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Abstract

If a user had the possibility to watch the latest television news on a mobile phone, or listen to the news on the radio or read text news with the mobile, what would he or she choose? In what cases would the user opt for mobile TV content and when would text or audio be chosen?

This report examines the users' mobile media choices (text, audio and video) in different everyday contexts. The data for the research is based on ongoing empirical research, including field tests on a mobile media service prototype, carried out in Finland in 2006. The role of mobile TV news is also discussed in relation to other media usage.

The purpose of the first field study was to evaluate the usability of the prototype and to explore users' media choices in different situations. Qualitative and quantitative methods were combined to make sure that adequate data was collected. Semi-structured interviews and media diaries help us understand users' media habits and how they voice their expectations and preferences. Log data reveals the time and duration of actual occurrences of service use.

The empirical research shows that the mobile phone as media is suitable for many different situations. Mobility, diversity and the real-time effect are considered to be the most important characteristics of the service and that combination distinguishes the use of the news service from any other media use. The ability to select the media format (text, audio or video) suited to the situation at hand was considered important. Audio was perceived as being suitable for situations where the user was mobile, e.g. while walking, cycling or roller skating. For situations when the user was sitting or standing still, the media format selected was more likely to be illustrated news, text or video.

Users appreciated updated information and information-rich media forms for mobile news delivery. There was high demand for only the latest news in mobiles. The real-time effect was considered important. Users appreciated fast functions, easy usability and condensed information and media forms for mobile TV and news delivery. Most of the users looked at the headlines or followed the news several times a day – much more often than the traditional TV and news prime times would allow.

Preface

This publication contains the first field trial results of the project "Intuitive and parallel media service platform to 3G, podcasting, and DVB-H (Podracing)". The two-year project is funded by Tekes, VTT and several companies. The aim of the project is to *compare* different media formats (e.g. text, audio and video), delivery methods, and mobile networks. This publication compiles the main findings of the first user trial, which concentrated on news content. The delivery method used was on-demand. The implemented prototype used 3G networks. The second field trial will concentrate on Podcasting and the third phase will focus on broadcast.

Besides Tekes, companies and organisations financing the project are represented in the project management group. The group comprised chairman Vesa Erkkilä *(Digita),* Jonas Kronlund *(Elisa),* Lari Aho *(Infocast)*, Juhani Reiman *(Lingsoft)*, Teemu Lehtonen *(MTV3)*, Jani Hätönen *(Radio Nova)*, Jyri Huopaniemi *(Nokia)*, Ari Pöyhtäri *(Sofia digital)* Eskoensio Pipatti *(Swelcom)*, Jouni Siren *(Yle)*, Marko Heikkinen *(Tekes)* Petri Vuorimaa *(TKK)*, Caj Södergård *(VTT)*, Esa Reunanen *(TAY)*, and Mikko Ruohonen *(TAY)*. Ville Ollikainen from VTT acts as the project manager. The group has made a great effort on behalf of the project.

The project is carried out by VTT Technical Research Centre of Finland, the Helsinki University of Technology *(TKK),* and the University of Tampere. The project group consists of Ville Ollikainen *(VTT),* Elina Noppari and Maarit Mäkinen *(TAY),* Carlos Herrero and Pia Ojanen *(TKK),* Virpi Oksman, Tuomo Kivinen, Juha-Pekka Koivisto, Timo Kinnunen, Tero Hannula, Chengyuan Peng, and Antti Tammela *(VTT).*

Mobile media is a new and rapidly developing technology. Hopefully, this publication will give the readers some new ideas and guidance in this fascinating field.

Tampere, 10.9.2006

Antti Tammela

Senior Research Scientist
VTT Technical Research Centre of Finland

Contents

1. Introduction

The various media formats – text, audio and video – have conventionally lived in their own worlds separated from each other. The value chains – content creation, publication, delivery methods etc. – have been very much media format specific. Newspapers have published text and pictures; traditional radio has been a media for audio, and television for video. The Internet and the mobile revolution have now changed the situation. Mobile phones already have a radio feature. It has been possible to read newspapers on the Internet for several years. It seems that mobile television is going to make a breakthrough in the next few years. Soon, it will be quite easy to get different media formats (text, audio and video) from a single mobile device.

The aims of the study emerged from the integration of different media formats. Our primary study question has been formulated as following: If a user had the possibility to watch the latest television news on a mobile phone, or listen to the news on the radio or read text news with the mobile, what would he or she choose? The first phase of the study concentrated on 3G news content and the on-demand delivery method. The second and third phases will concentrate on podcast and broadcast (Figure 1).
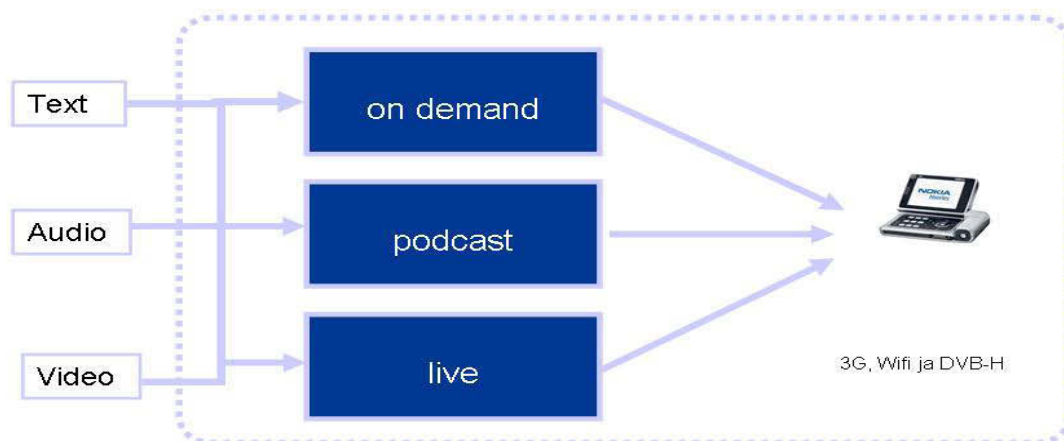

Figure 1. The first phase concentrated on 3G on-demand news.

This digital convergence causes the traditional media to re-organize their publication schedules. For example, what is going to happen to prime time? Is mobile television prime time the same as conventional television prime time? Or perhaps a little bit

earlier? Text is often the quickest format to get the news. Is it then so, that people want to read the latest news or are there some social situations (e.g. bus) where they prefer to listen to the latest news. The first aim of the study is to investigate these questions in practical user trials.

Being able to view text, audio or video news on the move from a wireless handset has a value in many situations. When travelling on public transport (train, bus, etc.) a handset offers a way to keep up to date all the time. The same goes for public spaces like cafeterias, shopping malls, bus stops, entrance halls, queues in supermarkets and waiting rooms. Also in private spaces, there is a need for mobile news. Even in your own living rooms, at work, at a summer house, in a taxi or a private car, the opportunity to receive mobile news is interesting. Some family members may even wish to have their own *personal* mobile news service at home.

In addition to these possibilities, up-to-date and rich news content offers a lot of business opportunities for companies. For the broadcaster it provides a new way to reach its audience while they are on the move, and for operators 3G provides a flexible way to deliver data. The current 3G technology development offers good tools to realise mobile news. Also, more and more transmission capacity is available for these services.

In summary, the goal of the work reported here was to *compare mobile, text, audio*, and *video news content* in a field trial. The report assembles the results of the trial. The report also presents results from a state-of-the-art study of the subject. Implementation of the prototype is also briefly described.

The field test started in March 2006 with 10 people who used the service with 3G phones (Nokia 6630 and N70) for one month with an Elisa (Finnish operator) subscription. The ages of the users ranged from 23 to 56.

2. Background to the research: The use of mobile media services

2.1 Some general aspects of mobile phone use and services

Mobile phones, while maintaining their original function of one-to-one voice (and text) communication, have developed functionalities peculiar to other media. They have built-in cameras and video-cameras, and the use of data services, mobile television etc. is increasing. More and more mobile phones are developing into multipurpose devices: from communication tools to integrated communication devices, media terminals, remote controls etc. (May & Hearn 2005)

Studies made of Japanese mobile phone market indicate that the mobile phone is evolving from a phone into a ubiquitous tool for personal electronic needs. Service providers have developed services that, for example, enable users to pay with their phones or check in just by waving the phone in front of sensors. (McClelland 2005, Funk 2005)

In Finland mobile phones have been used quite traditionally so far. According to the Finnish Consumer Research Centre, regular use of mobile services has so far been quite rare. Their data was collected during the years 2003 and 2004 and at that time about 8 per cent of the study participants had tried mobile news services, 10 per cent had followed mobile weather forecasts and 11 per cent had used mobile location services. Mobile entertainment services were used very rarely. (Hyvönen & Repo 2005)

Table 1. Finnish people were most willing to pay for these mobile services (Hyvönen & Repo 2005).

Mobile service	Percentage of respondents
1. Search engines and services	62
2. Timetables	36
3. Ordering services	32
4. Location services	28
5. Banking services	27
6. Paying for goods	22
7. Email	22
8. Ringtones, logos	20
9. Interactive public services	17
10. Remote control of home systems	17

About 60 per cent of the study participants said that the main reason for using mobile services was ease of use. Secondly, they mentioned efficiency: getting first-hand information anytime and anywhere. Obstacles to use were expensiveness of services, usability problems, complexity of service attributes and defective guidance. (Hyvönen & Repo 2005)

However, mobile phone usage conventions may also change quite rapidly. In Finland they may have changed considerably since the 3G mobile phone service packages were allowed in April 2006. The Finnish telecommunications company Elisa estimates that there are about 150 000 3G-customers at the moment in Finland, and it believes that that number is going to double by the end of this year. Customers who have bought 3G service packages also use more new services.[1]

Digital music is the most popular form of mobile entertainment and it is supposed to be a key driver for customer adoption of new 3G services. The market for music-capable phones is expected to grow quickly, ad the mobile phone is thus substituting for other portable music devices. Different mobile search engines and services and context-aware services are also expected to be popular in the future. According to a Siemens survey, the most attractive applications for American consumers are mobile email, mobile music and mobile TV. (May & Hearn 2005, Siemens 2006)

Of all the new services, mobile television is especially interesting for the Podracing project and it is therefore examined more closely in the next chapter.

2.2 Mobile television

A variety of services are currently offered, aiming to provide a TV-like experience on a mobile phone. Some services have started relaying standard TV channels to mobile phones. Video iPods allow downloading video content for consumption on the move.

Several countries have developed their mobile television services. Korea was first to start broadcasting commercial mobile television via both satellite and terrestrial networks in 2005. Korean mobile television has over 2 million subscribers and it is based on DMB technology. Italy, on the other hand, started DVB-H mobile television in June 2006. In Norway, Ericsson and the Norwegian Broadcasting Corporation were first to experiment with an interactive mobile television. This interactive pilot is based on games, chat and messaging. Viewers can, for example, vote for which music video is to be played next and are able to chat with each other all at the same time. The Norwegian

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[1] http://www.elisa.fi/ir/index.cfm?t=5&o=5110.00&did=13367

pilot has had good results. The viewing time of interactive mobile television has been twice as long as traditional mobile television offerings. In Finland, Digita and Nokia are developing the first Finnish mobile television network, starting during the autumn of 2006. (Argillander 2006)

At the end of 2005, mobile television services had over six million subscribers. According to some forecasts, mobile TV services will have 514 million subscribers worldwide in 2011.[2] Nokia estimates that a mass market for mobile television will open up in 2008. Even though one should adopt a moderate attitude towards market predictions, mobile television has clearly been one of the most appealing mobile services, according to several completed user-pilots done all over the world. In mobile television two major media services are amalgamated: television – the most important medium at home, and the mobile phone – the most personal medium people have. (Argillander, 2006)

Some key results of previous studies made on mobile television usage are presented in the following two sections.

2.3 Mobile television content

The findings of a number of studies made on mobile television show that the most popular mobile television content is news. (Södergård 2003, Knoche & McCarthy 2005a, Mäki 2005) Different mobile television content types listed by their popularity are:

1. news
2. music
3. sports
4. animation
5. movies
6. soap operas
7. sitcoms
(Knoche & McCarthy 2005a).

News is well suited to mobile phones, because the use of mobile TV bursts lasts less than 10 minutes[3] and viewing is likely to be transient and low commitment. News channels are also quite easily re-broadcasted over the mobile phone, because the content of the channel is continually news: if the user selects the mobile news channel (s)he is most likely to get what (s)he expected. Other channels may have to think how well their

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[2] http://www.abiresearch.com/abiprdisplay.jsp?pressid=668
[3] In a Finnish mobile television pilot an average use time of mobile television was 5–20 minutes daily. Only very active users viewed mobile television more than that – up to maximum 40 minutes per day.

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broadcasting is fitting to the mobile environment. For example, if a mobile television user selects a music channel, it's disappointing if there isn't music in the agenda during his/her short period of viewing. This limited time of mobile television use has ramifications for both the type of content and the way people consume it. (Södergård 2003, Knoche & McCarthy 2004, Mäki 2005)

The cheapest way to produce mobile television content is to deliver traditional TV material without additional editing. A challenge for mobile TV news services may be that, despite the fact that news channels offer a constant flow of short news, news seldom has fast-moving pictures and is thus easy to follow – text is usually an important tool in the presentation of news. Reading text in a mobile phone may be difficult and text legibility is one of the biggest challenges of recoded TV news content (Knoche 2005, Knoche & Sasse 2006)

Different studies have shown that the quality of text contained in mobile television clips may affect the perceived quality of the video and audio. Also, audio quality affects the way video quality is perceived: better audio enhances the observed video quality – so all these elements are interconnected. (Knoche & Sasse 2006)

Knoche et al. (2005) examined responses to four different image resolutions, seven video encoding bitrates, two audio bitrates and four content types. The results show that acceptability was significantly lower for images smaller than 168 x 126, regardless of the content type. The effect was more pronounced when bandwidth was abundant, and was due to important detail being lost in the smaller screens. Surprisingly, the participants were more likely to rate image quality as unacceptable when the audio quality was high.

The two exceptions to these rules were news and very low bandwidth music videos. At the lowest bandwidth (32 kbps), music videos were more acceptable at the lowest image resolution. For news coverage, the legibility of text is an important issue and may be improved by reducing the image resolution of the content prior to encoding. More generally, however, the recommendation is to stream the text information separately to the device. (Knoche & Sasse 2006)

In addition to traditional television programmes re-broadcasted over mobile phones, mobile television users have expressed their desire for programmes made especially for mobile devices. Some media companies have responded to this demand and have begun to produce unique television shows (e.g. short, mobile television soap operas, so-called mobisodes) for the tiny mobile screen. Some of those programmes are tied to popular television shows like Lost or 24. So far the audience of this original mobile content is

quite small, but may increase as the 3G phone market evolves and new technologies improve. (Fitchard 2006)

Probably in the future there will be room for both broadcast TV re-broadcasted over the mobile phone and made-for-mobile TV. The same applies to famous TV brands and new entrepreneurs. Perceptions among MobiTV[4] users show that established (entertainment) brands are those that draw people to mobile TV. At first people are looking for brands they already know (like NBC Mobile or CNN), but when they get familiar with the mobile television concept, their usage conventions may change to new channels like, for example, Comedy Time[5]. (Fitchard 2006).

2.4 Context of use

The usage of mobile phones evolves in the three general user spheres of home, work and public. Quite typically, mobile phones are regarded as devices for use in the public sphere, for example, while waiting or commuting. They are used to kill time and to keep their users entertained or up-to-date [6].

Whereas the public sphere is going to remain an important area for mobile television usage, some studies have shown that mobile services are measurably used in the private sphere too. For example, a mobile television pilot in Oxford, UK, revealed that about 50 percent of the test users viewed mobile television at home and didn't move anywhere while viewing. The typical time for using mobile television was late at night, in bed, just before falling asleep. (Dowell 2006)

According to a Finnish mobile television pilot, people use different content types in different locations. News and information services are used everywhere throughout the day, and the mobile phone is regarded as a valuable channel especially when something newsworthy suddenly happens. Live broadcasts of sports are watched anywhere if there is no conventional television available. Series and entertainment services are viewed in short periods during waiting periods, for example in public transportation. Music is also listened to when on a move. Films and longer programs are only watched when a conventional television is not available. Users may start watching a movie via the mobile phone and continue watching it on their main television when they get home. Mobile television is often viewed during the daytime, which differs from the peak viewing times of traditional television. (Mäki 2005)

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[4] MobiTV is the first mobile television and digital radio service provider for cellular, WiFi and broadband enabled devices.
[5] Comedy Time has been ranked routinely among the top five channels viewed on MobiTV's channel line up. Comedy Time's content is primarily comprised of made-for-mobile shows.
[6] According to a Finnish mobile television pilot, 43 % of test users used mobile television for killing time and 40 % to stay up-to-date while on the move. Among American mobile television users, being entertained is an important driver for application usage.

The use of mobile phones in the public sphere has certain limitations. For example, users have been worried about becoming absorbed in mobile multimedia content, which requires their visual attention. They fear increased risks of accidents and lapses. The possibility of listening to music or the radio while on the move is thus highly valued, because it doesn't need visual attention. Many mobile television test users have expressed more interest in being able to follow radio live on their phone than for example music television. Also text legibility may be difficult when on a move. (Knoche 2005)

2.5 On-demand vs. real-time services

On-demand down-load services and time-shifting are a growing trend in media environment. Continental Research estimates that downloading TV programs via the internet is becoming habitual. The program types that are downloaded most are popular TV shows of traditional television channels (such as Lost – the most-watched downloaded programme). In a Continental Research survey 40 per cent of participants said that their viewing of downloaded programmes will increase in the future. (Light 2006)

The BBC also got very positive results from the company's on-demand trial, which ended last February. During the trial the BBC offered downloadable television and radio programmes to a closed panel of 5000 test users. The test users consistently watched on average two downloaded programmes a week during the trial, despite a limited range of content. The main reason for usage was to catch up on favourite programmes. About 77 per cent of the users used service to watch a favourite programme that they had missed, 64 per cent used it to watch or listen to a programme at a more convenient time and 32 per cent used it to watch a programme they had never heard of. Comedy, drama and documentaries were the most-viewed genres. In addition to favourite TV shows, also some niche programmes performed consistently well throughout the trial. The BBC survey showed that most on-demand viewing took place between 10.00 and 11.00 p.m., so it was after the traditional television viewing peak time of 7.00 to 10.00 p.m. [7]

When it comes to mobile on-demand services, the content type viewed strongly affects users preferences. According to a study of Knoche, more than 50 per cent of mobile phone users ranked live contents as one of their top three choices (Knoche 2005). As one would expect, users prefer to have news – the most-viewed content in the mobile environment so far – live.

Also, about 96 per cent of the participants in a Siemens survey answered that they are interested in live mobile TV. But those test users were almost as interested in mobile

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[7] http://www.bbc.co.uk/pressoffice/pressreleases/stories/2006/04_april/05/imp.shtml

TV on demand (93%) and video downloads (82%). When asked what type of a content they would like to download, the responses were full-length movies (68%), music videos (45%), clips from sport events (41%) and movie trailers (31%). (Siemens 2006)

It seems that there is room for both on-demand and live mobile television. Made-for-mobile TV and the bulk of mobile video entertainment will probably be popular on-demand content. News users prefer live feeds.

The limitations of viewing downloaded programmes via the mobile phone are the same constraints that limit mobile internet, especially the small screen of mobile phones and incomplete content compared to standard TV. (Light 2006)

2.6 A significant future trend: user-generated mobile content

The contact rather than the content may be the key driver for future mobile media. In addition to conventional television programs re-broadcasted over mobile phones and made-for-mobile TV, there will be a huge variety of user-generated content in the mobile market. In these contents, the contact (interactivity, communality) is important (Kumpula 2006). The terms of web 2.0 and social media are already familiar from the internet. According to CacheLogic, at the end of 2004, 60 per cent of the internet traffic was peer to peer[8]. Pew Internet Project 7/06[9] has announced that nearly 40 per cent of American web-users read blogs. This social networking phenomenon, which is transforming the internet, is going mobile. For example, Nokia estimates that nearly half of future mobile content will be somehow user-generated[10].

There are already popular mobile services where users are producing (and paying for) the content. For example, the UK mobile media company 3 has announced that nearly 4 million customers are using the company's self-generated content services like SeeMeTV[11] and are joining virtual communities like 3's new Kink Kommunity[12] on their mobile phones. The SeeMeTV service allows customers to share videos and to receive a payment each time a video clip is watched. It has had more than 12 million video downloads since its launch last year. Kink is a social networking community which offers subscribers access to personal mixed media blogging from a mobile phone. It receives on average 350,000 postings per day. Keeping mobile weblogs – moblogs – has became a new social practice. Winksite[13] is an example of a community-based

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[8] http://www.cachelogic.com/home/pages/research/p2p2005.php
[9] http://www.pewinternet.org/pdfs/PIP_Politics%20Aug06_Memo.pdf
[10] http://news.inq7.net/infotech/index.php?index=1&story_id=73812
[11] http://www.three.co.uk/planetthree/detail.omp?cid=1139512467578
[12] http://www.kinkkommunity.com/
[13] www.winksite.com

mobile service, which offers a platform for those interested in mobile blogging, chat etc. YouTube[14] has also launched a new mobile portal for its customers, which allows them to send videos when on the move. It can be assumed that many of the new mobile services will concentrate on communication-based services such as communities (Sarvas et al. 2004, Döring & Gundolf 2005).

Mobile users not only produce funny entertainment content and home video clips, but can also participate in news production. As picture-taking with a phone is becoming an everyday activity, users with camera-phones are often able to cover remarkable news events with their phones before professional journalists arrive on the scene. This poses a certain type of challenge to traditional journalism and media companies. In order to respond this challenge, some companies[15] have added user-generated elements into their programs and are also actively searching for eyewitnesses who possess camera-phone shots. There are already photo agencies where traditional media companies can buy user-generated shots.[16] Users also get some compensation for their published work on many occasions. For the present, camera-phone shots are not technically ready for broadcasting, but things are certainly moving quickly in that direction.

User-generated podcasting – audio and video file sharing to a portable device – is also a significant phenomenon. There are plenty of amateur podcasters all over the world. Quite often they get their power from different subcultures and interest groups. They may offer quick information like short movie and restaurant reviews, or news headlines or summaries. Independent musicians have started to reach their listeners without intermediary record companies. There are sites for podsafe-music[17], where podcasters are able to download free background music for their shows. Other services are also created for podcasters, like podcast editing and voice offering services. This whole podcasting or mobcasting[18] phenomenon may affect the forms of present media supply. For example, the Finnish Broadcasting Company, YLE, which started its podcasting experiment in autumn 2005, has recounted that one of the most wished-for podcast contents is a radio play.[19] There has been speculation that the podcasting phenomenon may lead to the renaissance of talk-radio. The popularity of podcasting challenges traditional radio stations and business models. The first open source radio station, based on podcasting, started up in April 2005 in San Francisco.[20] The channel is moderated and quality controlled for unacceptable material.

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[14] www.youtube.com
[15] For example ABC online news: http://abc.net.au/news/services/
[16] For example www.celljournalist.com
[17] http://music.podshow.com
[18] mobcasting is podcasting to a mobile phone
[19] http://blogit.yle.fi/podcasting
[20] www.kyoradio.com

Overall, user-generated content multiplies and diversifies the whole media content supply, and users have countless channels to get information and entertainment that is just to their personal liking. The advance of user-created content and the empowered consumer turns up the pressure on production companies to produce more interactive mobile content.

Clearly, user choices will determine the success of mobile media services. Indeed, for media companies and consumers, mobile media is really nothing new. Print media such as newspapers or magazines are mobile; the same holds true for media such as the car radio or Walkman (Feldmann 2005). Thus, if new mobile broadcast services are to be successful, questions regarding the relevance of the service to consumers need to be asked. The research needs to ask questions such as: How does the service improve users' lives or help them? Why it is valuable to them? It is also important to consider the issues of when and where the usage will take place, as the mobile broadcasting services will most likely be used in different locations and times than the fixed media and information technologies (Picard 2005). Taking all the above points into consideration, the report will next present the results of a user study.

3. Field test results

3.1 Podracing prototype

The PodRace uses a tabbed view structure to give users three selections: "TekstiTV", "Radio", and "TV". The content is retrieved from a server in VTT and streamed from YLE's Website (Radio and TV) using a 3G connection. The first prototype application was written using Symbian C++ and is tested with a Nokia 6630 Smartphone.

Text view

CATEGORY
"Etusivu"
"Hakemistot"
"Kotimaa"
"Ulkomaat"
"Talous"
"Sää ja liikenne"
"Urheilu"
"Veikkaus"
"TV-ohjelmat"
"Lapset"
"Nuoret"
"Alueuutiset"
"På svenska"
"Hyötytieto"

Figure 2. Text news categories.

The text view contains a navigation hierarchy of three levels. On the first level, we can see different available categories. On the second level, there are article titles from the selected category and third level has the actual article content (for one selected article). The first level is "hardcoded" into the application, whereas the two other levels are read from specific XML files generated by the server. PodRace application retrieves, stores, displays and deletes those files as the user navigates in TeleText article hierarchy.

The application records and stores all relevant user interactions into a logfile.

3.2 Menu selections

TeleText pages are stored in the phone memory only for a short period of time (=session time). The PodRace prototype cleans the memory when the user starts the PodRace

application. Files are stored during one session, which should give the best user experience. When the user navigates from page to page, those pages already retrieved are displayed directly from memory.

Table 2. The available menu selections depend on the hierarchy level.

1st Level (CATEGORY INDEX)	2nd Level (PAGE INDEX)	3rd Level (CONTENT)
"Open"	"Open"	"Next page"
"Exit"	"Go to page"	"Previous page"
"Options"	"Options"	"Options"
"Exit"	"Back"	"Back"

3.3 Radio view and TV view

Radio and TV content is played directly from YLE's website using existing mobile content. Access is based on permanent links found on YLE's website and the list of available content is "hardcoded" into the application. The phone browser is launched with the selected URL given as a parameter.

Figure 3. Radio and TV content from YLE's website.

4. Research methods

The purpose of the first field study was to explore users' media choices in different situations and to evaluate the usability of the prototype. Qualitative and quantitative methods are combined to make sure that adequate data is collected. Semi-structured interviews and media diaries help us understand users' media habits and how they voice their expectations and preferences. Log data reveals the time and duration of actual occurrences of service use. We also asked the users to take some photos with the camera phone about the situations in which they might use the mobile news service, and of other places, things or contexts that are important to them. This helps us gain an understanding about the role of media in the users' everyday lives.

The first field trial started in March 2006 with 10 users who used the service with 3G phones (Nokia 6630 and N70) for one month with an Elisa subscription. Before the test period, the users were interviewed and they received information concerning the test. Demographic data and media user profiles were gathered from the informants. The ages of the users ranged from 23 to 56. All of them worked at least part time and had used mobile services before. During the test period, the users reported their user experiences in a test diary. After the test, they were asked to fill in a usability evaluation form and they were interviewed again.

The test users took some photos with the camera phone about the places and situations in which they used regular media and the mobile news service.

4.1 Comparing text, audio and video

According to the log data gathered, the service was used several times throughout the day. The usage was most active during the first week of the testing period. There was especially active use on the second testing day (See Figure 4). The median for text use was 18 sec., for audio 2 min 56 sec. and for video 1 min 43 sec. Thus the average viewing time for mobile video is relatively short. Out of the media formats on offer, text and video were used most often. Audio was not perceived to be as useful as the other media types because the testing device (N70) already had a radio feature implemented. People who use radio preferred listening to it in real time rather than in preloaded format.

Mobile TV obviously possesses some novelty value, which was present in the usage situations. Mobile TV aroused curiosity also in situations with friends or colleagues. It was the most used media type in social situations when the device was tested with others.

-   *TV was the most interesting to me. The thing I used the most was TV news during my coffee break at work. That way I came to show my friends that I had a TV in my mobile. Some thought, well, you always have to have the latest gadget. Others said, ok, that's interesting, but the screen is very small. You could make out what it is, but the size of the screen caused a little doubt about whether or not it's worth it*. (Man, 56)

The mobile news service was considered relatively fast in comparison with other media. The service was expected to be updated continuously. It should offer the latest news, and not broadcasts which had already been received in other media forms. The speed of the service concerning both content and function was important. The news service was found most reliable when it offered the latest news without there being too much effort involved in using it.

The test users compared and assessed the reliability of different media from a variety of viewpoints. Some considered that despite its reliability the newspaper may be unable to compete in speed with electronic media — occasionally, printed news may already be out of date by the time it hits the streets. Some continued to value the reliability of newspapers despite their slowness: electronic media may publish anything with no verification.

"The image of newspapers is reliable but it is incredibly dated. It's pretty slow compared to the Internet in that the situation can have changed by the time the paper comes out." (Woman, 26)

"These days it is possible for anyone to produce electronic media. If we talk about reliable media, that for me is print media, national newspapers, such as Helsingin Sanomat*, or the major TV channels. If you get it through some other channel, you start thinking is this a joke or something somebody's made up."* (Man, 42)

Typically, the test users described the service as a supplementary media format, which does not replace the conventional media, but adds something to it. The mobile news did not make any remarkable changes in their daily routines, but offered some new ways of having mobile access to the latest news, regardless of time and place.

Compared with earlier studies, the use of mobile phone earpieces has become increasingly common and makes it possible to follow media contents, for instance, in public transport without disturbing others. With the increased use of I-pods and MP3 players, wearing earpieces in public places has become a common occurrence and the use of mobile services no longer brings surprised looks from passers-by.
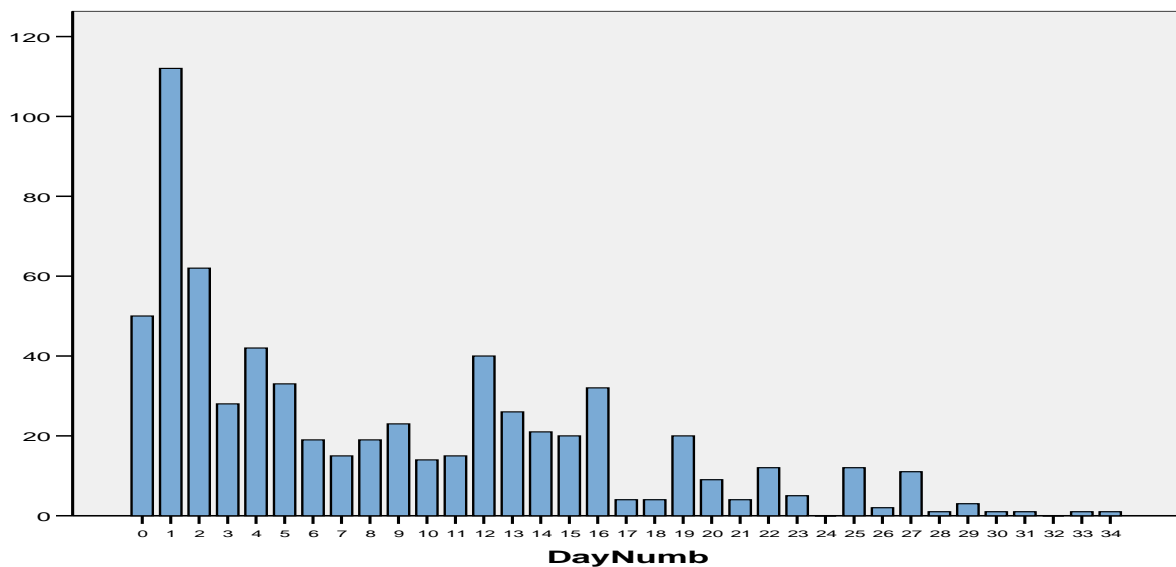

Figure 4. The diagram shows the sum of all view-commands per day during the whole usage. Clearly, the usage was most active during the first week of the testing period and especially on the second testing day. On the last testing weeks the server was down for some days. During that period the service could not be used at all.

4.2 Users' views of media types

When the users had the opportunity to choose to receive news in different media forms in their mobiles, text format was the option opened most often (see Table 3). Typically, users perceived the text news format as being the most convenient for various kinds of

situations and especially suitable for quick news headlines updates "on the go". The text-based news format was also discovered to be less susceptible to the functional problems of the 3G network. However, regarding the total amount of time, the video news format was used the longest. It seems that video news viewing is actually done more rarely than opening text news, but as soon as the reception is good, people like to watch the news broadcasts for a bit longer than just a glance.

The users were asked to describe the main characteristics of different media types in mobiles.
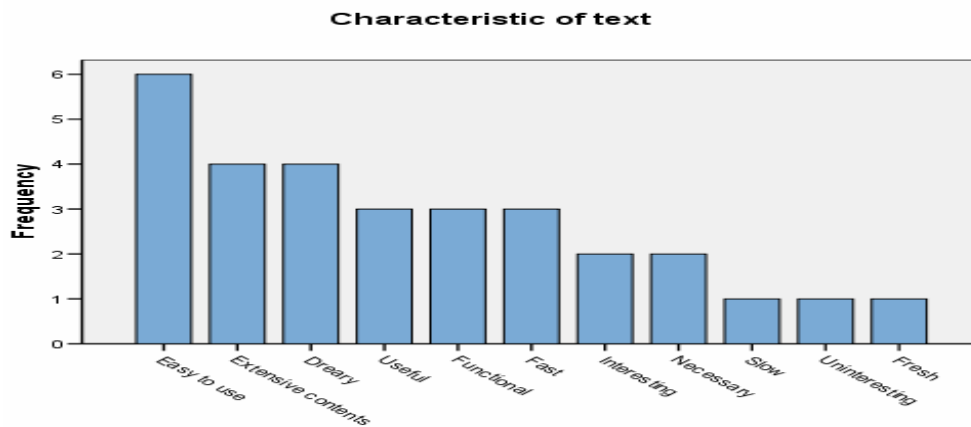
Figure 5. Text was perceived as 1. easy to use 2. having extensive contents and 3. dreary.

In general, the text format was regarded as the most easy-to-use media form during the test period. Test users found it easy to choose news categorized by titles, and the content was offered in a compact way. Reading news was fast and easy in different situations, even at meetings and in public. The small screen was quite convenient for news in text format, although video format was found more interesting.

Table 3. Text format was the media type used most often, but total usage time was longest for video.

	Number of sessions	Total amount of time
Text	129	2h 40' 13"
Audio	27	3h 41' 39"
Video	80	10h 59' 13"

Characteristic of audio
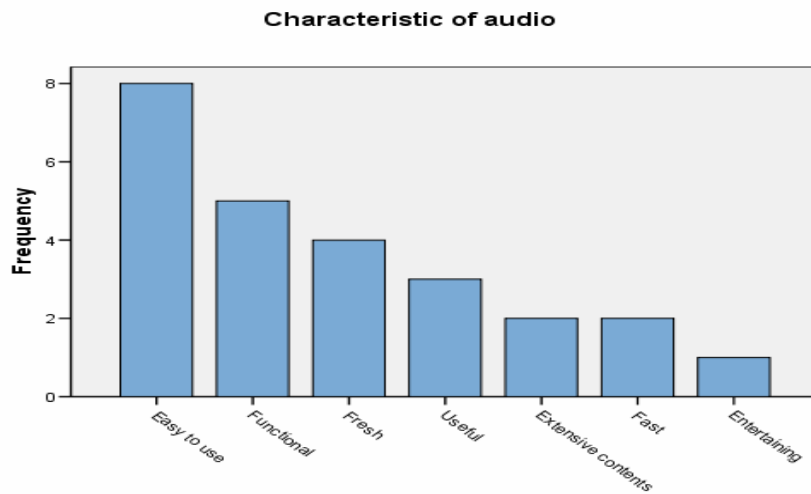
Figure 6. Audio was perceived as 1. Easy to use 2. Functional 3. Fresh.
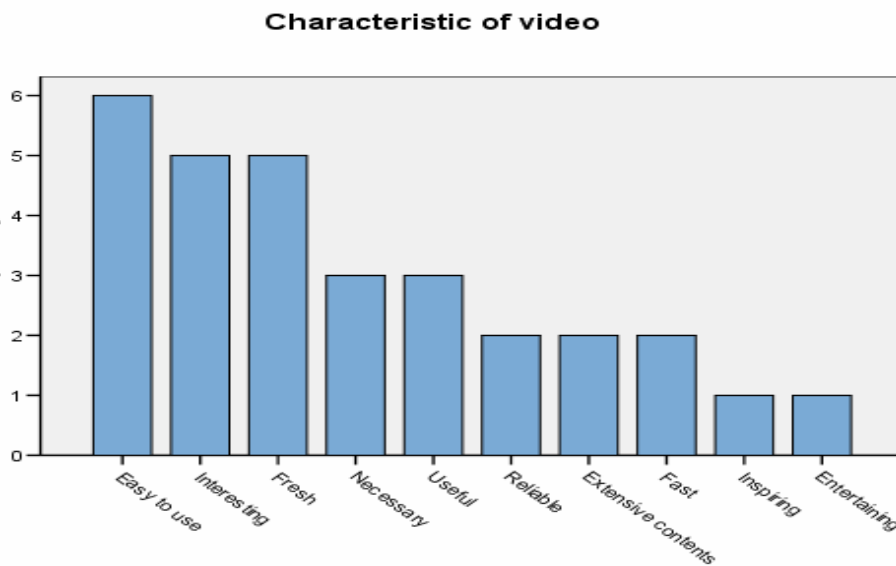

Characteristic of video

Figure 7. The video was perceived as 1. Easy to use 2. Interesting 3. Fresh.

Although audio was seen as an easy-to-use media format, it was quite rarely seen as interesting and fresh. It seems that video was deemed the most interesting form of media in the mobile phone. The huge information value in the video image was also considered important: the opportunity to condense things and explain them in an understandable way in a short time. Crucially, text was generally considered the most reliable form of media. It is suited for many different situations and was accessible in situations where other forms of media are not, for instance due to network problems. Some perceived the small screen of a mobile as surprisingly well-suited for the use of media contents; some were of the opinion that the small screen hindered media use.

Figure 8. Finnish Broadcasting Company (YLE) news in mobile phones. Video was considered as an interesting media form in mobiles, as it delivers the message in a fast and condensed form.

A movie would be too long to watch on this, but I suppose you could have some trailers that you could have a peek at when you're deciding on a film you want to see. I could imagine that ten minutes is the maximum you could maintain an interest in something like that. (Man, 56)

I think it was very exciting to watch TV on the mobile. But it is not so necessary, I could do without it. And it is so dreary, because the living image is always nice. (Man, 26)

Mobile video use was an engaging activity partly because it was physically quite demanding: one or both hands were needed to hold the mobile device, and users really concentrated on watching the small screen and listening to the audio. Even at home users did not leave the mobile video on for "background noise" – the sound levels were considered very good, but users still held the phone in their hands and most often did not do anything else while watching. In that sense, audio and text news were seen as easier channels than video: only eyes or ears, not both of them, were needed. When they watched mobile video, users were focused; quite contrary to the low commitment expectation suggested by Knoche & McCarthy (2005b).

Almost all the users said that they typically use some media simultaneously, most often with TV; for example, while the TV is on, they may surf on the Internet, talk over the phone or read a newspaper. However, with mobile video this overlap did not happen. One of the main characteristics of traditional TV, background use, was left out – users did not wash the dishes or iron while watching mobile TV. Users did show the service to their friends, but many also reported usage breaks ("demo effect") that made the watching sessions short and hindered watching together.
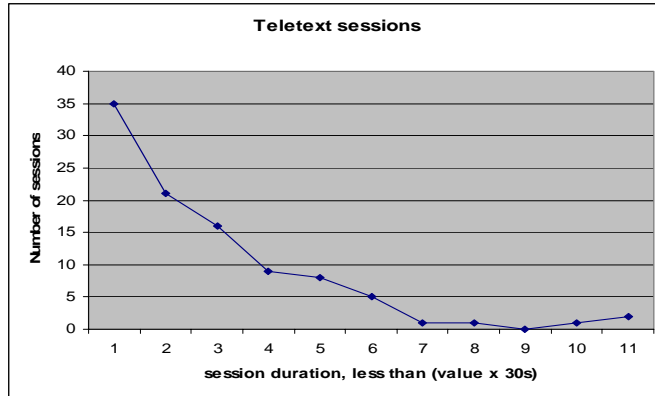
Figure 9. The development of teletext sessions (the first testing week ignored).
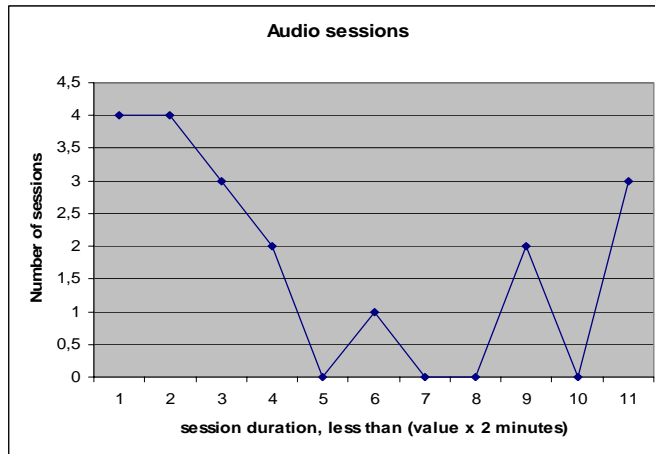

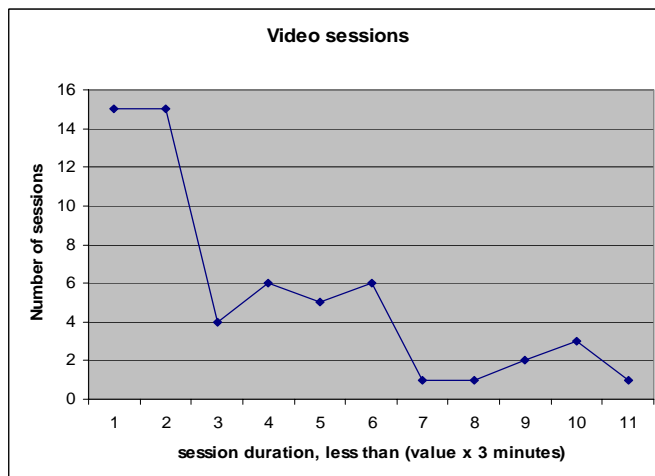*Figure 10. Audio sessions (the first testing week ignored).*

Figure 11. Video sessions (the first testing week ignored).

4.3 The most interesting news categories in mobiles

The categories of domestic (25%), sports (15%) and foreign news (9%) attracted the most interest. Also the TV-program guide was checked quite often (11%). The local news and children's sections were read more randomly. There was high demand only for the latest news – the older news from the archives were barely read at all.
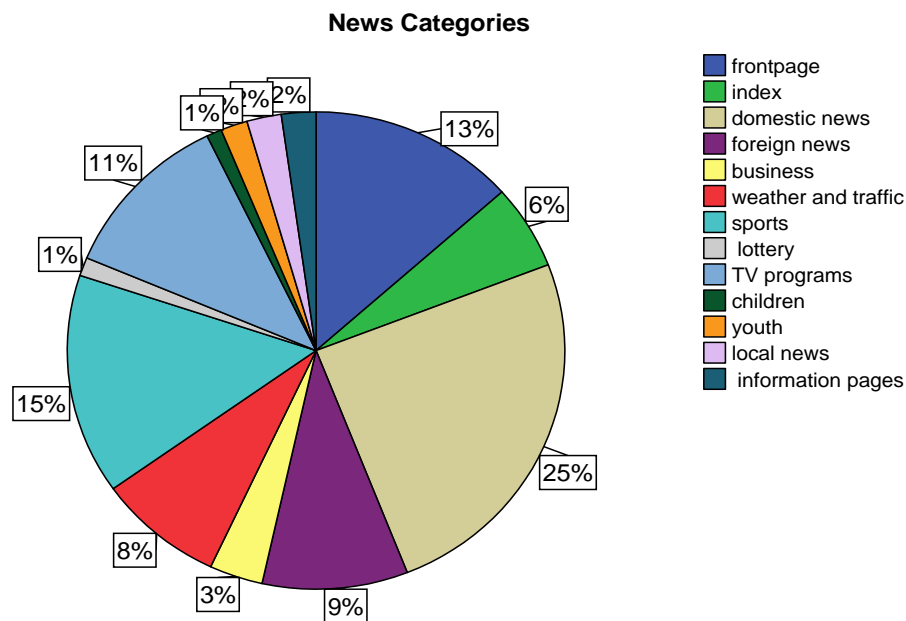
News Categories

Figure 12. The regular news categories such as domestic news, sports and foreign news attracted the most interest in mobiles.

4.4 The contexts of use

The ability to select the media format suited to the situation at hand was considered important. Audio was perceived as being suitable for situations where the user was mobile, e.g. while walking, cycling or roller skating. For situations when the user was sitting or standing still, the media format selected was more likely to be illustrated news, text or video.

"The media format (text, video, audio) has more significance when it is associated with situations you find yourself in. If you need to know the general contents of a specific item of news, then I'd opt for a moving image, kind of like news broadcasts on TV, that's condensed information. If you want a more in-depth view, you read from the

paper or an electronic service. That is a different viewpoint. When there is an interesting item of news and you want to find out more about it, then a text media like that is just what you want." (Man, 42)

The service was used in parallel with other media. One could hear part of the news from somewhere, then check it out on a mobile service, and finally use the Internet to look for more information.

The use of the mobile media service raised a discussion in the immediate circle of the test users. The general view was that its use was best suited to situations where other media were not available or where people found themselves with time on their hands. They could use the service while waiting for someone, during their break from work, or while travelling on public transport. Users described it as a nice way of passing the time.

The mobile news service was mainly used as an individualized, personal media format. While watching TV, the device became occasionally more social, but after the demonstration phase it was mostly used by one person only.

At work and where I study I would be with others, at home and in the bus I would use it on my own. It generated a lot of discussion about how it would work, what you could use it for and how nice it would be. For us mature students coming from different parts of Finland this would be really good as we tend to travel a lot from place to place. For when you're sitting on a train or in a bus or for lonely nights in student housing when you don't feel like going out. (Woman, 34)

Users mentioned that in noisy environments, like in a bus or in traffic, text might be easier to use. The use of earpieces in a public place was seen as less awkward than it would have been before; however, mobile TV would not be used without earpieces for example in a bus, and it would be an extra effort to find and attach them to the phone.

Mobile TV was obviously not used while driving. The radio news section of the service was rarely used at all; users opted for their regular car radio or mobile phone radio instead. On-demand radio news in the mobile did not add value. Users were quite interested in the teletext news section, but some of them were put off by difficult navigation, which did not function in the mobile prototype as in the TV. One user said that he preferred teletext use even through the Internet, because he was convinced he could get news fastest there.
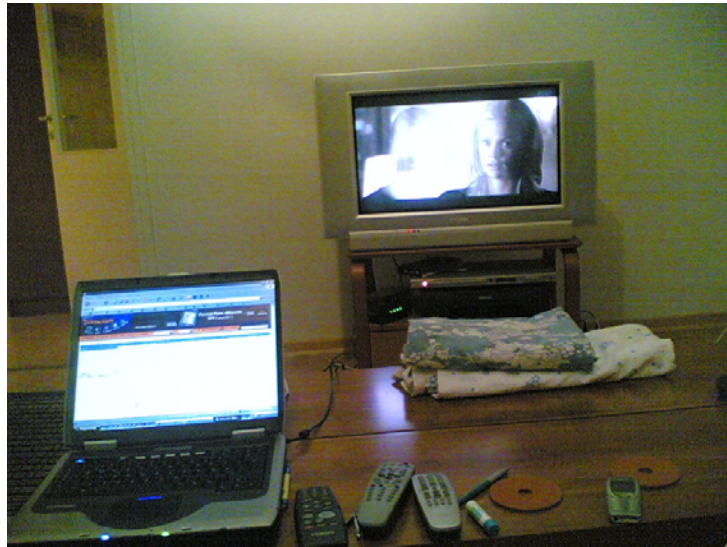
The mobile media service was used in parallel with other media. One could hear part of the news from somewhere, then check it out on a mobile service, and finally use the Internet or main TV to look for more information.

5. Mobile primetime and prime place

The service use spread relatively evenly for the whole day, although use was more frequent during the mornings (from 8 to 10) and before the noon (from 10 to 12) and early in the evenings (from 16 to 18).
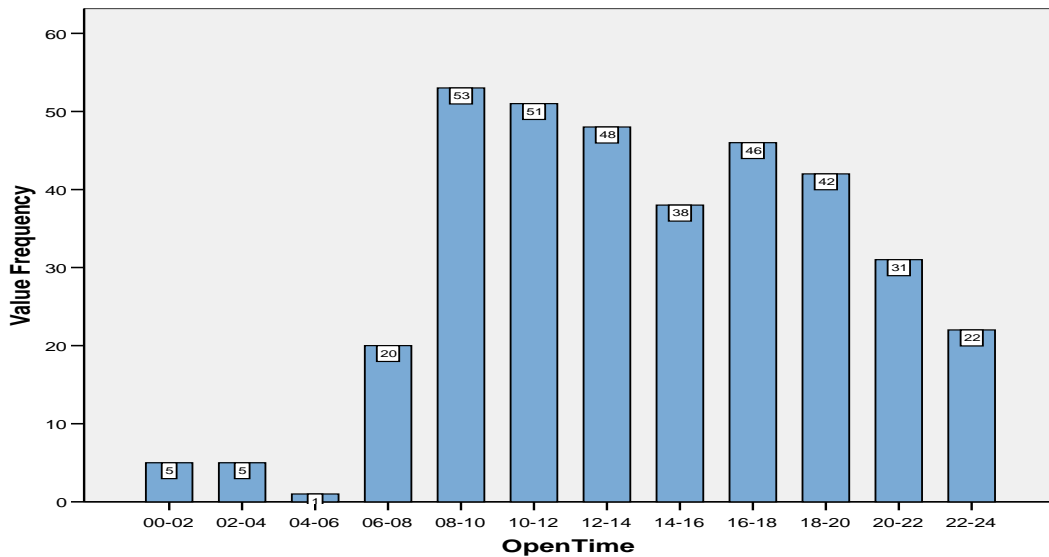

Figure 13. The mobile prime times.

The test users considered the service most useful while they are on the move and not at home or in situations where they are unattainable by regular media. However, they used it also at home for mainly quick check ups and as a personal media device if they were not close to a TV-set. Users appreciated the ability to watch news any time they liked to.

It is very handy indeed that you are able to watch news whenever it is suitable for you. You don't have to care about times. (Woman, 43)
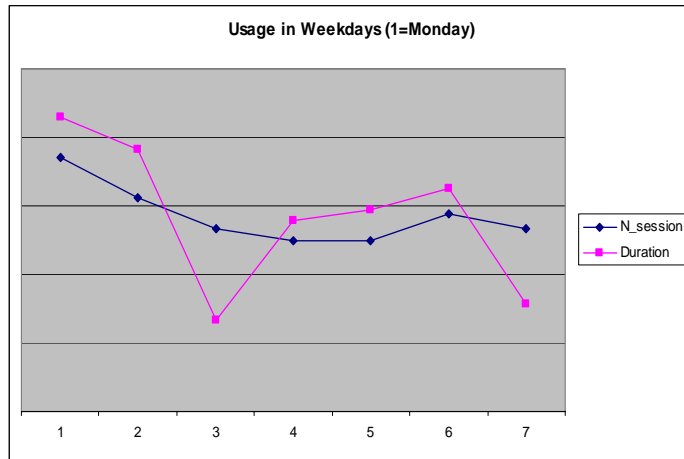
Usage in Weekdays (1=Monday)

Figure 14. The service use was most active in the beginning of the week. The usage tended to become less active during the weekends – it was remarkably low on Sundays. In this chart the first two testing days are ignored, as the usage activity tends to be especially high during the first couple of days.

6. Two user profiles

The test group consisted of persons who had been using mobile phones and mobile services actively during the last few years. They were also keen news followers but each had a different kind of media user profile. Some of them were very loyal newspaper readers, while others regarded the Internet or TV as the best news source. The test users had different kinds of hobbies, lifestyles and interests. During the test, they carried the test phone as their primary mobile, using it for both professional on personal communication. They did not have to pay for using the service. Clearly, the usage activity level of the podrace news service differed quite a lot among the test users. The two user profiles presented below describe the interests and media habits of the individuals who used the service most and used it least.

Female, 34 years, used the service 86 times:

The test user has been using a mobile phone for about 11–12 years. She works and studies at the same time: spends weekends in another city, travels weekly by train and by bus. She often sends SMS messages and uses the camera and calendar on the phone, but never touches the games or the visual radio. Nor does she participate in mobile IRC or chats. She does not read any particular magazine daily.

She listens to the radio several times a day, for about 50 hours a week altogether. She watches TV for only two hours a week, most of the programs less than weekly. She has a broadband Internet connection at home, which she uses for about 40–50 hours a week. She follows the news several times a day on the Internet and radio and daily in the newspapers. She prefers receiving work-related news via the Internet, but news in other categories via a mobile device. **Mobility is important.**

- What I appreciated most was the mobility of the service. Situations where you're travelling from one place to another and you have some time to spare; it's perfect for that. The most disturbing thing was that the service connection was poor in more distant areas. I watched a lot of news. I usually don't have much time for TV.

Male, 23 years, used the service 15 times:

The test user has been using a mobile phone for about 10 years. He often sends SMS messages and uses his phone for browsing internet pages and playing games. He uses the calendar, news and event services (Kanavat) and downloadable applications as well. He has never used the Visual radio.

He reads the morning paper every day, other newspapers and magazines less frequently. He listens to the radio several times a day, for about 38 hours a week. He watches news and entertainment as well as music programs on TV daily. He spends about 17 hours a week watching TV. He has a broadband Internet connection at home, which he uses for about 50 hours a week (says he is addicted to it) He follows the news several times a day on the Internet (ampparit.com), both at work and at home, and daily in the newspapers, on the TV and mobile devices, but never on the radio.

He prefers media other than mobile devices for receiving news in different categories in the first place. **Real-time effect is really important.**

- I would always like to see live broadcasts, and they can be found on the Internet and TV easily. In this service the news were recordings made before so that they were already at least 30 minutes old. And also, there are many other ways of finding the same content elsewhere.

The mobile news service was mainly used as an individualized, personal media format. The test users considered the service most useful while they are on the move.

7. Conclusions

Although the field tests were constructed around testing a service in its early development stage with a small test group, they yielded certain interesting results on the uses of mobile media services in different contexts of people's daily lives. The empirical research shows that a device optimised for voice and text communication can offer users an interesting visual experience, such as mobile TV news. It was interesting to note that the mobile news service could be used in various situations and at different times, although some usability and network problems did occur during the trial.

The mobile phone as media is suitable for many different situations. Mobility, diversity and the real-time effect are considered to be the most important characteristics of the service and that combination distinguishes the use of the news service from any other media use. Users appreciated updated information and information-rich media forms for mobile news delivery. There was high demand for only the latest news in mobiles. The real-time effect was considered important. Users also appreciated fast functions and easy usability. Compared with the situation in earlier studies on mobile video content (Repo et al. 2003), the use of earpieces with the mobile phone has become increasingly common and makes it more convenient to follow media content, for instance, on public transport without disturbing others.

Users appreciated condensed information and media forms for mobile TV and news delivery. Most of the users looked at the headlines or followed the news several times a day – much more often than the traditional TV and news prime times would allow. It would be interesting to uncover the reasons behind this – do we crave for news because we fear catastrophes or is it just some kind of ritual?

The mobile phone as media is suited to many different situations. Its nature as a personal, community or mass media depends on the situation, technology affordances, type of use, contents and social aspects ─ in other words, how the media shapes itself to accommodate the users and the environment.

As personal communication devices are turning into multimedia communication devices delivering news and other mass media content, new questions about user experience challenges will emerge. Two users interestingly pointed out that they would expect the user interface to display a new functional or visual idea. They had recently started using a text-based syndicated news browser (Kanavat) that has its own "smooth" scroll implementation which they found pleasant. For these users, the new scrolling implementation signified the service providers' investment and commitment to developing a good service, and this increased the users' positive attitude towards the service.

Thus, usability issues regarding small-screen user interfaces will be particularly important. In the long run, it will also be crucial to discover what kind of existing and new media formats and distribution channels will best suit mobile media. Regarding the entertainment services, mobile video is thus best suited to quick updates and the viewing of trailers or advertisements for upcoming TV shows. Not many people would be interested in watching a whole episode of a TV show or a movie on the screen of a mobile, at least not at this stage.

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Title
News in mobiles
Comparing text, audio and video

Abstract

If a user had the possibility to watch the latest television news on a mobile phone, or listen to the news on the radio or read text news with the mobile, what would he or she choose? In what cases would the user opt for mobile TV content and when would text or audio be chosen?

This report examines the users' mobile media choices (text, audio and video) in different everyday contexts. The data for the research is based on ongoing empirical research, including field tests on a mobile media service prototype, carried out in Finland in 2006. The role of mobile TV news is also discussed in relation to other media usage.

The purpose of the first field study was to evaluate the usability of the prototype and to explore users' media choices in different situations. Qualitative and quantitative methods were combined to make sure that adequate data was collected. Semi-structured interviews and media diaries help us understand users' media habits and how they voice their expectations and preferences. Log data reveals the time and duration of actual occurrences of service use.

The empirical research shows that the mobile phone as media is suitable for many different situations. Mobility, diversity and the real-time effect are considered to be the most important characteristics of the service and that combination distinguishes the use of the news service from any other media use. The ability to select the media format (text, audio or video) suited to the situation at hand was considered important. Audio was perceived as being suitable for situations where the user was mobile, e.g. while walking, cycling or roller skating. For situations when the user was sitting or standing still, the media format selected was more likely to be illustrated news, text or video.

Users appreciated updated information and information-rich media forms for mobile news delivery. There was high demand for only the latest news in mobiles. The real-time effect was considered important. Users appreciated fast functions, easy usability and condensed information and media forms for mobile TV and news delivery. Most of the users looked at the headlines or followed the news several times a day – much more often than the traditional TV and news prime times would allow.

If a user had the possibility to watch the latest television news on a mobile phone, or listen to the news on the radio or read text news with the mobile, what would he or she choose? In what cases would the user opt for mobile TV content and when would text or audio be chosen?

This report examines the users' mobile media choices (text, audio and video) in different everyday contexts. The empirical research shows that the mobile phone as media is suitable for many different situations. Mobility, diversity and the real-time effect are considered to be the most important characteristics of the service and that combination distinguishes the use of the news service from any other media use. The ability to select the media format (text, audio or video) suited to the situation at hand was considered important. Audio was perceived as being suitable for situations where the user was mobile, e.g. while walking, cycling or roller skating. For situations when the user was sitting or standing still, the media format selected was more likely to be illustrated news, text or video. Users appreciated fast functions, easy usability and condensed information and media forms for mobile TV and news delivery. Most of the users looked at the headlines or followed the news several times a day - much more often than the traditional TV and news prime times would allow.