing so called cumulative UX while Vermeeren et al. (2010) were more specific and had two categories for that, one for measuring the short and one for the long-term UX.

Why long-term? – By measuring the UX over time the users’ experiences throughout a product’s life cycle and thus its success could be predicted better and money is saved. The eventual impact of the momentary experiences on the cumulative UX may be revealed by focusing on longer periods, in that case for example real importance of a strong negative reaction during use can be seen (Roto et al. 2011). For example Karapanos et al. (2009) showed that the product qualities providing positive initial experiences are not as crucial for motivating prolonged use which makes studying the prolonged use economically important. In other words evaluating the momentary user ex-

perience is not very reliable for predicting the UX in real life or for assessing product's success in most cases because the over time evolving user's experience and the relationship with a product is what makes people to continue to use it and to recommend to others (Kujala et al. 2011). In addition previous experiences influence a future one and with longer time spans it is possible to structure the UX in terms of a lifecycle, like from the first encounter through episodes of usage to reflection on usage and by recounting after one usage episode will frame anticipations of future ones (Roto et al. 2011).

Evaluating the long-term UX - is relatively new phenomenon. It all started with Mendoza and Novick (2005) when they addressed the issue that usual usability testing might actually reveal problems of the novice users than emphasizing problems frustrating the experienced users. So in 2006 only a few were attempting to track and explain changes in behavior and experience over time in the context of the HCI (von Wilamowitz-Moellendorff et al. 2006). However when the user experience issues have become more central to the HCI also the value of longitudinal research is increasingly recognized (Courage et al. 2009). On the other hand still in 2011 truly longitudinal studies do not exist in the UX research but some study experience over several weeks (Bargas-Avila & Hornbæk 2011).

Evaluation ways - Two very first ways of measuring the long-term UX are cross sectional studies and longitudinal studies which have different approach in the time when the data is gathered. In 2006 the **cross sectional studies**, in which only one point in time is covered but with users with different levels of experience, were the most prevalent (von Wilamowitz-Moellendorff et al. 2006). This approach was found problematic because as long as not the same users are monitored over time you cannot tell if the differences are because of the time or because of the interpersonal variation, which means that it falsely might attribute variation across the different user groups (von Wilamowitz-Moellendorff et al. 2006, Karapanos et al. 2010). Second the **longitudinal studies** are more suitable because they cover a particular period of time with two or more observations or measurements taken from the same users (von Wilamowitz-Moellendorff et al. 2006). So the longitudinal studies mean within-subjects and the cross-sectional studies are between-subjects methodology (Novick et al. 2012).

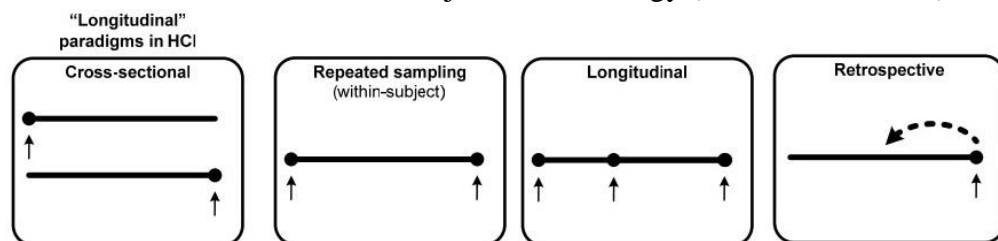


Figure 6. "Longitudinal paradigms in HCI" (Karapanos et al. 2010).

After that at least two more approaches have emerged for measuring the long-term UX. For example Karapanos et al. (2010) divided the time the data is gathered into three categories: 1) **repeated sampling studies** which use pre- and post-test, 2) **longitudinal studies** which collect multiple UX as they occur and 3) **retrospective studies** which

gather multiple UX from memory at the end of the study period. See the differences between these terms more clearly in the Figure 6. These kind of longitudinal studies are considered as the gold standard for measuring the changes over time even though they are quite laborious, while the repeated sampling method may not readily infer time effects but maybe due to random contextual variation and in the retrospective method the challenge is whether it gathers memories or actual experiences (Karapanos et al. 2010).

Evaluation methods - For example according to the web page “All about UX” (2014) there are 29 methods for specially suitable for evaluating the long-term UX. Roughly they can be divided into ten groups: 1) **Questionnaires, or suitable in them** (Attrk-Work, Game Experience Questionnaire, Product Attachment Scale, Sentence Completion, ServUX questionnaire), 2) **Story telling without researcher** (Audio narrative, Experience Clip, Mental Mapping, Private Camera Conversation), 3) **Collection of techniques** (I.D. Tool, Perceived Comfort Assesment, Repertory Grid technique), 4) **Service** (Kansei Engineering, TUMCAT, WAMMI), 5) **Interview technique** (Laddering, Exploration test), 6) **Diary method** (DRM, ESM), 7) **Visualizing the changes in experience** (iScale, UX Curve), 8) **Cards** (Emotion cards), 9) **No need for actual users** (Immersion) and 10) **Live study** (Living lab method).

Next 26 of these methods are presented in Table 1. These methods are not domain specific but suitable for field user experience studies. Out of the scope of this presentation are left the methods which 1) Were meant to be used in too specifically defined context (e.g. Attrak-Work, Game Experience Questionnaire), 2) Were not much used when the validity or reliability cannot be guaranteed (e.g. Audio narrative), 3) Required complementary methods e.g. observation session (e.g. Contextual laddering), 4) Needed some specific equipment (e.g. Experience Clip), or 5) was otherwise unclear (e.g. Emotion Cards, I.D. Tool). However there are a short overall description, strengths and weaknesses of these methods which can be seen as proofs for why they are not used in this thesis.

Table 1. The long-term UX evaluation methods presented in All About UX – website which were considered inappropriate for this thesis.

Method	Short description	Strengths	Weaknesses
Attrak-Work questionnaire	Method is based on Attrak-Work questionnaire but it is specifically made for measuring UX of mobile system in mobile news journalism (Väättäjä et al. 2009).	+ Perceptions of wider set of users than from interview + Same themes are asked from all users, and they may not come up in observation or interview + Reflects well especially the hedonic aspects related to mobile system use (Väättäjä et al. 2009)	- Developed for specific purpose - Needs to be development to be applicable to other field of mobile work also (Väättäjä et al. 2009)
Audio narrative	Users tell about their experiences in a story format (freely, or by topics or questions) and it is audio recorded (AllaboutUX 2014).	+ Captures the most important experiences (AllaboutUX 2014)	- Only short stories because not all are comfortable telling about experiences - Stories need to be transcribed for later analysis (AllaboutUX 2014) - Not much used in the field of HCI and UX because sources in literature are very hard to find
Contextual Laddering and UX Laddering	One-to-one interviewing in context: the interviewer asks user to mention positive/negative features and then (s)he repeats to ask why until user cannot no more give an answer or another feature (Jordan 2000 p. 165). One-to-one interview where the user answers why questions about the deep reasons behind the experience (AllaboutUX 2014).	+ Answers to why-questions + Abstract and concrete level data + Product preferences + Can be used at any point of product creation process + Gives information about formal and experiential properties, desired benefits and characteristics of the people for whom the product is designed, and the relation between these aspects (Jordan 2000 pp. 167-168)	- Lots of effort needed (Jordan 2000 p. 168): 1) Duration of interview typically 60-70min, 2) Demanding for user who might try to answer based on rationality not true feelings 3) Hard to analyse - Requires a skilled interviewer - Both laddering interview and observation sessions are needed, they complement each other (Zaman 2008) - The difference between these laddering techniques is not clear because they are not much used in the field of HCI and UX according the lack of literature findings
Day Reconstruction Method (DRM)	Produce a detailed description (diary) of previous day in user's life including real-time experience measurement. So it supports accurate retrieval of specific episodes and multidimensional description of the affect experienced in each episode. (Kahneman et al. 2004)	+ Advantages of an offline method and the accuracy of introspective approaches such as the ESM (AllaboutUX 2014). + Takes less time, does not interrupt users' daily activities and imposes smaller burden upon them than ESM (Karapanos et al. 2009). + Provides time-budget information which is not collected effectively in ESM (Kahneman et al. 2004).	- Analysing the stories is rather laborious - Field studies are possible for almost ready products only (AllaboutUX 2014)
Experience Sampling Method (ESM and Timed ESM)	Collecting information of the context and content of the daily life of users (Hektner et al. 2007 p. 6). Collect information on users' reported feelings in real time in natural settings during selected moment of the day (Kahneman et al. 2004).	+ Rich data: written responses throughout each day + Especially emotions are captured well (Hektner et al. 2007 pp. 6-7) + Minimize the bias caused by retrospection (Kahneman et al. 2004).	- Demands a lot from participants: self-selection bias and selective nonresponse - High costs of implementation (Hektner et al. 2007 p.7) - Users need to interrupt their current activity and conducting ESM for longer periods of time is very difficult - Provides very little information about uncommon or brief events (Kahneman et al. 2004) - Filling the cards must become a habit (AllaboutUX 2014)
Emotion Cards	User carries the cards with him/her over a period of time and quickly documents emotions at a specific moment (AllaboutUX 2014).	+ Quick and easy to researchers and users (AllaboutUX 2014) + Appealing when recruiting (AllaboutUX 2014)	- AllaboutUX 2014 does not describe clearly how it differs from Emocards (presented in Desmet et al. 2001). - Not much used in the field of HCI and UX because sources in literature are very hard to find
Experience clip	In natural usage situation one user uses the product and one other (well known to actual user) uses mobile phone to shoot clips about usage and expressions of experiences (AllaboutUX 2014).	+ No need for special equipment + Allows natural context + Take use of social interaction between users (AllaboutUX 2014) + Rich data about emotions, feelings and experiences + Suitable for evaluating mobile application in mobile usage situations (Isomursu et al. 2004).	- Analysis of video material is time consuming - Quality and richness of video is often low because it depends on users (how many clips, how verbose the user is etc.) (AllaboutUX 2014) - Needs lots of effort beforehand: briefing about what and how to capture - Users need to be motivated and willingness (Isomursu et al. 2004)
Exploration test	Asking people about their perceptions of a design or prototype, other similar products and ways of use (AllaboutUX 2014).	+ Real perceptions + People's needs in their own context (AllaboutUX 2014)	- Correct script interview - Subjective analysis (AllaboutUX 2014) - Not much used in the field of HCI and UX because sources in literature are very hard to find
Game experience questionnaire (GEQ)	Questionnaire which consist of Core, Social presence and Post game moduls (AllaboutUX 2014).	+ Game experience based on number of items + Playing experience also when playing with others + Special variation for kids is made + Suitable for both lab and field studies (AllaboutUX 2014)	- Some items are difficult to fill in after a short time playing (e.g. in lab settings) (AllaboutUX 2014) - Not much used in the field of HCI and UX because it is still in preparation
I.D. Tool	Include three parts: 1) Interviews or focus groups for collecting impressions, 2) Interview analysis and 3) Visual result presentation (AllaboutUX 2014).	+ In-depth understanding of target customers' reaction (AllaboutUX 2014)	- Subjective opinions of specific customer group which makes it culture dependent (AllaboutUX) - Not much used in the field of HCI and UX because sources in literature are very hard to find
Immersion	Investigator is the only user in this field study by reporting and evaluating all the experiences (s)he had with the tested product in real context when they actually happened (Jordan 2000 pp. 161-162).	+ No need to recruit users + Researcher can tell design improvements needed directly based on experiences (Jordan 2000 p. 163-164)	- Difficult to get real experiential data: easily the focus is on technical or usability issues - Only subjective data from one user (Jordan 2000 p. 164) - Not much used in the field of HCI and UX because sources in literature are very hard to find
iScale	It is a graphing tool to elicit change in product perception and evaluation over time	+ The most impactful experiences over time are shown (Karapanos et al. 2012)	- Counting on memories of experience than in real ones - Produce large amount of qualitative information that will

	and there are two versions of it: 1) Constructive (experiences in chronological order) and 2) Value-account iScale (distinguish the elicitation of value-charged and contextual information) (Karapanos et al. 2012).		require labour-intensive analysis (Karapanos et al. 2012)
	Similar to UX Curve method (AllaboutUX 2014).		
UX Curve	Retrospective method for user to draw one or more curves to describe the changes in experience of a product (Kujala et al. 2011). Paper and pen version of iScale (AllaboutUX 2014).	+ Rich qualitative and quantitative data about experiences over time (Kujala et al. 2011).	- Relies on memories of experiences rather than reality (Kujala et al. 2011).
Kansei Engineering Software	Software which follows Kansei Engineering procedure (AllaboutUX 2014). It helps investigator to understand relationships between formal and experiential properties of a product through two direction of flows: 1) from design to diagnosis and 2) from context to design, by relying on statistical analysis (Jordan 2000 pp. 178, 181).	+ Most reliable and valid technique for linking product properties to product benefits + Effective approach to creating delightful designs (Jordan 2000 p. 182).	- Sometimes unwieldy to apply - Time consuming - Analysis relies on assumption that design is the sum of its parts or formal properties (Jordan 2000 pp. 181-182).
Living Lab Method	Living lab is a method in which researchers study behaviour of users in naturalistic real life context like classroom or home in order to improve the invented technologies (Abowd et al. 2000).	+ User experience evaluation over time real life context with specific target users (AllaboutUX 2014)	- Needs resources and time: community building, keeping people motivated - Needs to be combined to other methods in the field (AllaboutUX 2014)
Mental mapping	Users describe the product with selecting a famous person it reminds them of or they imagine the product as a person and describe its life (Jordan 2000 pp. 189-191).	+ User try to reveal more experiential aspects than invent rational reasons for product evaluation + Fun method (AllaboutUX 2014) + Useful results (Jordan 2000 p. 191).	- Relies a lot on assumptions in the interpretation of users' comments - Effectiveness depends on skills and judgements of the analyst - Hypnotising of users raises ethical issues (Jordan 2000 p. 192)
Perceived Comfort Assessment	Method description includes four steps (collect, reduce, separate and group factors) to develop the scale for assessing comfortability of car seats and various other domains as well (AllaboutUX 2014).	+ More efficient and cost-efficient seat evaluations because focus is on perceived comfort (AllaboutUX 2014)	- Does not replace research and evaluations of ergonomic or biomechanical criteria (AllaboutUX 2014) - Not much used in the field of HCI and UX because sources in literature are very hard to find
Private camera conversation	Users are in private booth talking to a video camera about the product (which is often with them), either freely or by following a list of issues given by investigator (Jordan 2000 p.137).	+ More authentic experiential data than a normal face-to-face interview + If two friends are in the booth together, the discussion might reveal interesting experiential aspects (Jordan 2000 pp. 138-139)	- No guarantee that the user talks about the interesting topics - Not all feels convenient talking to a video camera - Analysis can be complex, time consuming and difficult to interpret (Jordan 2000 p. 139)
Product Attachment Scale	It can be used in questionnaires because it includes four statements to measure the strength of the emotional bond a person experiences to a product during ownership with semantic differentials (AllaboutUX, Mugge et al. 2006).	+ Addresses aspects of product experience which are stronger related to long-term use (AllaboutUX 2014)	- Subjective scale drawbacks - Original scale only in Dutch (AllaboutUX 2014) - Not much used in the field of HCI and UX because sources in literature are very hard to find
Repertory Grid Technique (RGT)	The repertory grid technique is a method of illustrating the so-called personal constructs people employ when confronted with other individuals, events of artefacts (Hassenzahl & Wessler 2000).	+ Valuable when exploring a set of artefact's design space from a user's perspective + Ability gather design-relevant information + To illuminate important topics without the need to have a preconception of these + Efficient + Wide variety of types of analyses that can be applied to the gathered data (Hassenzahl & Wessler 2000)	- Requires a set of at least four artefacts - Insensitivity to good or bad attributes shared by all artefacts in the set - Lack of support for the actual phrasing and labeling of constructs, high number of merely descriptive constructs, - Problems with determining relations among constructs (Hassenzahl & Wessler 2000)
Sentence Completion	Users are provided with the beginnings of sentences that they complete in ways that are meaningful to them, it is both a projective technique and questionnaire (Kujala & Nurkka 2012).	+ Users use their own words to describe situation thus giving more spontaneous and honest answers + Uncovers conflicted attitudes and values + Users can be reached online (Kujala & Nurkka 2012)	- Qualitative data is not straightforward to analyse (Kujala & Nurkka 2012).
ServUX questionnaire	Tool is a modular questionnaire specifically designed for evaluating modern web-based services e.g. crossmedia services featuring Web 2.0 characteristics (Väänänen-Vainio_Mattila & Segerstahl 2009).	+ Fast and easy to respond to + Modularity works well in case of comparison between the services (Väänänen-Vainio-Mattila & Segerstahl 2009)	- Needs to be complemented by other methods - Method is still in progress (Väänänen-Vainio-Mattila & Segerstahl 2009). - Not much used in the field of HCI and UX because sources in literature are very hard to find
TUMCAT	Testbed for automated data gathering for user experience measurements in field studies for both product and service development and more theoretical research on UX (Vermeeren & Kort 2006).	+ Compatible with the most common hard- and software platforms + Enables measuring multifarious way: short and long periods of time, multiple users and within multiple context at the same time (Vermeeren & Kort 2006)	- Method is still in progress (Vermeeren & Kort 2006) - Not much used in the field of HCI and UX because sources in literature are very hard to find
WAMMI (Website Analysis and Measurement Inventory)	WAMMI is a web analytics service (it includes a questionnaire) for measuring and analysing the user experience of web sites. (WAMMI 2014).	+ Can be applied to any kind of website at any time + Good predictor site's performance after launched (WAMMI 2014) + Standardised psychometrically + Good concurrent validity + Report is standard and uses client-friendly words (AllaboutUX 2014)	- Number of users is restricted to about 30 - Time frame is limited to the duration of the usability test (WAMMI 2014) - Response rate is not known reliable for example due to WAMMI spammers - Does not give behavioural data e.g. time on task (AllaboutUX 2014)

After these field study methods still three common methods for evaluating user experience are presented more carefully here: 1) AttrakDiff, 2) (Long-term) Diary study and 3) Semi-structured interview. In other words these are not regular longitudinal methods.

The attrakDiff is a questionnaire in which both hedonic and pragmatic dimensions of the UX are studied with semantic differentials (AllaboutUX 2014, Hassenzahl et al.

2003). It produces comparative and quantitative data which however might assess only a reflection of user experience not the actual experiences (AllaboutUX 2014). It has been developed further and that is called AttrakDiff 2 presented in Hassenzahl (2005) and nowadays also a shorter version of it has been introduced (called AttrakDiff 2 short presented by Hassenzahl&Monk 2010 and van Schaik 2012). The **attrakDiff 2 short** measures effectively user's feelings in dimensions of pragmatic, hedonic and appeal and it has been used widely to studying products' usability, overall beauty and goodness (Hassenzahl&Monk 2010, Schaik 2012).

In the **Diary study** users fill in a diary either 1) in pretermained intervals, 2) whenever a signal prompt user to report, or 3) each time the event in question occurs (Bolger et al. 2003). Its strengths are that it 1) Provides reports of events and experiences of users' daily lives in their natural and spontaneous context, 2) Reduces the likelihood of retrospection by minimizing the time between the experience and its account, 3) Has an ability to characterize temporal dynamics for example daily cycles, weekday versus weekend effects, which makes it appropriate for modelling time or other within person factors (Bolger et al. 2003). On the other hand diary studies place a great burden on users by 1) Requiring detailed training beforehand in order to obtain reliable and valid data, 2) Demanding commitment and dedication, 3) Causing some deleterious effect for example the user may skim over sections that rarely applies to their experience and may omit responses even at relevant times (Bolger et al. 2003).

The semi-structured interview can be done face-to-face or over a phone and it covers central set of issues by each participant but at the same time they have opportunity to raise issues that are important (Jordan 2000 p. 159). This method can be used throughout the design process and those who agreed to start the interview usually will also finish it (Jordan 2000 p. 159). When compared the results of a semi-structured interview to a questionnaire it gives richer and more valid data due to the interactivenss and it doesn't need that much preparation (Jordan 2000 p. 159). However the interview is more time consuming to interviewer and particularly strong opinions are not given because talking to another person, not being as anonymous as in questionnaires (Jordan 2000 p. 159).

Table 2. Summary of the best practices in longitudinal research (gathered from Courage et al. 2009).

Focus	Research question like	Users	Methods	Comparison over time	Qualitative data analysis
Scope carefully	- How and when novice users become experts? - Studying aspects such as abandonment/adoption rate, learnability, comfort with technology, productivity, evolution of user perceptions	Recruit extra participants	Determined by research questions	Keep some dimension constant (e.g. tasks, people, measures)	Mental modelling, Content analysis, Affinity or Activity diagrams, Classification, Flow charts and Frameworks/models are the most frequently used

Choosing the right methods - The research question determines the methods which should be used rather than the longitudinal nature of the study even though the diary studies and usage logs are the most often used (Courage et al. 2009). In addition it has to be scoped carefully in order to avoid overwhelmingly large set of data, to have com-

parison over a time, to recruit extra users in order to cope with drop-outs and consider the best techniques for analyzing qualitative data (Courage et al. 2009). See the short summary what to consider in the longitudinal studies in the Table 2.

In summary - the user experience (UX) differs depending on the time when measured. The long-term UX can be measured in several ways (e.g. retrospective vs. repeated sampling) and the workload the study brings to both researchers and user participants should be considered carefully in order to plan and execute it well and in comparable way in terms of a scientific research. Even though the awareness of the changes in the UX over longer period of time has existed almost ten years now it still has not spread as much as it perhaps should have been in the field of the HCI because most of the methods for measuring it are still in the middle of development. However by using more than one method (e.g. both interview and questionnaire) which also are appropriate for the wanted time type (short vs. long-term) with more than one UX metrics (e.g. AttrakDiff and some others) the results will be successful in user experience studies.

3 DIGITAL NEWS

The goal of this chapter is to introduce and define a term “digital news” with authentication methods for ordering and consuming them according to current knowledge. Different types of digital news are included among with the history due to the focus of this thesis on digital replicas and browser optimized versions. Then also relevant authentication methods and earlier studies about the user experience of the digital news on tablet or computer with or without authentication are discussed and then summarized in terms of the system, the user and the context of use in order to cover factors affecting the user experience.

3.1 What is digital news?

Internet newspaper, online news, electronic newspaper, cyberjournalism, digital journalism, e-paper and online journalism means more or less an online newspaper (Chung et al. 2010). In this thesis all these and also news websites, electronic news and online newspaper are considered as synonyms for the term “digital news” which in short means a collection of news delivered via Internet and which may include multimedia elements. In this chapter the history of the digital news are covered and terms summarized basing on this examination in order to unify them for future research.

History – the first digital news emerged about twenty years ago for computer screens but together with the development of information and communication technologies it has spread also to mobile devices and e-paper technology. In the middle of nineties the online newspapers entered the Internet and since then it has become more and more common to read news online (Ihlström & Åkesson 2004). Newspapers have begun to appear in electronic media mainly on the screens of home computers with Internet connection but also on the small screens of mobile electronic devices such as personal digital assistants (PDAs) and mobile phones when the electronics, information and communication technologies have developed (Shapira et al. 2009). As the mobile technology progresses also the delivery of the electronic newspaper and the e-ink printed newspaper-like technology grows along with it (Shapira et al. 2009).

Definition – of the digital news has not changed much during the years being still a collection of news delivered via Internet and which may include multimedia elements and have special characters, which are interactivity and immediacy when comparing to traditional news. In 2004 Ihlström and Åkesson understood the digital newspaper so that it consists of multimedia content, interactivity, immediacy and other media characters and the integration of the web medium and the traditional newspaper genre defines a genre for online newspapers. The online newspapers are local and national daily press

with online editions, not branch specific or other newspapers (Ihlström & Åkesson 2004). A couple of years later, in 2009, a group of news delivered to the public via Internet may include multimedia elements in addition to text formed an electronic newspaper (Shapira et al. 2009). In 2010 the Internet newspaper is defined as a publication available on the World Wide Web which has colorful platform provided by navigation software (Chung et al. 2010). In addition the digital news differs from the traditional news by two special characteristics which are 1) Interactivity which means that users are able to add information to the news content or context changing the appearance over time and it's not controlled directly by a news organization, and 2) Immediacy which means that the news media content can be changed, tweaked or erased at any time (Karlsson & Strömbäck 2010).

Different forms of the digital news – There have been a couple of types of the digital news which remind each other, for example by technical layout, but their naming and amount depending on the person using them. A broadsheet format of the ink-on-paper newspaper was mimicked by the earliest versions of newspapers on computers and called a **replicated newspaper genre** (Ashton & Cruickshank 1993). There was almost no difference in either content or form and very little added functionality and the electronic form appeared to be inevitable (Shepherd & Watters 1998). Evolvement was quickly and the replicated news cybergenre added new functionality building on the capabilities of the new medium and the interface for this digital newspaper (also called a **variant cybergenre** or a newsgenre) which looks and acts like newspaper but includes video clips, blow ups of stories and photographs and interaction based on string searching and hypertext links (Shepherd & Watters 1998).

However web news providers adopted a single document window mode of presentation and a dominant news genre appears to be evolving back to something closer to its original genre, the broadsheet form (Shepherd & Watters 1998). It appears to be so well suited for reading the news task where the enjoyment of the reading process is as important as the information gained (Dozier & Rice 1984, Stephenson 1967). Also Watters et al. (1996) found in their study that readers overwhelmingly prefer to read news on the broadsheet form and that they do not require training to use it.

The news cybergenre has developed further and the novel forms of it with the virtual instantiation of the news content (also called a **web-based variant news** genre or cybergenre) and it means that it is generated dynamically and does not persist beyond that particular point in time (Shepherd & Watters 1998). Ihlström & Åkesson (2004) developed this understanding of the digital news genre a little bit forward by inserting the fourth leaf “positioning” next to the content, the form and the functionality but it was not then generalized. In summary the news cybergenre has evolved from the replicated paper newspaper genre through dynamic and interactive genre variants to the novel cybergenre based on virtual instantiations of form and content with additional functionality (Shepherd & Watters 1998). See the difference of these forms of the earliest digital news in Figure 7.



Figure 2. Replicated Newspaper Genre



Figure 3. Variant News Genre



Figure 4. Web-Based Variant News Genre

Figure 7. The evolution of an online newspaper in 1998: 1) The replicated, 2) The variant and 3) The web-based variant news genres (Shepherd & Waters 1998).

Today there are a couple of forms for electronic newspapers: 1) an electronic edition of a printed newspaper, 2) a news website and 3) a search-engine-type (Shapira et al. 2009). The **electronic edition of newspaper** is the “standard” newspaper uploaded onto a website by using for example PDF files similar to the paper edition (Shapira et al. 2009). There is no personalization in terms of either the content or the layout (Shapira et al. 2009). In this thesis the term “**digital replica**” is used for this form due to its shortness.

The **news website** includes menus according to subject categories and subcategories so that the leaf level of each menu leads the user to news items that the editor of the newspaper has decided to include on the website (Shapira et al. 2009). The advantages 1) From the readers’ point of view are that they can use the menus to find almost directly a desired section of the newspaper rather than read serially as in the electronic edition, and 2) From the publisher’s point of view are that it is possible to provide up-to-date news by being able to update the content at any time (Shapira et al. 2009). In this thesis the term “news web service” is used for this form in order to describe the diversity of the different services the owners of the site may add next to the actual news for example links to other newspapers of the same media company or to the digital replica, advertisements and so on.

The **search-engine-type** enables user to insert topics of interest and to receive relevant news items that are published on the Web by various news providers (Shapira et al. 2009). It does not publish or edit news but provides links to the news published elsewhere by news providers enabling some level of personalization because reader can define a profile by selecting topics of interest and basing on them the system will search for items (Shapira et al. 2009). SMS messages, RSS feeds and alerts sent over mobile phone are other ways to deliver news to users via electronic devices (Shapira et al. 2009). For example the Google News (<http://news.google.com/>) is this kind of electronic newspaper (Shapira et al. 2009). In this thesis the term “online news portals” is used for this in order to better to supply its meaning as a news dealer. See the differences between these forms of today’s digital news in Figure 8.

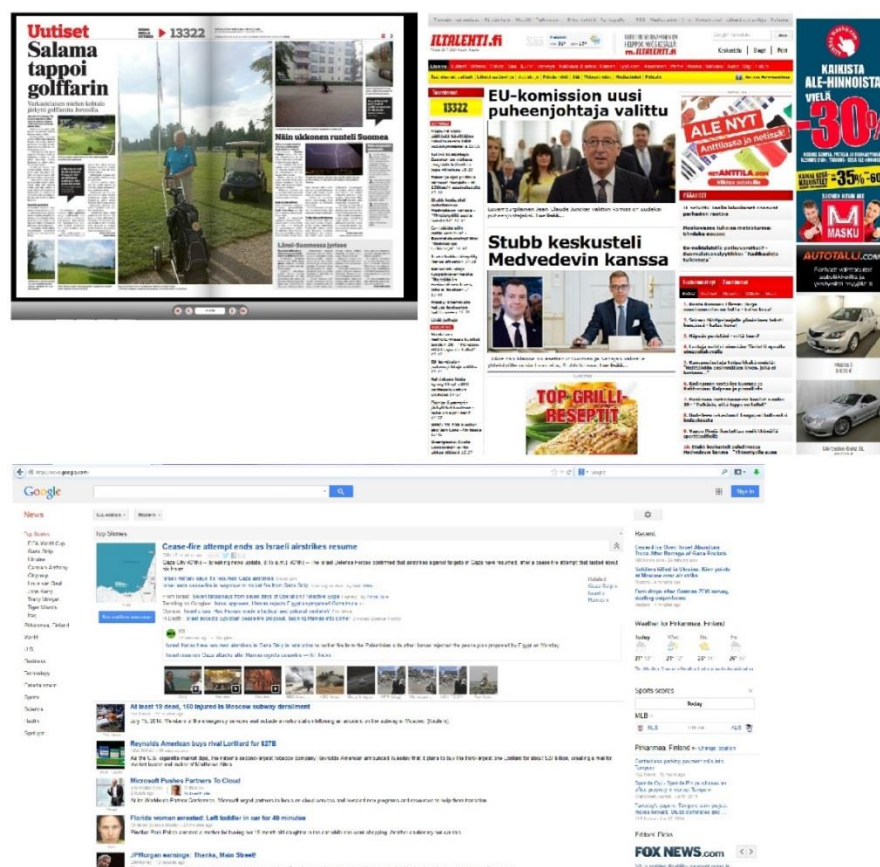


Figure 8. The digital replica (up left) and news web service (up right) of *Ilta-lehti*, and the Google News on 15th July 2014.

In addition Chung et al. (2010) and Deuze even in 2001 had similar grouping for digital news as Shapira et al. described in 2009. Chung et al. (2010) had three types of online newspapers: 1) Mainstream, 2) Independent and 3) Index, and Deuze (2001) had four types of online journalism sites: 1) Mainstream news, 2) Index & category, 3) Meta & comment and 4) Share & Discussion. In both cases the first one (the **mainstream**) is the most widespread and basically offers the same distribution than the printed newspapers (Chung et al. 2010, Deuze 2001). The **index** ones do not provide much editorial content of its own but various news content from newspapers on search engines or portal Inter-

net services by offering links to existing news sites elsewhere for example Google News (Chung et al. 2010, Deuze 2001). However the last ones differ from each other: while the **independent** focus on production and distribution of news on media outlet's online site only (Chung et al. 2010), the **meta&comment** is about news media issues in general produced by variety of journalists discussing about content elsewhere and the **share&discussion** is centered around a specific theme like computer news for example by exchanging ideas, stories and so on (Deuze 2001). Basically the mainstream is similar to the digital replica and the index to the online news portals but the independent might remind of, but not be equivalent to, the news web service while the last two are not that much of real, reliable, news sites at all.

Lack of cohesion - Despite the fact that all authors above described very similar types of categorizing forms for the digital news they did not refer to each other's work while doing so. First Deuze (2001) combines his online journalism sites from the literature because more or less condensed overview of what kinds of them exist were missing, but does not go too many years back because he does not refer to for example Shepherd and Watters (1998) work on news genres in the online newspapers. Chung et al. (2010) presented their own way of dividing the online newspaper but without exactly telling the reasoning behind it but however at some other point of their paper about credibility of online newspapers they referred to Deuze's (2001) work on online journalism but not Shepherd and Watters (1998) or Shapira et al. (2009). In addition although Shapira et al.'s (2009) paper is about e-paper and they start by defining types of electronic newspapers, however they do it without any connections to literacy or other definitions of the digital news. In conclusion the terms and definitions used in the field of the digital news are still not settled down or standardized.

Table 3. Summary of the different namings of the digital news.

Name of the digital news	Definition	Term used in this thesis
Replicated newspaper genre / Replicated news cybergenre Electronic edition of newspaper Mainstream	Electronically mimicked content and format without added functionality, Standard newspaper on website as PDF, or Same journalism than printed newspaper.	"Digital replica"
Variant cybergenre / Variant newsgenre News website Independent	Newspaper with video clips, blow up stories, photographs and hypertext links, News items chosen by editor presented with menu and submenu structure, or Focus on production, or The goal is to be online only.	"News web service"
Web-based variant news genre / Web-based variant cybergenre A search-engine-type Index	Generated dynamically, Does not publish or edit news but provide links to the news topics user is interested in and which is located elsewhere in the Internet, or Does not provide own editorial content but collection of news content of other online newspaper.	"Online news portals"
Meta & comment	Content which is produced by variety of journalists discuss about news media issues in general.	-
Share & discussion	Generated around some specific theme (e.g. Computer news) and there users for example exchange ideas, stories and so on.	-

In summary - the digital news started with one form which evolved over time so that nowadays there might be for example three forms of the same newspaper online, and still the terminology is not standardized. The first version of the digital news (the replicated) looked like the print newspaper but it was presented online for computers which

now can be understood being the same thing as the digital replica as well as the mainstream or the electronic edition of newspaper which emerged later. After that there were the variant and the web-based variant news genres which could be compared to what the news web service is today. Later also the totally personalized online news portal (also known the index) appeared. As been shown the terms and definitions do not have standardizations because every author has come up with their own definitions and categorizations for the digital news without using each other's work. Thus this thesis tried to enlighten this gap for future researchers and to offer some cohesion to the used terms.

3.1.1 The forms of the digital news used in this thesis

The **digital replica**, which definition (the “standard” newspaper uploaded onto a website by using for example PDF files similar to the paper edition, not personalized by content or layout) was presented by Shapira et al. (2009), and the browser optimized version, which has not findable definition in the literature, are the forms of the digital news studied in this thesis. The definition for the browser optimized version is not found from the literature neither for tablet (as it used in this thesis) nor for other devices, and the search leads only to tablet e-paper newspaper by Moberg et al. (2010) which uses different technology. So in this thesis the **browser optimized version** as a form of the digital news means: *a digital version of a print newspaper where the content has been presented up-to-date on a website so that the layout and the content might not be all the same as in the print version but more suitable for browsing with a computer or mobile devices including subcategories and navigation elements like menu bars. It gives reader the power to read the articles of the newspaper in any order (s)he likes.* See the comparison between these two types in Figure 9, where the Keskipohjanmaa newspaper has presented as digital replica and as tablet browser optimized version.



Figure 9. The starting page of the browser optimized version (left) and the digital replica of KP on 29th June 2013.

More precisely descriptions about the studied versions of this thesis could be found later in the chapters “User evaluation” (Study 1) and “Tested versions” (Study 2). The online news portals (like Google News), the news web services and the news based on the e-

ink technology are out of the scope of this thesis and thus not examined from here forward so in the next chapters only the digital replica and the browser optimized versions of the digital news are described more profoundly, first in the authentication, then earlier studies and finally summarization of the system, the user and the usage context point of view.

3.2 Authentication in ordering and consuming the digital news

Authentication, identification and authorization are terms which are closely tied together. They are all needed when defining for example who of the clients of a newspaper publishing house have bought the digital replica of a certain newspaper and have rights to read it. Because the focus of this thesis is not in information security this is only a descriptive chapter rather than examining one. In this chapter first the authentication is described further, then there is specification about for what it is used for and finally the benefits and disadvantages of it for user are covered.

Authentication – In general authentication is a process where a user's/person's or proceses' identity is verified (Neuman & Ts'o 1994, Rhodes-Ousley 2013 p. 167). So it means that an identity (typically a name), which is already known, is connected with some entity and only based on the authentication the entity gets access to resources which have been granted to it earlier (Koskinen 2014). Usually the entity needs to 1) Be something, especially be a human who has physical properties like fingerprints, a shape of a hand, voice, a retina or an iris of an eye from which they can be separated from each other (biometrics) or to have behavioral properties like handwriting or speaking, 2) Have something physical like a key or a smart card which is not easily copied or forged like an electronic identity card or a SIM card of GSM, or 3) Know something which is typically a password, so that it could be identified unambiguously (Koskinen 2014). At least one of these properties are needed but not necessarily one is enough when a high level security is wanted, for example two-factor authentication could be a SIM card and a PIN code for it which include two properties from two different categories (Koskinen 2014).

Usage of authentication – Some digital news are offered free of charge but in some cases it is not possible. In that case the users who have bought the right to access and consume the digital news must be somehow separated from those who are not. Thus an other term closely related to it is **authorization** which means determining what the person or the process is allowed to do in the system or in the network (Rhodes-Ousley 2013 p. 167, 188). In practice the term **access control** means the same thing because it is about letting the right and only the right people to access to some information resources and that means that a person, an action and a target make up an triangle which could be resolved either right or wrong (Koskinen 2014). Before the access control usually the authentication is needed and after the decision there must be a mechanism to

separate accepted of abandoned users in order to let them access the information or deny the information from them (Koskinen 2014).

Authorization methods – Often a user's rights are provided directly by the operating system, via permissions granted to the user account directly or through the use of groups (Rhodes-Ousley 2013 p. 188). Other authorization methods are for example role-based access controls and access control lists (Rhodes-Ousley 2013 p. 188). Commonly found in most organizations is a user group authorization (if the user account belongs to a particular group it is granted rights to do certain things) which is not easy to manage and has a high potential for error (Rhodes-Ousley 2013 p. 188). For example in a media company the customers can be divided into several groups with different rights to consume the content of that media company. First customers can be divided into those who order the same digital replica of some newspapers and thus they belong in a same specific group with same rights to consume the media. Second they could be divided to those who order something else inside the same media company and thus they belong to some another group of rights than the first group.

Authentication methods - Nowadays there are a few methods available to authenticate HTTP connections: 1) A basic authentication in which a browser encodes the username and the password using BASE64 encoding, 2) A digest authentication in which the MD5 is used to hash the username and the password by using a challenge supplied by the web server, 3) A Secure Sockets Layer (SSL) which can require a client certificate and authenticate users only if they have a known certificate, 4) An encrypted basic authentication which is used in conjunction with regular SSL, thus encrypting the whole session including BASE64 encoded username and password, and 5) A CAPTCHA which is a popular method for verifying that the person is a human being by showing a disorted image of letters or numbers and requiring user to type them correctly (Rhodes-Ousley 2013 pp. 630-631). It is possible that if someone possesses your user credentials that person can say they are you and to prove it to the satisfaction of the system (Rhodes-Ousley 2013 p. 187).

The chosen authentication method should always be evaluated how easy it would be to defeat its controls and many modern systems are based on some hardware for example as tokens and smart cards and on processes that can be assumed to be more secure for example one-time passwords (Rhodes-Ousley 2013 p.187). However still most systems rely on passwords which are terrible way to identify people and thus does not offer a very good protection (Rhodes-Ousley 2013 p.187). So in traditional systems the user's identity is verified by checking a password typed during login and the system records the identity and uses it to determine what operations may be performed (Neuman & Ts'o 1994).

Pros and cons for the user – According to my best knowledge the authentication is studied with real users basically only from two perspectives which are phishing the passwords (for example via email in a study of Karlof 2009) or how users use their passwords which includes for example reusage and recycling of passwords (studies of Duggan et al. 2012 and Hoonakker et al. 2009 as examples). Otherwise in more general

level the benefits and the disadvantages which actual users have for having to go through the authentication on some website is not known.

However it is a fact that a really secure password is hard to remember and there are quite a few guidelines in order to keep the password safe but luckily nowadays also the protocols have been developed for double securing the passwords. A fixed password authentication is also called simple and weak authentication because in that case the weaknesses of the password protocols are forgotten and only concentrated on the biggest problem of passwords which is the fact that their user is a human being who has tendency to forget things (Koskinen 2014). Ten randomly chosen ASCII-characters create quite a strong password but understandably it is hard to remember for humans (Koskinen 2014).

In addition people 1) Choose passwords which are easy to predict (usually this is more dangerous than the others), 2) Use the same password for too long or recycling the same few passwords, 3) Use the same password in many places or 4) Write the password down to somewhere where it is easy to find by the attacker (Koskinen 2014). It is like that even though the guide for using passwords could be summarized in following prohibitions: 1) Don't show it when typing, 2) Don't tell even if anyone asks, 3) Don't save unless the place is good, 4) Don't let it age for disproportionately, and 5) Don't use it again no matter if the place is different (Koskinen 2014). Luckily for people some protocols are developed for making the passwords they can remember strong anyway, for example a challenge-response protocol is like that (Koskinen 2014).

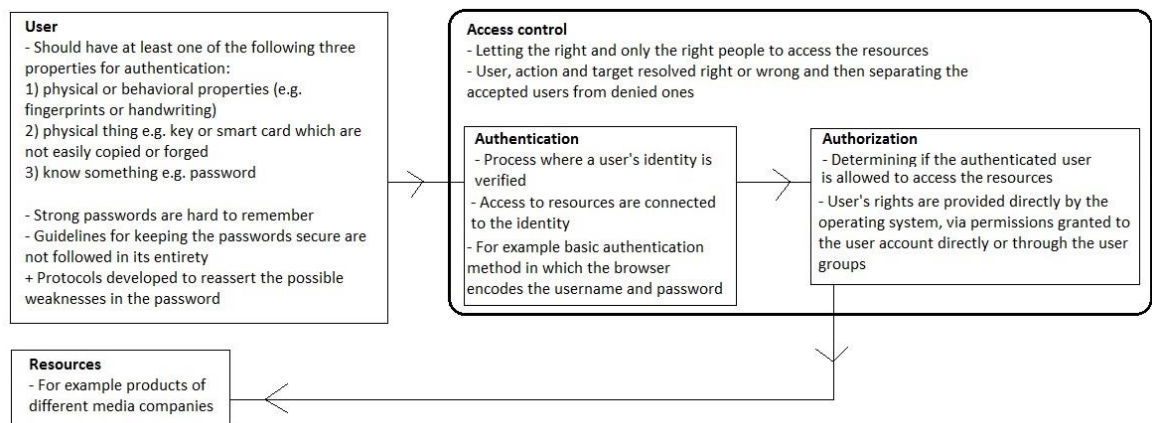


Figure 10. Summary of authentication.

In summary with authentication the users are distinguished from each other with some identification method, which today mainly is the password authentication, in order to provide the right amount of content to the right users especially when the weight is more and more on the digital news in the future (see the more precise summary in the Figure 10 above). For the user the password authentication method gives a lot of power to determine whether it is a strong in the information security point of view or not. This means that by following the guidelines given and choosing enough long and unpredictable passwords, and if the service provider also uses some extra protocols behind the authentication this method protects the resources quite well. In addition the user experi-

ence of the authentication in ordering and consuming digital news is interesting topic of a study because there are no earlier studies which can also be seen in the next chapter.

3.3 Earlier UX studies about the digital news

The user experience of the digital news has been studied with real users over time relatively seldom and those studies are also hard to find because the terms are not standardized. Because the focus of this thesis is on the semi-long-term user experience (UX) of the digital news, especially on digital replicas and browser optimized versions, only the UX studies which examined digital news over a longer period of time was accepted for further exploration. Thus for example a UX study of the news web services conducted by Aranyi et al. (2012) was not included. Altogether only five studies could be accepted for further examination and those are listed alphabetically in the Table 4 below. As conclusion UX studies about the digital replica and the browser optimized version over time basically do not exist.

Table 4. A short summary of the earlier studies of the digital news over time with real users.

Publication	Goal	Users	Studied news	Test context	Method	Data gathered about	Findings
Althaus, S. L., & Tewksbury, D. 2002. "Agenda setting and the "new" news patterns of issue importance among readers of the paper and online versions of the New York Times"	To explore whether different modes of delivering essentially the same news content give rise to differences in agenda-setting effects.	University undergraduate students, 63% females - 42 people in control group - 43 in online group - 38 in paper group	Both the web site of New York Times and the traditional print version of it.	Online group gathered to computer laboratory and paper group to university classroom. Control group "in real life"	Users read the news daily for 1 hour during altogether 5 days. - Pre- and post-tests - Advised to 1) not to modify their news consumption habits (control), or 2) to restrict their news exposure to what they received in the visits	- Most important problems - News recognition - Importance of news stories	- Online news leads to greater individual control over news exposure - Greater control leads readers to focus on different kinds of information and to develop different perceptions of important problems than audience of printed newspaper
d'Haenens, L., Jankowski, N., & Heuvelman, A. 2004. "News in online and print news-papers: Differences in reader consumption and recall"	How readers consume and recall news presented in online and print versions of two newspapers in the Netherlands.	151 university students (social science), 39 male. Average age 21 years.	The national newspaper de Telegraaf and the regional newspaper de Gelderlander - both online and print versions	Specially-arranged rooms at the university	Users read the news daily for a maximum of 30 minutes daily from Monday to Friday. - Pre- and post questionnaire - Advised to refrain from attending to any other news sources during the week and during the sessions users were requested to try and inform themselves as broadly as possible regarding the news of the day	- Media use and basic personal information - Participants' general knowledge - Recalling the news freely and with cues	- News consumptions seems to be more dependent on the news category, reader gender and interest in a particular topic than on whether the news appears in print or online - On the basis of cued and free recall questions, no consistent pattern differentiates readers of the print newspapers from the online versions - Evidence has not been found that online readers consume and retain news differently from readers of the print versions
Ihlström, C., & Lundberg, J. 2002. "The Audience of	To describe the users'	1. Part: 3,696 responders,	Swedish local online	"In real life"	Two online questionnaires: 1. Part focused on	- Audience demographics	- The audience tends to read the online newspaper more often, mostly

<i>Swedish Local Online Newspapers:-a Longitudinal Study"</i>	de-mographic s and reading habits as well as the users' expectations of current and future issues regarding the online edition	67% men. 73% non-subscribers, 75% from the area of the newspaper 2. Part: 3,661 responders, 62% men. 53% subscribing leaders. Not necessarily the same users in part one and two.	newspapers Eskilstuna Kuriren (www.ekuriren.se) Hallandsposten (www.hallandsposten.se) Östgöta Correspondenten (www.corren.se) Norrköpings Tidningar (www.nt.se)		current issues for the online paper (on year 2000), 2. Part focused on future issues (on year 2001/2002).	and reading habits	updated or local news to stay updated - The online edition is mainly read from work or at home in the early morning or in the evening - There is a need for better navigation aid at the news sites - The newspapers could gain from making the advertisements more attractive for the users - Multimedia could be used in the future as there is an interest among the users
Tewksbury, D., & Althaus, S. L. 2000. <i>"Differences in knowledge acquisition among readers of the paper and online versions of a national newspaper"</i>	To compare the differential effects of exposure to print and online versions of the New York Times	University undergraduate students, 63% females. - 42 people in control group, 43 people in online and 38 in paper group	New York Times' online site (www.nytimes.com) and print version of the national edition of the Times	Online group gathered to computer laboratory and paper group to university classroom. Control group "in real life"	Users read the news daily for minimum of 30 minutes to maximum of 1 hour during altogether 5 days. - Pre- and post-tests - Adviced to 1) not to modify their news consumption habits (control), or 2) to restrict their news exposure to what they received in the visits	- Reading patterns - News events recalling without and with cues	Online readers of the Times: - Appear to have read fewer national, international and political news stories - Were less likely to recognize and recall events that occurred during the exposure period
Vaughan, M. W., & Dillon, A. 2006. <i>"Why structure and genre matter for users of digital information: A longitudinal experiment with readers of a web-based newspaper"</i>	To understand the impact of designing for digital genres on users' mental representations of structure	1. phase: 6 expert (4 woman) news readers of HCI experts. All had experience designing web pages with HTML 2. phase: 25 novice (68% female) web news readers. Basic level of familiarity with web browsing because recruited from university students	2. phase: *web newspaper, content was drawn primarily from the on-line campus newspaper *a database of 60 news stories.	2. phase: The laboratory *software: Netscape Communicator 4.0	1. phase: reading web-based news 5 days a week or more, total of 3h session with 2 breaks, videotaped 2. phase: users were exposed to one of the two designs over 5 sessions of 1h, videotaped - 20min reading session, questionnaires - Adviced to refrain from keeping up with the news in any manner, print, radio, TV or online form	1. phase: - issues, written response to questions, discussions, drawing or sketching - trying to agree 2. phase: - Comprehension (recall, recognition) - Usability (time on task, accuracy, user satisfaction) - Navigation (path length, category node hits)	- The both structure and time make a difference in terms of user performance with web-based information spaces - Effect of time on the genre-violating group demonstrates that a mental representation for a particular generic form may take some time to develop but that it can indeed develop - Exposing users to new designs for single trials or sessions may fail to reveal important dynamics in the user response to technology that occur with repeated exposure

In summary – None of the accepted studies are focused on the digital replica or the browser optimized version with or without the authentication as the focus is in this thesis. Otherwise they were quite similar by their approach and had problems with external validity. Here there is only a short summary of the earlier studies, about their most important similarities, differences and shortcomings, but they are more precisely displayed in the next chapters (“In the usage context’s point of view” and “In the user’s point of view”) about what is already known about the digital news of the user’s and the context’s point of view.

Similarities – All the studies (except Ihlström & Lundberg 2002) examined university students in a laboratory context. Also all of them studied the news web service form of the digital news and three of them had also the print version under examination. There was actually two papers which dealt with the same study and those were Tewksbury & Althaus 2000 and Althaus & Tewksbury 2002, and also most of the other studies used this study as reference for choosing their method which also explains most of the similarities and shortcomings.

Differences – Ihlström & Lundberg (2002) were the only ones to examine the actual readers in a real context but they didn’t have the actual long-term user experience study but two separate questionnaires measuring the current and future issues of the news web service and thus they also had more users than the rest of the studies. In addition there were different web sites of newspapers in almost all of the studies under examination were for example CNN, New York Times and a couple of Dutch which indicates though that in different parts of world the digital news are emerging and becoming interesting for study focus.

Shortcomings – None of the studies did examine the digital replica or the browser optimized version which are the focus of this thesis. Also none of them measured actually the real user experience of the digital news over time but only things like news recalling or differences between the print and the news web service in a laboratory environment. In practice only one method was used in the studies and it was questionnaires, and only one also video taped the study sessions in the laboratory so the results of the studies do not really tell anything about the digital news in the user and the context point of view. However most of them had a control group in the study which were not guided to restrict their news consumption methods at any way but unfortunately they did not focus on those behavior with the digital news.

In conclusion there are no earlier studies which have been examining the context of real life use or the actual users of the digital replica or the browser optimized version over time with or without an authentication, which means that there basically are no earlier studies and the few examined lack in external validity. This means that there is no knowledge about the overall system of use or who uses and where the digital news. Thus also the user experience of the digital news is really not studied earlier.

3.3.1 In the usage context's point of view

In this chapter there is a brief examination about the digital news in the usage's point of view. It has been divided into five categories: 1) Social, 2) Physical, 3) Task, 4) Technical and information and 5) Temporal context which were discovered in the previous chapter "Components of the UX". The earlier studies (Althaus & Tewksbury 2002, d'Haenens et al. 2004, Ihlström & Lundberg 2002, Tewksbury & Althaus 2000 and Vaughan & Dillon 2006) found in the previous chapter made these discoveries about the digital news but they are not exactly about the digital replica or the browser optimized version.

First of all in the earlier studies there were no results about the **Social context** of digital news but the other aspects of the usage context were little bit more studied. However also in the **Task context** could only be included that the users were guided to read the news for some predefined amount of time (in most of the earlier studies). For example in Vaughan & Dillon's study (2006) users were asked to perform a general news reading task for 20 minutes and instructed to "*scan the news until you feel you have a good, overall sense of the news*" which does not leave much space for natural actions to happen so that task context could really be examined.

Physical context – Only one study examined the place where the news are read in real life. Ihlström & Lundberg (2002) found out that the printed edition is read primarily at home whereas the online edition is read at home and at work at the same extent. In addition not-working senior citizens read news only at home. However those environments are not studied in more detailed level so there is still room for new studies about the physical context of use also as well as it is the case with the social and the task context. The other studies and the laboratory environment is studied more in the next chapter.

Technical and information context – All of the studies actually measured the digital news reading over time, so all except Ihlström & Lundberg 2002 (which had two separate questionnaires compained together in order to create a long-term examination) used some kind of laboratory environment. So d'Haenens et al. (2004) used specially-arranged rooms at the universities where the users were studying, Althaus & Tewksbury (both 2000 and 2002) were about the same study conducted in a computer-equipped classroom or regular classroom (the print version) and finally Vaughan & Dillon (2006) also had it in university's usability laboratory. So users had an individual computer to use for news reading (Tewksbury & Althaus 2000 and 2002), or the hardware setup with more details included a PC with a 100 MHz processor, 16 MB of RAM, running Windows NT, a keyboard, a mouse and a 17" monitor (resolution 600x800) with Netscape Communicator 4.0 (Vaughan & Dillon 2006). In conclusion this was basically very controlled environment, similar to every user, and not about the actual technical and information context the users might really have in their real life.

Temporal context – In the earlier studies the users were asked to come and read the digital news for approximately five days and the amount of time they were given in or-

der to get the to know the news varied between 30 to 60 minutes. For example in d’Haenens et al. (2004) study the users read the news for maximum of 30 minutes daily from Monday to Friday and in Althaus & Tewksbury (2000 and 2002) the users read news for five days and each time for minimum of 30 minutes to maximum of one hour, and the average reading time was 40 minutes.

Only one study actually measured when and how often the users read the news in real life and it revealed that the print edition was read early in the morning but the news web site throughout the day. The study was done by Ihlström & Lundberg (2002) and over half of the users read the print in the early morning while the news web service reading among the users were divided almost evenly to every given category of time (Early morning, Morning, Lunch time, Afternoon, Evening). See Table 5 in order to see the difference more precisely.

Table 5. "Reading frequencies of the online edition" (Ihlström & Lundberg 2002).

Reading frequency	More than once a day	Once a day	Several times a week	Once or twice a week	Other
Study 1 (n=3,696)	5.4%	20.7%	25.6%	35.6%	13%
Study 2 (n=3,661)	11.6%	23.5%	17.3%	32.3%	15.3%

Only one of the earlier studies was about measuring also the time the users actually spent with reading the digital news and it revealed for example that the Front page category in the news web service was read a longer period of time than the same “category” in the print version for approximately for 8-9 minutes. The Front page category in the news web service had more news stories and it was read for a longer period of time (d’Haenens et al. 2004). Also the foreign and the business news categories were read for a longer period of time from the news web service than from the print version but the sport and the regional news were read less online (d’Haenens et al. 2004).

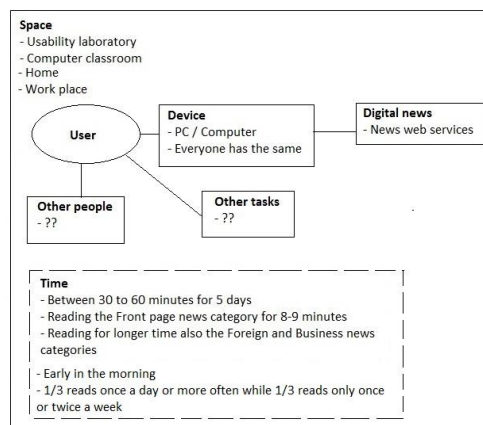


Figure 11. Summary of the usage context of the digital news in the earlier studies.

In summary – The usage context (especially the social and the task context) was most poorly examined in the earlier studies basically because of the study settings: very strictly guided laboratory conditions. The physical context was mainly home but also work environment without any further explanations or details in the only study measuring real life experiences so basically the technical and information context was all about

laboratory conditions with individual computers and not about the real situations in real life of the users.

Then the temporal context was also predefined because the study methodology told to read the news for specific period of time and it set the limitations also to the actual time spent in different news categories in the news web service which was also measured with results of reading the Front page, the Foreign and the Business news categories were read longer online. **In conclusion** there are no earlier studies which have been examining the context of real life use of the digital news over time and not to speak about studying the differences between the digital replica and the browser optimized version.

3.3.2 In the user's point of view

In this chapter there is a brief examination about the digital news in the user's point of view how it is known today. So they have derived from the earlier studies about the digital news over time done by Althaus & Tewksbury (2002), d'Haenens et al. (2004), Ihlström & Lundberg (2002), Tewksbury & Althaus (2000) and Vaughan & Dillon (2006). First background, age and skills of the users, then overall news consumption, read news content and overall news reading and finally about news reading devices and other interesting topics are covered.

Background - Mainly the users in the earlier studies were university students due to the fact that they are a future user group of the digital news and the restricted study methodology (laboratory as context). In the study of d'Haenens et al. (2004) the users studied social science, had same grade point average, came from upper middle-class backgrounds and they were recruited from two universities, the Twente University (75 users, 25 male) and University of Nijmegen (76 users, 14 male). In Vaughan & Dillon's (2006) study there were 25 users, and 68% of them were female, and they read overall a print newspaper an average of 3.28 days a week demonstrating a general familiarity with news form and layout.

Also the other three studies (actually two different studies but three papers written) used university students. According the study of Vaughan & Dillon (2006) the users were recruited from the university: two undergraduate information technology classes with web search components at a large Midwestern university. Tewksbury & Althaus (2000 and 2002) had volunteered students from a large Midwestern university and they were mainly undergraduates (63% of them were female).

However Ihlström & Lundberg (2002) had only non-subscribing or subscribing responders of the two questionnaires not actual users but the amount of them is significant. In the first study 3,696 responders, of which 67% were men, and in the second study 3,661, of which 62% were men (Ihlström & Lundberg 2002). In the first study 73% of the responders were non-subscribers of the online newspaper readers and nearly 75% of them were from the area where the newspaper located while the rest were located abroad (Ihlström & Lundberg 2002). However in the second study 53% of the responders were subscribing readers (Ihlström & Lundberg 2002). As can be seen the

background information of the study 1 and 2 are disconnected and hard to compare for example some data is only measured in one study but not in the another one (see Table 6).

Table 6. Digital news users according to Ihlström & Lundberg 2002.

	Study 1	Study 1
Age	Up to 20: 7.3 % Between 21-40: 63.5 % Between 41-60: 25.4 % Over 60: 3.9 %	Up to 15: 1.1 % Between 16-25: 22.6 % Between 16-35: 31 % Between 36-45: 19 % Between 46-55: 15.5 % Between 56-65: 9 % Over 66: 1.9 %
Education	-	University: 45.1 % Comprehensive school: 44.5 % Compulsory school: 10.4 %
Occupation	-	Full time workers: 60.5 % Students: 18.9 % Part time workers: 6.5 % Unemployed: 4.3 % Sick leave: 2.2 % Material leave: 1.3 % Other: 2.6 %
What people read from the online newspaper? (Note. N = 3,574 in Study 2)	News: 69.4 % Local news: 59.4 % Sports: 42.4 % Domestic news: 33 % Economy: 15.4 % Culture: 18.6 % Foreign news: 19.5 %	Updated news: 71.3 % Advertisements: 19.6 % Local news: 49.6 % Sports: 34 % Domestic news: 23.5 % Economy: 11 % Culture: 11.9 % Foreign news: 15 %
Reasons for reading the online news (Note. N = 3,574 in Study 2)	-	Updated news: 57.1 % Local news: 46.4 % Advertisements: 11.7 % The "whole newspaper": 6.2 % To discuss: 2.5 % Other: 24.7 %
Why users read the online newspaper?	To stay informed/updated: 58.5 % Information search: 25.5 % Lack of print edition: 23.9 % Complement to print edition: 18.9 % To save money: 8.3 % To read advertisements: 8 % Other: 18.3 %	-
What users read?	Only what they were interested to read: 66.6 % What they were searching for: 19.2 % The whole "newspaper" online: 2 %	-

Age – The range of the age of the users was quite homogenous because they were mainly just university students (only one study had responders under 15 and over 66 years old). D’Haenens et al. (2004) had users between 18-28 years of age and the average was 21 years. However Ihlström and Lundberg (2002) had only responders not users so in their studies there was more comprehensive set of users with different age but the categories unfortunately varied between the two studies (see Table 6).

Skills – Users were needed to have similar kind of know-how of Internet and the time spent online because of the study methodology. For example d’Haenens et al. 2004 stated that the homogeneity in the users proved useful because if their study would results differences in reading behavior, news consumption in general or in news recall in particular it would not be due to a difference towards Internet or time spent online

(d'Haenens et al. 2004). Also Vaughan & Dillon (2006) wanted to make sure that users have at least a basic level of familiarity with web browsing but only those people were accepted who never had made use of a web-based newspaper. Users of the study of Tewksbury & Althaus (2000 and 2002) were relatively familiar with the Internet and used at least occasionally the World Wide Web prior to the study.

Overall news consumption – There are hardly any differences between news consumptions of the print and the digital news and during the study users were also mostly requested to refrain from attending to any other news sources except the study sessions. For example the users read more news stories in the print version of newspaper than from the news web service according to d'Haenens et al. (2004) but they also stated that the reader consumption of news seems more dependent on the news category, the reader gender and the interest than whether the news appear online or as print.

For example in Vaughan & Dillon's (2006) study the users were asked to refrain from keeping up with the news in any manner: print, radio, TV or online form so that possible contamination effect of external news knowledge on the comprehension scores could be reduced. Also d'Haenens et al. (2004), Althaus & Tewksbury (2000 and 2002) asked their users to restrict their news consumptions habits during the study. However if they had a control group like for example Tewksbury & Althaus (2000) had, those users were not asked to modify their news consumptions habits at all.

Read news content – With digital news the users mostly have control over what and in which order they read news stories but in the study sessions the web service was ordered. For example in the study of d'Haenens et al. (2004) the users were pointed out what news web service they will use and they should try to inform themselves as broadly as possible regarding of the news on that day so users mainly began to read the summaries on the front page and when a news story caught their attention they clicked it (which is possible through the hyperlink structure) and read it partially or entirely.

The news web service readers have more control over the news read so they may acquire less information about national, international and political events and had troubles with recalling events (according to one study). Online news media facilitate greater individual control over the news exposure and this greater control leads them to focus on different kinds of information and to develop different perceptions of important problems than readers of printed newspapers according to Althaus & Tewksbury (2002). Further on the readers of the news web services may acquire less information about national, international and political events than print newspaper readers would (Tewksbury & Althaus 2000). In addition the users of the news web service were also less likely to recognize and recall events that occurred during the exposure period (Tewksbury & Althaus 2000).

For example one study showed that local and sports news were read because the users wanted to stay updated or to gain information. According to Ihlström & Lundberg (2002) the users of the news web service read news in order to update news read earlier and they read local and sports news. See more detailed results in the Table 6. Users read news in order to stay updated or for gaining information (Ihlström & Lundberg 2002).

Also these results are hard to compare between the study 1 and 2 which raises a question if these studies are comparable enough to consider them together as a long-term study and that means there is still lack of knowledge of the digital news readers' news consumption habits.

Overall news reading – Only few results are about how the users actually read the news web service (not in specific order) and comparison between the print and the news web service didn't reveal huge differences but the print was preferred. Ihlström and Lundberg (2002) found out that mainly the users do not read the news web service in any specific order (64%). There is no clear difference of which edition (the news web service or the print) is easier or more rapid to read but half of the users agreed that the search of specific part of the newspaper was easier in the news web service (Ihlström & Lundberg 2002). In addition most of the users knew their position in the news web service and that the previously visited pages were easy to find but however they perceived that they are unwilling to return to already visited pages (Ihlström & Lundberg 2002). Finally majority of the users preferred the print edition of the newspaper over the news web service (Ihlström & Lundberg 2002).

Devices used for news reading – The most popular devices for news reading were measured only in the Ihlström & Lundberg's (2002) study without users but with responders of questionnaires and they were TV, handheld computer and mobile phone. So the most preferred alternative forms for the news were video news, radio news or SMS news (Ihlström & Lundberg 2002).

Other interesting topics - Other interesting issues in the digital news are advertising, personalization, payment and multimedia content but they have been studied only little but the interest for these exists. Mainly the attitude towards the advertisements were positive or neutral (only 33.2 % were negative), majority of the users would not like a fully personalized paper (55.6%) but some were interested, and the users would not pay even a small sum of money for more and faster local news according to Ihlström & Lundberg (2002). Also attitude towards the multimedia content like moving images and sound were ok by more than half of the users, some considered them very positive thing (only 14.5% thought they were disturbing) by Ihlström & Lundberg (2002).

In summary – the real users of the digital news are studied very little and basically there is no knowledge of them because almost all studies only had very strict definitions for appropriate user candidates. Mainly users were relatively young, university students who were familiar with the Internet, or actual non- or subscribers of the newspaper who were under 15 to over 66 years old. One study showed for example that local and sports news are read online because the users want to stay updated and gain information but nothing is basically known about the news consumption of the news web services in real life because the users were restricted to access news outside the study sessions and the source of news was also ordered beforehand.

In addition news from the news web service is not read in any specific order and no remarkable differences are found when comparing to the print edition reading. Alternatives for news could be for example video, radio or SMS news because the users read

news with handheld computers and mobile phones beside television according one study. Other interesting topics found in the previous study were advertising, personalization, payment and multimedia content. **In conclusion** the earlier studies have not been focused on examining the users of the digital news in real life, not even speaking about differences between the digital replica and the browser optimized version readers, but they have concentrated on comparing news recalling from the news web service and the print version which leaves a lot of room to study the actual behaviors of the users of the digital news outside the laboratory context.

3.3.3 In the system's point of view

In this chapter there is a brief examination about the digital news in the system's point of view but this chapter is not based on the earlier studies because they didn't describe the system with enough details and did not study the digital replica or the browser optimized version at all. First a couple of words about digitalization and news are covered, then different stakeholders and techniques behind the digital news are presented and finally there are some technical solutions about publishing especially the digital replica and the browser optimized versions online.

The development of digital technology has forced also the newspaper to evolve for example both in publishing methods and where to get income. The Internet has expanded and institutionalized as an alternative for the production and consumption of the news (Mitchelstein & Boczkowski 2009, Utesheva et al. 2012). However the digitalization of the newspaper publishing has not been trouble-free due to constant introduction of new digital technology, increased mobility, changing media consumption and advertising patterns (Åkesson 2009, Utesheva et al. 2012). Changes had to happen also in income strategies: traditional sources of income are for example advertising and subscription but thanks to the Internet the new income strategies for example are e-commerce and targeting advertising according to consumers' profiles (Mitchelstein & Boczkowski 2009).

The overview of the news system these days is presented in the Figure 12. Different output channels for delivering news are mobile user, home user and printed newspaper (Op de beeck et al. 2008). The publishing platform is able to deliver news in real-time to the mobile users connecting on the move using a mobile device through a telecom infrastructure and also the news services are offered to the home users that connect via the publisher website but the publishing platform still supports the classical delivery mechanisms like printing and the physical delivery of the newspaper which makes it backwards-compatible (Op de beeck et al. 2008).

In addition the publisher offers two actual servers which are the publishing server and the replica (Op de beeck et al. 2008). The accounting system (in the bottom side of the figure) connects the publishing servers to financial institutions for example bank servers to trigger payment transactions (Op de beeck et al. 2008). Two separate back-end servers are represented (in the right side of the figure) and there are one for each of the main types of data: 1) The content storage consists of news content like articles,

advertisements, advertisement reservations and their meta-data while 2) The customer profile storage includes user profile information like all customer information together with user interests that are both statistical, which are defined by user him-/herself, and dynamically, which means inferred by the publishing system (Op de beeck et al. 2008).

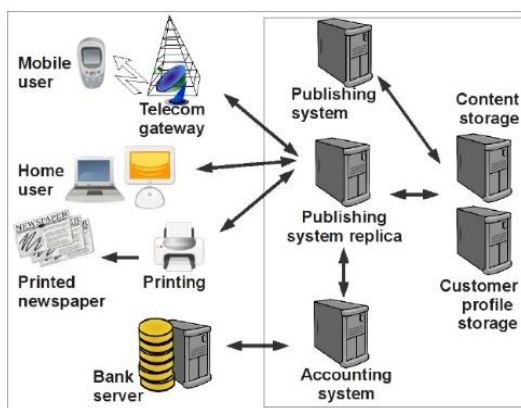


Figure 12. “Deployment view of distributed architecture” (Van Landuyt et al. 2008).

Furthermore the digital news has an interface with 1) Publication system providers, 2) News editors, 3) Advertising agencies, 4) Consumers and 5) Telecom providers. In the earliest times of the digital news there were at least four different types of sources in the digital news environment: news editors, computers, other users and user her-/himself (Sundar & Nass 2001). Sometimes it is uncertain who or what is the source of a piece of information (Sundar & Nass 2001). In addition newspapers are among others engaged in networks of relationships with newspapers, publication system providers, advertising agencies, consumers and along with the digitalization also the telecom providers are related giving opportunity to offer mobile news (Åkesson 2009).

The news content online is updated all the time, suspicious and made either by humans or algorithms. The main newspaper editors consist of humans and algorithms (Watters et al. 1998). Still online journalists are influenced by remnants of post traditions like prioritization of an information-gathering, provision orientation and they don't trust the Internet as a source of knowledge (Mitchelstein & Boczkowski 2009). On the other hand the digital news producers seem to publish new information constantly which is one of the practices that online media make possible (Mitchelstein & Boczkowski 2009).

Solutions for getting the content of a web browser news application online can be done for example by using HTML5/CSS3- and JavaScript-technology (Nurmi et al. 2011). HTML5/CSS3 approach provides single source base for multiple device platforms, it has good support for in most mobile web browsers and no application installation is necessary (Nurmi et al. 2011). A digital replica on the other hand can be published in the Internet as PDF file (Shapira et al. 2009). See the summary in the Figure 13.

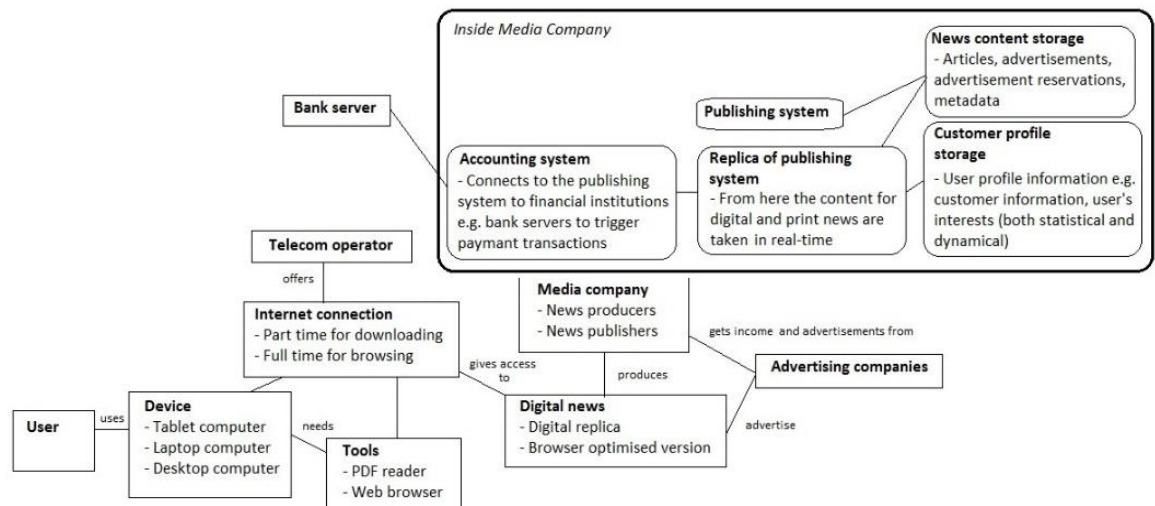


Figure 13. Summary of the system around Digital news.

In summary – In this thesis the system can be understood as a functional entity that from the user's point of view offers digital news. It consists of one physical product (such as tablet, laptop or desktop computer) which has network connection all the time or just or part time in order to access the digital news and it may need an application for reading PDF files (for opening the digital replicas) or some web browser for accessing web sites (the browser optimized version). Behind the Internet, not visible to the user, there are telecom operators and behind the content there are news producers and publishers (with publishing and accounting systems and data storages) who get income from advertising companies or account payments.

4 SUMMARY OF THE THEORY AND RE-SEARCH QUESTIONS

The user experience (UX)

The UX is formed by interacting with a product (device or service) and it is influenced by 1) a user's personal qualities like state, expectations and skills, 2) product qualities also known as system properties including both designed ones but also those consequential of use, and 3) a context of use which is the context around the user and the product, which consists of tasks and social, physical, temporal and technical and information context. This definition may have small differences if some specific areas of the HCI (e.g. mobile newsmaking) are studied more extensive. In addition the UX is more and more important part of a product and also for the advancement of the field. The UX should not be muddled up with the Human-Computer Interaction (HCI), the User-Centered Design (UCD), the Quality of Experience (QoE) or the Usability which are different terms.

By nature the UX is dynamic, subjective, situated and complex which are the reasons why the most popular methods for evaluating it are not UX-specific but questionnaires semi-structured interview and live user observation which allow to study it in general level without smaller details. On the other hand with the reliable, observable and quantifiable numeric UX metrics something more objective or subjective about certain aspect of the UX can be revealed and the bigger the amount of used metrics is the better as well as if they also are tailored, contextualized or even self-created.

In the long-term UX studies the user data is collected over time, for example over a week or even a year, and this is important in order to predict users' experiences through the product's life cycle in order to make successful products but also to save money. It can be measured in several ways (e.g. retrospective vs. repeated sampling) and the workload it brings to both researchers and user participants should be considered carefully in order to plan and execute the study well and in comparable way in terms of a scientific research. Despite the awareness of the changes in the UX over longer period of time has existed almost ten years now still most of the methods for evaluating it are in the middle of development. However in conclusion by using more than one method (e.g. both interview and questionnaire) which also are appropriate for the wanted time type (short vs. long-term) with more than one UX metrics (e.g. AttrakDiff and some others) the results will be successful in the UX studies.

The digital news

The digital news have not had standardized terminology but everyone has been using their own words for basically the same things. In this thesis at least three still common forms of the digital news can be named from the literature: 1) The digital replica (other names were Replicated newspaper genre, Replicated news cybergenre, Electronic edition of newspaper and Mainstream), 2) The news web service (including Variant news-genre, Variant cybergenre, News website and Independent) and 3) The online news portals (compined from Web-based variant news genre, Web-based variant cybergenre, A search-engine-type and Index). In addition the most important ones in this thesis are the digital replica and the browser optimized version.

The digital replica means a digital version of the standard print newspaper so that it has been uploaded onto a website by using for example PDF files similar to the paper edition by layout and content, and it does not include any personalized content or layout. Meanwhile the browser optimized version is a digital version of the print newspaper where the content has been moved online and its layout is more suitable for browsing with a computer or mobile devices including subcategories and navigation elements like menu bars and the content can be updated even during a day.

With the authentication the users are distinguished from each other by using some identification method and still today that is the password authentication. This way the customers of a media company who have bought the right to read and consume some media content can be separated from those who have not. The user experience (UX) of the authentication in ordering and consuming multiple digital news is an interesting topic as well as the long-term UX of the digital news because in my best knowledge there are no earlier studies about this area. Only five studies could be accepted for further examination of the earlier stadies of the long-term UX of the digital news.

None of the earlier studies were focused on the digital replica or the browser optimized version but otherwise they were quite similar to each other by their approach having also some problems with external validity. There were no studies which examined the context of real life use or the actual users of the digital replica or the browser optimized version over time which means that there is no knowledge about the overall system of use or who uses and where the digital news. Thus the user experience of the digital news over time is not really studied earlier.

Framework for this study

The framework of this study has been illustrated in Figure 14 (current state) and Figure 15 (possibly in the future). In the current situation both different media companies and different newspapers have different websites for the authentication. For user this means several web sites to go through in order to read news of just for more than one newspaper. However in the future it could be possible that via one channel, the Next Media – key, the different digital news of different newspapers and several media companies can be accessed via one authentication.

Basically a user currently uses some device for accessing Internet and websites of the media companies. Digital replicas demand for PDF reader from the device used for reading in order to display the content while browser optimized versions only need a web browser. There is not much knowledge about the context of use of the actual users of the digital news over time so that part in the picture are just as example of the earlier studies. The digital news are produced and controlled by the media companies. Different company may have different kind of authentication and also inside one media company there could be multiple ways to access different media products.

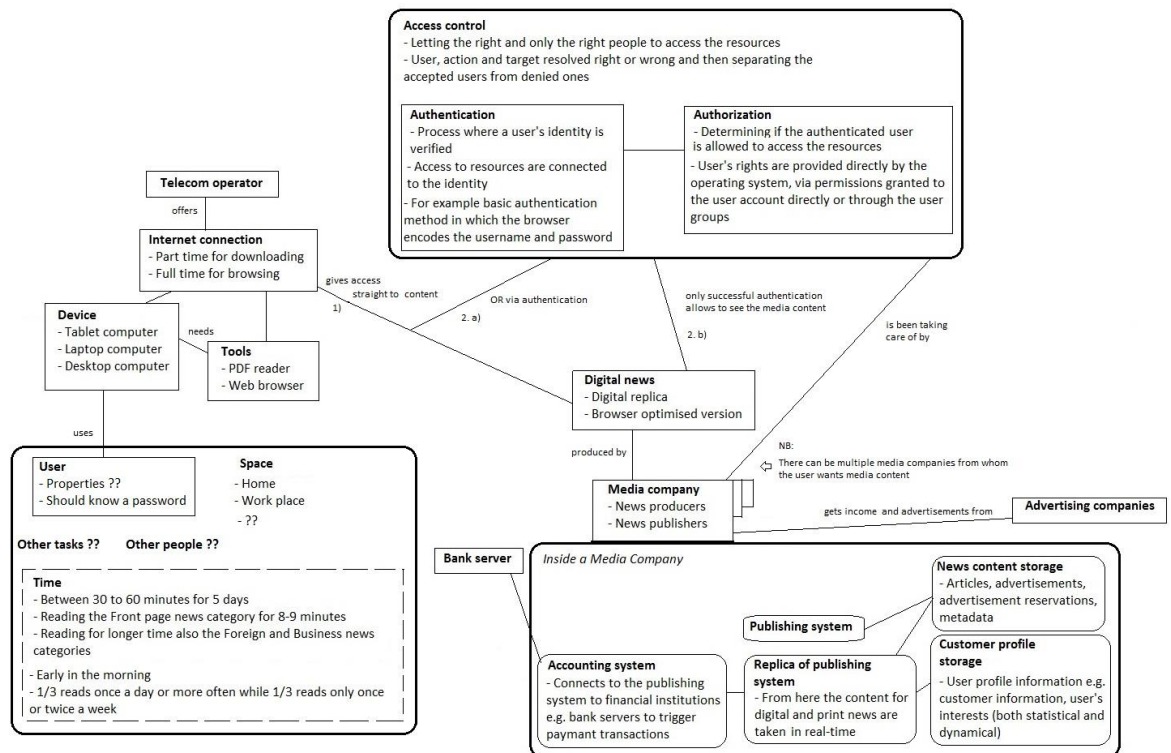


Figure 14. Framework of a media product usage in study 1. Here media companies offer different kind of access to their media content.

In the future it could be possible that content of multiple media companies could be accessed via only one channel: the Next Media –key (see study 2 “Tested versions”). In that case for user should go through only one authentication before accessing multiple products of the digital news both different news products but also from different media companies. Also the media companies would not separately control the access anymore but it would be done via the Next Media –key. How all this and also the advertising should be done is still under examination and this thesis will help to decide about the future of the Next Media –key.

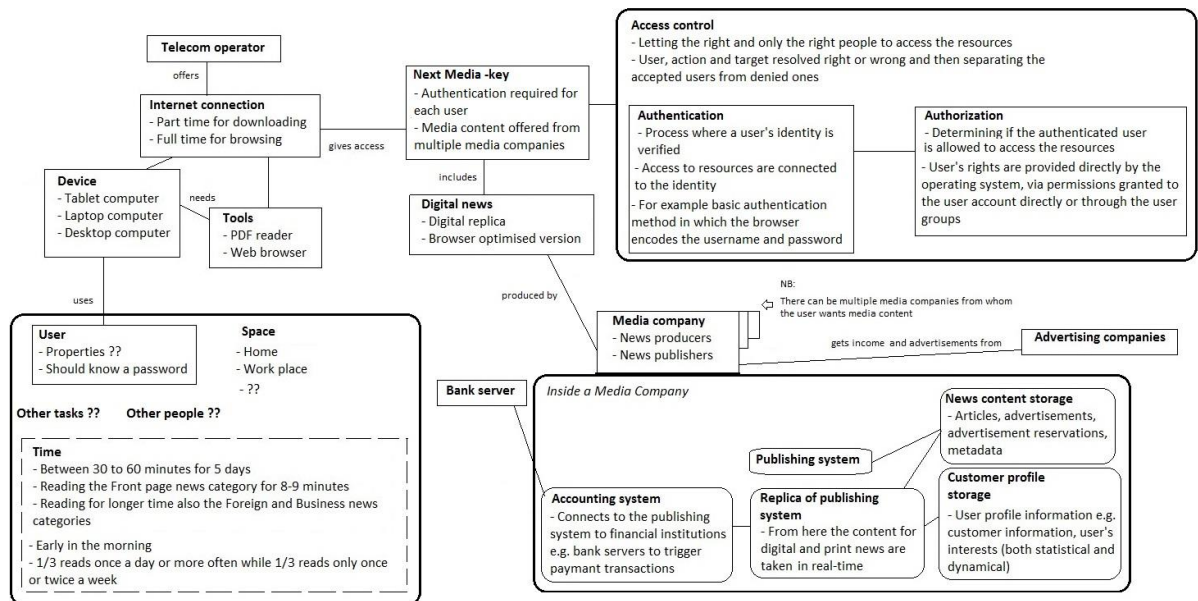


Figure 15. Framework of a media product usage in study 2. Here users get access to media content of multiple media companies via one channel: the Next Media –key.

The research questions

Because in practice there were no earlier studies about how the digital news are experienced in a real life usage over a longer period of time it needs to be examined further. The digital replica is the oldest form of the digital news and thus it is interesting to know how news readers react to it even today. On the other hand the browser optimized version might be the solution of the future because it could be more suitable for different kind of reading devices like tablets for example.

RQ 1: How the digital news are experienced over a longer period of time?

- Semi-long-term UX of three tablet browser optimized versions of a local newspaper.*
- Semi-long-term UX of digital replicas of three newspapers.*

The authentication is part of ordering and consuming the digital news even today so it is important to get actual data about how users think about it together with digital news reading over a longer period of time. This was also a topic seldomly studied in the past.

RQ 2: How a novel authentication method (the Next Media –key) is experienced in ordering and consuming the digital replicas over a longer period of time?

5 STUDY 1 – USER AND EXPERT EVALUATION OF THE BROWSER OPTIMIZED VERSIONS

The main goal of this study was to explore the user experience (UX) of tablet browser optimized versions with an expert evaluation and a semi-long-term user evaluation study. Three web based tablet versions of a local newspaper differed by their layouts. In the meantime the context of use was partly studied including tablet holding and browsing habits, social and task context, reading habits, reading from other sources and devices.

5.1 Research method

The aim was to compare users' experiences between three different web based tablet versions of Keskipohjanmaa's news content in a two week field study and get the experts' evaluation of the versions.

5.1.1 Heuristic evaluation

Heuristic evaluation means an informal method of the usability analysis where a number of evaluators are presented with an interface design and asked to comment on it based on certain usability rules (Nielsen & Molich 1990). Severity ratings give a rough estimate of the need for additional usability efforts and it can be used to allocate the most resources to fix the most serious problems (Nielsen 1995). It was chosen as a research method in this study because it's popular and successful as well as inexpensive, intuitive, easy to motivate evaluators to do and effective in the early phase of the UX process (Hartson & Pyla 2012, p. 473). This way the creators of the tablet versions could have feedback from usability experts also in order to develop them further.

The goal of the heuristic evaluation was to identify the usability issues between the three tablet versions used also in the user evaluation. Five usability experts including both males (3) and females and both researchers (1) and master students of Usability from the Tampere University of Technology found out differences between the versions. Five is enough to cover the majority of the usability problems (Nielsen & Molich 1990). Three independent set of heuristics, intended for mobile and tablet platforms, were used to provide exhaustive analysis of difference between the versions (Bertini et al. 2006, Heikkilä 2013 and Lahikainen 2013) so that there were altogether 29 heuristics to be evaluated (see Table 7 and Appendix A).

Table 7. Used heuristics in English and their references.

	Heuristic	Reference
1.	Visibility of system status and locatability of the mobile device	
2.	Match between system and real world	
3.	Consistency and mapping	
4.	Good ergonomics and minimalist design	Bertini et al. 2006
5.	Ease of input, screen readability and glancability	
6.	Flexibility, efficiency of use and personalization	
7.	Aesthetics, privacy and social conventions	
8.	Realistic error management	
9.	Visibility of system status and feedback	
10.	Uniformity and navigation	
11.	Presenting the information and minimizing the memory load	
12.	User's control, freedom and recovery	Lahikainen 2013
13.	Prevent mistakes, presenting them and recovery	
14.	Minimalism and presenting the information	
15.	Aesthetics and ergonomics	
16.	Flexibility, efficiency and personalizing	
17.	Context of use, user and content	
18.	Help and documentation	
19.	Legibility and readability	
20.	Guidance	
21.	Touch screen ergonomics	
22.	Perceivability	Heikkilä 2013
23.	Orientation	
24.	Memory load	
25.	Responsiveness	
26.	Flow	
27.	Interestingness, playfulness, arousal	
28.	Mood and brand	
29.	Interactivity	

The severity ratings were instructed to be given at the same time to all found usability issues (this is part 2, after they were written down) with Likert 5-point scale from “I do not agree that this is a usability problem at all” to “Usability catastrophe: Imperative to fix this before product can be released” (Nielsen 1995). The original guidance and the complete heuristics used in the part 1 (finding the issues) in this study can be seen in Appendix A.

The heuristic evaluation was held in the beginning of August which was 1.5 months after the user evaluation. However the functionality of the versions was kept the same all the time. An Apple iPad 3rd with Retina display was used in the expert evaluations. Each conducted evaluation independently using one day for 1) to examine and discover all usability problems in the three tablet versions and after it 2) judged their severity.

Analysis - After all of the five evaluations were done, the analysis began by gathering all the found usability issues together according to tablet version and merging together the findings with precisely same meaning. First the amount of findings per each severity ratings was calculated. Then the heuristics which were mentioned the most were found out in order to clear up simply differences between the versions. After that the findings were looked more closely and the percentage of the evaluators who found the same usability problem were counted. Then the average of their severity ratings was calculated in order to more specifically map the worst problems of each version. See the results later in chapter “The heuristic evaluation”.

5.1.2 User evaluation

PILOT STUDY

Pre-study also known as pilot study was held for four people (2 men, 2 women) during two days in 25.-26.5.2013 (Saturday and Sunday). The goal was to make sure that the instructions and the questionnaires planned for the actual study could be easily understood and the three tablet versions worked. Three of them were interviewed after the pilot.

The implementations of the tablet versions were not changed after the pilot study because they worked well. Some little improvements were made to the steps in instructions and the forms of some questions in the questionnaires. Actual study is described in the chapters below.

PROCEDURE

The data-collection in the actual field study was divided into four parts (Figure 16). 1) A background questionnaire gathering the main demographic information and media consumption was filled prior to the actual field study started. 2) A diary questionnaire was filled daily. The duration of the use of the one version was one week and at the end of this period a retrospective summarizing questionnaire (after a week questionnaire) was filled to reflect the user experience of the whole week. 3) Similarly, the daily diary and the summarizing questionnaire were filled during and after the usage week of the second tablet version. In addition, a short final questionnaire about the preferences and news reading was completed after the second week. 4) An interview was conducted with half of the participants after the active usage.

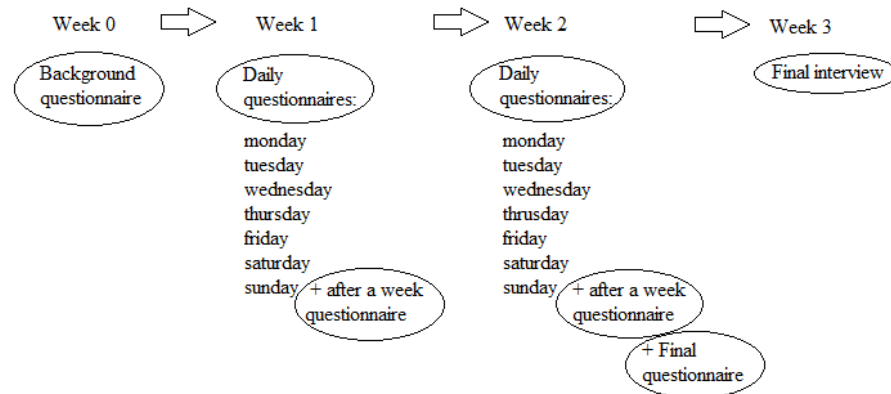


Figure 16. The research procedure of the study 1.

In addition during the test week some log data (about for example which themes and articles of each of the versions were mostly visited and how long) was gathered. It was collected by the developers of the versions (KPK, Aalto and Metropolia) and thus the data differs between the versions what could be measured. Comparable measures between the implementations were for example time and duration of the reading, orientation of the tablet and the read news/themes of the newspaper. So within the timeframe of the project the log data was not analyzed.

DATA GATHERING METHODS

Data was gathered with the questionnaires and the interview in Finnish. Also some log data was gathered. Detailed descriptions of them can be seen below. More than one data gathering methods were used in order to minimize the errors in each one of them.

Questionnaires - There were altogether 18 questionnaires for studying users' background (an enrolment and a background questionnaires), daily experiences with the tablet browser optimized versions including the context of use (daily questionnaires), and after the usage period there was an after a week questionnaire which summarized the final user experience of the version. In addition there was a final questionnaire about more preferable version and context of use. It was chosen because it is primary instrument for collecting subjective data from users in all types of evaluations and with semantic differential scale (Likert scale) it can yield reliable quantitative subjective data independently of the product (Hartson & Pyla 2012 pp. 444-445). The questionnaires were offered online to make the usage as easy as possible to the users and with using the same questionnaires to all it made sure that the data between users are comparable.

Measures in the questionnaires – When choosing the measures for these studies a PhD thesis of Aranyi (2012) was used as help. According to Aranyi (2012 p. 340) the components of interaction experience with news web services are 1) Perception of instrumental qualities (like pragmatic quality, usefulness of content, trust), 2) Affective reactions (like positive and negative affect) and 3) Perception of non-instrumental qualities (like hedonic quality and perceived enjoyment). Thus PANAS (positive and negative affect scale), AttrakDiff (measure for pragmatic and hedonic quality, beauty and goodness) and wider scale for UX pragmatics was selected.

First of all the PANAS short (MacKinnon et al. 1999) was chosen in order to keep the questionnaires as short as possible but at the same time measure positive and negative affect of states and traits the versions have on users. It is also studied that the short version of PANAS is as effective as the longer, original one is (MacKinnon et al. 1999).

Next AttrakDiff 2 short (Hassenzahl&Monk 2010, van Schaik 2012) was chosen to measure shortly but effectively users' feelings in the dimensions of pragmatic and hedonic quality and appeal. This short form has widely been used for studying products' usability, overall beauty and goodness (Hassenzahl&Monk 2010, Schaik 2012).

In addition the week summarizing questionnaire measures also the pragmatic side of the UX with statements gathered from three measure sources (Cho et al. 2009, Yang et al. 2005, Ahuja & Webster 2001). Not all of the items of all the three sources were used so that the length of the questionnaire would stay in minimum but some parts from all of them were included in order to study more widely the practical side of user experience.

All the items of each of the measures used multiple times during the week were in different order each day because the memory –effect wanted to be reduced. So the users could not fill the questionnaires based on their memory but they needed to think and

concentrate again. This randomization was used also in the Study 2 – UX of digital replicas and Next Media -key.

Analysis – The measures were analysed with simple statistical methods (e.g. Mean, St Deviation) as they are defined to and also with ordinal, non-parametric methods for related and unrelated data (Kruskal-Wallis and Mann-Whitney U tests) in order to compare the UX between the three tablet browser optimized versions if they differ scientifically significantly. The other questions with Likert scale (e.g. context of use) were analysed only with simple statistical techniques in order to map the mainstream. The open-ended questions were analysed with the Grounded theory analysis as well as the final interviews (see **Semi-structured final interview** below) so that they will be comparable (Anttila 1998 pp. 308-312).

Content of the questionnaires more detailed - Basically the enrolment questionnaire was all about gathering suitable users and to give them a hint what is coming up (Table 8), the background questionnaire covered according to its name users' backgrounds concerning the main themes which are relevant to this study (Table 9), the daily questionnaires covered the UX over time of the three different web based tablet versions together with the context of use (Table 10) and the after a week questionnaire summarized the UX of the tablet versions over the whole usage period (Table 11). In the end the final questionnaire was all about choosing the most pleasant tablet-version with reasoning the choice, recommendation of the versions and describing the context of use (Table 12). It shortly summarized the two test weeks together showing the outcome of the study.

Table 8. Categories in the enrolment questionnaire in study 1.

Category	Items	Scale
Contact info	Name, Number, Email, Address	
Gender	Male, Female	
Age		Open ended question
Education		Open ended question
Devices' daily usage frequency	Tablet, Smart phone	0 months – 6 or more months. Likert 7-point scale
Tablet's usage frequency		Daily – Do not use or has never used. Likert 6-point scale
Use tablet for...	Email, Youtube, Facebook, Picture service, Information searching, Navigation and map services, Other	
Daily in use tablet		Open ended question
Tablet's Wi-Fi connections	Do not know, Wi-Fi, 3G, Both	
Sharing the tablet	Only you use it, Other family members use it too	
News reading	Do not read news, From print, From digital news with PC/Laptop/Tablet/Smart phone	
Consent for gathering log data	Yes, No	

Table 9. Categories in the background questionnaire in study 1.

Category	Items	Scale
First language	Finnish, Swedish, English, Russian, Other	
Dominant hand	Left, Right, Both	
Protective sheet on tablet's display	Yes, No, Do not know	
Internet usage with tablet	With only Wi-Fi, only 3G, Both, I do not know or pay attention to it	

Portable devices' usage frequency	Smart phone, Tablet, Laptop	Do not use or has used only a couple of times – Daily. Likert 7-point scale
Devices are used for...	Do not use, News reading, Email, Video services, Social media, Picture services, Information searching, Navigation and map services, Games, Other	Smart phone, Tablet, Laptop
Where use devices	At home, Work, Cottage, Library, Café, Park, In Car, Bus, Train, Boat, Camper van/car, Other	Smart phone, Tablet, Laptop
Reading frequency with tablet of the sources	Magazines, Digital replicas, News web services, E-books, Blogs, Online news portals, Other	Do not read or has read only a couple of times – Daily. Likert 7-point scale
Reading the content of Keskipohjanmaa	Print, Web service, Digital replica	Do not read or has read only a couple of times – More than once a day. Likert 8-point scale
Reading frequency with tablet (the content of KP)	Web service, Digital replica	Do not read or has read only a couple of times – More than once a day. Likert 7-point scale
Other news reading sources	Do not read news this way, Local free newspapers, Tabloids, Newspaper of my town, Österbottens Tidning, Yle Keskipohjanmaa, Helsingin Sanomat, Maaseudun Tulevaisuus, Other	As print, As digital
Most interesting themes in KP	Local news, Home country news, Economy, Foreign country news, Culture, Sport, Editorial, Readers' opinions, TV- and radio program, Comics, Notifications/advertisements, Other	
Motivation for reading news	To follow breaking news, To stay informed, For relaxation (Marshall 2007), For spending time, For work, Other	
Recommending read news articles to others		Do not recommend or have done it only a couple of times – Yes, I recommend more than once a day. Likert 8-point scale
Reading the news articles recommended to you		Do not read or no-one recommends – Yes, I always read articles recommended to me. Likert 5-point scale

Table 10. Categories in the daily questionnaire in study 1.

Category	Items	Scale
What has been the most inspiring, positive or satisfactory to you while reading KP with tablet?		Open ended question
What has been the most irritating, negative or dissatisfactory to you while reading KP with tablet?		Open ended question
Overall reading experience		Very unpleasant – Very pleasant (0-10). Likert
PANAS short: Positive and Negative affect	Determined, Attentive, Alert, Inspired, Active, Afraid, Nervous, Upset, Ashamed, Hostile (MacKinnon et al. 1999)	Never - Always (1-7). Likert
AttrakDiff 2 short: PQ, HQ, Appeal	Confusing – Structured, Impractical – Practical, Unpredictable – Predictable, Complicated – Simple, Dull – Captivating, Tacky-Styleish, Cheap – Premium, Unimaginative – Creative, Ugly – Beautiful, Bad – Good (van Schaik et al 2012)	1-7. Likert
Take picture of the context of use today		Send picture to us
Holding the tablet	Did not read, Tablet was on table not hands, With left/right/both hands with/without leaning on something, Other	
Others present	Did not read today, Alone, Spouse, Children, Other relatives, Friends, Colleagues, Unknown people, Pets, Other	
Participation of the others present	Scale + Other way	Did not participate at any way, they did their own things – I read with them: out loud an article to others (1-5). Likert (so that more could be chosen)
Browsing the tablet version	Did not browse, With stylus (special pen for tablet), With my finger (Thumb/Index finger/ Multiple fingers: both with thumb and index finger), Other	

What read	Scale + Did not read, Other	Only topics and pictures with captions from the interesting themes - Everything systematically (1-8). Likert
How read	Scale + Did not read at all, Other way	Read only a part of what wanted to read but did not get back to it later on – All at once, or all what wanted to read was read at once (1-3). Likert
Other sources	Nowhere else, As print, From Web service/ Digital replica	
With other devices	Smart phone, Laptop, Desktop, Other	
Other doings “at the same time”	Did nothing else, Reading print, Watching TV, Listening radio, Using computer / smart phone, Talking, Jogging, Other	Just before, At the same time, Right after
Interruptions	No interruptions, Interruption because of Tablet/Internet malfunctioning, Context (Couldn’t or Could continue after fixing), Other	
Describe troubles if any while using the tablet version		Open ended question
Free comments		Open ended question

Table 11. Categories in the after a week questionnaire in the study 1.

Category	Items	Scale
What has been the most inspiring, positive or satisfactory to you while reading KP with tablet?		Open ended question
What has been the most irritating, negative or dissatisfactory to you while reading KP with tablet?		Open ended question
How would you describe to your friend what things were pleasant in this version?		Open ended question
How would you describe to your friend what things were unpleasant in this version?		Open ended question
PANAS short: Positive and Negative affect	Determined, Attentive, Alert, Inspired, Active, Afraid, Nervous, Upset, Ashamed, Hostile (MacKinnon et al. 1999)	Never - Always (1-7). Likert
AttrakDiff 2 short: PQ, HQ, Appeal	Confusing – Structured, Impractical – Practical, Unpredictable – Predictable, Complicated – Simple, Dull – Captivating, Tacky-Stylish, Cheap – Premium, Unimaginative – Creative, Ugly – Beautiful, Bad – Good (van Schaik et al 2012)	1-7. Likert
UX Pragmatics: Disorientation, Ease of use, Accessibility, Usefulness of content, Functionality, Continued usage, User interface design, Satisfaction	D1-7 (Ahuja & Webster 2001) PEOU1-4 (Cho et al. 2009) A1-2 (Yang et al. 2004) UC1-2, UC4 (Yang et al. 2004) PF1-4 (Cho et al. 2009) CUI1, CUI4 (Cho et al. 2009) PUID1, PUID3-4 (Cho et al. 2009) USat4 (Cho et al. 2009), S1-2 (Yang et al. 2004)	Strongly disagree – Strongly agree (1-7). Likert
Other online newspapers	Local free newspapers, Tabloids, Newspaper of my town, Österbottens Tidning, Yle Keski-Pohjanmaa, Helsingin Sanomat, Maaseudun Tulevaisuus, Other	Once a week – More than once a day (1-5). Likert + Did not read
Reading according previous habits	According previous habits, More KP / other web news overall/with tablet/with other device	Yes, No, Do not know
Extra statements	About satisfaction, Having problems, Reading more other news or with other devices, Using in the future and Recommending to friends and family	Strongly disagree – Strongly agree (1-7). Likert
How this tablet version could be better		Open ended question
Other comments		Open ended question

Table 12. Categories in the final questionnaire in the study 1.

Category	Items	Scale
Which one the reading experience was more pleasant	KPK + Aalto, Aalto + Metropolia, Metropolia + KPK	Open ended question
Describe what made it more pleasant		
Which one would you recommend to family and friends	KPK + Aalto, Aalto + Metropolia, Metropolia + KPK, And Both, Neither, I do not know	Open ended question
Which one would you recommend to be used in the future as KP's tablet version	KPK + Aalto, Aalto + Metropolia, Metropolia + KPK, And Both, Neither, I do not know	
How would you describe to your friend in what kind of situation you'd prefer to read news (in the study)		Open ended question
How would you describe to your friend in what kind of situation you'd prefer to read news (generally)		Open ended question
Other discoveries you made		Open ended question
How this tablet version could be better		Open ended question
Other comments		Open ended question

Semi-structured final interview – was conducted in Finnish after the test weeks at user's home (if possible) or at café in order to more deeply explore the user experience of the three different tablet browser optimized versions and understand news reading usage patterns and the context of use. It was chosen as one of the research methods because it is data-driven method so the themes would arise from the actual data (Anttila 1998, pp. 230-237). With an interview different attitudes, opinions, experiences, observations et cetera can be gathered more widely from the users than just with a qualitative questionnaire by self-reporting. Themes in the interview were *Functions&Properties*, *Content of the newspaper*, *Comparing the versions*, *Recommending*, *Context of use* and *Other*. Approximately half of the users (4 women, 7 men, age: 18-63 years old) were interviewed and the duration varied between 0.5 – 1 hour.

Analysis - After conducting all the interviews the audio recordings were used for making transcriptions out of the data. The transcriptions were analysed with the Grounded theory analysis (Anttila 1998 pp. 308-312). It was used because the more real and trustworthy results are gotten when the analysis is totally based on the real data and not tried to fit it in some already existing theory which might not be the case this time. First the data was freely coded into sub categories (components) and then into main categories. Only one answer per user per component is included in the results.

Log data – Each of the creators of the tablet versions collected as much of the asked log data about the usage of the versions according to user as they could with their limited resources. All saved the data in different format also. This makes the analysis a little bit difficult and takes time, so far it is not analysed. The goal was to gather objective data about the real usage of all three tablet browser optimized versions and map the temporal context of their use. However the analysis was not done due to lack of resources.

USERS

The field study was conducted with 19 native Finnish speakers. All users were active readers of the Keskipohjanmaa newspaper and owners of an iPad. The KPK was re-

sponsible for recruiting the users. 27 answered the recruitment questionnaire and 22 started the trial (five never showed up). There were altogether three dropouts due to time schedule problems.

The range of users' age was 18-65 years (Mean 40, Median 39, St. Deviation 12.31). There were seven women and 12 men. The distribution of the users' age and gender per version is presented in Table 13. The selection and starting order of the tablet versions were randomized.

Table 13. The final distribution of users per tablet versions.

Tablet versions	Men	Women	Age: 18-30 Men	Age 18-30 Women	Age 31-44 Men	Age 31-44 Women	Age over 44 Men	Age over 44 Women
KPK	7	5	0	1	3	3	4	1
Aalto	8	5	2	2	2	2	4	1
Metropolia	9	4	2	1	3	3	4	0
KPK + Aalto	3	3	0	1	1	1	2	1
Aalto + Metropolia	5	2	2	1	1	1	2	0
Metropolia + KPK	4	2	0	0	2	2	2	0

Most of the users were right-handed (79%). The users were rewarded with free usage of Keskipohjanmaa's tablet version for the rest of the year 2013. Those who were interviewed got also 20 euro gift token.

TESTED VERSIONS

The three **browser optimized** tablet versions of the Keskipohjanmaa having different user interface made by 1) Keski-Pohjanmaan Kirjapaino Oyj (KPK), 2) Aalto University and 3) Metropolia University of Applied Sciences were included in the study. The Aalto's version took its content directly from the editorial system of Keskipohjanmaa. The content was also collected to the database from the editorial system and from there the KPK's version took its content while RSS feed of this database was offered for the Metropolia's version. Because of these differences the Aalto's version may differ from the other two versions for its content. See the first pages of these tablet browser optimized versions in the Figure 17 and Figure 18.



Figure 17. The first page of the tablet version of KPK (left) and Metropolia on 7th June 2013.



Figure 18. The first page of the tablet version of Aalto on 7th June 2013.

TEST ENVIRONMENT

The users used their own tablets (Apple iPads) for two weeks in their daily life. The majority of them clearly reported to have iPad 2nd- or newer in use (Table 14) while seven said “Apple iPad” which could be interpreted either meaning the iPad 1st or any of them (presented in the table as missing users and with brackets).

Table 14. The tablets users used (n=12/19).

	Apple iPad 1 st	Apple iPad 2 nd	Apple iPad 3 rd (with Retina display)	Apple iPad 4 th (not the iPad mini)
Number of users	1 (+7)	3	4	4

The users did not have any cover sheet on their tablets’ display (90%, n=19). Internet was used either with both Wi-Fi and 3G (58%, n=19), or only with Wi-Fi (42%).

The study was conducted at the beginning of June (3.-16.6.2013). In this time frame some of the users were on vacation while others were working. At any point users could

ask with email or telephone about the research if they had any questions or problems concerning the research.

5.2 Results

In this chapter there are results of both the expert and the user evaluation. The usability issues and the user experience of the three tablet browser optimized versions are presented as well as the measured dimensions of the context of use.

5.2.1 The heuristic evaluation

In this chapter the results of the expert evaluation of the three tablet browser optimized versions are presented. All the findings per version could be found in Appendix B.

OVERALL

Overall the KPK had the most usability issues with the lowest severity ratings while the Metropolia had the least but with the highest severity. Total the KPK had 82 usability problems, the Aalto 57 and the Metropolia 53. After merging, the KPK had 64, the Aalto 43 and the Metropolia 38 usability issues. 61% of the Metropolia's findings had severity 3 or 4, 56% of the Aalto's and 43% of the KPK's while 26% of the KPK's findings had severity 0 or 1, 21% of the Aalto's and 19% of the Metropolia's.

Table 15. The amount of the findings grouped by their severity per version in the heuristic evaluation.

Severity rating	Definition (Nielsen 1995)	KPK (n = 64)	Aalto (n = 43)	Metropolia (n = 38)
0	I do not agree that this is a usability problem at all	6 %	5 %	8 %
1	Cosmetic problem only: need not be fixed unless extra time is available on project	20 %	16 %	11 %
2	Minor usability problem: fixing this should be given low priority	30 %	23 %	21 %
3	Major usability problem: important to fix, so should be given high priority	34 %	42 %	32 %
4	Usability catastrophe: imperative to fix this before product can be released	9 %	14 %	29 %

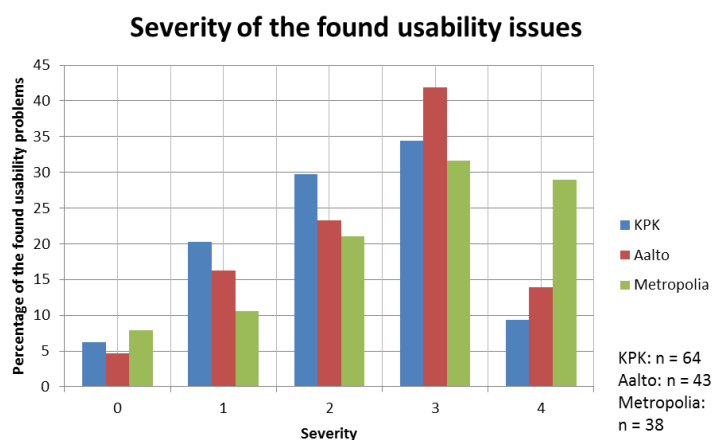


Figure 19. The found usability issues by their severity ratings in the heuristic evaluation.

In addition the KPK's version broke the least amount of different heuristics when compared to the Aalto and the Metropolia's versions. All the tablet versions broke heuristics 10 (Uniformity and navigation) and 23 (Usability: Orientation). Both the Aalto and the Metropolia broke also the heuristics: 19 (Accessibility: Legibility and readability) and 21 (Usability: Touch screen ergonomics).

Most broken heuristics

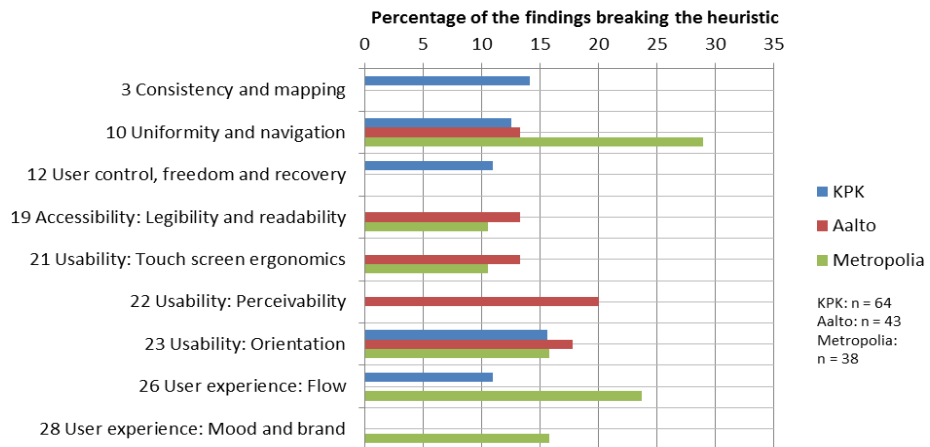


Figure 20. The most broken (> 10%) heuristics by the version.

In summary overall the Metropolia's version has the worst usability because its problems have mostly very serious severity ratings while it also broke quite many different heuristics. There is not as clear difference between the KPK and the Aalto.

KPK –VERSION

The KPK's version did not have much usability issues but it could slightly improve the navigation clues offered to users, fix the bug crashing the browser when the orientation of device changes and make the article close button bigger. Basically it had only problems with offering navigation clues to users.

Table 16. The most broken heuristics in the KPK version (> 15%).

Heuristic	Heuristic's explanation	How many findings broke it (n = 64)
23 Usability: Orientation	Sense of place (USE VISUAL LANDMARKS TO CREATE BETTER "BROWSABILITY"). Sense of place (TELL USER THE LENGTH OF THE STORY, AND HIS POSITION IN MAGAZINE). Sense of direction (ensure existence of the four positional affordances). EFFECTIVENESS OF NAVIGATION	16 %

Only two findings were the most locatability issues. It made the browser crash while the orientation of the device was changed which is catastrophic and it had too small close button for articles (Figure 21).

Table 17. The severity of the KPK's findings which were found by more than two evaluators.

Finding	Definition	% of evaluators (n = 5)	Mean severity (0-4)
<i>Causes browser to crash</i>	When changing the orientation of the tablet it crashed the browser very often.	100	4
<i>Small close-button</i>	The close-button for closing an article is too small (for fingers). It could barely be seen.	80	2.5

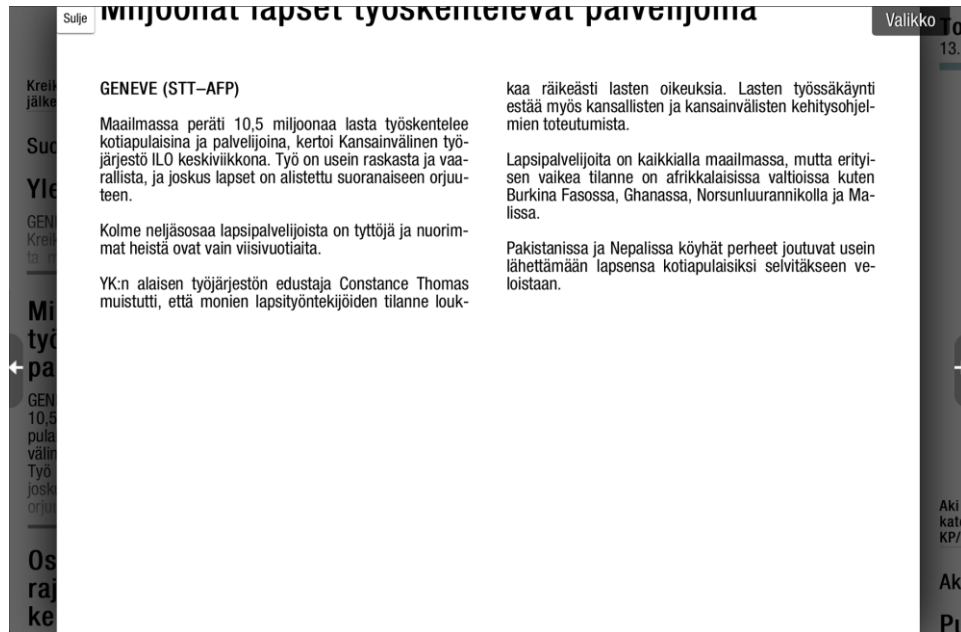


Figure 21. The too small close button could be seen in the upper left corner of the article open in the KPK's version.

AALTO –VERSION

The Aalto's version did not have much usability issues but it could improve the navigation clues offered to users, visualize the user interface functions better and make it clearer what article is coming next. Basically it had problems with offering navigation clues to users as the KPK's version but also in visualizing the functions of the user interface.

Table 18. The most broken heuristics in the Aalto version (> 15%).

Heuristic	Heuristic's explanation	How many findings broke it (n = 43)
22 Usability: Perceivability	Visibility (IF SOMETHING IS CLICKABLE, MAKE IT LOOK LIKE IT).	20 %
	Visibility (if something is not clickable, make it not look like it is). Use difference and change with a purpose. AFFORDANCES SHOULD BE AS SELF EXPLANATORY AS POSSIBLE.	
	Affordances (PREFER FAMILIAR AND REAL-WORLD METAPHORS).	
	Affordances (PREFER EXISTING DESIGN PATTERNS AND PLATFORM CONVENTIONS).	
	Natural mapping (MAKE INFORMATION APPEAR IN NATURAL AND LOGICAL ORDER).	
23 Usability: Orientation	Natural mapping (GESTALT LAWS). Natural mapping (Utilize contrasts to create clear hierarchies).	18 %
	Sense of place (USE VISUAL LANDMARKS TO CREATE BETTER "BROWSABILITY"). Sense of place (TELL USER THE LENGTH OF THE STORY, AND HIS POSITION IN MAGAZINE). Sense of direction (ensure existence of the four positional affordances). EFFECTIVENESS OF NAVIGATION	

Only one finding was the most locatability issue. There were no clues about what article is next in browsing inside some theme.

Table 19. The severity of the Aalto's findings which were found by more than two evaluators.

Finding	Definition	% of evaluators (n = 5)	Mean severity (0-4)
<i>Browsing articles without knowing the next</i>	There is possibility to browse direct to the next article but there is no clue what's the next article is about	60	3



Figure 22. While browsing from an article to another inside “Ulkomaat” - theme there are no clue about what's coming next. Only balls with left and right arrows next to the theme name can be seen in the Aalto's version.

METROPOLIA –VERSION

The Metropolia's version has a few usability issues and thus can improve the navigation clues offered to users, uniformity in navigation functions, smoothness in usage experience, make the visual quality in digital similar as the mood and brand of the print newspaper are as well as insert theme name in the themes pages, keeping the background colors stable independent of browsing order and make the zooming function more perceivable.

Basically it had problems with offering navigation clues to users as well as the KPK's and the Aalto's but moreover also with having uniformity in navigation functions, giving smooth usage experience and signaling similar visual quality in digital as the mood and brand of the print newspaper.

Table 20. The most broken heuristics in the Metropolia version (> 15%).

Heuristic	Heuristic's explanation	How many findings broke it (n = 38)
10 Uniformity and navigation	The user interface design has to be uniform / consistent and platform convention should be followed. The navigation elements should be clear and they should point out the view to which they open.	29 %
26 User experience: Flow	Do not interrupt reading experiences unnecessarily. Strive to create a natural and transparent reading-flow Keep it simple and clean; avoid very noisy and flashy design and uncalled actions. Retain wished tonality from start to end.	24 %
23 Usability: Orientation	Sense of place (USE VISUAL LANDMARKS TO CREATE BETTER “BROWSABILITY”). Sense of place (TELL USER THE LENGTH OF THE STORY, AND HIS POSITION IN MAGAZINE). Sense of direction (ensure existence of the four positional affordances). EFFECTIVENESS OF NAVIGATION	16 %
28 User experience: Mood and brand	Strive to ubiquitousness of the brand image in design. Strive to similar visual quality guidelines in digital as in print.	16 %

There was the highest amount of the usability issues out of the all three evaluated tablet versions (altogether five issues). There were no theme names in theme page (Figure 23), by visiting some themes and returning to the first page its background color has changed thus sometimes the date and the name of the newspaper became hard to read (Figure 24), it does not have zooming function and the identity of the original newspaper does not come across.

Table 21. The severity of the Metropolia's findings which were found by more than two evaluators.

Finding	Definition	% of evaluators (n = 5)	Mean severity (0-4)
<i>The home page changes its background color</i>	The home page, menu page, changes its background color depending on in which theme the user visited last. This confuses the user.	80	2.3
<i>Identity of the original newspaper does not come across</i>	The whole version does not look like the original version of Keskipohjanmaa at any way from any of the pages	80	2
<i>No theme name anywhere could be seen</i>	The version does not tell in which theme the reader is in except with the background color but those need to be memorized. User lost easily in the version	60	3.3
<i>Some themes makes the very first page difficult to read</i>	Selecting the theme on the top and on the right side of the very first page and then returning back to the very first page it is more difficult to see the date and other information	60	3
<i>Zooming not possible</i>	There is no zooming feature at all.	60	2.3



Figure 23. The main page of the "Uutiset" –theme in the Metropolia's version on 7th of June but how can you tell that without e.g. proper name visible on the top?

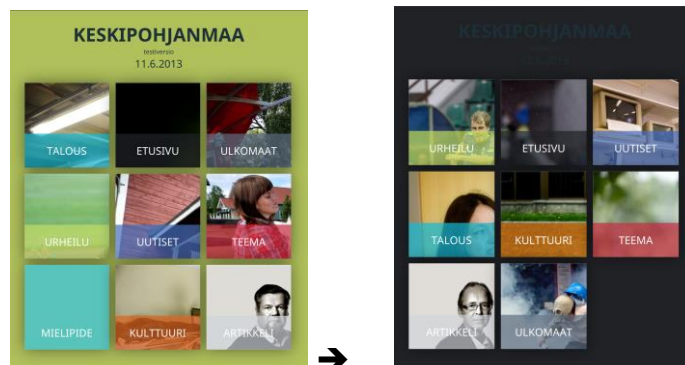


Figure 24. Original background color (left, on 11th of June) of the first page in the Metropolia's version and after visiting the "Etusivu" –theme it changed to that color hiding the name of the newspaper (right, on 12th of June). Order of the themes differs also between days.

5.2.2 The user evaluation

TABLET BROWSER OPTIMIZED VERSIONS

In this chapter there are results about the user experience of the tablet versions during and after the two week of usage period.

UX OF THE TABLET VERSIONS AFTER THE USAGE

Here are the results of the most Pleasant and recommended version, Affect, Pragmatic, Hedonic and Overall quality and UX pragmatics of the tablet browser optimized versions after the usage period.

Most pleasant tablet version – was the Aalto's (Figure 25) and it was also the most recommended one. The Aalto's version could also be recommended to family and friends (63%, $n = 16$) and used for future tablet version of the Keski-Pohjanmaan Kirjapaino Oyj (53%, $n = 15$).

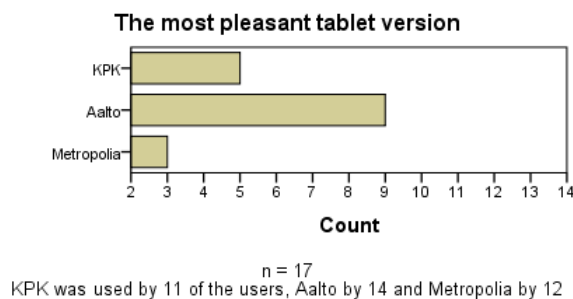
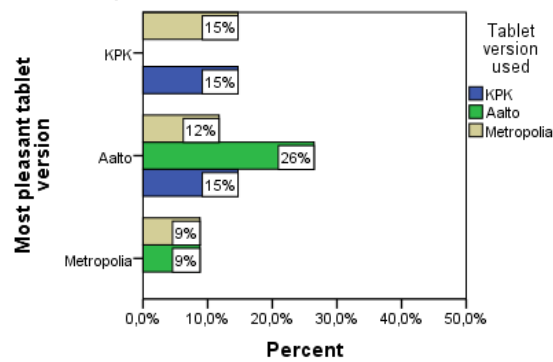


Figure 25. The most pleasant tablet version of the newspaper.

There was a significant association between the tablet version used and the most pleasant version chosen $X^2(4) = 10.07$, $p = 0.039$ (< 0.05). However six cells (67%) have expected count < 5 and the minimum expected count is 1.78. On the other hand there was no significant association between the used tablet version and the recommendation to family and friends, nor to the future version (Chi-square: $p > 0.05$).

The KPK-version's users couldn't decide between the KPK and the Aalto which is more pleasant (Figure 26) while the Aalto's users experienced the Aalto the most pleasant one and the Metropolia's users experienced all the versions quite similar.

The most pleasant tablet version out of the used versions



n = 34
KPK was used by 10 of the users (who answered this), Aalto by 12 and Metropolia by 12

Figure 26. The most pleasant tablet version out of the used versions.

Affect - All the tablet browser optimized versions were experienced on the same level, providing similarly slightly more often positive and almost never negative affect on users but it can still be improved. There was no significant difference between the tablet versions in positive or negative affect (Kruskal-Wallis: $p > 0.05$) and there were no significant differences in any of the pair-wise comparisons between the versions (Mann-Whitney U: $p > 0.05$). Cronbach's alpha > 0.7 when N1 Afraid and N4 Ashamed were removed from the analysis. Overall, mean values reflect positive affect (Mean 4.2–4.7) with relatively large individual differences (SD 0.88–1.36) and negative affect (Mean 1.4–1.8) with relatively large individual differences (SD 0.67–0.93). See Table 22 and Figure 27.

Table 22. The affect of the tablet versions after the usage period.

Scale (items)	Cronbach's α	Version	Mean	SD	Min	Max
Positive affect (5)	0.933	KPK	4.7	1.00	2.4	6.0
		Aalto	4.5	0.88	2.6	5.8
		Metropolia	4.2	1.36	1.0	6.0
Negative affect (3)	0.778	KPK	1.6	0.90	1.0	3.3
		Aalto	1.8	0.93	1.0	4.0
		Metropolia	1.4	0.67	1.0	3.0

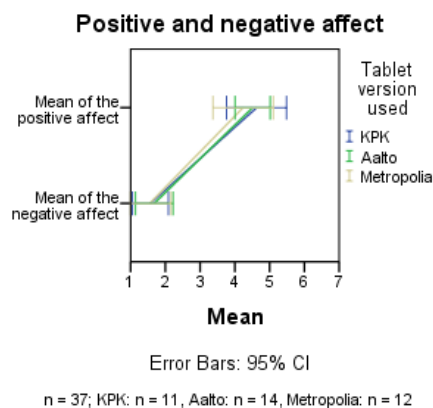


Figure 27. Positive and negative affect of the tablet versions after the usage.

PQ, HQ, Overall Q - All the tablet browser optimized versions were experienced on the same level, providing similarly slightly positive experience on users, but it can still be improved. The tablet versions did not have significant difference in pragmatic quality, hedonic quality, overall beauty or goodness (Kruskal-Wallis: $p > 0.05$) and there were no significant differences in any of the pair-wise comparisons between the versions (Mann-Whitney U: $p > 0.05$). Overall, mean values reflect positive experience in all measured dimensions (Mean 4.3-5.0) with relatively large individual differences (SD 0.79–1.58). See Table 23 and Figure 28.

Table 23. PQ, HQ and Overall Q of the tablet versions after the usage period.

Scale (items)	Cronbach's α	Version	Mean	SD	Min	Max
Pragmatic quality (4)	0.739	KPK	4.7	1.22	3.0	6.5
		Aalto	5.0	0.79	3.5	6.0
		Metropolia	4.8	0.98	3.3	6.5
Hedonic quality (4)	0.861	KPK	4.5	1.23	2.5	6.5
		Aalto	4.5	1.17	2.0	6.3
		Metropolia	4.3	1.09	2.5	5.8
Beauty (1)	0.888	KPK	5.1	1.58	3.0	7.0
		Aalto	5.0	1.30	2.0	7.0
		Metropolia	4.6	1.08	3.0	6.0
Goodness (1)		KPK	4.7	1.35	3.0	7.0
		Aalto	4.9	1.14	3.0	6.0
		Metropolia	4.4	1.31	3.0	6.0

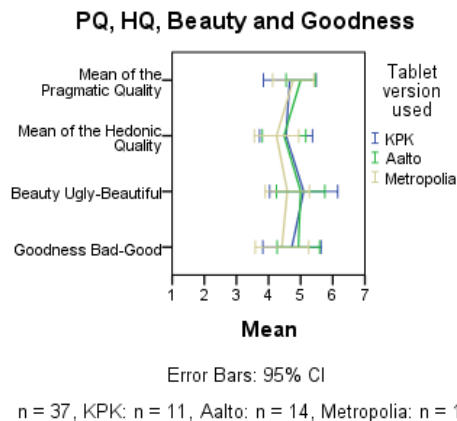
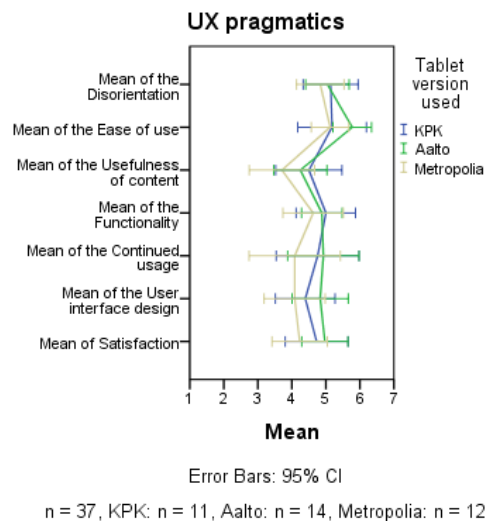


Figure 28. PQ, HQ and Overall Q of the tablet versions after the usage period.

UX pragmatics - All the tablet browser optimized versions were experienced on the same level, being similarly good in *disorientation*, *ease of use*, *functionality*, *continued usage*, *user interface design*, *Usefulness of content* and *satisfaction* having still room for improvement. The tablet versions did not have significant difference in *disorientation*, *ease of use*, *usefulness of content*, *functionality*, *continued usage*, *user interface design* or *satisfaction* (Kruskal-Wallis: $p > 0.05$) and there were no significant differences in any of the pair-wise comparisons between the versions (Mann-Whitney U: $p > 0.05$). Overall, mean values reflect positive pragmatic experience in all measured dimensions (Mean 3.9-5.8) with relatively large individual differences (SD 0.87-2.11). See Table 24 and Figure 29.

Table 24. UX pragmatics of the tablet versions after the usage period.

Scale (items)	Cronbach's α	Version	Mean	SD	Min	Max
Disorientation (7)	0.780	KPK	5.2	1.09	3.43	6.86
		Aalto	5.0	1.11	2.86	7.00
		Metropolia	4.8	1.10	3.57	7.00
Ease of use (5)	0.763	KPK	5.2	1.50	2.40	6.80
		Aalto	5.8	0.98	3.40	7.00
		Metropolia	5.1	0.87	3.60	7.00
Usefulness of content (2)	0.756	KPK	4.5	1.45	2.50	6.50
		Aalto	4.4	1.12	2.50	6.00
		Metropolia	3.7	1.51	1.00	6.50
Functionality (4)	0.754	KPK	5.0	1.30	2.75	6.75
		Aalto	4.9	1.03	3.50	6.75
		Metropolia	4.6	1.40	2.75	6.25
Continued usage (3)	0.913	KPK	4.8	1.81	1.00	7.00
		Aalto	4.9	1.82	1.33	6.67
		Metropolia	4.1	2.11	1.33	6.67
User interface design (2)	0.780	KPK	4.4	1.38	2.50	7.00
		Aalto	4.6	1.69	1.50	7.00
		Metropolia	3.9	1.68	1.50	6.50
Satisfaction (4)	0.733	KPK	4.7	1.38	2.25	7.00
		Aalto	5.0	1.18	2.35	6.50
		Metropolia	4.2	1.28	1.75	6.50

**Figure 29. UX pragmatics of the tablet versions after the usage period.**

In conclusion the user experience of the tablet browser optimized versions provided similarly slightly positive affect on users, positive pragmatic and hedonic quality and appeal, and they were clear, easy to use, functioned well, beautiful user interface, satisfactory and users would use them in the future. However there is still room for improvement.

UX OF THE TABLET VERSIONS DURING THE USAGE

Here are the results of the Overall reading experience, Affect, Pragmatic, Hedonic and Overall quality of the tablet versions during the usage period.

Overall reading experience - Through the week the overall reading experience of the tablet versions was slightly pleasant having still a little room for improvement in all cases and the KPK's and the Aalto's versions were a bit better than the Metropolia's

version. The tablet versions had a significant influence on overall reading experience on users through the week (Kruskal-Wallis: $H(2) = 8.7$, $p = 0.013$ (< 0.05). So there were significant differences between the Aalto and the Metropolia versions (Mann-Whitney $U = 2\,721.50$, $p = 0.016$ (< 0.05)) and the KPK and the Metropolia ($U = 2\,199.50$, $p = 0.007$ (< 0.05)). In overall, mean values reflect overall slightly positive reading experience in the week (Mean 4.9-7.4) with relatively large individual differences (SD 0.97-3.15). See Figure 30.

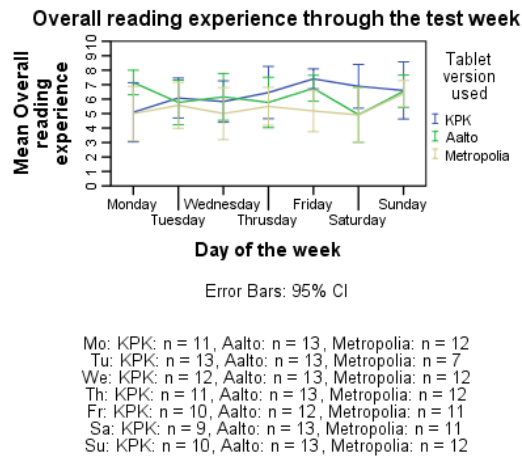


Figure 30. The overall reading experience of the tablet versions during the week.

Affect – Through the week the tablet browser optimised versions had slightly more often positive and almost never negative affect on the users which changed over time in all cases and can still be for improved, and the KPK's affected slightly more often positively than the Aalto's and the Metropolia's. There was a significant difference in positive affect between the tablet versions throughout the whole week (Kruskal-Wallis: $H(2) = 8.5$, $p = 0.014$ (< 0.05)), and there were also significant differences between the KPK and the Aalto versions in positive affect throughout the whole week (Mann-Whitney $U = 2\,788.50$, $p = 0.040$ (< 0.05)), and between the KPK and the Metropolia versions in positive affect throughout the whole week (Mann-Whitney $U = 2\,148.00$, $p = 0.004$ (< 0.05)). In overall, mean values reflect positive affect (Mean 3.6–4.7) with relatively large individual differences (SD 0.55–1.46) and negative affect (Mean 1.1–2.1) with relatively large individual differences (SD 0.16–1.29). In addition the results show tendency towards the end of the period that the affect seems to become better (negative affect slightly decreases). See Table 25 and Figure 31.

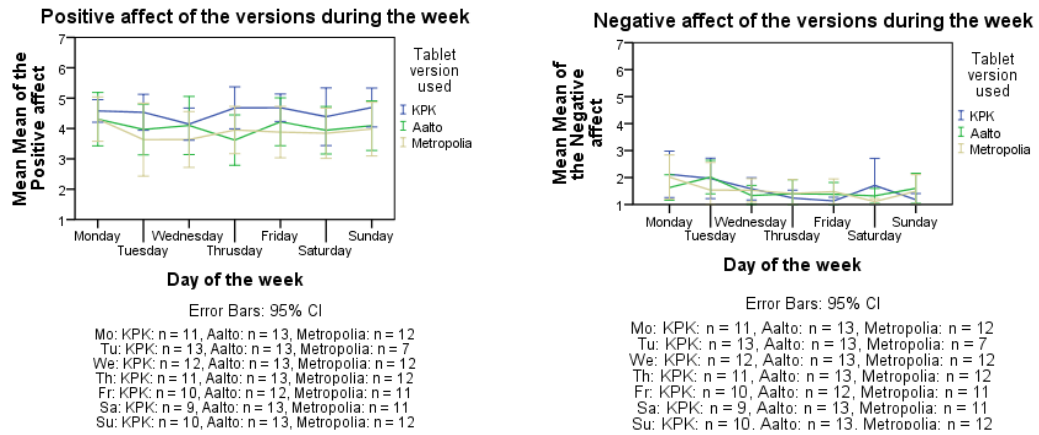


Figure 31. The positive and negative affect of the tablet versions during the week.

Table 25. The positive and negative affect of the tablet versions during the usage period.

Scale (items)	Cronbach's α	Day of the week		KPK	Aalto	Metropolia
Positive affect (5)	0.925	Monday	Mean (SD)	4.6 (0.55)	4.3 (1.46)	4.3 (1.15)
			Min, Max	3.2, 5.2	1.0, 5.8	1.6, 6.0
		Tuesday	Mean (SD)	4.5 (0.98)	4.0 (1.39)	3.6 (1.30)
			Min, Max	2.6, 6.4	1.0, 5.8	1.0, 5.0
		Wednesday	Mean (SD)	4.1 (0.83)	4.1 (1.58)	3.6 (1.45)
			Min, Max	2.4, 5.6	1.0, 6.2	1.0, 6.0
		Thursday	Mean (SD)	4.7 (1.03)	3.6 (1.37)	4.0 (1.23)
			Min, Max	2.8, 6.0	1.0, 5.6	1.0, 5.0
		Friday	Mean (SD)	4.7 (0.63)	4.2 (1.24)	3.9 (1.26)
			Min, Max	3.4, 5.4	1.4, 5.8	1.0, 5.4
		Saturday	Mean (SD)	4.4 (1.24)	3.9 (1.29)	3.8 (1.24)
			Min, Max	1.8, 6.4	1.0, 5.8	1.0, 5.2
		Sunday	Mean (SD)	4.7 (0.89)	4.1 (1.35)	4.0 (1.39)
			Min, Max	2.8, 6.0	1.0, 6.0	1.0, 6.0
Negative affect (5)	0.869	Monday	Mean (SD)	2.1 (1.28)	1.6 (0.78)	2.0 (1.29)
			Min, Max	1.0, 4.6	1.0, 3.2	1.0, 4.4
		Tuesday	Mean (SD)	2.0 (1.24)	2.0 (1.03)	1.5 (1.11)
			Min, Max	1.0, 4.8	1.0, 4.0	1.0, 4.0
		Wednesday	Mean (SD)	1.6 (0.65)	1.3 (0.62)	1.5 (0.68)
			Min, Max	1.0, 3.0	1.0, 3.0	1.0, 3.0
		Thursday	Mean (SD)	1.2 (0.44)	1.4 (0.86)	1.4 (0.81)
			Min, Max	1.0, 2.2	1.0, 4.2	1.0, 3.8
		Friday	Mean (SD)	1.1 (0.19)	1.4 (0.68)	1.5 (0.69)
			Min, Max	1.0, 1.6	1.0, 3.4	1.0, 3.0
		Saturday	Mean (SD)	1.7 (1.30)	1.3 (0.46)	1.1 (0.16)
			Min, Max	1.0, 4.0	1.0, 2.2	1.0, 1.4
		Sunday	Mean (SD)	1.2 (0.32)	1.6 (0.92)	1.5 (0.97)
			Min, Max	1.0, 2.0	1.0, 4.0	1.0, 4.0

PQ, HQ, Overall Q – Through the week all the tablet browser optimized versions provided slightly positive user experience which changed over time in all cases and can still be for improved, and the Metropolia's version had slightly worse pragmatic quality than the Aalto's, and also slightly worse overall appeal (beauty and goodness) than both the Aalto's and the KPK's versions. There were significant differences between the versions in Pragmatic quality (Kruskal-Wallis: $H(2) = 10.9$, $p = 0.004 < 0.05$), in Beauty (Kruskal-Wallis: $H(2) = 7.7$, $p = 0.022 < 0.05$) and in Goodness (Kruskal-Wallis: $H(2) = 8.8$, $p = 0.012 < 0.05$) throughout the week. There were significant differences be-

tween the Aalto and the Metropolia versions in Pragmatic quality (Mann-Whitney $U = 2\ 401.00$, $p = 0.001 < 0.05$), in Beauty (Mann-Whitney $U = 2\ 623.00$, $p = 0.005 < 0.05$) and in Goodness (Mann-Whitney $U = 2\ 614.50$, $p = 0.005 < 0.05$) throughout the week. In addition there were significant differences between the KPK and the Metropolia versions in Beauty (Mann-Whitney $U = 2\ 396.50$, $p = 0.049 < 0.05$) and in Goodness (Mann-Whitney $U = 2\ 309.50$, $p = 0.021 < 0.05$) throughout the week. In overall, mean values reflect positive experience in all measured dimensions (Mean 3.6–5.4) with relatively large individual differences (SD 0.43–1.46). In addition the results show tendency towards the end of the period that the PQ and Appeal of the tablet versions seems to get better. See Table 26, Figure 32 and Figure 33.

Table 26. The PQ, HQ and Overall Q of the tablet versions during the week.

Scale (items)	Cronbach's α	Day of the week		KPK	Aalto	Metropolia
Pragmatic quality (4)	0.630	Monday	Mean (SD)	4.0 (1.11)	4.8 (1.00)	4.3 (1.14)
			Min, Max	2.0, 5.3	3.0, 6.3	2.5, 6.3
		Tuesday	Mean (SD)	4.3 (1.15)	4.9 (0.88)	4.5 (0.82)
			Min, Max	2.0, 6.0	2.5, 5.8	3.8, 5.8
		Wednesday	Mean (SD)	4.6 (0.71)	4.7 (0.87)	4.5 (0.98)
			Min, Max	3.5, 6.0	3.3, 6.0	2.8, 6.5
		Thursday	Mean (SD)	4.8 (0.96)	5.0 (0.71)	4.5 (0.89)
			Min, Max	3.0, 6.0	3.5, 6.3	3.0, 6.0
		Friday	Mean (SD)	5.2 (0.87)	4.9 (0.92)	4.3 (0.92)
			Min, Max	3.8, 6.8	2.5, 6.3	3.0, 6.0
		Saturday	Mean (SD)	4.7 (1.07)	5.0 (0.43)	4.6 (0.77)
			Min, Max	2.8, 6.0	4.3, 5.8	3.3, 5.8
		Sunday	Mean (SD)	5.2 (1.05)	5.0 (0.51)	4.8 (0.95)
			Min, Max	3.0, 6.5	4.0, 5.8	3.3, 6.8
Hedonic quality (4)	0.864	Monday	Mean (SD)	4.0 (1.29)	4.8 (1.04)	4.2 (1.27)
			Min, Max	1.5, 6.3	2.8, 6.3	2.3, 6.0
		Tuesday	Mean (SD)	4.4 (1.19)	4.2 (1.26)	4.5 (0.78)
			Min, Max	2.3, 6.5	1.5, 6.0	3.3, 5.5
		Wednesday	Mean (SD)	4.5 (0.88)	4.6 (1.00)	4.0 (1.21)
			Min, Max	3.3, 6.0	2.0, 5.8	2.3, 5.8
		Thursday	Mean (SD)	4.6 (1.04)	4.6 (0.58)	4.1 (1.01)
			Min, Max	3.0, 6.0	3.5, 5.5	2.3, 5.3
		Friday	Mean (SD)	4.8 (0.98)	4.3 (0.99)	3.8 (1.19)
			Min, Max	3.3, 6.5	2.0, 5.8	1.0, 5.0
		Saturday	Mean (SD)	4.6 (1.40)	4.2 (0.74)	4.1 (1.06)
			Min, Max	2.3, 6.5	2.3, 5.3	2.0, 5.5
		Sunday	Mean (SD)	5.0 (0.92)	4.3 (1.02)	4.4 (0.64)
			Min, Max	4.0, 6.5	2.5, 6.0	3.5, 5.5
Appeal (2)	0.718	Monday	Mean (SD)	4.3 (1.18)	4.9 (0.95)	4.3 (1.40)
			Min, Max	2.0, 6.0	3.0, 6.0	2.0, 6.0
		Tuesday	Mean (SD)	4.3 (1.37)	4.7 (1.28)	4.4 (0.89)
			Min, Max	2.0, 6.5	2.0, 6.5	3.0, 5.5
		Wednesday	Mean (SD)	4.1 (1.18)	4.7 (1.20)	3.6 (1.09)
			Min, Max	3.0, 6.0	3.5, 6.5	2.0, 6.0
		Thursday	Mean (SD)	5.1 (1.06)	4.7 (0.97)	4.3 (1.36)
			Min, Max	3.5, 6.5	3.0, 6.0	2.0, 6.0
		Friday	Mean (SD)	5.4 (0.97)	5.1 (0.96)	4.1 (1.46)
			Min, Max	4.0, 7.0	3.0, 6.0	1.0, 6.0
		Saturday	Mean (SD)	5.0 (1.35)	4.9 (0.82)	4.7 (1.10)
			Min, Max	2.5, 7.0	3.0, 6.0	2.0, 6.0
		Sunday	Mean (SD)	5.3 (0.98)	5.0 (1.16)	4.6 (1.10)
			Min, Max	4.0, 7.0	2.5, 6.5	2.0, 6.0

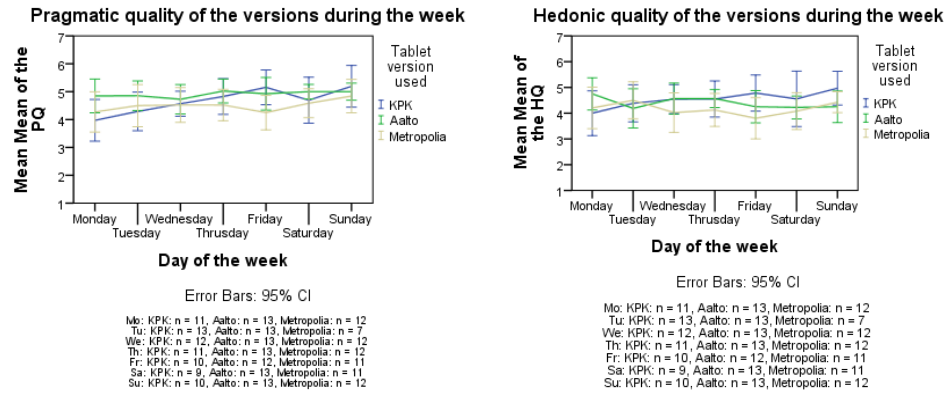


Figure 32. PQ and HQ of the tablet versions during the week.

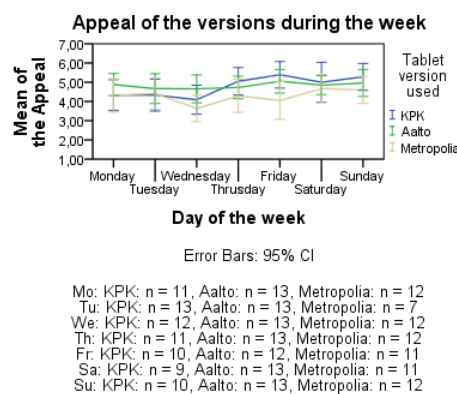


Figure 33. The overall appeal of the tablet versions during the week.

Table 27. Summary of statistically significant differences between the tablet versions during the usage period.

	Overall reading experience	Positive affect	Pragmatic quality	Overall appeal
Differences between the versions	KPK and Aalto better than Metropolia	KPK better than Aalto and Metropolia	Aalto better than Metropolia	KPK and Aalto better than Metropolia

In conclusion the overall reading experience of the tablet browser optimized versions was pleasant, they provided positive affect on users having also positive pragmatic, hedonic and overall quality. However these values were only slightly positive and improvements to the tablet versions could be done. On the other hand the Metropolia's version was experienced slightly worse in Overall reading experience, Positive affect, Pragmatic quality and Appeal (See Table 27 above). Thus the Metropolia's version provided the worst UX during the usage period. In addition the Affect, PQ and Appeal of the tablet browser optimized versions seemed to slightly increase over time.

COMPARISON BETWEEN THE STARTING AND ENDING POINT

In this chapter the results from Overall reading experience, Affect, Pragmatic, Hedonic and Overall quality of the tablet versions are compared between the first and the last day of the study week (Monday vs. Sunday) so that if there is some kind of development in the UX of the browser optimized versions over time, it could be seen.

Table 28. Differences in the UX between the starting and the ending point of the study 1.

	KPK	Aalto	Metropolia
Mean overall reading experience (scale 0-10)	Su-Mo: 6.6-5.1= 1.5	Su-Mo: 6.5-7.2= -0.7	Su-Mo: 6.4-5.0= 1.4
Mean positive affect (scale 1-7)	Su-Mo: 4.7-4.6= 0.1	Su-Mo: 4.1-4.3= -0.2	Su-Mo: 4.0-4.3= -0.3
Mean negative affect (scale 1-7)	Su-Mo: 1.2-2.1= -0.9	Su-Mo: 1.6-1.6= 0.0	Su-Mo: 1.5-2.0= -0.5
Mean pragmatic quality (scale 1-7)	Su-Mo: 5.2-4.0= 1.2	Su-Mo: 5.0-4.8= 0.2	Su-Mo: 4.8-4.3= 0.5
Mean hedonic quality (scale 1-7)	Su-Mo: 5.0-4.0= 1.0	Su-Mo: 4.3-4.8= -0.5	Su-Mo: 4.4-4.2= 0.2
Mean appeal (scale 1-7)	Su-Mo: 5.3-4.3= 1.0	Su-Mo: 5.0-4.9= 0.1	Su-Mo: 4.6-4.3= 0.3

In summary the measured dimensions of the user experience (UX) seemed to slightly increase when comparing the starting and the ending point of the study week. The KPK's values increased in all of the aspects of the measured UX (improvement between 0.1-1.5). The Aalto's values did not change that much between the starting and the ending point (increasing only between 0-0.2 and decreasing 0.2-0.7). The Metropolia's values improved in all of the aspects (increasing between 0.2-1.4) except positive affect which decreased 0.3.

IMPRESSIONS OF THE TABLET VERSIONS

In this chapter there are results of users' impressions of the tablet browser optimized versions during and after the usage.

Impressions of the tablet versions during the usage – The results are combined from daily questionnaires by version and day of the week. First there are results most of the inspiring, positive or satisfactory things and after that the most irritating, negative or unsatisfactory ones. Altogether the inspiring answers could be divided into seven categories: *Navigation, Appearance, Features, Functions, Content, Usage* and *Availability*, and the irritating things as well into seven categories: *Content, Availability, Browsing, Features, Appearance, Functioning* and *Usage*.

In summary the Metropolia's version had the most irritating things compared to the KPK's and the Aalto's versions while all had equally many inspiring things the whole usage period gathered together (Table 29 and Table 30). All the versions had good pictures and users got used to it but no similar irritating things were found. The KPK's and the Aalto's had also good layout and visually pleasing appearance. The Aalto and the Metropolia were simple and clear, functioned well and had interesting articles and also missing content and unpleasing appearance irritated. In addition on Wednesday the versions were as inspiring and irritating than any other day described by users (see Appendix C) so in this study could not be found why the user experience on that day dropped (see Figure 33).

Table 29. The inspiring experiences with the tablet versions during the week ($\geq 5\%$). Same users multiple times in the results.

Week together			N=78	N=90	N=76
Category	Component	Definition (examples)	KPK	Aalto	Metropolia
Appearance	Good pictures	The size of pictures was right. Pictures were big/nice/accurate/good/impressive/high-quality/better than in print version. The pictures opened. The pictures could be zoomed bigger also.	9%	6%	20%
	Good colors	The colors of the tablet version are nice/joyful/good/harmonious. They separate the themes nicely. Colors are refreshing. Colors clarify the themes from each other.	0%	1%	7%
	Simplicity	The tablet version is simple. The appearance of the version is plain. The size of the tablet version is very compact.	0%	7%	5%
	Clarity	The tablet version is clear/ understandable. It feels clear. It is easy to understand the idea of the version. Articles, themes and topics are presented clearly. Big and small articles can be distinguished from each other.	3%	11%	8%
	Good layout	The layout of the version was nice/clear. The layout was new/refreshing/handy/funny.	6%	8%	1%
	Visually pleasing	Visually the tablet version was finished/high quality like/pleasing/stylish/stable/world like/satisfactory/good/cool/great.	9%	12%	4%
Features	Good starting page	The starting page was good/clear. The appearance of starting page was positive. There was inclusive overview of the news.	8%	1%	0%
	Good loading page	The very first loading page when arriving the tablet version had good clock/picture.	5%	0%	1%
Functions	Functioning was good	The site worked without a criticism. The user interface worked well. It did not crash at any point. There were no technical or other problems. Working was stable and trustworthy.	4%	9%	12%
	Logic	The logic and the fluency of the version were pleasant/ understandable.	5%	1%	0%
Content	Had interesting articles	The tablet version had some interesting articles.	4%	6%	8%
Usage	Fast to use	The tablet version is fast to use. It is fast to glance the topics and news themes. The content is pictured faster from the tablet version than from print. The speed was appreciated	5%	1%	7%
	Got used to	The user got used to the tablet version which made the usage/reading easier/faster/clearer and/or appearance more acceptable. User learnt to use the tablet version e.g. found some new features. User does not be any more afraid of tablet version but enjoyed it. The reading was a matter of routine. The reading experience increases day by day.	13%	7%	5%

Table 30. The irritating experiences with the tablet versions during the week ($\geq 5\%$). Same users multiple times in the results.

Week together			N=77	N=90	N=76
Category	Component	Definition (examples)	KPK	Aalto	Metropolia
Content	In some themes there was no content at all	In some themes there was no content at all.	0%	13%	0%
	Missing content	For example the advertisement, notifications, comics, TV-program and access to digital replica were missing on the tablet version. There was not enough content. The amount of content was restricted and wasn't similar to print.	3%	8%	16%
Browsing	Not fluent	In the tablet version swiping the screen in order to change the page was not fluent. When moving from an place to other it is not fluent. Pages does not change fluently. The whole functioning of the tablet version has lags.	3%	0%	8%
Features	Scrolling moved the version also left to right	While scrolling the tablet version up to down or vice versa it moved also the version from left to right or vice versa on the background.	5%	0%	0%
Appearance	Bad starting page	The starting page was boring/unstable/had too much boxes which made it forbidding.	3%	0%	7%
	Messy	The tablet version/pages/layout are messy/disorderly.	6%	2%	12%
	Visually unpleasing	The tablet version is graphically/visually modest/low profile/unfinished/unconvincing/cheap/bad. The appearance was impersonal /boring. The "cover" of an article was graphically too big.	3%	6%	7%
	Too small font	The texts (links) in the top navigation bar were too small. The texts are overall not zoomable.	0%	6%	1%
Functioning	Does not look like KP	The tablet version does not look like Keskipohjanmaa, the original newspaper/not newspaper like.	0%	0%	7%
	Browser crashed	The browser of the tablet version crashed.	12%	0%	0%
Usage	Loading problems	The pictures did not load/open. Loading the pages took too long. The loading happened too slowly.	8%	0%	0%
	Did not feel like reading newspaper	Reading the tablet version did not feel like reading really newspaper but reading smaller news articles. Plain and simple version does not temp to read further, it does not stick in user's mind as channel of news.	1%	1%	5%

Impressions of the versions after usage period – Here are the users' impressions of the versions gathered together from the two after a week questionnaires. Altogether the answers could be divided into three categories: *Appearance*, *Accessibility* and *Overall usage*. All the tablet browser optimized versions were considered somewhat easy to use but with the KPK's version users had some technical difficulties while the Aalto's and the Metropolia's were clear.

Table 31. Impressions about the tablet versions after the usage periods (> 40%).

Category	Component	Definition (examples)	KPK (n=11)	Aalto (n=14)	Metropolia (n=12)
Appearance	Clear	Somehow said to have been clear: overall, view, user interface.	27%	50%	42%
Accessibility	Technical difficulties	Some participants had technical difficulties with the version. Browser or whole tablet went down. The overall functioning was weak or unstable.	45%	0%	8%
Overall usage	Easy to use	Many participants mentioned that the version was somehow easy, or easy to use, easy to learn, or it had easy usability/user interface.	36%	43%	42%

Impressions of the most pleasant tablet version - As we know the Aalto-version was chosen for the most pleasant version, then the KPK- and the Metropolia-version in the final questionnaire. Here are the reasons users mentioned. Only the users are included to the frequency, who chose the version as the most pleasant one. Altogether the answers could be divided into two categories: *Appearance* and *Usage*. The most pleasant version was clear, classy and easier to use but these reasons were for the KPK's and the Metropolia's versions (when chosen the most pleasant) because there were no main reasons for the Aalto's.

Table 32. The final impressions about the versions said in the final questionnaire (> 50%).

Category	Component	Definition (examples)	KPK	Aalto	Metropolia
Appearance	Clear	The version was clearer somehow: overall, appearance, functions or structure.	3/5	2/9	1/3
	Classy	The version was classier.	1/5	0/9	2/3
Usage	Easier to use	The version was easier to use or easier to browse.	0/5	0/9	2/3

Final impressions of the versions – Here are the users' impressions of the tablet versions after the test weeks asked in the final interview. Altogether the answers could be divided into six categories: *Appearance*, *Pictures*, *Functions*, *Navigation*, *Content* and *Experience*. In summary the KPK's version had only strengths and slightly most of them while the Aalto and the Metropolia had also weaknesses. The Aalto had slightly more strengths and fewer weaknesses than the Metropolia. Thus the KPK's version could be considered being the best (Table 33).

Table 33. The strengths and the weaknesses of the tablet versions ($\geq 50\%$).

KPK (n=8)		Aalto (n=8)		Metropolia (n=8)	
Strengths	Weaknesses	Strengths	Weaknesses	Strengths	Weaknesses
Appearance	Newspaper like (63%)	Newspaper like (63%)	Bad colors (50%)	Good colors (50%)	Not newspaper like (63%)
	Clear (50%)	Clear (50%)			Confusing (50%)
		Good colors (50%)			Bad colors (50%)
Pictures	Good pictures (63%)	-	-	Good pictures (88%)	-
Functions	Zoomable (50%)	-	Problems with zooming (63%)	-	-
Navigation	Swiping worked (63%)	Navigation bar good (50%)	Navigation bar bad (63%)	Back-button for returning to the home page (50%)	-
Content	Had More content (50%)	-	Not enough content (50%)	-	Not enough content (63%)
			Part of the newspaper (50%)		Part of the newspaper (50%)
			Confusing greying (50%)		
Experience	-	Easy to use (50%)	-	-	-

By version – The *KPK* was newspaper like, had good pictures and working swipe. It was also clear, zoomable and had more content. The *Aalto* was newspaper like but then had problems with zooming and bad navigation bar. It was also clear, good and bad in colors, did not have enough content being only part of the newspaper and some liked the navigation bar. The *Metropolia* had good picture but it was not like newspaper and did not have enough content. It was also confusing, good and bad in colors, had good Back-button for returning the last page and felt like being only part of the newspaper.

Table 34. Final impressions of the tablet browser optimised versions ($\geq 4/8$).

Category	Component	Definition (examples)	KPK (n=8)	Aalto (n=8)	Metropolia (n=8)
Appearance	<i>Confusing</i>	Appearance of the version was confusing, unclear, complex or difficult to perceive. The usability was not so obvious.	1/8	1/8	4/8
	<i>Clear</i>	The version had clear appearance, system, layout etc.	4/8	4/8	2/8
	<i>Good colors</i>	The colors were said to have been better somehow: white background, more restrained or peaceful, nice and good. Some mentions about color coding in themes were said to have been a good thing.	2/8	4/8	4/8
	<i>Bad colors</i>	The colors were said to have been bad somehow: outdated, too little of them, white background, too restrained or too much of colors. Also some mentions were about Metropolia versions changing colors how confusing they were.	0/8	4/8	4/8
	<i>Newspapery</i>	The version had the appearance of a real newspaper and gives the feeling of reading a newspaper to the participants. They thought this as a good thing and it gives certain dignity to the version.	5/8	5/8	0/8
	<i>Not newspaper</i>	The version was not enough like the real newspaper: no feeling of reading a newspaper or Keskipohjanmaa.	1/8	0/8	5/8
Pictures	<i>Good pictures</i>	The pictures of the version were said to have been good, nice, pleasant, great, high quality, or there were more of them and they were bigger. Also the size of the pictures was good and they impressed.	5/8	1/8	7/8
Functions	<i>Zoomable</i>	The zooming both pictures and text was working and findable. Especially for the KPK version the pictures zooming was mentioned, the text zooming was for Aalto.	4/8	2/8	0/8
	<i>Problems with zooming</i>	The zooming was hard to find how it worked or it was not zoomable with the fingers pinch. Pictures or text could not be zoomed at all, or the text could not be zoomed enough.	3/8	5/8	2/8
Navigation	<i>Back-button for returning to the home page</i>	The navigation was good due to the many options for navigate through the version and its articles. However with Metropolia the back-button was liked the most and the closing an article just by clicking it had few mentions.	2/8	0/8	4/8
	<i>Navigation bar good</i>	The top navigation bar showed the location in the themes (KPK). Also all the possible themes were at the same time in sight, the bar was clear and stabile, modern and clear (Aalto). The buttons to the themes were big and usable with fingers (Metropolia).	2/8	4/8	2/8
	<i>Navigation bar bad</i>	Top navigation bar do not show all the themes at the same time, the pictures in the top menu difficult to know which theme they represent, some unpleasantness in the menus (KPK). The balls and arrows for navigation inside a theme from article to another kept the reader blind for next article, only at the top if the page and took much space of the page for it, also the theme bar was too small for using with fingers (Aalto).	1/8	5/8	0/8
	<i>Swiping worked</i>	The swiping for navigation was fast, logical, working and liked.	5/8	0/8	1/8
Content	<i>Not enough content</i>	There were not enough content in the version for the participants: advertisement, notifications etc. were not there, were missing. Some articles were also too short, too brief compared to the newspaper or in general. There were no links to any extra material like KP24.fi or to the digital facsimile. There were more content in this version and it was liked. There were link to the digital facsimile and had advertisement and notifications in it. Somehow there were more content due to the participants' opinion in these versions and some of them mentioned they read more the content of Keskipohjanmaa because of it.	3/8	4/8	5/8
	<i>More content</i>	The version did not even have all of the content which the real papery newspaper had and it disappointed the participants. They commented: "the version was only a part of the newspaper".	4/8	2/8	0/8
	<i>Part of the newspaper</i>	The texts with topics on the listing went gray at some point and it confused the reader (KPK). Some of the themes in the top menu were gray every day and it was irritating and confusing for the readers (Aalto).	2/8	4/8	0/8
	<i>Confusing gray</i>		2/8	4/8	0/8
Experience	<i>Easy to use</i>	The version was easy to use, no need for help, did not look like difficult to use.	3/8	4/8	3/8

In conclusion – Overall all three tablet browser optimized versions had positive and negative properties mentioned by users. However the KPK's version can be considered slightly better than the other two because it had only strengths in final impressions while the Metropolia's had the most irritating things during the usage period and there were

no main reasons for users to pick the Aalto's as the most pleasant one. The most important things mentioned dealt with clarity, pictures, appearance, simplicity, functioning, usage and content thus the creators should make the version good-looking, well-functioning and informative.

CONTEXT OF USE

In this chapter there are results about the measured dimensions of the context of use during the usage period of the tablet browser optimized versions, and overall news reading context impressions and evaluation.

DURING THE USAGE PERIOD

Here are presented the results about the context of use during the usage period asked in the diaries. Note that the answers of the whole week are combined together so that there are the same users multiple times in the results, and also that in some sections there was no appropriate answer offered for “not doing/reading/using this at all” (in Task context, Other people present, Reading the content with other device and Interruptions). Thus the amount of answers might vary a lot between the subsections and that some of the questions may have lacked proper answer which means that the results cannot be fully trusted (see more in “Discussion”).

Table 35. Reading the tablet versions: context of use during usage period.

	KPK	Aalto	Metropolia
Holding tablet (>20%)	Not hold with hands, it's on table 43%, n=77	With left hand and leaned on sth 25%, Not hold with hands it's on table 23%, n=89	Not hold with hands, it's on table 41%, With left hand and leaned on sth 22%, n=74
Way of browsing (≥15%)	With index finger 54%, With thumb and index finger 15%, n=76	With index finger 57%, n=88	With index finger 52%, With thumb and index finger 18%, n=73
Social context (≥15%)	Alone 35%, Spouse 16%, n=77 No interruptions 63%, Demanded a little bit of attention 20%, n=54	Alone 39%, Spouse 28%, n=89 No interruptions 68%, Demanded a little bit of attention 15%, n=62	Alone 39%, Spouse 28%, n=74 No interruptions 82%, n=54
Task context (≥7)	<i>Just before:</i> Did nothing (14/36) <i>At the same time:</i> Did nothing (28/36) <i>Right after:</i> Did nothing (8/36)	<i>Just before:</i> Did nothing (15/69), Listened radio (8/69) <i>At the same time:</i> Did nothing (29/54), Listened radio (7/54) <i>Right after:</i> Listened radio (9/58), Talked to family/friends/etc. (9/58)	<i>Just before:</i> Did nothing (9/47) <i>At the same time:</i> Did nothing (21/41) <i>Right after:</i> Used laptop (7/44)
How read (>20%)	<i>What:</i> All topics of all themes, only part of interesting articles 34%, All topics of all themes, all interesting articles 33%, n=77 <i>How:</i> Only part of all or what wanted at once and got back to it later on 36% or without getting back to it 21%, All or all what wanted at once 25%, n=77 <i>Interruptions:</i> No interruptions 60%, Tablet malfunctioning but could repair it and continue 24%, n=67	<i>What:</i> All topics of all themes all interesting articles 26%, all topics of all themes only part of interesting articles 25%, only topics and picture captions of interesting themes 25%, n=89 <i>How:</i> Only part of what wanted without getting back to it later on 37%, All or all what wanted at once 30%, n=89 <i>Interruptions:</i> No interruptions 90%, n=79	<i>What:</i> All topics of all themes, all interesting articles 37%, Only topics and picture captions of interesting themes 26%, n=73 <i>How:</i> All or all what wanted at once 43%, Only part of all without getting back to it later on 33%, n=73 <i>Interruptions:</i> No interruptions 94%, n=64
Other sources (>20%)	Nowhere else 44%, Print 25%, n=72	Nowhere else 54%, Print 34%, n=86	Nowhere else 41%, Print 31%, n=70
With other device (>20%)	With laptop 33%, With desktop 25%, n=12	With laptop 62%, With desktop 39%, n=13	With smart phone 33%, With laptop 33%

In summary – In all cases (KPK, Aalto and Metropolia) holding tablet, browsing it, social and task context and other sources for reading the Keskipohjanmaa’s content was mainly similar. The tablet was not hold with hands at all or just with left hand, and it was browsed with index finger only or with it and thumb. Users were alone or with their spouse mainly without any social interruptions doing nothing else, listening radio, talking or using laptop around reading the versions. If the content of the Keskipohjanmaa was read from somewhere else it was the print version of the newspaper.

Differences between the versions were related to reading habits (content, ways and interruptions) and other devices for reading Keskipohjanmaa’s content. The KPK’s users got sometimes back to the tablet version if all or all what wanted were not read at once but the Aalto’s and the Metropolia’s did not. The Metropolia’s users also read less the content in version than the Aalto’s and the KPK’s. The reading was not interrupted except for some in the KPK’s version (see below the problems). Laptop was used along with tablet for reading the content of Keskipohjanmaa and desktop in the KPK’s and the Aalto’s but smart phone in the Metropolia’s case.

Problems with the tablet versions – In additional described to the open ended question of happened troubles with the versions and only the KPK’s users reported a problem. 23% of them (n=84 including same users multiple times) said that the tablet’s browser crashed at some point.

OVERALL NEWS READING DESCRIPTIONS

Here are presented the results from the after a week and final questionnaires concerning the news reading habits during the study and descriptions about the most pleasant context for reading news with tablet.

Table 36. The most pleasant context for news reading with tablet (>20%).

Category	Component	Definition (examples)	% of the users (n=18)
Where	<i>At home</i>	Tablet version could be used at home.	56
	<i>On the way</i>	The tablet version is easy to take with you when travelling or being on the way.	44
	<i>Wherever</i>	Tablet version could be used everywhere you want, or have appropriate moment for it. Many places, wherever, no restrictions could be seen for it.	33
	<i>On a couch</i>	Tablet version could be used on a couch.	28
	<i>At a table</i>	Tablet version could be used at the table.	22
When	<i>In the morning</i>	Tablet version could be used in the morning.	33
	<i>In peace</i>	Tablet version could be used in peace, when you have some free time.	28

Context descriptions – Altogether the answers could be divided into two categories: *Where* and *When*. The users described that the news could be read with tablet at home, on the way or wherever e.g. on a couch or at the table in the morning or whenever you have some free time.

Reading according users’ habits – All in all the users estimated they have read all tablet versions according to their habits during the study but also more Keskipohjanmaa’s web news with and without tablet. There were eleven statements with “yes”, “no” or “do not know” answer options in the after a week questionnaire and

users themselves estimated changes (if any) occurred in their reading habits during the study.

Majority of the users read news according to their habits in case of the KPK (82%, n=11), the Aalto (71%, n=14) and the Metropolia (92%, n=12). The users also estimate that they read more the web news of the Keskipohjanmaa newspaper during the study in all cases (KPK: 55%, Aalto: 71%, Metropolia: 58%) and also with tablet (KPK: 73%, Aalto: 57%, Metropolia: 75%).

Reading other web news with tablet during the usage period – Majority of the users did not read local free, town's own, Österbottens Tidning, Yle Keskipohjanmaa or Maaseudun Tulevaisuus newspapers with tablet. However tabloids also known as afternoon papers were read as well as Helsingin Sanomat (HS). Tabloids were read once a day and HS 2-3 times a week.

In conclusion – Overall the users described that the news could be read with tablet at home, on the way or wherever e.g. on a couch or at the table in the morning or whenever they have some free time. All in all the users estimated they have read all tablet versions according to their habits during the study but also more Keskipohjanmaa's web news with and without tablet. Also the tabloids and Helsingin Sanomat were read with tablet during the study.

5.3 Discussion

The goal of this study was to survey the user experience (UX) of three tablet browser optimized versions with an expert evaluation and a semi-long-term user evaluation. The results showed that the UX of the Aalto's version was the best but the KPK's version was also acceptable. Even though all versions could be improved more or less by their usability and UX, the determining factor was users' preference towards the Aalto's version.

Surprisingly the study results revealed that in some level the users still long for the traditional (print) newspaper and it is not that easy to totally to give up the print version and shift only to digital news reading. The Metropolia's version was not considered like how the users understand the concept "newspaper" and during the study week if the users read news somewhere else than from the tested tablet versions it was from the print newspaper. The users estimated they did not change their news reading habits during the study week.

The results also showed that the UX of the tablet versions improved over the study week which indicates that surveying the UX over time matters. For example if the UX was instead measured with cross sectional study this might not have shown the development of the users' experiences similarly or not at all. Changes in the UX over time could have a great impact when trying to predict whether a product will succeed or not in a long run among the end users and thus whether or not it will benefit the manufacturer (Karapanos et al. 2009, Kujala et al. 2011).

About the research method – Semi-structured interviews and diary like questionnaires including UX metrics like the AttrakDiff 2 short are well suited for measuring the longer term UX, because then both the general and the more detailed level of the UX could be surveyed, and thus the construct validity of the study is confirmed. Construct validity is about the quality of conceptualization or operationalization of the relevant concept which deals with whether the correct measures have been used and an accurate observation of reality is gained (Vääätäjä 2014 p. 99). Firstly diary study provides experiences of users' daily lives in natural context, reduces the likelihood of retrospection by minimizing the time between the experience and its account and has an ability to characterize temporal dynamics in cycles so it is appropriate for modelling time (Bolger et al. 2003). All things just mentioned are in main roles when trying to measure longer term UX as stated above.

Secondly by using UX metrics the UX could be more detailed, objectively and quantitatively measured (Hartson & Pyla 2012 p. 378-379). The AttrakDiff 2 short is effective and functional way of gathering information about user's feelings in several dimensions and it is widely used (Hassenzahl&Monk 2010, Schaik 2012). It produces quantitative and comparable data (AllaboutUX 2014), which are properties of good UX metrics (Albert & Tullis 2013 p. 7), and thus it is here considered also as UX metrics. In addition overall evaluative judgements and preferences are incorporated in the consequences of the UX (Vääätäjä 2014 p. 12). The users were asked to give overall value for the UX before the more detailed metrics and in the final questionnaire the most pleasant one (preference) was asked.

Thirdly by using the semi-structured interview as one of the data gathering methods was useful because together with questionnaires gives richer and more valid data due to the interactiveness (Jordan 2000 p. 159). With it the UX could be measured in general level (Salminen 2013). It is also one of the most popularly used method in user experience studies according to Bargas-Avila & Hornbæk (2011).

While examining the used methods in more detailed level it is notable that the context of use part of the questionnaires gave valuable support to the results and thus the usage context was worth studying. When the users' reading habits were surveyed it was noted that only the KPK's users got back to the tablet version later on the same day in order to continue reading, if all or all what they wanted were not read at once, but the Aalto's and the Metropolia's users did not get back to the version. Significant is also that the Metropolia's users read less content than the others' users. In the earlier UX studies of the digital news over time there was no knowledge about the usage context (see the chapter "Earlier UX studies about the digital news") but after this study the interest for examining that also has arisen.

In addition the answer options and the length of the questionnaires should have been thought through more carefully in order to get more easily analyzed answers. Firstly always to offer options "*I don't know*" and "*Other*" so that all the results would be unambiguous. Secondly even though the daily questionnaire was tried to keep as simple and short as possible it can still be seen that it might have been too long because for

example the task context was sometimes filled carelessly and some answers were missing (even though here the answer options were offered correctly) which is a symptom about the great burden often associated diary based studies (Bolger et al. 2003).

Lastly the users had some troubles filling the diary with tablet via Internet which luckily only existed with few users only but in the future studies saving or other options might be useful to offer. For example sometimes the Internet connection broke down in the middle so that the user lost already filled pages of the questionnaire and needed to start all over again. If this kind of troubles happen often and many times a day a user might become frustrated and then also the results may change to more negative towards the product also. Thus an option for saving the answers in the middle could be considered for future studies.

Limitations – Unfortunately there was no time to go through and analyze the collected log data but still two different research methods (questionnaires and interview) gained results which support each other and thus confirms the validity and reliability of the results. When you use more than one method you will get reliable results about dynamic and subjective UX (Olsson 2012 p. 29). All heuristics, interviews and questionnaires emphasize that Metropolia's version is the most unpleasant but the other two are acceptable which makes the results also valid.

Notable is however that the context of use could have been measured more precise scientifically by surveying all its aspects with the same methods but the users' opinions about physical and temporal context were considered more important than measuring them daily. This way also the diary questionnaires did not become even longer (when the physical and the temporal aspects of usage context were not measured in it) and the opinions still helped to finding out the preferred ways about reading news with tablet in the future and to understand the context's impact on the preferred form of digital news.

Data about all components of the UX were gathered in the study in order to find reasons behind the UX, but the user component was left out as the least important one. The components of the UX help to identify the reasons behind a certain experience but the UX itself cannot be described by describing those (Roto et al. 2011). The usage context was covered in questionnaires and interview, system properties were discussed in interview, and information about users were gathered in background questionnaire. The user's information is the most difficult one to take advantage of while trying to figure out the most pleasant tablet browser optimized version and how they should be developed in the future so it was left out of this study without further examination.

To conclude the three tablet versions were experienced quite similarly slightly positive and improving over time but users still preferred the Aalto's version partly due to its traditional newspaperly like appearance. Usability of all the versions could be made better significantly. In this study there were no remarkable limitations and the choice of research methods was successful.

6 STUDY 2 – UX OF DIGITAL REPLICAS AND NEXT MEDIA -KEY

The main goal of this study was to explore the user experience (UX) of digital replicas and an authentication method for consuming them with a semi-long-term study. Three digital replicas of newspapers included technically two different kinds of digital replicas. The authentication method is a new concept for ordering digital media products from different media companies with only one username and password and it's called the Next Media –key (originally “Next Media –avain”). In the meantime the context of use and news reading impressions were partly studied including time, place, social and task context, reading habits, reading from other sources and devices.

6.1 Research method

The aim was to understand the user experience of the digital replicas, and the user experience, attitudes and acceptance of the Next Media –key in one week field study.

6.1.1 Pilot study

Pre-study also known as pilot study was held for four people (2 men, 2 women) during two days in 5.-6.11.2013 (Tuesday and Wednesday). The goal was to make sure that the instructions and the questionnaires planned for the actual study could be easily understood and the Next Media –key (NM –key) with three digital replicas worked. All users were interviewed after the pilot.

The implementation of the NM –key was not changed after the pilot study because it worked well. Some little improvements were made to the steps in instructions. Actual study is described in the chapters below.

6.1.2 Procedure

The data-collection in the actual field study was divided into three parts (Figure 34). 1) A background questionnaire gathering the main demographic information and media consumption was filled prior to the actual field study started. 2) A diary questionnaire was filled daily. On the first day (Monday) also the taking the NM –key into use and ordering digital replicas with it was studied. In addition a final questionnaire about reading the digital replicas and the usage of the NM –key now and in the future was completed after the week. 3) An interview was conducted with six of the users after the active usage.

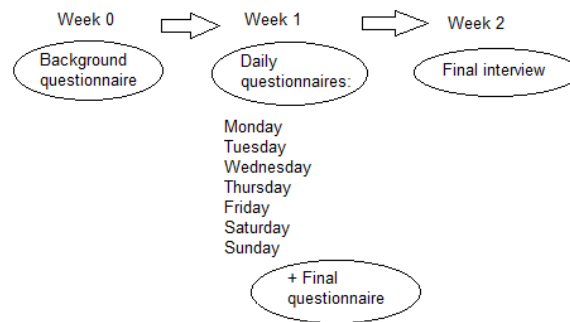


Figure 34. The research procedure of the study 2.

In addition the enrolment questionnaire was filled when the users registered as user candidates for this study, and during the test week the log data about how many of the users used the Next Media –key at the same time and during the week. Within the timeframe of the project all the log data was not analyzed.

6.1.3 Data gathering methods

Data was gathered with the questionnaires and the interview in Finnish. Also some log data was gathered. Detailed descriptions of them can be seen below. Mainly the data gathering and analysis methods were similar and chosen with same reasons than in the Study 1 (“User evaluation”) also so that the results would be comparable.

Questionnaires - There were altogether 10 questionnaires for studying users’ background (the enrolment and the background questionnaires), daily experiences with the Next Media –key and digital replicas including the context of use (the daily questionnaire), and final questionnaire about final user experience of them and scenarios of the NM –key’s future usage. This method was chosen with same reasons and executed similarly as in Study 1 (“User evaluation”) and **analysed** as well with two exceptions: 1) from the data of the daily questionnaires only the users, who had read digital replicas on that day and finished the study are included in the analysis, and 2) only simple statistical methods (e.g. Mean, St. Deviation) were used because there was nothing to compare while all digital replicas were measured as one.

Measures in the questionnaires - The PANAS short (MacKinnon et al. 1999), AttrakDiff 2 short (van Schaik et al 2012) and UX pragmatics (Cho et al. 2009, Yang et al. 2005, Ahuja & Webster 2001) were also used in this study. See the chapter “Research method” in Study 1 in order to see the justifications.

In addition on the first day of usage period (Monday) the Questionnaire of usability of online stores (Christophersen & Konradt 2011) was used for measuring the first impressions of the Next Media –key because it’s designed for buying media products and it’s interesting to find out how usable it really is. In order to keep the questionnaire as simple and short as possible only part of the items were used (Table 39).

Two items of the After-Scenario Questionnaire (the ASQ, Lewis 1991) was used together with a comprehensive item for measuring UX (Table 39) in order to measure

satisfaction and user experience of the NM –key daily. ASQ was chosen due to its shortness and validity for a satisfaction questionnaire (Lewis 2006).

Content of the questionnaires more detailed - Basically the enrolment questionnaire was all about gathering suitable users and to give them a hint what is coming as well as take some workload of the background questionnaire (Table 37), the background questionnaire covered according its name users' backgrounds concerning the main themes this study has (Table 37), the daily questionnaires covered the UX over time of the digital replicas and the Next Media –key together with the context of use (Table 39) and the final questionnaire summarized the UX of the digital replicas and the Next Media –key together over the whole usage period together with users' attitudes towards this new way of authentication as well as some features designed to be included in the future (Table 40).

Table 37. Categories in the enrolment questionnaire in study 2: mostly background questions.

Category	Items	Scale
Contact info	Name, Number, Email, Address	
Gender	Male, Female	
Age		
First language	Finnish, Swedish, English, Russian	
Dominant hand	Left, Right, Both	
Devices' usage frequency	Smart phone, Tablet, Laptop, Desktop	Less frequently than daily – over 6 mo. Likert 8-point scale
Used browser	IE, Mozilla Firefox, Safari, Google Chrome, Other	
News reading sources	Print, Digital replica, Web service, Smart phone / tablet downloadable app, Online news portals	Does not read, or has read only a couple of times – Daily. Likert 7-point scale
News reading frequency with devices	Smart phone, Tablet, Laptop, Desktop	Does not read, or has read only a couple of times – Daily. Likert 7-point scale
Newspapers read	Aamulehti, Iltalehti, Kauppalehti, Nokian Uutiset, Helsingin Sanomat, Iltasanomat, Free paper of my town, Newspaper of my town, Other	Does not read, Print, Digital replica, Web service. Nominal
Participation to the study	Participating to the study, Interest to participating also to the interview	

Table 38. Themes in the background questionnaire in study 2.

Theme	Category	Items	Scale
Background questions about usage habits	Devices' usage frequency	Smart phone, Tablet, Laptop, Desktop	Does not use or used only a couple of times – Daily. Likert 7-point scale
	Device usage	Does not use, News reading, Email, Video services, Social media, Picture service, Information searching, Navigation and map services, Games, Other	Smart phone, Tablet, Laptop, Desktop. Nominal
	Touch screen on laptop's display	Yes, No, I do not have laptop or do not use it	
	News reading devices in last week	Smart phone, Tablet, Laptop, Desktop	
	Where read digital news with the devices in last week	At home, Work, School/Educational establishment, Cottage, Library, Café, Restaurant, Park, Car, Bus, Train, Boat, Camper van/car, Other	Smart phone, Tablet, Laptop, Desktop. Nominal
Reading habits of Aamulehti, Iltalehti, Nokian Uutiset	Reading the content of AL	Print, Web service, Digital replica, Tablet / Smart phone downloadable app	Does not read or has read only a couple of times – More than once a day. Likert 8-point scale
	Device with read AL	Smart phone, Tablet, Laptop, Desktop, Do not read	
	Reading the content of IL	Print, Web service, Digital replica, Tablet / Smart phone downloadable app	Does not read or has read only a couple of times – More than once a day. Likert 8-point scale
	Device with read IL	Smart phone, Tablet, Laptop, Desktop, Do not read	
	Reading the content of NU	Print, Web service, Digital replica, Tablet / Smart phone downloadable app	Does not read or has read only a couple of times – More than once

Usage habits of content	Device with read NU	Smart phone, Tablet, Laptop, Desktop, Do not read	a day. Likert 8-point scale
	Most interesting themes in newspaper	Local news, Home country news, Economy, Foreign country news, Culture, Sport, Entertainment, Editorial, Readers' opinions, TV- and radio program, Comics, Notifications/advertisements, Weather, Other	
	Motivation for reading news	To follow breaking news, To stay informed, For relaxation (Marshall 2007), For spending time, For work, Other	
	Recommending read news articles to others		Do not recommend or have done it only a couple of times – Yes, I recommend more than once a day. Likert 8-point scale
	Reading the news articles recommended to you		Do not read or no-one recommends – Yes, I always read articles recommended to me. Likert 5-point scale

Table 39. Themes in the daily questionnaires in study 2. Marked with “x” if used in Monday questionnaire (MoQ) and/or from Tuesday till Sunday questionnaires (Tu-SuQ).

Theme	Category	Items	Scale	MoQ	Tu – SuQ
Reading experience of the digital replicas	Read replicas	AL, IL, NU		x	x
	Overall reading experience		Very unpleasant – Very pleasant (0-10). Likert	x	x
	PANAS short: Positive and Negative affect	Determined, Attentive, Alert, Inspired, Active, Afraid, Nervous, Upset, Ashamed, Hostile (MacKinnon et al. 1999)	Never - Always (1-7). Likert	x	x
	AttrakDiff 2 short: PQ, HQ, Appeal	Confusing – Structured, Impractical – Practical, Unpredictable – Predictable, Complicated – Simple, Dull – Captivating, Tacky-Stylish, Cheap – Premium, Unimaginative – Creative, Ugly – Beautiful, Bad – Good (van Schaik et al 2012)	1-7. Likert	x	x
Experiences of taking the NM – key into use	Questionnaire of usability of online stores: Usability, Trust, Aesthetics	(Original identification used) ur1, ur3, ur5, ur7, ur9 t1, t2, t3 a1, a2 (Christophersen & Konradt 2011)	Strongly disagree – Strongly agree (1-7). Likert	x	
	Give freely comments about taking the NM – key into use		Open ended question.	x	
Experience of ordering with the NM -key	Questionnaire of usability of online stores: Usability, Trust, Aesthetics, Intention to buy	(Original identification used) ur1, ur3, ur5, ur6, ur7 t2 a1, ib1, ib2, ib3 (Christophersen & Konradt 2011)	Strongly disagree – Strongly agree (1-7). Likert	x	
	Give freely comments about ordering with the NM -key		Open ended question.	x	
Using experience of the NM - key	Overall UX	ASQ: Easiness, Speed of use (Lewis 1991), Pleasantness	Very unpleasant/difficult/slow – Very pleasant/easy/fast (0-10). Likert	x	x
	Smoothness in logging in		Automatically without any extra actions (e.g. browser remembered the pw and user's attention not needed) – Lots of problems (e.g. pw did not work and therefore no access to digital replicas). 1-4. Likert	x	x
	If you had troubles while using the NM – key, describe what		Open ended question.	x	x

	happened				
Using ways of the digital replicas	When	AL, IL, NU	Did not order or read today, in the morning, at noon, in the evening, at night.	x	x
	Others present	Alone, Spouse, Children, Other relatives, Friends, Colleagues, Unknown people, Pets, Other		x	x
	participation of others present	Scale + Other way	Did not participate at any way, they did their own things – I read with them: out loud an article to others (1-5). Likert	x	x
	Other doings “at the same time”	Did nothing else, Reading print / other digital replica, watching TV, listening radio, Sleeping, Eating, Drinking, Using laptop / tablet / smart phone, Working, Talking, Jogging, Other	Just before, At the same time, Right after	x	x
Using the content of digital replicas	What read		Read whole digital replica systematically through – Scanned only part of the articles that were recommended to me for reading and read only those (1-8). Likert	x	x
	How read		Read only a part of what wanted to read but did not get back to it later on – All at once, or all what wanted to read was read at once (1-3). Likert	x	x
	Interruptions	Scale + Other	Reading was not interrupted by any reason and read as long as wanted – Interruption: sudden event in the surroundings, needed attention and had to stop reading before wanted (1-7). Likert (<i>so that more could be chosen</i>)	x	x
Reading the content of AL, IL, NU from elsewhere	Other sources	Nowhere else, Print, Web service, Tablet / Smart phone downloadable app	AL, IL, NU	x	x
	With other devices	AL, IL, NU	Smart phone, Tablet, Only with computer	x	x
	Where	Did not read, at home, work, School/Educational establishment, Cottage, Library, Café, Restaurant, Park, Car, Bus, Train, Boat, Camper van/car, Other	AL, IL, NU	x	x
About NM - key	Give freely comments and ideas concerning the NM -key		Open ended question.	x	x

Table 40. Themes in the final questionnaire in study 2.

Category	Items	Scale
Ordered digital replicas	AL, IL, NU	
What has been the most pleasant or positive while reading digital replicas during the week?		Open ended question.
What has been the most unpleasant or negative while reading digital replicas during the week?		Open ended question.
PANAS short: Positive and Negative affect	Determined, Attentive, Alert, Inspired, Active, Afraid, Nervous, Upset, Ashamed, Hostile (MacKinnon et al. 1999)	Never - Always (1-7). Likert
AttrakDiff 2 short: Pragmatic and Hedonic quality, Appeal	Confusing – Structured, Impractical – Practical, Unpredictable – Predictable, Complicated – Simple, Dull – Captivating, Tacky-Styleish, Cheap – Premium, Unimaginative – Creative, Ugly – Beautiful, Bad – Good (van Schaik et al 2012)	1-7. Likert
UX Pragmatics (Replicas): Disorientation, Ease of use, Accessibility, Usefulness of content, Functionality, Continued usage, User interface design, Satisfaction	(Original identification used) D1-7 (Ahuja & Webster 2001) PEOU1-3 (Cho et al. 2009) A1-2 (Yang et al. 2004)	Strongly disagree – Strongly agree (1-7). Likert

	UC1-2, UC4 (Yang et al. 2004) PF1-4 (Cho et al. 2009) CUI1-2 (Cho et al. 2009) PUID1, PUID3-4 (Cho et al. 2009) USat4 (Cho et al. 2009), S1-2 (Yang et al. 2004)	
Most pleasant digital replica		
Describe what made that one the most pleasant one?		Open ended question.
Overall reading experience	Aamulehti (AL), Iltalehti (IL), Nokian Uutiset (NU)	Very unpleasant – Very pleasant (0-10). Likert
Overall impression about the content	AL, IL, NU	Interesting, Boring,, Necessary, Unnecessary, Useful, Useless, Timely, Old, Ample, Narrow, Local, Domestic, Global (more than one could be chosen)
Give freely comments concerning the reading experience or content of the digital replicas		Open ended question.
Reading according previous habits	According previous habits (Overall, AL, IL, NU), More web news of (AL, IL, NU, Other), Less web news of (AL, IL, NU, Other)	Yes, No, I can't tell/I do not know. Nominal
What has been the most pleasant or positive while using the NM -key during the week?		Open ended question.
What has been the most unpleasant or negative while using the NM -key during the week?		Open ended question.
UX Pragmatics (NM -key): Disorientation, Ease of use, Functionality, Continued usage, Satisfaction	(Original identification used) D1, D5 (Ahuja & Webster 2001) PEOU1-2 (Cho et al. 2009) PF1-4 (Cho et al. 2009) CUI1-2 (Cho et al. 2009) S1-2 (Yang et al. 2004)	Strongly disagree – Strongly agree (1-7). Likert
How using the NM –key could be more pleasant?		Open ended question.
NM –key ordering from different media company / NM –key using products from different media companies /		Easy, Difficult, Practical, Unpractical, Fast, Slow, Useful, Harmful, Trustworthy, Untrustworthy, Clear, Unclear, Simple, Complex
NM –key collecting usage information and sharing it with media companies / NM-key recommending media products based on the usage information		Good, Bad, Practical, Unpractical, Useful, Harmful, Trustworthy, Untrustworthy, Inspiring, Feeling anxiety, Calming, Disturbing, Interesting, Repulsive
Statements of future usage of NM -key	Sharing personal info between media companies, Affect recommendations, Recommendations of free media products, or with fee,	Strongly disagree – Strongly agree (1-7). Likert
More benefit than harm statements about NM -key	Collecting usage habit information, Recommending media products, Overall the NM –key has	More harm than benefit – More benefit than harm (0-10). Likert
Give freely comments about recommending products basing on collected usage habits, ordering media products with one username or overall collecting the usage information		Open ended question.
What would you choose for package of digital replicas? [not included]		AL, IL, NU, KL, Other (more than one could be chosen)
What would you choose for service package? [not included]		Digital replica of AL / IL / NU / KL; Web services with fee of AL / IL / NU / KL, Other
Give freely comments about the necessary content or of which you could pay		Open ended question.
The most pleasant way of reading the content of newspaper	Print, Digital replica, Browser optimized version, Tablet downloadable app, Smart phone downloadable app	Most pleasant – Most unpleasant (1-5). Likert
Other comments		Open ended question.

Semi-structured final interview - was conducted in Finnish after the test week in order to more deeply explore the UX of the digital replicas and the Next Media -key as well as users' reading habits and attitudes. Themes in the interview were *Reading the digital replicas*, *Reading context of devices*, *Using the Next Media -key (taking the key into use*

*and ordering with it), Future scenarios (more than one media company included, collecting usage habits, sharing usage information and recommending media products) and Other. Six of the users (2 women, 4 men, age: 32-66 years old) were interviewed and the duration varied between 0.5 – 1 hour. Read the **analysis** method (Grounded theory) more detailed in the chapter “Research method” in study 1.*

Log data – Was collected by VTT (Technical Research Centre of Finland, Magnus Melin) with Google Analytics (<http://www.google.com/analytics/>) but unfortunately it was not analysed for this thesis due to lack of resources. The goal was to gather objective data about the real usage of the Next Media –key and map e.g. the temporal context of its use.

6.1.4 Users

The field study was conducted with 17 native Finnish speakers. All the users were currently ordering the Aamulehti newspaper with a digital package. The media company was responsible for recruiting of the users. About 496 customers were contacted by an email and asked to participate. 24 answered the recruitment questionnaire and 20 started the trial (one cancelled after recruitment and two never showed up). There were altogether three dropouts due to technical difficulties or disappointments towards technology.

The range of the users’ age was 30-69 years old (Mean 47, Median 49, St. Deviation 11.99). There were nine men and eight women.

Table 41. The distribution of the users’ age and gender in study 2.

	Age 30-40	Age: 41-50	Age 51-60	Over 60 years old
Men	4	1	4	-
Women	2	2	2	2

The users were rewarded with one month free usage of the digital replica of Iltalehti (national evening news tabloid). Those who were interviewed got also two free tickets to the movies.

6.1.5 Tested versions

Digital replicas published by the Alma Media Oyj were included in the study: Aamulehti (AL), Iltalehti (IL) and Nokian Uutiset (NU). Two of the digital replicas were technically different. The NU differed in technical execution (device and user interface adaptable: for Adobe Flash supporting devices it was Adobe Flash and for others HTML5) from the other two (Adobe Flash and open article –feature with XML). See the first pages of these digital replicas in the Figure 35, Figure 36 and Figure 37 below.



Figure 35. The main page of the digital replica of the Aamulehti.



Figure 36. The main page of the digital replica of the Ilta-alehti.

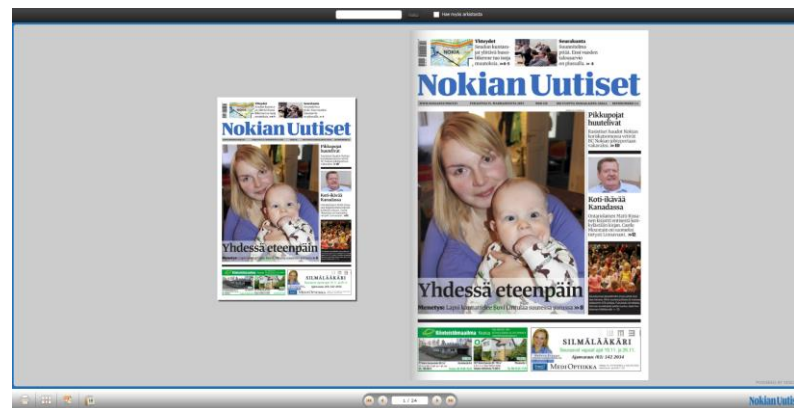


Figure 37. The main page of the digital replica of the Nokian Uutiset.

The Next Media –key was implemented to be used with the browser of a computer, either laptop or desktop (not yet with smart phone or tablet) at this point. The implementation was done at VTT (Technical Research Centre of Finland, Magnus Melin). It had Logging page, Introduction page, Ordering page and the Main page (Figure 38).

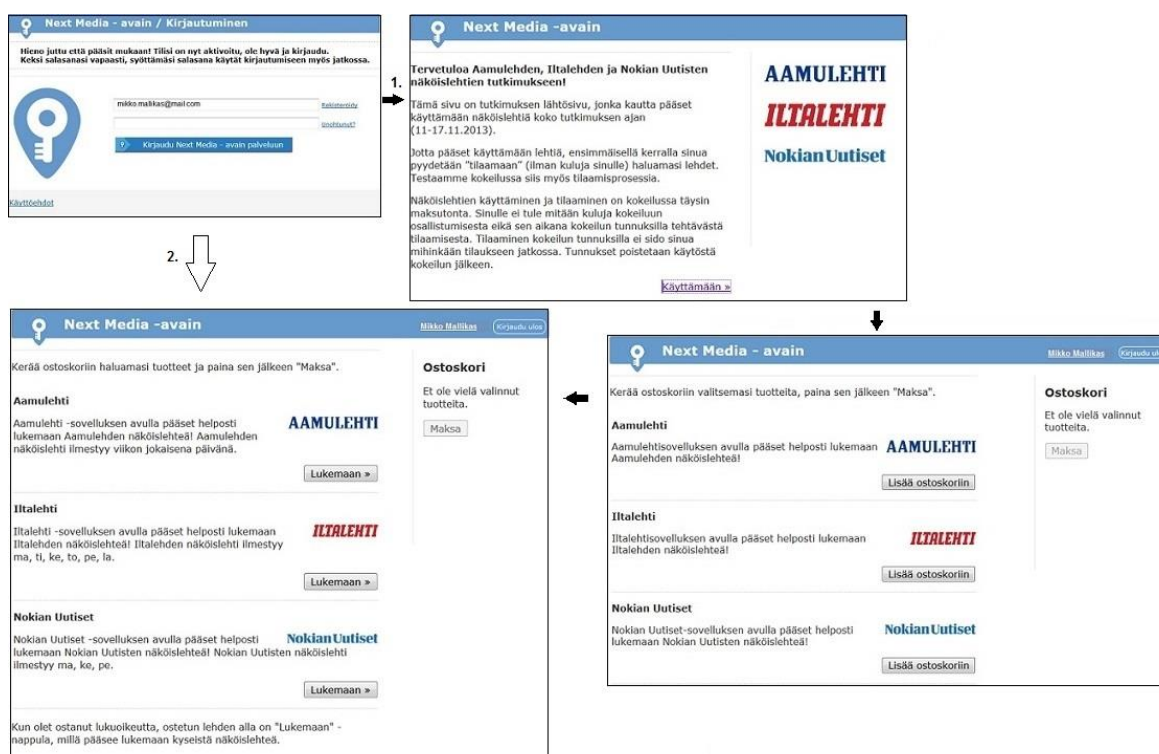


Figure 38. Navigation of the Next Media –key from logging in (for the first time follow path no.1, otherwise no. 2) to the main page.

6.1.6 Test environment

The users used their own computers (either laptops or desktops, or both) for one week in their daily life. Majority of the users (60 %, $n = 15$) ordered all three of the digital replicas offered for this study (Aamulehti, Iltalehti, Nokian Uutiset).

Digital replicas ordered via the Next Media –key – 12/15 of the users ordered the Aamulehti, same amount ordered the Iltalehti and the Nokian Uutiset was ordered by 14/15. 9/15 ordered all three of the offered digital replicas (AL, IL and NU), 2/15 ordered two of the three digital replicas (AL and NU, IL and NU), 1/15 ordered only Nokian Uutiset and 1/15 ordered AL and IL. **Digital replicas read** - Both the AL and the IL were read the most (26 %, $n = 73$ [altogether the whole week]), then all three of them (AL, IL, NU; 22 %), and then only IL (21 %). Some read only AL (12 %, $n = 73$).

The browsers used in users' computers according to the background questionnaire were Mozilla Firefox (29 %, $n = 17$), Internet Explorer (18 %) or Google Chrome (18 %).

The study was conducted in the middle of November (11.-17.11.2013). In this time frame the users were casually working. At any point users could ask with email or telephone about the research if they had any questions or problems concerning the research.

6.2 Results

In this chapter there are results of user experience of the digital replicas and authentication method also known as the Next Media –key, and the measured dimensions of the context of use.

6.2.1 The digital replicas

In this chapter there are results about the user experience of the digital replicas during and after the usage period.

USER EXPERIENCE OF THE DIGITAL REPLICAS AFTER THE USAGE

Here are the results of Final reading experience, Affect, Pragmatic, Hedonic and overall quality and UX pragmatics of the digital replicas after the usage period. 15 of the users answered to these if otherwise is not said.

Most pleasant digital replica – The Aamulehti and the Iltalehti were equally the most pleasant ones while the Nokian Uutiset was the least pleasant one.

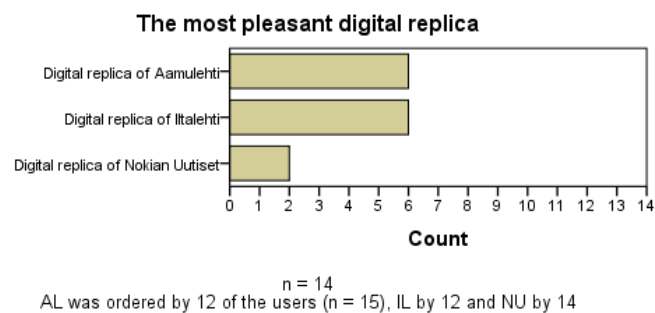


Figure 39. The most pleasant digital replica of the newspapers.

Final reading experience – All the digital replicas provided similarly pleasant reading experience while it can still be improved. After the usage period the digital replicas were evaluated to have given quite positive reading experience on the users (Figure 40).

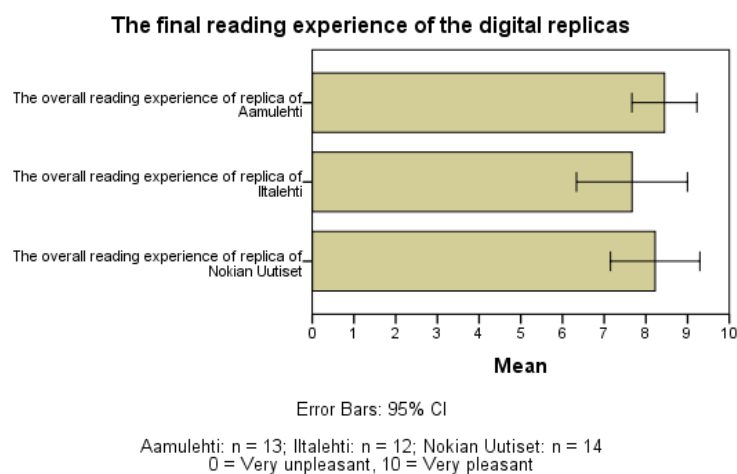


Figure 40. The reading experience of the digital replicas after the usage period.

Affect – The digital replicas provided positive affect on users but it can still be improved. The digital replicas provided slightly more positive and almost never negative affect on the users. Overall mean values reflect positive affect (Mean 4.6-5.5) with relatively large individual differences (SD 1.06-1.56) and negative affect (Mean 1.0-1.9) with relatively small individual differences (SD 0.00-0.92). See Table 42 and Figure 41.

Table 42. The affect of the digital replicas after the usage period.

Scale (items)	Cronbach's α	Mean	SD	Min	Max
Positive affect (5)	0.783	5.1	0.95	2.80	6.40
Negative affect (5)	0.704	1.5	0.48	1.00	2.40

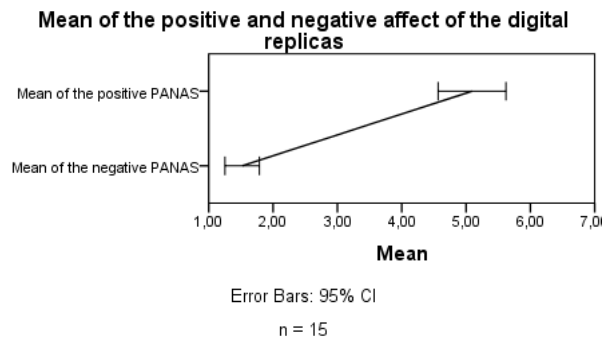


Figure 41. The positive and negative affect of the digital replicas after the usage period.

PQ, HQ, Overall Q – The digital replicas provided positive user experience but it can still be improved. The digital replicas provided slightly positive experience to the users. Cronbach's $\alpha > 0.6$ after removing the PQ3 (Unpredictable - Predictable) from the analysis. Overall mean values in all measured dimensions reflect positive experience (Mean 4.6-5.6) with relatively large individual differences (SD 0.73-1.28). See Table 43 and Figure 42.

Table 43. PQ, HQ and Appeal of the digital replicas after the usage period.

Scale (items)	Cronbach's α	Mean	SD	Min	Max
PQ (3)	0.869	5.3	0.73	4.00	6.67
HQ (4)	0.638	4.9	2.75	2.75	6.50
Appeal (2)	0.906	5.2	1.16	3.00	7.00

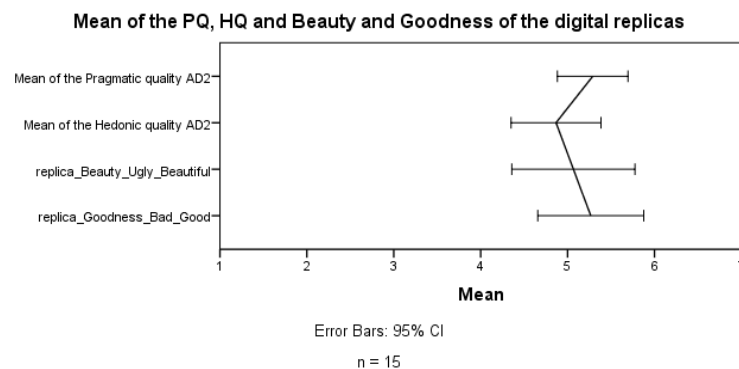


Figure 42. PQ, HQ and Overall Q of the digital replicas after the usage period.

UX pragmatics – The digital replicas were experienced on the same level, being similarly good in *disorientation*, *ease of use*, *usefulness of content*, *functionality*, *continued usage*, *user interface design* and *satisfaction* having still room for improvement. Cronbach's $\alpha > 0.5$ when Accessibility (“the digital replicas were accessible for reading” and “the digital replicas had high speed of loading”), UC1 (“The digital replicas offer unique content”), F3 (“The features of these digital replicas enable me to access the content I need”) and UID3 (“Overall user interface of these digital replicas is satisfactory”) was removed from the analysis. Overall the mean values reflect positive pragmatic experience in all measured dimensions (Mean 4.4-6.3) with relatively large individual differences (SD 0.82-2.15). See Table 44 and Figure 43.

Table 44. UX pragmatics of the digital replicas after the usage period.

Scale (items)	Cronbach's α	Mean	SD	Min	Max
Disorientation (7)	0.565	5.7	0.82	4.14	7.00
Ease of use (4)	0.612	5.4	1.15	3.00	7.00
Usefulness of content (2)	0.591	6.1	0.87	4.00	7.00
Functionality (3)	0.710	5.2	1.40	1.67	7.00
Continued usage (2)	0.847	4.9	1.56	1.50	7.00
User interface design (2)	0.711	5.4	1.19	2.50	7.00
Satisfaction (3)	0.831	5.5	1.47	1.67	7.00

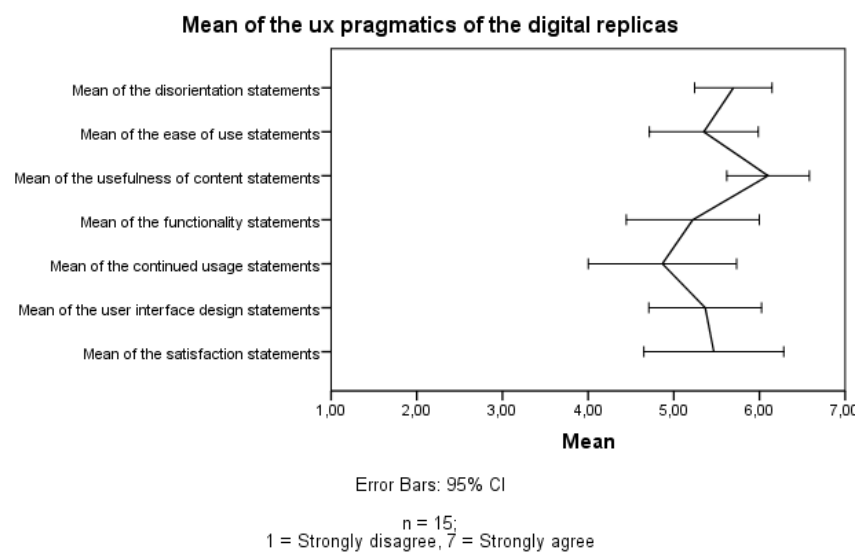


Figure 43. UX pragmatics of the digital replicas after the usage period.

Content of the digital replicas – After the usage the content of all the newspapers during the study were considered as interesting and timely, the AL and the NU was also necessary, useful and local, the AL and the IL was global, the AL domestic and the IL was ample. Only answers > 30% of the users are included. The content of the AL was interesting (92%, n = 12), necessary (83%), useful (50%), timely (83%), local (58%), domestic (50%) and global (33%). The content of the IL was interesting (83%, n = 12), global (50%), timely (42%) and ample (42%). The content of the NU was considered interesting (62%, n = 13), necessary (54%), timely (62%), useful (39%) and local (100%).

In conclusion the user experience of the digital replicas provided similarly pleasant reading experience, all in all positive affect on users, slightly positive pragmatic, hedonic and overall quality, and they were clear, easy to use and satisfactory while having useful content. However there is room for improvement. The content of the digital replicas were considered as interesting and timely.

USER EXPERIENCE OF THE DIGITAL REPLICAS DURING THE USAGE

Here are Overall reading experience, Affect, PQ, HQ and Overall Q of the digital replicas during the usage period.

Overall reading experience – The overall reading experience during the week was slightly pleasant but can still be improved. Overall mean values throughout the usage period reflect pleasant reading experience (Mean 6.5-7.8) with relatively large individual differences (SD 1.16-3.30). See Figure 44.

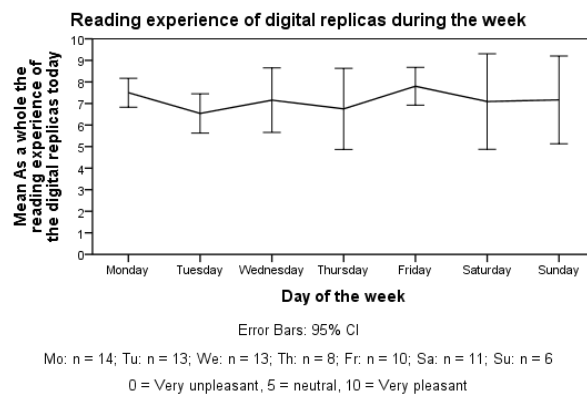


Figure 44. Reading experience of the digital replicas during the week.

Affect – The digital replicas had slightly more positive and almost never negative affect on the users throughout the usage period, and the experience changed over time. Overall mean values reflect positive affect (Mean 3.4-5.5) with relatively large individual differences (SD 0.84-2.04) and negative affect (Mean 1.2-2.6) with relatively large individual differences (SD 0.42-1.94) throughout the usage period. In addition the results show tendency towards the end of the period that the affect become better (positive affect increased and negative affect slightly decreased). See Table 45 and Figure 45.

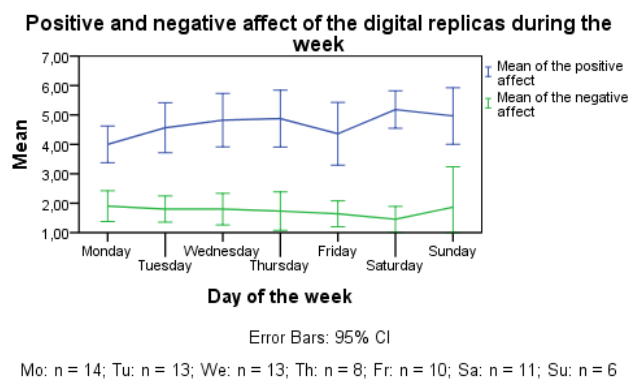


Figure 45. The positive and negative affect of the digital replicas during the usage period.

Table 45. The positive and negative affect of the digital replicas during the usage period.

Scale (items)	Cronbach's α	Day of the week	Mean	SD	Min	Max
Positive affect (5)	0.904	Mo	4.0	1.08	1.60	6.20
		Tu	4.6	1.40	1.60	6.20
		We	4.8	1.50	1.20	7.00
		Th	4.9	1.12	3.40	6.20
		Fr	4.4	1.49	1.00	6.20
		Sa	5.2	0.95	3.20	6.40
		Su	5.0	0.92	4.00	6.20
Negative affect (5)	0.766	Mo	1.9	0.91	1.00	4.00
		Tu	1.8	0.74	1.00	3.40
		We	1.8	0.89	1.00	3.20
		Th	1.7	0.78	1.00	3.00
		Fr	1.6	0.62	1.00	3.00
		Sa	1.5	0.65	1.00	2.80
		Su	1.9	1.31	1.00	4.00

PQ, HQ and Overall Q – The digital replicas provided slightly positive user experience which can still be improved and the user experience changes over time. Cronbach's $\alpha > 0.6$ after removing PQ3 (Unpredictable - Predictable) from the analysis. Overall mean values in all measured dimensions reflect positive experience (Mean 3.9-5.7) with relatively large individual differences (SD 0.82-1.70) throughout the usage period. In addition towards the end of the period the PQ, HQ and Appeal of the digital replicas got better. See Table 46 and Figure 46.

Table 46 The PQ, HQ and Overall Q of the digital replicas during the usage period.

Scale (items)	Cronbach's α	Day of the week	Mean	SD	Min	Max
PQ (3)	0.608	Mo	4.6	0.82	3.33	6.00
		Tu	4.8	0.94	3.67	6.33
		We	4.9	0.62	3.67	6.33
		Th	5.3	0.77	4.00	6.33
		Fr	5.0	0.78	3.67	6.00
		Sa	5.2	1.39	2.33	7.00
		Su	5.2	1.00	4.00	7.00
HQ (4)	0.752	Mo	4.4	0.65	3.50	5.75
		Tu	4.5	0.74	3.50	6.25
		We	4.7	1.04	2.75	6.25
		Th	4.9	1.03	3.75	6.50
		Fr	4.8	0.83	3.00	6.00
		Sa	5.3	1.33	3.00	7.00
		Su	5.2	1.10	3.75	7.00
Appeal (2)	0.859	Mo	5.0	0.71	4.00	6.00
		Tu	4.7	1.23	2.50	7.00
		We	5.2	1.11	3.00	7.00
		Th	5.1	1.25	3.00	7.00
		Fr	5.1	1.13	2.50	6.00
		Sa	5.3	1.33	3.00	7.00
		Su	5.4	0.92	4.50	7.00

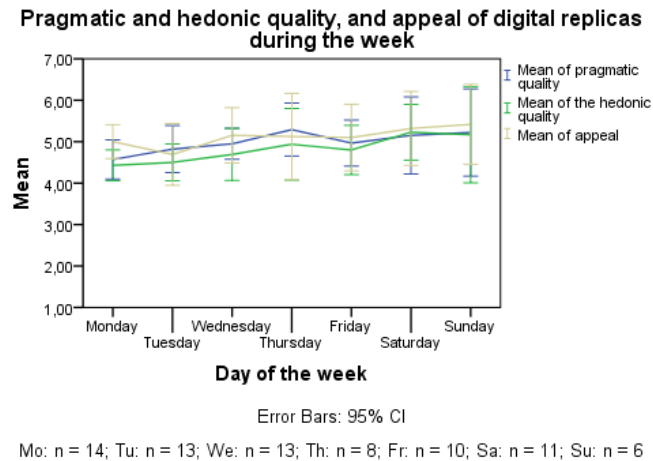


Figure 46. PQ, HQ and Overall Q of the digital replicas during the usage period.

In conclusion the overall reading experience of the digital replicas was pleasant and they provided positive affect on users having also positive pragmatic, hedonic and overall quality throughout the usage period. However these values were only slightly positive and improvements to the digital replicas could still be done. On the other hand the digital replica of the Nokian Uutiset was chosen as the most unpleasant one of the three. In addition the affect, pragmatic and hedonic quality and appeal of the digital replicas seemed to slightly increase over time.

COMPARISON BETWEEN THE STARTING AND ENDING POINT IN DIGITAL REPLICAS

In this chapter the results from Overall reading experience, Affect, Pragmatic, Hedonic and Overall quality of the digital replicas are compared between the first and the last day of the study week (Monday vs. Sunday) so that if there is some kind of development in the UX of the digital replicas over time, it could be seen.

Table 47. Differences in the UX of the digital replicas between the starting and the ending point of the study 2.

	Mean overall reading experience (scale 0-10)	Mean positive affect (scale 1-7)	Mean negative affect (scale 1-7)	Mean pragmatic quality (scale 1-7)	Mean hedonic quality (scale 1-7)	Mean appeal (scale 1-7)
Digital replicas	Su-Mo: 7.2-7.2= 0.0	Su-Mo: 5.0-4.0= 1.0	Su-Mo: 1.9-1.9= 0.0	Su-Mo: 5.2-4.6= 0.6	Su-Mo: 5.2-4.4= 0.8	Su-Mo: 5.4-5.0= 0.4

In summary the measured dimensions of the user experience (UX) seemed to slightly increase when comparing the starting and the ending point of the study week. The increase in the case of digital news was between 0.0-1.0.

IMPRESSIONS OF THE DIGITAL REPLICAS

Altogether the answers could be divided into four categories: *Appearance*, *Content*, *Technical problems* and *Ordering*. Majority of the users interviewed had ordered all three of the digital replicas in the study.

“The fact exactly for example that with computer I think it [most pleasant digital replica: IL] was clearer immediately: the text was clearer and handling it was easier than for example in the AL.” –Female, 66

” -- I haven’t read NU for a long time so it was in principle quite nice experience to read local newspaper for a change. --” –Male, 32

Table 48. Final impressions of the digital replicas.

CATEGORY	COMPONENT	DEFINITION (examples)	Frequency ($\geq 3/6$)
Appearance	<i>Clear</i>	The texts in the digital replica (IL, AL, NU) were clear and easy to read. The digital replica was clear overall.	3/6
Content	<i>Local news pleasant</i>	It was nice experience to read local newspaper after a while. The digital replica (NU) offered a lot when it dealt with people you know. Local news are more interesting.	3/6
Technical problems	<i>Trouble-free IL</i>	The digital replica of Iltalehti had nothing unpleasant while using it, participants did not have troubles or problems with it. It was okay as technical aspect of UX.	3/6
	<i>No technical problems</i>	Participants had no technical difficulties or problems while trying to access the digital replicas during the study.	3/6
Ordering	<i>Ordered all three</i>	All of the three offered digital replicas (AL, IL, NU) were also ordered in the study by these participants.	5/6

In summary the appearance of the digital replicas was clear and local news in them was experienced pleasant. Users had no technical problems while using digital replicas and especially IL was experienced trouble-free. In conclusion the digital replicas were clear and troublefree, and local news is enjoyable.

6.2.2 The Next Media –key

In this chapter there are results about the first experiences of the Next Media –key (taking it into use and ordering digital replicas with it), the user experience of using the NM –key and logging with it during the usage period, overall UX afterwards and users’ final impressions about the NM –key and its future usage possibilities.

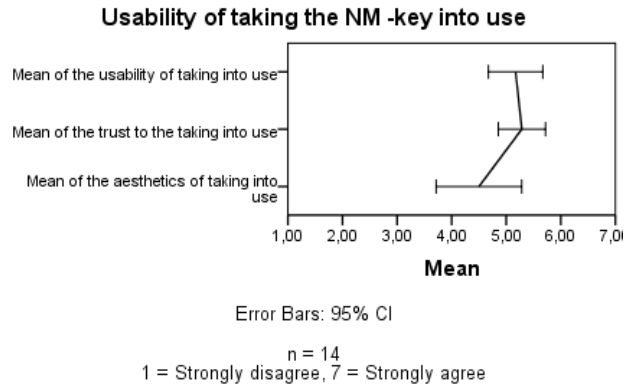
TAKING THE NM –KEY INTO USE AND ORDERING WITH IT

On the first day of the usage users got a username for the NM –key in order to take it into use and order digital replicas (without a fee) with it.

Taking the NM –key into use – The taking the Next Media –key into use process has slightly positive usability. It was slightly positive in *usability*, *trust* and *aesthetics* but having still room for improvement. Overall the mean values reflect positive usability in all measured dimensions (Mean 4.5-5.3) with relatively large individual differences (SD 0.75-1.36). See Table 49 and Figure 47.

Table 49. The usability of taking the NM –key into use.

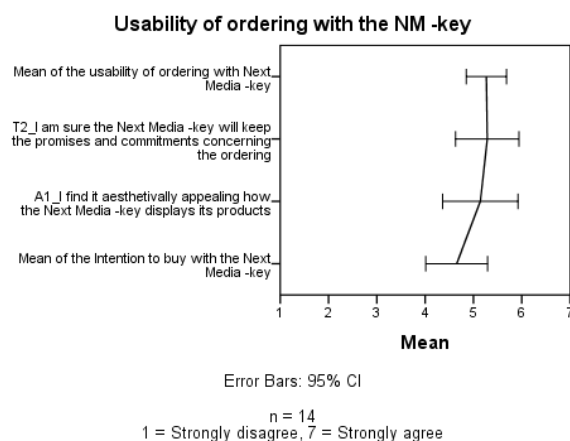
Scale (items)	Cronbach's α	Mean	SD	Min	Max
Usability (5)	0.500	5.2	0.87	3.40	6.80
Trust (3)	0.166	5.3	0.75	4.33	6.67
Aesthetics (2)	0.693	4.5	1.36	1.50	6.50

**Figure 47. Mean of the usability of taking the NM –key into use.**

Ordering with the NM –key – The ordering with the Next Media –key has slightly positive usability. It is slightly positive in *usability*, *trust*, *aesthetics* and *intention to buy* but having still room for improvement. Overall the mean values reflect positive usability in all measured dimensions (Mean 4.7-5.1) with relatively large individual differences (SD 0.72-1.35). See Table 50 and Figure 48.

Table 50. The usability of ordering with the NM –key.

Scale (items)	Cronbach's α	Mean	SD	Min	Max
Usability (5)	0.342	5.3	0.72	4.20	6.40
Trust (1)	-	5.3	1.14	3	7
Aesthetics (1)	-	5.1	1.35	3	7
Intention to buy (3)	0.684	4.7	1.11	1.80	5.93

**Figure 48. Mean of usability of ordering with the NM –key.**

In conclusion this means that the first experiences with the Next Media –key (taking it into use and ordering with it) were good in usability: users trusted it, felt it aesthetically appealing and could buy with it also later on. However, these values can still be im-

proved and ratings for some items indicate that communication of the concept, data usage and more versatile features for the Next Media –key than in this study need to be paid attention to.

AFTER THE USAGE: UX PRAGMATICS OF THE NM –KEY

After the usage of the Next Media –key the final questionnaire took place with its questions about using it for reading the digital replicas.

UX pragmatics – The Next Media –key provided slightly positive pragmatic experience on the users. It was slightly positive in *disorientation*, *ease of usage*, *functionality*, *continued usage* and *satisfaction* but having still room for improvement. Overall the mean values reflect positive pragmatic experience in all measured dimensions (Mean 4.1-6.3) with relatively large individual differences (SD 0.82-2.26). See Table 51 and Figure 49.

Table 51. UX pragmatics of the NM –key after the usage period.

Scale (items)	Cronbach's α	Mean	SD	Min	Max
Disorientation (2)	0.867	6.0	1.39	2.50	7.00
Ease of use (2)	-0.552	6.3	0.62	5.00	7.00
Functionality (3)	0.872	5.1	1.79	1.00	7.00
Continued usage (2)	0.912	4.9	1.77	2.00	7.00
Satisfaction (2)	0.448	4.4	1.62	1.50	6.50

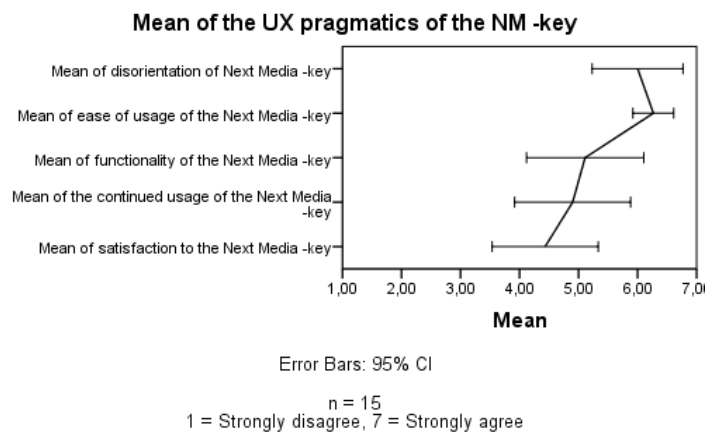


Figure 49. Mean of the UX pragmatics of the NM –key after the usage period.

Recommendation – Users would also recommend the Next Media –key to their family and friends (73% agreed [The 7-point scale was combined as follows: 1-3 disagreed, 4 neutral, 5-7 agreed], n = 15).

In conclusion the Next Media –key was clear, easy to use and functioning. Users would use it in the future and recommend to their friends and family. It was also satisfactory and users could continue its usage afterwards. However these values can still be improved.

OVERALL UX OF USING THE NM –KEY AND LOGGING DURING USAGE

In the daily questionnaires the smoothness of logging in with the Next Media –key and its overall user experience was measured. In summary using the Next Media –key was experienced pleasant, easy and fast, and the logging went smooth.

Throughout the usage the **logging in** was experienced trouble-free (Mean 1.5-1.7, SD 0.51-0.61).

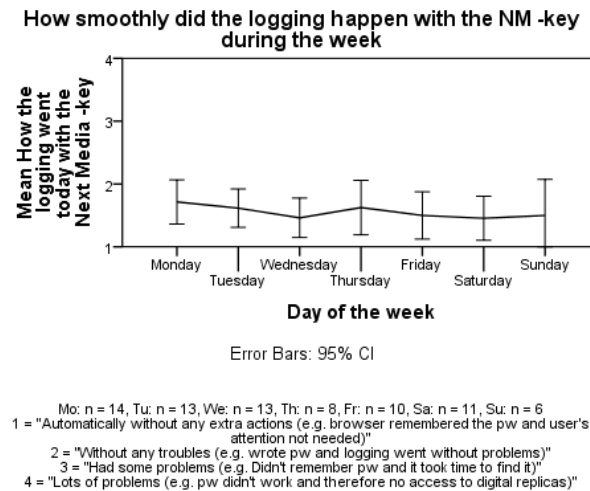


Figure 50. Smoothness of logging in with the NM –key during usage.

The usage was experienced **pleasant** (Mean 7.2-8.6, SD 1.13-2.93), **easy** (Mean 7.4 – 9.4, SD 0.70 – 2.59) and **fast** (Mean 6.9 – 9.4, SD 0.70 – 3.46).

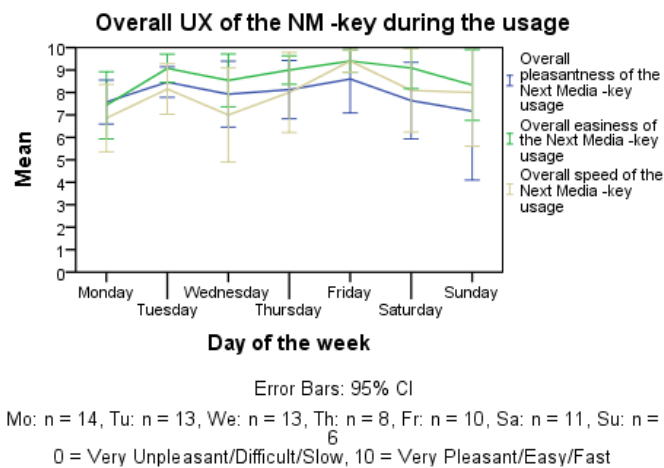


Figure 51. Overall UX of the NM –key during the usage period.

COMPARISON BETWEEN THE STARTING AND ENDING POINT IN THE NM-KEY

In this chapter the results from the overall smoothness and overall UX (pleasantness, easiness and speed) are compared between the first and the last day of the study week (Monday vs. Sunday) so that if there is some kind of development in the UX over time in the Next Media -key, it could be seen (Table 52).

In summary smoothness of logging, easiness and speed in using the Next Media -key improved over time. The smoothness increased by 0.2. The overall easiness in-

creased 0.7 and the speed 0.9. However the overall pleasantness of the NM –key decreased 0.2.

Table 52. Differences in the overall UX of the NM -key between the starting and the ending point of the study 2.

Mean of the smoothness of logging in (scale 1-4, reversed so that now 4 means the trouble-free)	Mean of the overall pleasantness (scale 0-10)	Mean of the overall easiness (scale 0-10)	Mean of the overall speed (scale 0-10)
Su-Mo: 3.5-3.3 = 0.2	Su-Mo: 7.2-7.4 = -0.2	Su-Mo: 8.3-7.6 = 0.7	Su-Mo: 8.0-7.1 = 0.9

NM –KEY IN THE FUTURE

After the usage impressions about what the NM –key could be like in the future was asked. In summary the users felt that the Next Media –key has more benefit than harm (100% agree [11-point likert scale combined as follows 0-4 disagreed, 5 neutral, 6-10 agreed], $n = 15$) and the media products from different media companies are welcome when users have the control over the collecting and sharing their own information and usage information as well as over getting recommendations for media products.

Ordering and using media products from different media companies with the NM -key – Overall these features were found very positive. Ordering sounded *Easy* (87%, $n = 15$), *Practical* (73%), *Clear* (53%) and *Simple* (67%), and Using sounded *Easy* (93%), *Practical* (60%), *Fast* (67%) and *Simple* (73%). All in all the positive adjectives got 100% out of the given 58 votes in both cases.

Collecting and sharing user information between media companies via the NM -key – All in all this was not liked by the users but they could also see benefits in it. It sounded *Bad* (40%, $n = 15$), *Practical* (40%), *Untrustworthy* (33%) and *Disturbing* (27%). All in all the negative adjectives got 59% out of the given 41 votes. In additional users personal information (e.g. name, email and payment data) should not be shared (73% agreed [combined values 5-7 out of the scale 1-7]). However users felt that collecting the usage information has overall more benefit than harm (60% agreed [combined values 6-10 out of the scale 0-10]).

Media product recommendations based on usage habits of the NM -key – Overall recommendations are acceptable if users have control over them. It sounded *Practical* (33%, $n = 15$), *Felt anxiety* (27%), *Disturbing* (27%) and *Interesting* (27%). All in all the negative adjectives got 58% out of the given 31 votes. The users felt that media products recommendations should not be based on collected usage habits data (67% agreed [combined values 5-7 out of the scale 1-7]) but they want to affect the recommendations given (73% agreed). In additional recommendations of media products with fee are not wanted (60% agreed) as well as free ones (47% agreed). However the users felt that media products recommendations have more benefit than harm (53% agreed [combined values 6-10 out of the scale 0-10]).

IMPRESSIONS OF THE NM –KEY AND ITS FUTURE

Altogether the answers could be divided into four categories: Usage of the NM –key, Future usage of it, Sharing personal info and Media product recommendations. See the table of the results in Appendix D.

“As I said it [Ordering process] was like walking in the streets: normal day in Internet in my point of view. – Actually of course the selection of the products was narrower but I would even say it was clearer than many net shops so as I said it was the most functioning parts in this whole thing. ” –Male, 32

Using the key - The Next Media –key was trouble-free (4/6) and simple (4/6) to use, overall it functioned (3/6) and users saved the username and/or the password to the memory of the browser (3/6). Taking the Next Media –key into use was trouble-free (3/6) as well as ordering the digital replicas with it (6/6).

“It [A possibility to buy products from different media companies with same username] is quite okay. Yes, it should include all the media companies then.” –Female, 51

Future usage of the NM -key – The users thought that all media companies should be included to it (6/6). There should be one clear Internet address for managing the orderings with it (4/6) but the idea of just one user authentication (in different web sites of media products) is also good and easy (3/6). It should also have some money storage like PayPal in it for cases when ordering media products in suspicious places (3/6).

“It [Sharing users’ personal info between media companies] might not have any obstacles unless the phone sellers are phased out because I have a bad feeling. – I understand advertising and else but it [answering some other questionnaire] caused flood of spam. --” – Male, 42

Sharing usage info - cannot cause spam (4/6). There should be clearly said who got access to it (3/6) and permission for marketing is needed from the user (3/6).

“I would not want it [recommendations] into email. Yes I perhaps prefer it on the [NM -key]site” – Male, 38

Media product recommendations – The users do not want recommendations via email (5/6) but they could be provided in the Next Media –key profile (the web site users log in for the content of the key). They also thought that recommendations based on automatic profiling of usage habits is better than the recommendations based on the user’s choices of interest in his/her profile (4/6), or the recommendations should be based on both: automatics and user’s choice of interests because they both have good qualities (4/6). In addition the user’s choice of interest has also good sides when affecting on recommendations (3/6)

In summary using the Next Media –key was experienced trouble-free. In the future more than one media company should be included in it and the Next Media -key should

have one clear web address for managing e.g. the ordered digital replicas, as well as it should be offered in different web sites of different media companies as one impression for logging in. In addition the future payment process of the Next Media -key should have one option like PayPal. Sharing the personal information of the user is acceptable when it does not cause spam and user has control over the marketing as well as can clearly see who got access to the information. Media product recommendations belong to the sites of the Next Media -key, not via email. Users want that the recommendations are based both on automatics and their own choice of interests, in the profile of the Next Media -key.

6.2.3 The context of use

In this chapter there are results about the measured dimensions of the context of use during the usage period of the Next Media -key and the digital replicas, and overall news reading impressions and evaluations.

DURING THE USAGE PERIOD

Here are presented the results about the context of use during the usage period asked in the diaries. Note that the answers from the whole week are combined together so that there are same users multiple times in the results, and also that in some sections there was no appropriate answer offered for “not doing/reading/using this at all” (in Task context and Other sources for reading the content of the digital replicas) or the users did not know how to use it (Reading the content with other devices). Thus the amount of answers varied a lot between the subsections and that some of the questions may have lacked a proper answer which means that the results cannot be fully trusted (see “Discussion”).

Table 53. Reading the digital replicas: The context of use during usage period.

	AL	IL	NU
When	In the evening 25% In the morning 22%, n = 68	In the evening 32%, In the morning 31%, n = 71	At noon 19% In the evening 15 %, In the morning 11%, n = 62
Where	At home All 30% (n = 70), Both AL, IL 30%, Only AL 26 % At work All 27% (n = 22), Only IL 27%		
Social context	Alone 29 %, Spouse 26%, Colleagues 12%, n = 73 No interruptions 85 %, n = 72		
Task context (≥ 10 users mentioned)	<i>Just before:</i> ate breakfast/lunch etc. (15/26), used laptop computer (14/27), did nothing (12/37), worked (11/19) or read the print versions (10/12) <i>At the same time:</i> did nothing else (27/37), drank coffee/tea etc. (16/27), used laptop (15/27), worked (11/19) or ate breakfast/lunch etc. (10/26) <i>Right after:</i> watched TV (15/21) or worked (13/19)		
How	<i>What:</i> Only all the interesting articles 50 % (n = 74), most (22 %) or only a part of the interesting 20 % <i>How:</i> All or all what wanted at once 54 % (n = 74) or only a part of it without getting back to it later on 35 % No interruptions 80%, n = 75		
Other sources	Nowhere else: Both IL and NU 36% (n = 47), All 23%, NU 19% Print: AL 73% (n = 45), Both AL and NU 24% Web service: IL 69%, n = 26		
With other devices	Smart phone: IL 50% (n = 20), Both AL and IL 10% Tablet: AL 23% (n = 22), IL 23%, Both AL, IL 27% Only computer: IL 18% (n = 40), Both IL and NU 18%, Both AL and IL 15% On Monday: No smart phone 25%, no tablet 14%, only computer 23%, n = 40 (NB. The axis were on the other way around so that's the reason why Monday is separately [the amount of users includes both Monday, n = 9 and the rest of the week		

In summary – The digital replicas were read during daytime not at nights (between 10 pm – 5:00 am), either at home or at work. Mainly users read alone and only all the interesting articles at once without interruptions. Working, doing nothing else, eating, drinking, using laptop and watching TV were related to reading the digital replicas. In addition AL was also read as print, content of IL from its web service but NU nowhere else and a little the smart phone and tablet was also used for reading the content of the digital replicas.

OVERALL NEWS READING DESCRIPTIONS

The most mentioned ones are presented here (See more in Appendix E) but also the users' evaluations about how similarly they read news during this study comparing reading habits before. Also there is impression about the most pleasant source for reading the content of newspaper which was asked in the final questionnaire and in this analysis answers to questions “*With which device you prefer most to read digital replicas?*” and “*What sources you prefer the most for reading the content of newspaper?*”.

Devices – Smart phones and tablets are more used than computers on the road. Smart phones are also suitable for short news and on the other hand tablets are not with you always as well as computers (See Table 54).

Table 54. Impressions about different devices for reading digital news.

Component	Definition (examples)	Count
Smart phone (Note. One user had not used smart phone and thus n = 5)		
<i>Short news</i>	The smart phone suits well for reading short articles or just like one topic and its article. It is mostly browsing the news topics. The position with smart phone is bad for longer articles.	4/5
<i>On the road</i>	If you are in a train or bus the smart phone is your choice for reading news. If you are on the road going somewhere you read news with smart phone not any other device.	3/5
Tablet		
<i>Not with you</i>	Users are not yet used to taking the tablet with them. They rather take the smart phone and read more with it while on the road. Even though the tablet might be with you, you do not take it out of bag and read with it, you read rather with smart phone.	3/6
<i>On the road</i>	Users take the tablet with them abroad or when they are not travelling with their own car but public transport. Users do not take computer with them rather tablet and read news with it on the road. Tablet has 3G connection so they are very handy on the road. Tablet is always with you as well as smart phone.	5/6
Computer		
<i>Not with you</i>	Users do not take the computer with them on the road. Even though it is laptop it is on the same table all the time, not with you. Users take rather tablet than computer with them on the road.	3/6

In summary users read news with smart phones and tablets while they were on the road and less with computers which stayed and not come with them.

Publications – A digital replica of the print newspaper and a tablet downloadable application are the two ways users pleasantly read news (See Table 55).

Table 55. Impressions about different publications of news.

Component	Definition (examples)	Count
Digital replica		
<i>One of the most pleasant ways of reading news</i>	It is the second most pleasant ways of reading the content of newspaper. Digital replica and browser optimized version are together one of the most pleasant ways of reading news.	3/6

<i>Tablet downloadable application good</i>	Tablet downloadable application Users read the news from tablet downloadable application because it functions well and is fast. It is available and has easy access.	3/6
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In summary the digital replica, the browser optimized version and the tablet downloadable application are the most pleasant ones for reading the content of a newspaper.

Reading habits told by the users - Users read news alone during the breaks (Table 56).

Table 56. News reading habits told by the users.

Component	Definition (examples)	Count
<i>Reading during breaks</i>	News is read on breaks: e.g. while having lunch, or coffee (If the news are not read before or user does not order some newspaper which could be found in cafe).	3/6
<i>Reading alone</i>	Users were mainly alone while reading news. If there was someone else they would not read news at all then. In some cases colleagues might be present but not reading with them.	3/6

In summary the users told they had a break and were alone while reading news.

Reading according to the users' habits - All in all the users estimated they have read the AL according to their habits during the study but read more the web news of the IL and the NU. There were twelve statements with “yes”, “no” or “do not know” answer options in the final questionnaire and users themselves estimated changes (if any) occurred in their reading habits during the study.

Majority of the users read news according to their habits (67%, $n = 15$) during the study. The AL was read according to previous habits (87%, $n = 15$) while the IL (62%, $n = 13$) and the NU (54%, $n = 13$) were not. The AL's web news were estimated not being read more (60%, $n = 15$) or less (64%, $n = 11$) than before the study. Web news of the IL and the NU were estimated being read more (IL 47% $n = 15$, NU 57% $n = 14$) but not less (IL 82% $n = 11$, NU 91% $n = 11$) than before. Other newspapers' web news are not read more (62%, $n = 13$) or less (77%, $n = 13$). In summary this means that the study increased a little bit of users' readings of the IL and the NU but no the AL or other web news when comparing users' previous habits.

The most pleasant way of reading the content of newspaper is print (87%, $n = 15$) and the most unpleasant way is smart phone downloadable application (57%, $n = 14$) according to final questionnaire. The second most pleasant way is the tablet downloadable application (69%, $n = 13$) and the second most unpleasant is the digital replica (42%, $n = 12$), or the browser optimized version (31%, $n = 13$) which was also considered as neutral (39%). In summary users like to read the content of a newspaper as print or with tablet.

In conclusion - On the road smart phone and tablet are used for news reading and the pleasant publication to do so is the digital replica or browser optimized version of the newspaper and its tablet downloadable application. The users read news when being alone and having a break. During this study the users estimated that they had read slightly more web news of IL and NU compared their habits before but AL according them. In addition the users prefer to read the content of newspaper as print or with tablet.

6.3 Discussion

The goal of this study was to survey the user experience (UX) of the digital replicas and the authentication method for consuming them with the semi-long-term study. The results showed that digital replicas have acceptable, slightly positive UX with room for improvements but the users preferred the Aamulehti and the Iltalehti equally over the Nokian Uutiset. The Next Media –key, new, one username authentication for accessing multiple media products, got positive welcome and should be developed further in order to better its UX. However the users want to be in control over its future properties like advertising and sharing their personal and usage information between media companies.

The results showed that the overall UX of the digital replicas and the Next Media -key improved over the study week which indicates that surveying the UX over time matters. This was discovered and discussed also in the study 1 (see “Discussion”). In summary the results would be different if measured for example as cross sectional study, and changes in the UX over time are important when predicting its success on the markets (Karapanos et al. 2009, Kujala et al. 2011). The more specific reasoning can be seen in that chapter, it is not repeated here.

About the research method – Like in the first study (see “Discussion”) the semi-structured interviews and the diary like questionnaires including UX metrics like the AttrakDiff 2 short can be categorized successful for measuring the longer term UX because in summary then both the general and the more detailed level of the UX could be surveyed and thus the construct validity of the study is confirmed (related references: AllaboutUX 2014, Albert & Tullis 2013 p. 7, Bolger et al. 2003, Hartson & Pyla 2012 p. 378-379, Hassenzahl&Monk 2010, Jordan 2000 p. 159, Salminen 2013, Schaik 2012, Väättäjä 2014 p. 99). The more specific reasoning can be seen in that chapter, it is not repeated here. However to support the construct validity, the diary questionnaire in this study included a question about whether the users read the digital replicas today or not and only those who did were analyzed so that the UX of everyday consists of only relevant answers.

Notable is that because the digital replicas were measured as one there is not enough proof for saying anything for sure about the mutual order of their UX, but still their UX could be overall compared to the browser optimized versions in study 1. This was done for three reasons. Firstly because the focus in this study was more in the authentication method and consuming digital news via the Next Media –key than comparing almost identical executions of the digital replicas. Secondly because measuring them might have lengthened the diary questionnaire too much for users to bear especially because it seemed to be too long already (some of its parts were not filled properly, which is a symptom of this by Bolger et al. [2003]). Finally by doing this some idea about the user experience of reading the digital replicas for longer period of time could be studied and compared to the browser optimized versions studied earlier.

In addition the newspapers are quite different in their target audience which might cause some differences in their UX and it would be interesting to study in the future.

For example the Nokian Uutiset was praised in the interviews about its local news content which was liked to read for a change even though it was chosen the least pleasant one in the end. Basically the Aamulehti has also news from all over Finland while Iltalehti might be more about presenting the news in entertaining way. Could it be that users' familiarity with the genre affected the results (see also **Limitations** below about the selected user group)? Actually the UX was measured as once when the effect of the novelty of some of the newspapers used in the study disappeared but the users' experiences about the news content might be important to cover in future UX studies if for example it has some impact on users' preferences.

Still some problems existed with filling in the questionnaires which might have been due to lack of proper answer options or instructions and these needs to be taken care of in the future studies. "*Other*" or "*None of these*" were missing, for example in background questionnaire and the question about the place of reading news. Also in the analysis phase some confusion was caused by poor definition of "*using laptop*" in task context. Many people chose it and maybe because they read the digital replicas with laptop but the actual reason why this question existed in the questionnaire was to find out if the users did something else with the laptop at the same time or around the time they read the digital news. In the future studies either the guidance of the questionnaire or the word adjustments of the answer options should be considered more carefully.

Limitations – Unfortunately also in this study there was no time to go through and to analyze the collected log data but still the two different research methods (questionnaires and interview) gained results which support each other and thus confirms the validity and the reliability of the results. More reliable data about the UX is gained when more than one method is used (Olsson 2012 p. 29). Both the questionnaires and the interviews showed the same thing that the Next Media –key experiment has potential and together with the digital replicas they both had slightly more positive UX and this makes the results valid.

Considering the research questions there is no problem with the results but still part of the study might slightly be limited by the selected user group, because some differences in usage context part could be explained by that. Users were orderers of the Aamulehti (AL) with its digital package. So for example during the study the AL's content was read also from its print newspaper (ordered) but the Iltalehti's from the news web site because it was free of charge and they might not have had order for that print newspaper. Also users estimated that they had read slightly more the Iltalehti's and the Nokian Uutiset's news during the study week when compared to their earlier habits, perhaps because in study the digital replicas were offered for free and it was common among the users to pick all offered (5/6 interviewed).

In addition also here all the components of the UX were examined in order to find reasons behind the UX, but the user component was left out as the least important one. The data about the components were gathered similarly to study 1 (see "Discussion" for further details) so that reasons behind the UX of the digital replicas could be gained as explained in Roto et al. (2011). The user's information is the most difficult one to take

advantage of while trying to figure out the pleasantness of the digital replicas and which form of the digital news should be developed for the future so it was left out of this study without further examination.

To conclude the digital replicas are acceptable versions of the digital news having slightly more positive UX which improves over time. The one log in method for authenticating to access multiple media products (the Next Media –key) has potential and should be developed further as long as the users have control over it. In this study there were no remarkable limitations and the choices of research methods was a success.

7 SUMMARY OF THE RESULTS

In this chapter the results of the two conducted studies are summarized. In study 1 the semi-long-term user experience of the three different tablet versions (browser optimized) of the local newspaper were examined. In study 2 the semi-long-term user experience of the authentication method for ordering and using the digital replicas of the three newspapers was explored.

The user experience (UX) of the browser optimized versions for tablet and the digital replicas was slightly positive and thus they could be considered as acceptable forms of the digital news. In case of the tablet versions the Aalto University's browser optimized version of the Keskipohjanmaa –newspaper was discovered the best but also the UX of the tablet version made by the media company called the Keski-Pohjanmaan Kirjapaino Oyj was acceptable. The digital replicas of the Aamulehti and the Iltalehti newspapers were chosen equally as the most pleasant version while the digital replica of the Nokian Uutiset got a little less preferences from the users.

The UX of both of these forms of the digital news, and also the usability of the tablet browser optimized versions, could be improved significantly. The mean value of the overall reading experience was between 4.9 and 7.4 for the tablet browser optimized versions, and between 6.5 and 7.8 for the digital replicas in the scale 0-10. According to the heuristic evaluation the Metropolia University of Applied Science had the biggest amount the most serious usability issues but overall the biggest amount of the found usability issues belonged to the KPK's version.

The new authentication method for consuming multiple media products, the Next Media –key (NM –key), had quite positive UX even though it yet did not have much features to be evaluated. Its mean practical dimension of the UX varied between 4.1 and 6.3 after the week but during the week the pleasantness, the easiness and the speed varied between 6.9 and 9.4. The users see more benefit than harm in the future features planned to it (more media companies available, collecting and sharing users' information between media companies, advertisements based on users' habits) as long as they are in control.

Another significant discovery was the tendency of the UX to improve over time. In the beginning of the week both of these forms of the digital news and the NM -key were experienced slightly worse than in the last day of the week. For the tablet browser optimized version this increase varied between 0.0 and 1.5 (also some decreasing occurred, between 0.2-0.7), and for the digital replicas between 0.0-1.0 in the measured dimensions of the UX (the overall reading experience, the affect, the pragmatic and the hedonic quality and the appeal). The overall smoothness of the logging in, the easiness and the

speed of using the NM –key increased between 0.2-0.9 (the pleasantness decreased 0.2). Also when examining the graphs displaying the dimensions of the UX during the week the same increase could be seen in the shape of the curve throughout the week (See for example the pragmatic and the hedonic quality graphs of both of these forms of the digital news “Figure 32” and “Figure 46”).

8 DISCUSSION AND CONCLUSION

The goals for this thesis were first to clarify the ambiguity in the definitions of the UX and the digital news, secondly to examine how the digital news, more precisely the tablet browser optimized version and the digital replica, are experienced by the actual users in real life usage over a longer period of time, and thirdly to examine the users' experience of the novel one username authentication method (the Next Media –key) for ordering and consuming the digital replicas in real usage over a longer period of time.

8.1 Discussion

The two studies carried out in this thesis gave a recent view on the digital news reading over time in real context of use with actual users. They showed that all the tablet browser optimized version, the digital replica and the Next Media –key (NM –key) were acceptable with slightly positive user experience (UX). According to the users the Aalto's tablet version and the Aamulehti's and the Iltalehti's digital replicas were the most pleasant while the Next Media –key authentication method has potential but need to be developed further so that users are in control.

The Next Media –key was a novel idea in the area of the digital news but it got positive welcome from the digital news readers and the ideas for its development can be derived from the study 2 results. Usually different newspapers need their own authentication and perhaps even via their own website in order to access multiple digital news products, as presented in the "Summary of the theory and research questions" but via the Next Media –key digital news readers can access multiple digital news products only with one authentication. It was experienced easy and trouble-free to use but improvements could be done in the variety of features and overall UX. It should for example include more than one media company and have one clear web address for users to control their information and advertisements.

According to these studies the UX of the measured forms of the digital news and the NM -key slightly improved over the one week of usage. Both the tablet browser optimized version and the digital replica as well as the examined authentication method were experienced slightly better in the measured dimensions of the UX in the last day of the study week when compared to the first one, and the direction of the UX was increasing throughout all the days of the week from the start to the end. The digital replicas improved in all of the dimensions. Also the smoothness of logging in, the overall easiness and the speed of the NM –key improved over time but the overall pleasantness decreased. The tablet browser optimized versions had more or less both increase and

decrease in the results. Interestingly the Aalto's version changed overall the least and it was the most pleasant version by the users.

These results partly differ from an earlier study of Karapanos et al. (2009) where the quality of the experience decreased after the first week of use but note that these studies are not directly comparable. Karapanos et al. (2009) measured the semi-long-term quality of users' experience of iPhone with users who had no previous experience with iPhone or with any smart phone. They discovered that after the very first week the UX sharply decreased (Karapanos et al. 2009). In these studies the overall UX of the digital replicas only increased but the overall UX of the tablet browser optimized versions and the NM –key authentication method had also slightly decreases in some of the dimensions which remotely reminds about the study of Karapanos et al. (2009). However firstly the quality of experience differs from the UX by being only system-centric phenomenon while the UX consists of three components (user, system and context of use) (Jumisko-Pyykkö 2011 p. 32), thus Karapanos et al.'s (2009) study was not counted as actual earlier study ("Earlier UX studies about the digital news").

Secondly the external validity, because of the selection of the users, differs between these studies and the study of Karapanos et al. (2009). The selection of the users includes the amount of them and their previous knowledge about studied product, which affects the external validity (Jumisko-Pyykkö 2011 pp. 36-37). This also differed because Karapanos et al. (2009) had novice users, but in this study the users were relatively familiar with the newspapers from which the versions of digital news were made of and they also used the same devices they already owned and had used for reading the studied versions. Even though the Next Media –key was a novel authentication method for accessing the digital news, the basic idea behind it (the password authentication) has been used a lot in different kind of systems (Rhodes-Ousley 2013 p.187). Thus there was nothing remarkable new for users which would have distracted them from the UX evaluation. In conclusion the results could not be compared totally but interesting to notice and keep in mind for the future studies that measuring the UX over time matters.

Digital news readers still desire a traditional print newspaper and thus for the future of the digital news the browser optimized versions and the digital replicas are preferred. Three supporting results from these studies: 1) The Aalto's and the KPK's version were liked because their traditional newspaperly like appearance, 2) During the study weeks the news were also read from the print newspaper if read somewhere else than studied versions according to the users' reports in both studies, and 3) The most pleasant ways of reading news is the print newspaper, then the digital replica and the browser optimized version. The digital replica basically means the print newspaper in digital format so the resemblance is obvious and the browser optimized versions were liked when they reminded about the traditional newspaper as just stated from the study 1 results.

Preferring traditional newspaper is not a new phenomenon but surprising is that it still exists after huge developments in the area of information technology. In earlier studies Watters et al. (1996) resulted that traditional newspaper broadsheet format of electrical news (then also known replicated newspaper genre and in this thesis known as

digital replica, see “What is digital news?”) was the favored newspaper metaphor because it suited for the process of “reading news” better than its opponent www-window document metaphor (now known as news web service). In the middle of nineties the digital news emerged and since then they have become more and more common (Ihlström & Åkesson 2004). Even so that nowadays digital news is not only for home computers but also smaller devices like mobile phones thanks to the development of electronics, information and communication technologies (Shapira et al. 2009).

Even the digital news could be updated during the day users still read them only once a day and reason is unclear after these studies. Due to the immediacy characteristic of digital news they could be updated or modified at any time (Karlsson & Strömbäck 2010). It was discovered in both studies that users mainly read digital news once a day. There could be multiple reasons: 1) UX of the versions was not enough high, 2) Users want to read digital news similarly to traditional print news, just for example. Unfortunately this was not asked from the users or the log data was not analyzed in order to examine this further. However the digital replicas were not updated during the day because their execution: the day’s print newspaper is online in static format like PDF (Shapira et al. 2009). Thus naturally they are not read more often but the browser optimized version is not as strictly made as stated earlier (“The forms of the digital news used in this thesis”). However it is unclear if they were still kept the same for the day during the study, but still KPK’s version was read sometimes more often.

Earlier studies about the long-term UX of the digital news were mainly laboratory studies so now partly new perspective of the real life usage context was gained. There were no earlier long-term UX studies in the real context of use about the browser optimized version or the digital replica with or without the authentication, but five studies were still accepted for further examination: Althaus&Tewksbury (2002), d’Haenens et al. (2004), Ihlström&Lundberg (2002), Tewksbury&Althaus (2000) and Vaughan&Dillon (2006). The temporal context revealed that the digital news were read once a day and more usually in the mornings or when they had free time. This was not studied earlier due to the laboratory surroundings (“Earlier UX studies about the digital news”). Then in the physical context was discovered that place for reading news was chosen to be at home. Ihlström&Lundberg (2002) discovered that online edition of newspaper is read at home or at work which is similar to our findings but their study was not totally longitudinal because different users were measured in the different end of the time measured. Thus it was more like the cross sectional study, where the study is conducted between-subjects rather than within-subjects (Novick et al. 2012).

By studying the content of the newspapers used in the digital news forms in users’ point of view, the reasons behind their UX might have been revealed more throughout. User is one of the components of the UX so that studying it, the reasons behind experiences could be revealed (Roto et al. 2011). Users’ familiarity with the news content could be counted as properties of the user component. In both studies studying the users’ experiences of the news content would have given more answers about the preferred versions of digital news. About tablet versions it would have lightened up how bad-

ly the lack of content affected the overall UX and about the digital replicas how greatly the liked local news content would affect the overall UX if the versions would have been measured separately.

The results of this study can be used by the media companies by taking ideas for improving the usability and the user experience of their digital news products. For example Keski-Pohjanmaan Kirjapaino Oyj and Alma Media Oyj publish newspapers as print and in digital format. The former can take ideas for the tablet browser optimized version from the results of both the heuristic as well as the user evaluation in order to decide which version should be developed further in order to provide their newspaper the best way online. The latter can have suggestions for how to offer the Next Media – key to digital news readers so that they feel being in control and accept it as a way of purchasing and consuming media products.

To conclude the browser optimized versions and digital news could be improved by their user experience but they are what the digital news readers long for at least as long as the traditions from the print newspapers exists. The context of use of the digital news revealed new information about the digital news reading from the time point of view. The Next Media –key is looked forward to change the ways of consuming the digital news products after it has been developed further.

8.2 Evaluation of the study

The research methods included both qualitative and quantitative techniques. The main data gathering method was the diary questionnaires filled daily and as supplementary method the interview in the end of the study was used. Versatile methods like the daily and the final questionnaires and the final interview were used. Same questionnaires with multiple measures (e.g. PANAS, AttrakDiff 2 short, UX pragmatis, ASQ) were filled by all the users and the interviews were conducted by one and same person. The results from the interview were consistent with the results from the questionnaire analysis thus it indicated that the research methods were reliable, as was stated in “Discussion” and “Discussion” (study 1 and 2).

The long-term user experience (UX) in the area of the digital news is not studied that often especially not with longitudinal method which however is the most trustworthy method for measuring the long-term UX. Because the UX is understood as dynamic, differing depending on the time when measured (Hassenzahl & Tractinsky 2006), and it was measured so little in the field of the digital news earlier (chapter “Earlier UX studies about the digital news”) so the semi-long-term method was decided to be used in this thesis. By measuring the UX with longitudinal method (same users were monitored over time) could be sure that differences in the results were not caused by the interpersonal variation which might have happened if the cross sectional method was used instead (von Wilamowitz-Moellendorff et al. 2006, Karapanos et al. 2010). With other methods (repeated sampling and retrospective studies) there is risks like that time effects may not

be inferred or that only the reflection of the experiences is measured not the actual ones (Karapanos et al. 2010).

The reliability of these studies is confirmed by clear documentation and using multiple researcher reviewing the progress. By being transparent about the procedures and enabling replication by storing the collected and created data for future use, the reliability of a study could be ensured (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Väättäjä 2014 pp. 98-99). The procedure of the studies is documented here in very detailed level, for example the content of the questionnaires, interviews and other instructions are explained in the chapters “Research method” and “Data gathering methods” for others to review. Also the analyzing methods and results are presented so that anyone could follow. I also got help for research design and analysis phases of the study from the examiner and supervisor of this thesis so that I would not have too great impact on the results but they would be more reliable (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Väättäjä 2014 p. 99).

The studies could be considered sufficiently valid because construct, external, internal and ecological validity could be met. The first one is already dealt with in “Discussion” and “Discussion” (study 1 and 2). This study is mainly explorative by having natural experiments as class of experiment, which means that strong causal relationships between conditions and variables is not aimed and could not be done (Jumisko-Pyykkö 2011 p. 36). The class however enables to explore behavior in natural settings without visible elements related to observation like people or instrumentation (Jumisko-Pyykkö 2011 p. 36), and this was done by conducting the study in the real life without any special tasks which users needed to follow. Thus the ecological validity will be fulfilled because findings are applicable to natural settings and generalizable to the real world (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Väättäjä 2014 p. 100). The internal validity was ensured for example by using the same measurements (e.g. AttrakDiff 2 short and PANAS) throughout the study week in all questionnaires and by randomizing the order of the items of the measurements (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Väättäjä 2014 p. 100). External validity is in order because the study was not a controlled laboratory study but it was conducted in the very context where the digital news reading happens with the actual digital news readers (as described later on) so it is also valid beyond these studies (Dubois&Gibbert 2010 and Yin 2003 pp. 33-39 cited by Väättäjä 2014 p. 100).

Valid knowledge about the real life experiences and the context of use was gained by conducting the UX studies in the field so that the users had no special tasks to follow. Without any distractions caused by the researchers or behavior instructions like tasks given to the users for the study the error in the results could be minimized and actual data about the real experiences and usage context could be gained. This was done in both studies so that the users participated the study from their normal daily lives with instructions to not to change their news reading habits for the study week. The tablet versions were randomly but evenly divided to the users so that all three versions were used first and last. The users could order and consume as many of the offered three

digital replicas as they wanted so that the intended way of using the Next Media –key would be studied as well as possible.

The sample group had variety so the users cover the usual digital news readers sufficiently and the drop-out ratio was in within good limits, thus these studies have external validity. In both studies there were almost 20 randomly chosen participants quite equally distributed into different age groups of adulthood and into men and women. Familiarity with the newspaper and the reading device were recruiting criterias so that there would be only actual digital news readers not novices, which is one of part of participant selection (Albert & Tullis 2013 pp. 58-59). Users were also previous orderers of at least one (the Keskipohjanmaa and the Aamulehti) of the studied newspapers which means that they knew which kind of content to expect from the newspapers. The tablet versions' users also owned a tablet computer and the digital replicas' users owned a computer already so there was no learning to use anything but the studied versions which they basically were familiar with already. There existed only 3 drop-outs in both studies after the start. The total amount of the users who finished all the parts of the study could have been higher but considering the goals of these studies it was sufficient because for each distinct group (studied versions) there were more than 4 users as guided for formative study by Albert&Tullis (2013 p. 59), and the amount of data was not overwhelming as instructed by Courage et al. (2009).

Also the expert evaluation was conducted in valid and reliable way and it gave deeper understanding about the tablet versions usability from which the developers can benefit. Enough many usability experts (5) were used to cover the majority of the usability problems (Nielsen & Molich 1990). The severity ratings were given after all the usability issues were located which ensured the evaluators' focus to the differences between the findings and they worked independently without influence of others (Nielsen 1995). Same instructions, device and heuristic guidelines were used to ensure reliable results. The usability's qualities are mostly objective even though it is narrower than the UX (Salminen 2013). In the result tables the findings with comprehensive definitions or descriptions are provided in order to help the developers to repeat the problems and fix them.

To conclude in these semi-long-term studies the three components of the user experience (the user, the system and the context of use) were measured with sufficient accuracy so that the findings made could be considered reliable and valid. The research methods were comprehensive and successful. The participants covered mainly the digital news readers of today.

8.3 Summary and future work

The motivation behind this thesis was to clarify the ambiguity in the terminology of the user experience (UX) and the digital news and also to examine how the tablet browser optimized version, the digital replica and the Next Media –key authentication method are experienced in the real life by the actual users over a longer period of time. The defini-

tions and the methods are widely covered in the literature review and then two semi-long-term UX studies were conducted to gain knowledge about the user experience of the chosen versions.

The studies revealed the digital news readers' favorite versions, new information about their context of use and the future of the new authentication method for purchasing (one time as well as long-term ordering) and consuming digital news. Both the browser optimized versions and the digital replicas are digital news readers' favorite because the similarities to the traditional print newspaper. The Next Media -key has potential and should be developed further. The overall UX of these versions, and the usability of the tablet versions could still be improved even though UX increased over time. The temporal aspect of the digital news reading usage context revealed the newest viewpoints.

In future studies it would be interesting to continue studying the longer or the long-term UX of the digital news for several reasons. The finding about improving UX needs to be confirmed, reasons behind it clarified and consequences to users' preferences explored. Focus of the study more profoundly on the context of use would give useful information for developing the future of the digital news. Should the concentration of development be on all the forms of the digital news (digital replica, browser optimized version, news web service, downloadable applications for different devices, online news portals), or is one or two enough to cover demands and expectations? For which devices they should be executed (smart phone, tablet, laptop, desktop computer)? Finally a question raised in the discussions: Does the experience of the newspaper's content have an impact on the overall UX?

Interesting topics for the future UX studies of the Next Media -key (NM -key) are only arising together with the results of this study. The new UX studies would be relevant: 1) When more media companies of Finland are added to it, 2) when different kind of news products (newspapers, magazines, video clips etc.) are added if added, 3) when it is usable with more versatile devices (smart phone, tablet) if suitable, 4) when the advertisement mechanism recommending new media products to users is executed, 5) when the development is so far that NM-key's UX over time is relevant to measure again. Depending on the direction of its development after this study there could be several more topics to cover which are difficult to predict now.

To conclude this thesis presented today's understanding about the terms user experience and digital news. The semi-long-term UX studies of the three tablet browser optimized version and the three digital replicas was conducted together with an new option for authentication, the Next Media -key, and as conclusion they were all discovered acceptable and even preferable for future of the digital news. Still a couple of interesting topics for the future of UX studies of the digital news remain.

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APPENDIX A: STUDY 1 – GUIDANCE OF THE HEURISTIC EVALUATION, PART 1

Heuristinen arviointi – Ohjeistus

1. **Käy aluksi läpi alla oleva heuristiikkalista**, eli suunnittelun ohjenuorat, niin, että ymmärrät kunkin kohdan. Kysy, jos on jotain epäselvää!
2. Käy itsellesi tablettiversioiden käyttöliittymää läpi haluamallasi tavalla. **Käy kukin käyttöliittymä läpi vähintään kaksi kertaa**: ensimmäisellä kerralla tarkoituksena on saada yleinen käsitys järjestelmästä, ja toisella kerralla tarkoituksena on keskittyä erityisiin käyttöliittymäelementteihin ja kuinka ne sopivat kokonaiskuvaan.
3. Kun käyt käyttöliittymää heuristiikkalistan avulla läpi, kirjoitathan huomiosi ylös raportiksi (annettu sähköpostilla valmis malli, johon täydentää). **Kirjaamasi havainnot ovat siis epäkohtia versioissa, jotka jollain tavalla rikkovat jotain heuristista ohjetta!**
 - **Kirjoitathan ylös kaikki havainnot!** Liitäthän jokaisen havaintosi mielestäsi siihen parhaiten sopivaan heuristiikkaan (numeroon). Kaikkiin heuristiikkoihin ei välttämättä tule lainkaan havaintoja ja toisiin voi tulla useampiakin
4. Pyri arvioinnissasi olemaan niin yksityiskohtainen kuin mahdollista kuvailllessasi ohjeistusta rikkovia kohtia. **Listaa jokainen käytettävyyssongelma erikseen!**
 - **Osa havainnoista voi liittyä useampaankin heuristiikkaan**: 1) jos heuristiikat, joihin havaintosi liitit, vaikuttavat päällekkäisiltä, eli sisältävät samaa asiaa, listaa kummankin numero samaan havaintoon; 2) jos havaintosi sisältää kahden erilaisen heuristiikan osa-alueita: irrota ne omiksi kohdiksi havaintolistaan siten että eroavat heuristiikat saavat kumpikin osansa havainnostasi!
5. Tarkoituksena on siis arvioida jokainen Keskipohjanmaa-lehden tablet-versio (3 kpl) erikseen omana kokonaisuutena mobiililaitteille ja -sovelluksille tarkoitettun suunnitteluohjeistuksen avulla. **Avaa versiot Safarilla**.
 - A. [http://tablet.kp24.fi \(käyttäjätunnus, salasana\)](http://tablet.kp24.fi (käyttäjätunnus, salasana))
 - B. [http://media.tkk.fi/nextmedia/keskipohjanmaa/ \(käyttäjätunnus, salasana\)](http://media.tkk.fi/nextmedia/keskipohjanmaa/ (käyttäjätunnus, salasana))
 - C. [http://ereading.metropolia.fi/reader/ \(käyttäjätunnus, salasana\)](http://ereading.metropolia.fi/reader/ (käyttäjätunnus, salasana))

HEURISTIIKAT

Heuristiikan numeron ja nimen jälkeen on vielä listattuna **esimerkkejä** aiheista tai asioista, joita kyseiseen heuristiikkaan voisi kuulua. Osassa on lisäksi kursivilla merkitty joitain apukysymyksiä hahmottamaan merkitystä.

1. **Järjestelmän tilan näkyvyys ja kannettavan laitteen löydettävyyys**
 - ✓ Kannettavan laitteen järjestelmän tulee aina pitää käyttäjän ajan tasalla tapahtumista.
 - ✓ Järjestelmän pitäisi asettaa viestit tärkeysjärjestykseen huomioiden kriittiset ja asiayhteyteen liittyvät tiedot, kuten akun ja Internetin tilan, ympäristöolosuhteet jne.
 - ✓ Koska kannettavat laitteet katoavat usein, on otettava huomioon esimerkiksi tiedon salaus menetysten minimoimiseksi.
 - ✓ Jos laite on kadonnut, joko laitteen, järjestelmän tai sovelluksen tulisi helpottaa sen löytämistä.
2. **Järjestelmän ja todellisen maailman yhteyks**
 - ✓ Mahdollista tiedon oikeanlainen tulkinta tarjoamalla se loogisessa järjestyksessä
 - ✓ Aina kun mahdollista, järjestelmän pitäisi pystyä tulkitsemaan ympäristöä ja mukauttaa tiedon esittäminen sen mukaisesti.
3. **Johdonmukaisuus ja kartoitus**
 - ✓ Käyttäjän käsitteellinen malli mahdollisista toiminnoista ja vuorovaikutuksista tulisi olla johdonmukainen asiayhteyden kanssa.
 - ✓ On erityisen tärkeää, että käyttäjän toimien/vuorovaikutuksien (laitteen nappien ja hallinnan kanssa) ja niihin rinnastettavien todellisten tehtävien (esim. navigoiminen todellisessa maailmassa) välillä on johdonmukainen ”kartoitus”.
4. **Hyvä ergonomia ja minimalistinen suunnittelu**
 - ✓ Kannettavien laitteiden tulisi olla helppoja sekä mukavia pidellä ja kantaa mukana. Lisäksi niiden tulisi olla kestäviä vaurioille (ympäristöllisistä tekijöistä johtuville).
 - ✓ Koska näytön todellinen tila on niukka mahdollisuuksiltaan, käytä sitä säästeliäästi.
 - ✓ Vuoropuhelut (dialogit) eivät saa sisältää asiaankuulumatonta tai harvoin tarvittavaa tietoa.
5. **Syötteen helppous, näytön luettavuus ja silmin havaitseminen**
 - ✓ Kannettavien järjestelmien tulisi tarjota helppoja tapoja syöttää tietoa, mahdollisesti vähentämällä, tai jopa välttämällä, tarvetta käyttää kahta kättä.
 - ✓ Näytön sisällön tulisi olla helposti luettavaa ja läpi navigoitavaa huolimatta erilaisista valaistusolosuhteista.
 - ✓ Ihannetilanteessa, käyttäjän pitäisi pystyä nopeasti saamaan kaikki kriittiset tiedot järjestelmästä vain vilkaisemalla sitä.
6. **Joustavuus, käytön tehokkuus ja personalisointi**
 - ✓ Salli käyttäjän räätälöidä/personalisoida (=tehdä tilaustyötä/henkilökohtaiseksi) tiheästi toistuvia toimintoja, kuten myös dynaamisesti konfiguroida (=”asettaa, määritellä”) järjestelmää asiayhteyden tarpeiden mukaan.
 - ✓ Aina kun mahdollista, tulisi järjestelmän tukea ja ehdottaa järjestelmäperustaista kustomointia (=muuttaa toiveiden mukaiseksi), jos sellainen olisi kriittistä tai hyödyllistä.
7. **Esteettisyys, yksityisyys ja sosiaaliset käytännöt**
 - ✓ Huomioi kannettavan laitteen ja järjestelmän käytön esteettisyys ja tunnepuolet.
 - ✓ Varmista, että käyttäjän tieto on yksityistä ja turvassa.
 - ✓ Kannettava vuorovaikutus järjestelmän kanssa pitäisi olla mukavaa ja kunnioittaa sosiaalisia käytäntöjä.
8. **Realistinen virheiden hallinta**
 - ✓ Turvaa kannettavien laitteiden käyttäjät virheiltilä.
 - ✓ Virheen sattuessa, auta käyttäjää tunnistamaan, määrittämään ja, jos mahdollista, palautumaan siitä.
 - ✓ Virheilmoitusten pitäisi olla yksinkertaisia ja tarkkoja, ehdotettava opettavaisesti ratkaisua (joka voi sisältää vihjeitä, UKK (=usein kysytyt kysymykset) jne.)
 - ✓ Jos virheelle ei ole ratkaisua, tai jos sillä olisi mitään vaikutus, mahdollista käyttäjälle sulava virheenkäsittely.
9. **Järjestelmän tilan näkyvyys ja palaute**
 - ✓ Järjestelmän tulee pitää käyttäjää ajantasaisesti informoituna nykytilasta ja tilan muutoksista.
 - ✓ Informoinnin tulee tapahtua tilanteeseen sopivalla tavalla.
 - ✓ Käyttäjän tulee saada palautetta siitä, että järjestelmä on hyväksynyt ja käsitellyt syötetyn tiedon.
10. **Yhdenmukaisuus ja navigointi**
 - ✓ Käyttöliittymäsuunnittelun tulee olla yhdenmukaista ja alustakonventioita (=alustatyyppiin yleisiä käytäntöjä) noudattavaa järjestelmän sisällä.
 - ✓ Navigointielementtien tulee olla selkeitä ja niistä tulee ilmetä näkymä, joka kyseisestä navigointielementistä avautuu.
11. **Informaation esittäminen ja muistikuorman minimointi**
 - ✓ Järjestelmän tulee käyttää käyttäjän kieltä ja käsitteitä teknisen slangin sijaan.
 - ✓ Järjestelmän tulee myös tukeutua jo opittuihin käsitteisiin ja/tai alustakonventioihin (= sovinainen tapa, käytäntö /kansainvälinen sopimus).
 - ✓ Järjestelmän tulee aistia ympäristö ja sopeuttaa informaation esitys sille sopivaksi.
 - ✓ Käyttäjää ei tule kuormittaa jo annetun tiedon muistamista järjestelmän muissa osissa.
12. **Käyttäjän hallinta, vapaus ja palautuminen**
 - ✓ Käyttäjän tulee tuntea, että hän kontrolloi järjestelmän toimintaa.
 - ✓ Laitteen tulee antaa käyttäjän kumota ja uusia tekemänsä toiminnot sekä tarjota hätäpoistumisteitä ei-halutuihin tiloihin.
 - ✓ Käyttäjän huomin siirtymässä pois järjestelmästä, järjestelmän tulee pitää tallella edellinen tila ja sallia käyttäjän palata siihen halutessaan.
13. **Virheiden estäminen, näyttäminen ja palautuminen**

- ✓ Käyttöliittymäsuunnittelun tulee minimoida virheiden esiintymisen mahdollisuus.
 - ✓ Mikäli virhetilanne on kuitenkin väistämätön, tulee virheiden syyt, seuraukset ja palautumiskeinot olla selkeästi ilmaistu käyttäjän kielellä.
14. **Minimalistisuus ja informaation esittäminen**
- ✓ Järjestelmän tulee näyttää vain käyttäjälle relevantti informaatio minimalistisella esitystavalla.
 - ✓ Esitystavan tulee myös mukautua käyttökontekstiin (=tilanne, jossa järjestelmää käytetään).
15. **Esteettisyys ja ergonomia**
- ✓ Järjestelmän tulee olla esteettisesti miellyttävä ja toimintojen sijoittelun tulee tukea mobiililaitteille (=kannettaville laitteille) ominaista käytäntöä.
16. **Joustavuus, tehokkuus ja personalisointi**
- ✓ Järjestelmän tulee mukautua erilaisten käyttäjien mieltymyksiin ja käyttötapoihin.
 - ✓ Järjestelmän tulee pystyä konfiguroimaan (= asettamaan, määrittämään: ”muuttamaan”) halutulla tasolla toimintojen ja ulkoasun suhteen.
17. **Käyttökonteksti, käyttäjä ja sisältö**
- ✓ Järjestelmän tulee esittää käyttäjälle relevantti sisältö käyttökontekstiin sopivalla tavalla, siten, että käyttäjän lopputavoitteen saavuttaminen helpottuu.
18. **Apu ja dokumentaatio**
- ✓ Käyttäjän tulee oletusarvoisesti kyetä käyttämään järjestelmää ilman erillisiä ohjeita.
 - ✓ Mikäli näin ei kuitenkaan ole, tulee järjestelmän tarjota kontekstisidonnaista apua ja ohjeistusta ongelmatilanteissa.
19. **Luotettavuus ja luettavuus**
- ✓ Vältä matalan x-korkeiden fontteja, samoin avointa kirjasinmuotoa ja/tai vahvoja kontrasteja.
 - ✓ Valitun painoasun tulee sopia kaikkiin näyttöihin.
 - ✓ Ei saa kursivoida liikaa tai tiivistää tekstiä.
 - ✓ Älä käytä liian pientä tekstiä.
 - ✓ Älä piilota sisältöä (ilman selkeää vihjetä).
 - ✓ Varmista riittävä kontrasti taustaan nähden (> 60–70 %, eli tulostettuna mustavalkoiseksi tausta ja teksti eivät sulaudu toisiinsa).
 - ✓ Värien saavutettavuus.
 - ✓ Käytä pikkutarkkaa/huolellista riviväliä ja rivitystä.
 - ✓ Tarkista rivien optimaalinen pituus (onko rivillä 40–90 merkkiä?).
20. **Ohjeistus**
- ✓ Suosi korkean tason intuitiivisuutta/ vaistonvaraisuutta.
 - ✓ Käytä ilmiselvää ohjeistusta, jos ohjeistus on tarpeellista. Harkitse animaatiota erityisryhmille (esimerkiksi lapsille).
21. **Kosketusnäytön ergonomia**
- ✓ Suunnittele sormille, ei kursorille (esim. painikkeiden koko: onnistuuko valita ilman virhepainalluksia/virheitä?).
 - ✓ Määrittele optimaaliset (parhaat mahdolliset) kosketusalueet (= ergonomisesti parhaat paikat valikoille).
22. **Havaitsemiskyky**
- ✓ Näkyvyys (jos jokin on valittavissa/painettavissa, tee siitä sen näköinen ja päinvastoin jos jokin ei ole valittavissa/painettavissa, älä tee siitä sen näköistä).
 - ✓ Käytä eroja ja muutoksia tarkoituksella (=ohjaamaan käyttäjän katsetta/toimia tarkoituksenmukaisesti).
 - ✓ Käyttömahdollisuuksien pitää olla niin itsestään selviä kuin mahdollista: suosi tuttuja ja tosielämän vertauksia, suosi olemassa olevia suunnittelukuvia ja alustan yleisiä käytäntöjä.
 - ✓ Luonnollinen kartoitus: tiedon esiintyminen luonnollisessa ja loogisessa järjestyksessä, hahmolaist, hyödynnä kontrasteja luodaksesi selkeitä hierarkioita.
 - ✓ Onko turhaa uudelleenkeksimistä symboleissa ja ikoneissa?
 - ✓ Onko sivuja, joissa käyttömahdollisuudet ja toiminnot eivät ole itsestään selviä?
 - ✓ Onko sivujen hierarkia mahdollista nähdä yhdellä vilkaisulla?
23. **Paikantaju**
- ✓ Tilan taju: käytä visuaalisia merkkipaaluja parantamaan selailua, kerro käyttäjälle jutun pituus ja hänen sijaintinsa aikakauslehdessä.
 - ✓ Suunnan taju: varmista neljään suuntaan käyttömahdollisuuksien olemassaolo.
 - ✓ Navigoinnin tehokkuus.
 - ✓ Ovatko mahdolliset vaihtoehdot toimista ilmiselvät käyttäjälle?
 - ✓ Onko mahdollista palata edelliseen tilaan tai etusivulle (tai home-tilaan)?
 - ✓ Onko umpikujia?
 - ✓ Onko eksyminen helppoa?
 - ✓ Onko visuaalisesti selkeää ja saavutettavaa (löydettävää) sisällysluetteloa?
 - ✓ Onko helposti tunnistettavissa julkaisun eri osat/osa-alueet?
24. **Muistin kuormittaminen**
- ✓ Onko paljon muistettavia asioita Esimerkiksi paljon kuormitusta pikamuistille (lyhytkestoiselle) muistille?
 - ✓ Esitetäänkö enemmän tietoa kuin on tarpeellista?
 - ✓ Onko tieto jaettu optimaalisiin (=parhaisiin mahdollisiin) osa-alueisiin?
25. **Vastereaktiot**
- ✓ Varmista, että käytät sisältöä, joka voi antaa nopean vasteen kosketukseen. Onko yli 0,2 sekunnin viiveitä?
 - ✓ Näyttöjärjestelmän tila (yleensä odotustila)
 - ✓ Tarjoa palautetta, kun tarpeellista.
26. **Virtauskokemus**
- ✓ Älä keskeytä lukukokemusta tarpeettomasti
 - ✓ Pyri luomaan luonnollinen ja ilmiselvä lukemisen kulku.
 - ✓ Pidä kokemus yksinkertaisena ja puhtaana: vältä todella äänestä ja räikeää suunnittelua, ja tarpeettomia toimintoja.
 - ✓ Säilytä toivottu tyyli alusta loppuun.
 - ✓ Onko julkaisu hämmäntävä tai ahdas?
27. **Kiinnostus, leikkisyys ja kiihottavuus**
- ✓ Vältä liiallista monotonisuutta/yksitoikkoisuutta.
 - ✓ Hyödynnä alustan mahdollisuuksia (esim. pysty- ja vaakatasoissa).
28. **Tunnelma ja tuotemerkki**
- ✓ Pyri pitämään suunnittelussa kaikkialla yllä tuotekuvaa.
 - ✓ Pyri samanlaiseen visuaaliseen laatuun sekä digitaalisessa että paperisessäkin versiossa (lehdessä).
29. **Vuorovaikutteisuus**
- ✓ Vuorovaikutuksen määrän tulisi vastata julkaisun DNA:ta (= vastaako julkaisun genren/lajityypin ja alustan odotuksiin?).
 - ✓ Suunnittele jonkin verran sosiaalista, sopeutuvaa ja luovaa vuorovaikutusta.
 - ✓ Onko paperiseen versioon nähden jotain lisätyä alustalle ominaista ”rikkautta”?
 - ✓ Voiko artikkeleita jakaa tai osallistuja kommentointiin?
 - ✓ Onko mahdollista antaa palautetta?
 - ✓ Voiko järjestelmää modifioida (=muunnella)?
 - ✓ Voiko tallentaa kirjanmerkkejä?
 - ✓ Voiko ottaa muistiinpanoja tai tallentaa muita tiedonmurusia? Voiko lukija osallistua sisällön luontiin esim. lähettää lukijakuvia?

APPENDIX B: STUDY 1 – ALL FOUND USABILITY ISSUES IN THE TABLET VERSIONS

KPK

FINDIGNS	DEFINITION (examples)	Severity (0-4)
<i>Difficult to perceive the relevant information</i>	The main articles are difficult to perceive from the other articles inside the themes. Hard to know which is relevant for yourself or new	4
<i>Poor navigation due to the crashing and jerkiness</i>		4
<i>The house -icon on the theme bar on the top of the page is lost</i>	The house-icon is lost in the theme bar on the top of the page. It is also hard to know where you are in relation to that home page	4
<i>Top down menu hides part of the article</i>	When the top down menu is open and you open an article, part of the article is hidden behind the top down menu bar	4
<i>Causes browser to crash</i>	When changing the orientation of the tablet it crashed the browser very often.	3.8
<i>Zooming not working everywhere</i>	Zooming worked only when reading an article, not in the other parts of the version. Not very intuitive.	3.5
<i>Already read article does not remain</i>	When opening an article already read it shows again from the start, not from the spot you left it	3
<i>Buttons do not look like buttons</i>	On the drop-down top menu there are at least two "buttons" (most read articles and the date) which are clickable but do not seem like it.	3
<i>Clicking the arrow changes page on the background</i>	When an article is open by clicking the arrow browser changes the page on the background. You cannot browse between the articles in the theme with the arrows; they work only for browsing between the themes.	3
<i>Confusing menu-button</i>	The menu-button for opening the top down menu is confusing before using. Does not tell clearly what is it all about	3
<i>Different view between the vertical and horizontal orientation of tablet</i>	The themes look like different version/publication when the tablet is in vertical vs. horizontal orientation.	3
<i>From an article to another you cannot drag</i>	An article can only be open from the theme pages. You cannot browse between the articles in the theme with the arrows; they work only for browsing between the themes.	3
<i>Name of the newspaper missing</i>	The name of the newspaper (Keskipohjanmaa) is not shown on every page. Instead there is date on the same corner on the other pages. Only at the very first page, or nowhere at all.	3
<i>News listing not aligned</i>	There are more than one column in where the articles are listed (horizontal orientation of tablet): there is no aligning them on the same row so it looks very hard to read	3
<i>Returning to the last state not possible</i>	The back-feature not supported. E.g. When you click "similar news", you cannot return back to that article were you left.	3
<i>Small menu-button</i>	The menu-button for closing an article is too small for fingers	3
<i>Some information missing in vertical orientation</i>	When tablet is held vertical some of the information in the loading page stays hidden. E.g. which week day or day is it.	3
<i>The state of one page does not remain to the next page</i>	When changing the page from one to another: the state the first one had does not remain but the new state is always at the top of the page	3
<i>The version is slow at times</i>	When browsing or scrolling the pages the version is sometimes quite slow and jerky	3
<i>Themes on top do not support navigation</i>	E.g. if you want to go to the home page from the very last theme, you need to go through more than one transition	3
<i>There is no error message for crashing</i>	When the version causes the browser to crash there is no error message	3
<i>Top down menu closes the article open</i>	If you open the top down menu while an article is open, this closes the article	3
<i>Top down menu looks confusing</i>	Visually confusing, the top down / theme bar menu	3
<i>Zooming did not last</i>	When an article is zoomed and then closed, the version does not remember the size of the font for the next article. You have to zoom then again.	3
<i>Swiping does not lead back to home page</i>	By clicking the navigation arrows from the last theme it goes back to start and home page, but not when you are swiping on the last page: then it does not go anywhere.	2.5
<i>Menu does not show where you are</i>	The top down menu does not show at any way where you are at the moment you opened it	2.5
<i>Small close-button</i>	The close-button for closing an article is too small (for fingers). It could be barely be seen.	2.5
<i>Too long response time</i>	At least the menu- and the close-button have too long response time	2.5
<i>After crashing the versions starts again from the start</i>	After the browser has crashed the version could remember the state were the user was and lead back to there, when opening it again. This does not happen	2
<i>Articles with pictures react poorly for touching</i>	When clicking an article with picture (e.g. on the first page) it sometimes react it like user wanted to scroll not to open the article for reading	2
<i>Date on the top misleads to think it could be changed there</i>	The older papers could be read but the date can only be changed from the top down menu not in the actual date of the paper shown on every (theme) page	2
<i>Does not support the four directions</i>	You cannot scroll the article from left to right	2

<i>From an article to another you cannot use arrows</i>	When an article is open by clicking the arrow browser changes the page on the background. You cannot browse between the articles in the theme with the arrows, they work only for browsing between the themes.	2
<i>Graying text not readable</i>	Graying text (picture, topic and the little bit of the article's content) is not readable due to the white background. At least not the last couple of rows	2
<i>House-icon does not give output</i>	When clicking the house icon in the top of the page it does not give user any output. User does not know if (s)he managed to actually click the icon or not	2
<i>Part of the next theme is showing on the side of the other theme page</i>	In both vertical and horizontal orientation of the tablet there is on the right side of the page a little bit of information of the next theme page showing	2
<i>Returning to the last state from similar news not possible</i>	The back-feature not supported. E.g. When you click "similar news", you cannot return back to that article were you left.	2
<i>Similar articles opens the same article</i>	"similar articles" button looks like opening the same article but the longer original version of it	2
<i>Some errors when starting to read</i>	Might have remembered something from the reading times before but not all so the version did not work at first	2
<i>Some inconsistency when using icons</i>	The house-icon leads to the navigation page, not to the real home page. House icon is however mostly used to lead to the home page, not the navigation page	2
<i>Some links on home page open new tabs</i>	If clicked some links which requires logging in it opens a new tab on browser. If this was a miss click there is too much work to close all those new tabs.	2
<i>The close-button is on the wrong side for majority</i>	The button where the opened article could be closed is on the left despite the fact that majority uses right hand for browsing when the button should be on the right side of the page	2
<i>The themes on the home page are difficult to understand as links to the themes</i>	On the home page there is the boxes with theme name and some picture. It is hard to recognize them to links to the actual theme pages without trying	2
<i>Theme bar not showing all the time</i>	The bar showing in which theme the reader is in does not show all the time e.g. when scrolling down the page.	2
<i>Top down menu no-intuitive to close</i>	The top down opening menu for navigation between the themes does not have clear close-button. The same dark background "Menu"-button which opens it, closes it too	2
<i>Unwanted selecting of an article happens when scrolling the page</i>	When scrolling the page up and down it might happen that you select some random article even though you did not want to	2
<i>Could not be personalized</i>	The version could not be personalized or customized in any ways	1.5
<i>Additional pictures confusing</i>	On the right side of an article there could be small pictures with blue background, very boxy appearance. They are like in the middle of the text not close to the real big picture of the article so they confuse the reader. Are they pictures from another article or more of this article?	1
<i>Confusing graying</i>	The short quotes about an article in the theme page (articles as a list: picture, topic and a little bit about the content) goes gray for bit by bit: makes you think you do not see right.	1
<i>Confusing loading bar</i>	In every page there is below the name of the newspaper a loading bar which needs clarification.	1
<i>Logging out lost</i>	Logging out the version is hidden in navigation bar on the top of the page and it could be seen not until you click menu-button	1
<i>No social media connections</i>	From the tablet version there is no connections to social media for e.g. recommending or sharing articles to friends. You also cannot send feedback or reader pictures through this version.	1
<i>Not ergonomic layout</i>	The layout: how the buttons and navigation bars are arranged is not ergonomic for using fingers (thumbs): you could not reach all those without releasing the hold of the tablet at least with one hand	1
<i>Pinch-zooming only makes the text bigger</i>	The pinch-zooming makes the text bigger but only when an article is open. The real pinch-zooming does not exist	1
<i>Pointless creation of new icons for links</i>	The house-home-page (navigation home page) have some themes which are links and their symbol for links is perhaps too weird to recognize	1
<i>Some bad aligning and writing mistakes</i>	A couple of texts in the theme pages were aligned to both sides so they were not very readable. Some words were also compound despite that they were not supposed to be compound.	1
<i>Too many "home pages"</i>	The house-icon home page and the real first page as home page are confusing. The house-icon home page is more like navigation menu, while the other home page lists news like a first page of newspaper	1
<i>Too many options for menu / navigation</i>	There were so many options for menu / navigation (navigation home page, top down menu, on the top the theme menu) so reader could not find purpose for all of them	1
<i>Too much info on one page</i>	The house-home page, navigation home page, is quite often very restless and full of everything. Reader really needs to sit down and concentrate what it contains.	1
<i>Unpleasant flashes while scrolling the page up and down</i>	When clicking the page in order to scroll down there is some unwanted flashes in the article under the finger and it is unpleasant especially when the article is bigger one	1
<i>Guiding needed: closing an article</i>	Article can also been closed with swiping in left-right -direction or clicking past the article, could be guided.	0
<i>Length of the article not clearly shown</i>	The length of an article or theme page cannot be seen without touching the page or article when the scrolling bar appears to the right side to tell the length roughly	0
<i>Not every article has a link for "similar articles"</i>	There is not always the option for look similar articles inside some article	0
<i>Only part of the themes are shown</i>	On the navigation bar on the top, there is no room for every theme to be shown at the same time. You have to scroll (to the left or right) it in order to see the rest of the themes	0

AALTO

FINDINGS	DEFINITION (examples)	Severity (0-4)
<i>Cheap looking: no aligning</i>	The version looks cheap and uncompleted. Between the columns there are no aligning at any point	4
<i>No any extra content</i>	No links to additional sites or so.	4
<i>Only topics of the articles in news listing</i>	There is only a topic of the articles listed (despite the home page). Without a little bit of the first lines of the article it is hard to tell what the article is all about	4
<i>The ball navigation only at the top of the page in themes</i>	The balls for navigation from an article to another are only at the top of the page. They do not follow to the reader which could be nice	4
<i>Pinch zooming not working</i>	Pinch zooming not working at all.	4
<i>Not intuitive navigation bar the balls which are also too small</i>	The balls (for navigating between the articles in themes) are hard to understand as navigation bar. The balls and arrows are too small for finger usage.	3.5
<i>Browsing articles without knowing the next</i>	There is possibility to browse direct to the next article but there is no clue what's the next article is about	3
<i>Buttons do not look like buttons</i>	On the fast menu opening to the left from just under the name of the newspaper on the left top corner. It is clickable although do not seem like it.	3
<i>Fast menu does not show where you are</i>	If you are in some theme or an article listed also in the fast menu (opening to the left) it does not indicate in any way that you are in some of its options	3
<i>Logging in not remembered</i>	If you try to use the version in new tab or window it does not remember your logging so you have to write username and password again	3
<i>Not aligned columns</i>	Because the columns are not aligned it makes the reading harder/slower	3
<i>Not ergonomic layout</i>	The layout: how the buttons and navigation bars are arranged is not ergonomic for using fingers (thumbs): you could not reach all those without releasing the hold of the tablet at least with one hand	3
<i>Returning to the last state not possible</i>	The back-feature not supported. Only way to get back to the previous state is to use browser's back-button	3
<i>Slow page loading</i>	When navigating to another view the version takes time to load: too slow	3
<i>Some of the articles have more than just a topic</i>	It seems that there is no logic in the presentation the news in lists: some have only a topic, some has topic and a little bit of text, some also has all of these and a picture	3
<i>Too long reaction times</i>	Sometimes moving from one page to another there was longer than 1 second waiting times	3
<i>Too small buttons, not zoomable</i>	The buttons on the user interface are quite small and the zooming does not work to them (only the text on an article can be zoomed)	3
<i>Too small buttons: arrows</i>	Also the arrows for browsing between the articles in themes are too small for using with fingers	3
<i>Touch screen features not used enough</i>	Only scrolling up and down happens by touching, e.g. from an article to another there are arrows to use by clicking	3
<i>Left menu does not work properly</i>	The menu opening to the left side of any page does not open properly (has all content showing) when you open it from a theme page which does not have much content	2.5
<i>Pointless creation of new icons</i>	The icon for the fast menu opening to the left has a symbol which is perhaps a little bit too weird to recognize	2.5
<i>Tablet features not used enough</i>	There is no possibility to navigate by swiping which is quite common for tablet applications. Navigation happens by clicking	2.5
<i>Too big pictures when the tablet is held horizontally</i>	When opening an article when the orientation of the tablet is horizontal: the picture is often so big that it cannot be seen as whole without scrolling. Also the topic cannot be seen	2.5
<i>Zooming badly executed</i>	Pinch zooming not working at all. The TTT-zooming works only for texts and there is no intuitive way of seeing how it really works (how much could be zoomed) and why there is 3 T's not 2 T's (two is simple: one makes bigger other smaller)	2.5
<i>Confusing graying</i>	Some of the themes on the top navigation bar are gray and they raise bad attention due to the difference appearance	2
<i>Confusing naming</i>	What is the difference between the Home country and region? Some of the articles seems to belong both or the other but it is replaced the exact opposite one	2
<i>Fast menu has redundant information</i>	The fast menu shows again all the themes already listed in the top of every page so in fast menu there could only be the choice to read older newspapers	2
<i>Fast menu scrolling with the page</i>	When the fast menu which opens to the left is open and you scroll the page also the fast menu scrolls with you	2
<i>Needless themes are shown on the top navigation bar</i>	On the top menu there are always all of the themes showing despite that not every day every one of them have content at all. This bar does not have enough space so why there has to be needless content also?	2
<i>Not intuitive navigation bar the balls</i>	The balls are hard to understand as navigation bar. Also they are hard to understand as clickable	2
<i>The ball navigation only at the top of the page when an article is open</i>	This is the same when some article is open: the balls are always only at the top of the page. They do not follow reading	2
<i>Too big pictures when the tablet is held horizontally when moving from an article to another</i>	It is hard to know whether you are in theme page or already opened an article due to the big picture covering most of the screen (when tablet held horizontally). The difference is in the balls: when an article is open one of the balls is a little bit darker, barely noticeable	2
<i>Too similar colors on top menu</i>	On the top menu there is some gray themes which do not stand out (the text and the background)	2

<i>With arrows you cannot change theme</i>	Using the arrows you can navigate through the articles in that theme you are in but you cannot go to the next theme unless you go through all the balls with arrows (or change it on the top menu)	2
<i>Additional pictures confusing</i>	There are other pictures and topics next in the article: Are they pictures from another article or more of this article?	1
<i>Could not be personalized</i>	The version could not be personalized or customized in any ways	1
<i>Fast menu hides part of an article</i>	When the orientation of tablet is vertical the fast menu (opening to the left) hides part of the article behind it and you cannot scroll left-to-right direction in order to see it	1
<i>Hard to get from an article back to the theme page</i>	There is no closing button or any other button for returning back to the theme page (where the article was open)	1
<i>No social media connections</i>	From the tablet version there is no connections to social media for e.g. recommending or sharing articles to friends. You also cannot send feedback or reader pictures through this version.	1
<i>Too similar colors</i>	On the top menu there is some gray themes which do not stand out (the text and the background)	1
<i>Too small buttons for fingers</i>	Due to the fact that all themes could be seen at the same time in the top navigation bar makes it each of them quite small. With fingers they are hard to use	1
<i>Length of the article not clearly shown</i>	The length of an article or theme page cannot be seen without touching the page or article when the scrolling bar appears to the right side to tell the length roughly	0
<i>Similar in vertical and horizontal orientation</i>	There is no variety at all for the reader depending on how the tablet is hold: vertical or horizontal	0
<i>No hyperlinking</i>	There is no hyperlinking in the version	
<i>No possibility to comment</i>	You cannot comment anything through the version	

METROPOLIA

FINDINGS	DEFINITION (examples)	Severity (0-4)
<i>Identity of the original newspaper does not come across on the first page</i>	The whole version does not look like the original version of Keskipohjanmaa at any way from any of the pages. The starting page has not the style of Keskipohjanmaa	4
<i>Navigation between the articles from the theme</i>	The navigation to the articles and between the articles is only possible from the theme pages	4
<i>Navigation between the themes from the first page</i>	The navigation to the themes and between the themes is only possible from the very first page, menu page	4
<i>No aligning</i>	The columns are not aligned even though there is like three or four columns next to each other: reading is difficult	4
<i>No any extra content</i>	No links to additional sites or so.	4
<i>Not ergonomic layout, article reading</i>	When holding the tablet horizontally the basic article reading is not working by thumbs due to the extra empty space emerging to the right side of the tablet. Not very easily at least	4
<i>Slow and jerky swiping</i>	The swiping while navigating is somewhat slow and jerky very often. E.g. when using swiping instead of the back to menu-button	4
<i>The back to menu -button too small</i>	Especially when holding the tablet on vertically the back to menu -button on the top on the right side is too small to use with fingers	4
<i>Too many "home pages"</i>	There is this very first page (home page) from where you can navigate to any of the themes and then there is this home page-theme. They should be named differently and more clearly what is the purposes of those	4
<i>Wrong font in the name</i>	The font is not the original or not even like the original in the name of the newspaper in the version. How could be thought to be the same paper?	4
<i>The order of the themes on the home page is confusing</i>	The order of the themes on the very first page, menu page, is very confusing. It is not in alphabetical order or any other logical order	3.5
<i>No theme name anywhere could be seen</i>	The version does not tell in which theme the reader is in except with the background color but those need to be memorized. User is easily lost in the version	3.3
<i>From the home page-theme you cannot navigate to any of the other themes</i>	It is impossible to navigate to other themes from the home page (-theme)	3
<i>Logging is not remembered</i>	If you try to use the version in new tab or window it does not remember your logging so you have to write username and password again	3
<i>No logout feature</i>	There is no logging out feature in this version	3
<i>Not all of the themes showing at the same time</i>	In the very first page there is so big buttons for selecting a theme that not all of the themes can be shown without scrolling down. With a little bit smaller buttons they could be seen at the same time and clicking with fingers would not be a problem	3
<i>Not ergonomic layout, back to menu-button</i>	The back to menu -button is not placed for not very natural usage with fingers	3
<i>Poor navigation disturbs reading experience</i>	The swiping in order to get back to the very first page from some theme page is by swiping very jerky and slow so it disturbs the reading flow badly	3
<i>Some themes makes the very first page difficult to read</i>	Selecting the theme on the top and on the right side of the very first page and then returning back to the very first page it is more difficult to see the date and other information	3
<i>The changing background colors are pointless</i>	The thing that the background color changes on the very first page, menu page, seems pointless	3

<i>The colors of the themes are not from the papery version</i>	The colors on the themes' background are not the same in the same themes in the papery version of the Keskipohjanmaa	3
<i>The state of one page does not remain while the orientation changes</i>	When changing the orientation of the tablet (between horizontal and vertical): the state of the page does not remain	3
<i>Too similar colors</i>	The theme "Article" has gray color on its background and the name on it is on white color, these are difficult to separate	3
<i>The home page changes its background color</i>	The home page, menu page, changes its background color depending on in which theme the user visited last. This confuses the user	2.3
<i>Zooming not possible</i>	There is no zooming feature at all.	2.3
<i>Back to menu button missing</i>	When an article is open there is no back to menu -button on the right top corner. When some theme is open there it is	2
<i>Browsing the news sometimes skips over a page</i>	While browsing the news from left to right and back it sometimes skips over a page without reader meaning it to happen	2
<i>Identity of the original newspaper does not come across</i>	The whole version does not look like the original version of Keskipohjanmaa at any way from any of the pages	2
<i>Returning to the last state not possible</i>	The back-feature not supported very widely	2
<i>The articles in home page are short versions</i>	The articles which could be find on the home page -theme cannot be found in any other theme (I think) and they are only a shorter versions of real article replaced in some other theme. It could be great if you could navigate from the shorter version direct to the original version	2
<i>Could not be personalized</i>	The version could not be personalized or customized in any ways	1.5
<i>Clicking closes the article</i>	When an article is open it could be closed by clicking	1
<i>Difficult to find the relevant information</i>	All the themes are at the same size buttons on the very first page so it is difficult to know which is more important and relevant than the other. Some hierarchy needed	1
<i>No social media connections</i>	From the tablet version there is no connections to social media for e.g. recommending or sharing articles to friends. You also cannot send feedback or reader pictures through this version.	1
<i>Serif font used</i>	The version uses serif font which is more difficult to read on the tablet screen	1
<i>The name of the newspaper is missing</i>	The name of the newspaper the version is all about is presented only at the very first page, menu page, and then nowhere else.	0
<i>There is no button for article closing</i>	When an article is open there is no close-button or back-button, or any clue how you can get back	0
<i>Too harsh impression</i>	The overall impression of the version is very harsh due to the multiple background colors	0

APPENDIX C: STUDY 1 – EXPERIENCES OF THE VERSIONS DURING THE USAGE PERIOD

KPK

KPK - INSPIRING ($\geq 15\%$)			N=11	N=10	N=12	N=11	N=10	N=9	N=14
Category	Component	Definition (examples)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Appearance	<i>Good layout</i>	The layout of the version was nice/clear. The layout was new/refreshing /handy/funny.	9%	0%	17%	9%	0%	11%	0%
Features	<i>Good starting page</i>	The starting page was good/clear. The appearance of starting page was positive. There was inclusive overview of the news.	18%	10%	8%	0%	10%	0%	7%
	<i>Good happenings page</i>	The theme "happenings" was liked that it had it own page	18%	0%	0%	0%	0%	0%	0%
	<i>Good loading page</i>	The very first loading page when arriving to the tablet version had good clock/picture.	0%	10%	0%	0%	0%	22%	7%
	<i>KP24 "Juuri nyt" good</i>	The KP24.fi right now changing news topics in the starting page was good feature.	27%	0%	0%	0%	0%	0%	0%
Functions	<i>Functioning was good</i>	The site worked without an criticism. The user interface worked well. It did not crash at any point. There were no technical or other problems. Working was stable and trustworthy.	9%	0%	0%	18%	0%	0%	0%
Usage	<i>Fast to use</i>	The tablet version is fast to use. It is fast to just glance the topics and news themes. The content is pictured faster from the tablet version than from print. The speed was appreciated The user got used to the tablet version which made the usage/reading easier/faster/clearer and/or appearance more acceptable. User learnt to use the	0%	0%	25%	0%	10%	0%	0%
	<i>Got used to</i>	tablet version e.g. found some new features. User does not be any more afraid of tablet version but enjoyed it. The reading was a matter of routine. The reading experience increases day by day.	0%	0%	17%	18%	10%	22%	21%

KPK - IRRITATING ($\geq 15\%$)			N=11	N=10	N=12	N=11	N=10	N=9	N=14
Category	Component	Definition (examples)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Appearance	<i>Bad starting page</i>	The starting page was boring/unstable/had too much boxes which made it forbidding.	0%	20%	0%	0%	0%	0%	0%
	<i>Messy</i>	The tablet version/pages/layout are messy/disorderly.	9%	0%	8%	0%	0%	22%	0%
	<i>Too much text</i>	In the themes there were too much text/too many columns without any pictures which made the appearance quite heavy. The view is too full, could have more columns.	0%	0%	0%	0%	10%	22%	0%
Functioning	<i>Browser crashed</i>	The browser of the tablet version crashed.	9%	10%	17%	9%	10%	22%	7%
	<i>Loading problems</i>	The pictures did not load/open. Loading the pages took too long. The loading happened too slowly.	0%	10%	25%	0%	10%	11%	0%
Usage	<i>Columns are formed oddly</i>	The long articles which have subtopics align the text into two columns which interrupts the reading annoyingly. Users want to continue reading from top to bottom first the left column and then the right one not change just before the subtopic to the right column and right after the subtopic back to left column first.	0%	20%	0%	0%	0%	0%	0%

AALTO

Aalto – INSPIRING (≥15%)			N=13	N=13	N=13	N=13	N=12	N=13	N=13
Category	Component	Definition (examples)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Navigation	Clear navigation	Easy/clear/fluent to navigate between the themes/pages.	15%	0%	0%	0%	0%	0%	0%
Appearance	Good pictures	The size of pictures was right. Pictures were big/nice/accurate/good/impressive/high-quality/better than in print version. The pictures opened. The pictures could be zoomed bigger also.	8%	8%	0%	8%	0%	0%	15%
	Simplicity	The tablet version is simple. The appearance of the version is plain. The size of the tablet version is very compact.	8%	0%	8%	15%	0%	15%	0%
	Clarity	The tablet version is clear/understandable. It feels clear. It is easy to understand the idea of the version. Articles, themes and topics are presented clearly. Big and small articles can be distinguished from each other.	38%	0%	15%	0%	8%	8%	8%
	Good layout	The layout of the version was nice/clear. The layout was new/refreshing/handy/funny.	15%	8%	8%	8%	8%	8%	0%
	Like the print	The tablet version reminds visually of the print version. It is more like the print/newspaper.	15%	15%	0%	0%	0%	0%	0%
	Visually pleasing	Visually the tablet version was finished/high quality like/pleasing/stylish/stable/world like/satisfactory/good/cool/great.	23%	23%	8%	15%	0%	0%	15%
Functions	Functioning was good	The site worked without an criticism. The user interface worked well. It did not crash at any point. There were no technical or other problems. Working was stable and trustworthy.	8%	0%	15%	8%	0%	8%	23%
Content	Local news	Reading the local news. The version had more local news. The local news were enjoyable. The "Maakunta" theme had content.	0%	15%	0%	0%	17%	0%	0%
Usage	Easy to read/use	The tablet version is easy/nice way to read the newspaper. Reading the version was easy. It had easy user interface. It was effortless to use and fast to get back to it later on to check already read news. Searching things in the tablet version is easy. The usage is easy and clear.	0%	0%	15%	8%	8%	0%	0%
	Reading the articles inside theme	Reading the articles inside a theme was fast/functioning/easy	23%	0%	8%	0%	0%	0%	0%
	Got used to	The user got used to the tablet version which made the usage/reading easier/faster/clearer and/or appearance more acceptable. User learnt to use the tablet version e.g. found some new features. User does not be any more afraid of tablet version but enjoyed it. The reading was a matter of routine. The reading experience increases day by day.	0%	8%	0%	15%	8%	8%	8%

Aalto – IRRITATING (≥15%)			N=13	N=13	N=13	N=13	N=12	N=13	N=13
Category	Component	Definition (examples)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Content	In some themes there was no content at all	In some themes there was no content at all	31%	15%	8%	0%	8%	8%	23%
	Only topics not a short introduction to the article next to it	Only topics not a short introduction to the article next to it. Topics only do not temp to read the article. The information the topic gives does not tell properly what the article is about. The information in the topic varies a lot between articles.	8%	15%	0%	8%	0%	0%	0%
	Missing content	For example the advertisement, notifications, comics, tv-programm and access to digital replica were missing on the tablet version. There was not enough content. The amount of content was restricted and wasn't similar to print.	8%	15%	0%	23%	0%	0%	8%
	Articles in wrong themes	In the tablet version some articles were mixed into wrong themes. While the right article was in right theme but similar article was in wrong theme. Same articles could also be found under a couple of themes, more than one. By content similar articles are not in the site clearly so similar, at least user do not perceive them as such.	0%	0%	0%	0%	0%	0%	23%
Functioning	Navigation bar only on top	The navigation bar was only on top but it should be on bottom. Moving to next article needed scrolling back to top. The page could be changed only on the top.	15%	0%	8%	0%	0%	8%	0%
Usage	Difficult to use	The tablet version was unclear/hard to use. User had usability problems. It was difficult to know where user was in the tablet version, the logic and navigation made it hard. The usability of the version/functioning was bad/not user friendly.	0%	23%	0%	0%	0%	0%	0%

METROPOLIA

Metropolia – INSPIRING (≥15%)			N=12 Mon	N=10 Tue	N=12 Wed	N=12 Thu	N=11 Fri	N=11 Sat	N=8 Sun
Category	Component	Definition (examples)							
Appearance	Good pictures	The size of pictures was right. Pictures were big/nice/accurate/good/impressive/high-quality/better than in print version. The pictures opened. The pictures could be zoomed bigger also.	25%	20%	8%	25%	9%	36%	13%
	Good colors	The colors of the tablet version are nice/joyful/good/harmonious. They separate the themes nicely. Colors are refreshing. Colors clarify the themes from each other.	0%	20%	17%	8%	0%	0%	0%
	Simplicity	The tablet version is simple. The appearance of the version is plain. The size of the tablet version is very compact.	0%	20%	17%	8%	0%	0%	0%
	Clarity	The tablet version is clear /understandable. It feels clear. It is easy to understand the idea of the version. Articles, themes and topics are presented clearly. Big and small articles can be distinguished from each other.	17%	10%	17%	8%	0%	0%	0%
Functions	Functioning was good	The site worked without an criticism. The user interface worked well. It did not crash at any point. There were no technical or other problems. Working was stable and trustworthy.	17%	20%	8%	17%	9%	9%	0%
Content	Had interesting articles	The tablet version had some interesting articles.	0%	0%	8%	25%	9%	0%	13%
Usage	Easy to read/use	The tablet version is easy/nice way to read the newspaper. Reading the version was easy. It had easy user interface. It was effortless to use and fast to get back to it later on to check already read news. Searching things in the tablet version is easy. The usage is easy and clear.	8%	10%	25%	17%	0%	27%	0%
	Fast to use	The tablet version is fast to use. It is fast to glance the topics and news themes. The content is pictured faster from the tablet version than from print. The speed was appreciated	0%	0%	17%	25%	0%	0%	0%
	Got used to	The user got used to the tablet version which made the usage/reading easier/faster/clearer and/or appearance more acceptable. User learnt to use the tablet version e.g. found some new features. User does not be any more afraid of tablet version but enjoyed it. The reading was a matter of routine. The reading experience increases day by day.	0%	0%	8%	17%	0%	9%	0%

Metropolia – IRRITATING (≥15%)			N=12 Mon	N=10 Tue	N=12 Wed	N=12 Thu	N=11 Fri	N=11 Sat	N=8 Sun
Category	Component	Definition (examples)							
Content	Missing content	For example the advertisement, notifications, comics, TV-program and access to digital replica were missing on the tablet version. There was not enough content. The amount of content was restricted and wasn't similar to print.	25%	30%	17%	17%	0%	9%	13%
	News were outdated	The tablet version included only outdated news articles.	17%	0%	0%	0%	0%	9%	0%
Browsing	Over the top motion effects	The motion effects on the tablet version were over the top.	8%	0%	17%	0%	0%	0%	0%
	Not fluent	In the tablet version swiping the screen in order to change the page was not fluent. When moving from an place to other it is not fluent. Pages does not change fluently. The whole functioning of the tablet version is TÖKKIVÄÄ	25%	0%	8%	0%	0%	0%	25%
Appearance	Messy	The tablet version/pages/layout are messy/disorderly.	8%	10%	17%	17%	18%	9%	0%
	Visually unpleasing	The tablet version is graphically/visually modest/low profile/unfinished/unconvincing/cheap/bad. The appearance was impersonal /boring. The "cover" of an article was graphically too big.	8%	0%	17%	0%	9%	9%	0%
	Does not look like KP	The tablet version does not look like Keskipohjanmaa, the original newspaper/not newspaper like.	0%	10%	0%	0%	18%	18%	0%
	Difficult to perceive	The totality was difficult to perceive. All articles with a picture seemed having the same value: as big articles. E.g. the starting page should be the first theme otherwise hard to perceive the totality. The content has been divided all over the version the totality is hard to perceive.	0%	20%	8%	0%	0%	0%	0%
Functioning	Technical problems	Overall the tablet version had some technical problems. The platform worked badly. There were problems with navigation and browsing.	8%	0%	17%	0%	0%	0%	0%

APPENDIX D: STUDY 2 – TABLE OF IMPRESSIONS OF NM –KEY

Category	Component	Definition	Frequency (≥ 3/6)
Usage of the NM -key	<i>Troublefree usage</i>	Using the Next Media -key during the week was unnoticable, effortless or trouble-free.	4
	<i>Password in the memory of the browser</i>	The password and/or the user name was saved to the memory of the Internet browser.	3
	<i>Overall functioning</i>	The NM-key worked well, was very functioning.	3
	<i>Simple usage</i>	Using the Next Media -key during the week was clear, simple or easy.	4
	<i>Troublefree taking into use</i>	Taking the Next Media –key into use was unnoticable, effortless or trouble-free.	3
	<i>Troublefree ordering</i>	Ordering with the Next Media -key could be done, it was unnoticable, effortless, pleasant or trouble-free. It was like "another normal day in Internet world".	6
Future usage of it	<i>NM -key would keep "money" in it</i>	Proposals for the paying in the future raised PayPal-like money account choice. User could once put some money on the NM-key account and use it whenever wanted/needed without digging up the bank registration numbers all the time.	3
	<i>All media companies in</i>	The fact that NM -key could include all or at least more than one of the media companies would be handy, clever and positive thing; it should be this way.	6
	<i>One address for NM-key good</i>	One clear Internet address where you can control and access all your orderings is good. You do not have to think all the ordered media products and their web sites. There is too much information in the Internet today so the one address would give you access to many relevant places.	4
	<i>Idea of one user authentication good</i>	It makes it only one username and password to remember. It would be good and easy thing to get this opportunity to log in whenever find a interesting web site of some media product.	3
Sharing users' personal info	<i>Clearly said who got the info</i>	It should be clearly said e.g. in the terms all of them who have access to the personal information of the user (name, email, address, payment info etc.).	3
	<i>Permission for the marketing usage needed</i>	Users want to give unrelated to the terms a permission for direct marketing; especially if the personal information will be used for that.	3
	<i>Sharing the info cannot cause spam</i>	The sharing the user's personal information should not cause any kind of spam, too much marketing or recommendations or it is not allowed.	4
Media product recommendations	<i>Recommendations based on both</i>	Recommendations should be based on both automatically collected usage habits and user's chosen interests in profile.	4
	<i>Recommendations based on automatics are better</i>	Comments were like: When you yourself choose what are your interests in you may not be able to choose all of them so automatic recommendation takes your usage information into account and be better able to recommend the content you really are interested in. You're too lazy to update your profile but automation is all the time updating itself.	4
	<i>Recommendations based on user's choice of interests are better</i>	Comments were like: Deepening the NM -key profile is interesting and user wants to be able to himself influence the recommendations given for him. Sounds reasonable but question is how well will be working? This is the only way recommendations could be justified.	3
	<i>No recommendations via email</i>	Recommendations via email could easily be aggressive (or) spam and it is not wanted. Today the email is very loaded even without these recommendations. After the ordering has finished the spam is not welcome via email or mail.	5
	<i>Recommendations into NM -key profile</i>	When logging in to the NM -key account e.g. once a day you would see the recommendations there. The recommendation feed could update itself once a day. The recommendations would be more interesting when in the NM -key profile because whenever going there you are seeking for something to read and perhaps order something new.	3

APPENDIX E: STUDY 2 – TABLE OF DIFFERENT WAYS OF READING NEWS

Component	Definition (examples)	Count
Smart phone (Note. One user had not used smart phone and thus n = 5)		
<i>Last option</i>	If there are no other devices available for reading news then users took the smart phone and read with it.	2/5
<i>Short news</i>	The smart phone suits well for reading short articles or just like one topic and its article. It is mostly browsing the news topics. The position with smart phone is bad for longer articles.	4/5
<i>On the road</i>	If you are in a train or bus the smart phone is your choice for reading news. If you are on the road going somewhere you read news with smart phone not any other device.	3/5
Tablet		
<i>More suitable than computer</i>	Users have been used to tablet more than computer as a device for reading news. Tablet is better than computer because you can get 3G connection in it.	2/6
<i>Too small display</i>	While using tablet for news reading you have to zoom the text bigger. The 10" is still quite small for reading.	2/6
<i>Not with you</i>	Users are not yet used to taking the tablet with them. They rather take the smart phone and read more with it while on the road. Even though the tablet might be with you, you do not take it out of bag and read with it, you read rather with smart phone.	3/6
<i>On the road</i>	Users take the tablet with them abroad or when they are not travelling with their own car but public transport. Users do not take computer with them rather tablet and read news with it on the road. Tablet has 3G connection so they are very handy on the road. Tablet is always with you as well as smart phone.	5/6
Computer		
<i>By chance</i>	If users are next to a computer they read news with it, if they are next to some other device they read with that. It depends on the situation.	2/6
<i>Reading digital replicas</i>	With laptop computer the digital replicas are read quite easily even though the display could be bigger (the better). With computer you can read any news you wish like RSS-feed and digital replicas.	2/6
<i>On the road</i>	Because users need laptop computer in their work they take it with them and read news also with it during the day. While you are abroad it is easy to check news from home country with it.	2/6
<i>Not with you</i>	Users do not take the computer with them on the road. Even though it is laptop it is on the same table all the time, not with you. Users take rather tablet than computer with them on the road.	3/6

Component	Definition (examples)	Count
Print newspaper		
<i>Not suitable for deliver every home</i>	Printing the newspaper to the paper is unnecessary. Most of people put it in the garbage in the very next day.	2/6
<i>Being used to</i>	Users are very used to reading print newspaper so it is difficult to try to use to digital news. Print version is more natural to read because they are used to it.	2/6
<i>Scent and sensation</i>	The print newspaper has its own scent and sensation which are liked while reading it. You can touch and feel the paper and it also smells special.	2/6
<i>Used once</i>	The print newspaper is used only once. You read it all at once. You read it once per day.	2/6
Digital replica		
<i>One of the most pleasant ways of reading news</i>	It is the second most pleasant ways of reading the content of newspaper. Digital replica or for browser optimized version is the most pleasant one.	3/6
Browser optimized version		
<i>One of the most pleasant ways of reading news</i>	With digital replica this is also one of the most pleasant ways of reading the content of newspaper, or this is even better than digital replica.	2/6
Web service		
<i>Web service has more up-to-date news</i>	During the day users read news from web services because in there were more news available and they were updated during the day.	2/6
Tablet downloadable application		
<i>Tablet downloadable application good</i>	Users read the news from tablet downloadable application because it functions well and is fast. It is available and has easy access.	3/6

Component	Definition (examples)	Count
<i>News reading in the evenings</i>	Mostly one user reads news in the evening when all other duties are done. Other user read comments in the web service in the evening.	2/6
<i>Reading in the morning</i>	Users read news in the morning while having breakfast.	2/6
<i>Reading during breaks</i>	News is read on breaks: e.g. while having lunch, or coffee (If the news are not read before or user does not order some newspaper which could be found in cafe).	3/6
<i>Back to news if someone else talks about it</i>	During the day users did not read the news except if someone requests to see some articles (e.g. friends, family member) or users need clarification about some article (s)he talks about with others.	2/6
<i>Scanning through, reading only interesting ones</i>	Users scanned through topics but read more carefully only those which seems to be interesting.	2/6
<i>Reading alone</i>	Users were mainly alone while reading news. If there was someone else they would not read news at all then. In some cases colleagues might be present but not reading with them.	3/6