

Mobility and Media Convergence

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Abstract. In this paper mobility and mobile information technology are discussed in the context of media convergence and the evolution of the media industry. The paper suggests that mobile information technology, in different forms, is converging with the more traditional media, i.e., mobile media. It is also claimed that visitors at different types of events are information demanding, and that mobile media can satisfy these demands. In the paper we give examples from three cases where a content management system was set up to give participants at the different events additional channels of information to increase their experience at the event.

1 Introduction

The transition of traditional media into new media is probably most obvious when discussing the convergence between television and the computer (see for instance Hargittai 2000 or Steemers 1997). The Internet is going broadband and television is going interactive. What is seen on, and how the television is used are similar to how the desktop computer is used. With convergence of media new types of use evolve. The users are now able to use media by controlling the stream of information and they have the opportunity to interact with not only the media, but also with the provider of the content and with other users.

Technical achievements have resulted in sophisticated and affordable media production equipment available off the shelf. Today, it is probably easier to set up a worldwide accessible radio or television channel on the Internet than it is to get employment at a traditional broadcasting company. This means that the control of the media production is diverging and that novel, sometimes less traditional content providers, enter the media industry.

Powerful computers, broadband and ubiquitous computing increase the opportunities for the content providers to reach an audience, as well as create possibilities for people to select, change and interact. We are approaching media and media convergence from a mobile informatics field (mobile informatics is discussed in section 3). From this perspective ubiquitous computing is a reality, as the Internet is accessible from a cellular phone or hand-held terminals, as well as terminals in cars and airplanes. This paper considers *mobility* as a dimension of the convergence of media. The fundamentals of media convergence, mobile informatics and mobile information technology are discussed and related to when proposing mobile media convergence as the next phase in the evolution of the media industry. Therefore the research question to be elaborated in this paper is:

What influence does use of mobile information technology have on media convergence?

The remainder of the paper is organized in the following sections. A discussion about current convergence of media is followed by a description of the research field of *informatics*, and especially *mobile informatics*. Further, three cases of mobile information technology use are presented to illustrate the perspective of mobile media convergence. The cases are then discussed and analyzed before the paper ends with conclusions.

2 The Convergence of Media

This section gives a background to the research presented in this paper. Research on convergence of media commonly approaches three interrelated aspects. First, convergence of different types of media businesses and of media itself. Second, on the aspects of regulation and control. Third, the research has been on different forms of interactivity and user participation in the media, and with the media. These three aspects are briefly discussed below.

2.1 Merging and Converging

Different perspectives of media convergence have been put forward in the literature. The perspectives range from mergers of different organizations such as the Time Warner and America On Line (AOL), and Disney and ABC, to convergence of different types of technology such as the desktop computer and the television, or the desktop computer and the newspaper (Aikat 1998).

The convergence of organizations is a result of how business models change when people's demands and expectations change. Time Warner merged with AOL to bring movies, music and journals to people over AOL's online web-distribution system.

Television broadcast over the Internet started in mid 1990s but has only lately become a reality to Internet users. Almost the same progress has the area of video-on-demand and interactive television. As this applies to high bandwidth applications such as streamed video, it does naturally also apply to audio: radio broadcast, music distribution and telephony, the later being one of many major subjects in the convergence research.

Newspaper on the Internet started out as a way to reuse already edited and published material. This has changed. It is now a way to compete for market shares by keeping contact, interacting and involving the readers. New types material is published on the web continuously. Opinion polls, email to journalists and chat areas urges the reader to interact. Still, it is sometimes argued that this is solely a remediation and refashioning of old media (Grusin 2000).

2.2 Regulation and Control

The context for the research reported in this paper is Scandinavia which has a strong tradition of public broadcasting service (PBS) and consequently a large number of public television viewers. New actors are entering the market and the current legislation is trying to accommodate them. The Swedish PBS television demand that computers at home with broadband connections should be considered as television sets, i.e., the owners should pay the television license fee. Media and especially the Internet content regulation and protection of children have received extensive interest. See for instance (Oswell 1999) for a discussion of these issues in a European context.

2.3 Interactivity

Interactivity promotes new ways of watching television. Quiz shows have web-sites where the viewer can view and answer the same information as the contestant see in the television studio. Many television programs invites the viewers to participate through telephone and more recently through electronic mail or chat. Viewers expect more opportunities to interact with the broadcasted program rather than being a passive consumer.

In the research on domestic computing and the interactions between children and parents in their homes the findings show that the computer has a symbolic value as both a toy and a tool (Downes 1999). As new media is emerging it is important to recognize the interaction the user has with other users, the media itself and the providers of content. The computer-human Interaction (CHI) research field is concerned with these forms of interaction and interactivity (see for instance www.acm.org/sigchi).

3 Informatics

The research conducted in this paper is *Informatics*. This research perspective has a pluralistic paradigm tradition although the dominating interest has been the creation and refinement of system development methods. Recently, the conception of Informatics research as a “*design oriented study of information technology use with the intention to contribute to the development of both the use and the technology itself*” (Dahlbom 1996) has influenced much of the conducted research the the Informatics community.

The central interest of Informatics research is to intervene and contribute to the process of change rather than to just observe and describe the process. Information technology changes people’s work and it should be emphasized that the informatics interest is to augment people’s proficiency rather than to replace them with information technology (Ehn 1988).

The information technology studied has primarily been of a stationary nature, e.g. desktop computers, but as mobile information technology becomes a part of our daily life, both vocational and mundane, a new field of research has emerged, referred to as mobile informatics.

3.1 Mobile Informatics

Mobility can be understood as a person in a mobile situation, which is defined by the environmental, physical and social settings surrounding the individual and how these aspects affect her possibilities to perform a certain activity (Kristoffersen and Ljungberg 1999). In some sense all people are mobile for parts of their day.

Professional use of information technology in organizations as well as more mundane use of information technology is changing towards increased mobile use. This change applies to work related cooperation, the way we travel to and from our workspaces, and to leisure time habits. Part of this is due to the development of wireless networks and handheld terminals. The understanding of the development and the technology in a mobile context has been described as “nomadic computing” (Kleinrock 1995). *Nomadcity* is defined as: “... *the system support needed to provide a rich set of capabilities and services to the nomad as he moves from place to place in a transparent and convenient form*” (ibid.). Mobility is believed to be a key factor in the future and this implies that a new perspective of information technology related research is needed. Hence, mobile informatics is the research field concerned with the development of innovative and useful services for the mobile person in a mobile society.

3.2 Mobile Information Technology

Cellular phones, personal digital assistants (PDAs) and laptops computers are what we usually refer to as mobile information technology. Cellular phones have been globally adapted and although the network standards differ between the continents it is possible to keep in touch with co-workers, friends and the rest of the world regardless of where you are. Both via voice and via SMS (short text messages up to 160 characters). PDAs have been widely accepted ever since the handwriting recognition technique and other input techniques proved sufficient. Handheld devices are increasingly powerful and equipped with color screens, speakers, microphones and networking capabilities. Laptops continue to lose weight and the interface is sufficient with large screens and full size keyboards. They are close to as powerful as stationary computers, and they are mobile.

The comparison between the developments of mobile devices is as rapid as it is interesting. PDAs are converging with cellular phones and now host phone functionality. Phones are equipped with e-mail, calendars and word-processing much like laptop computers and PDAs. Laptops get more sophisticated communication functionality, e.g. wireless local networks (WLAN) and different types of modems. Obviously different handheld technologies inherit features from each other to represent different appliances in one multi functionality and multi channel device.

The main challenge in the mobile information technology area is no longer to develop handheld devices with potent data processing power and low battery consumption. There are other challenges since there are many different innovations, ideas and ways of interacting with technology when we are on the move. For instance, not being able to rest the laptop computer on a stable surface, or connect to the company intranet. The feature that allows us to perform desktop tasks in a mobile setting is the possibility to connect to the Internet using cellular and wireless technology. Although the bandwidth is (still) relatively low it is possible to handle e-mail and web access. Wireless application protocol (WAP) A step towards an “anywhere, anytime” culture concerning information technology.

The future holds the introduction of the third generation (3G) of wireless communications (UMTS). The expected high bandwidth renders possibilities to explore high quality multimedia services on mobile devices (Varshney and Vetter 2000), such as videoconferencing, voice chat and fast Internet access. The release and adoption of 3G is expected to be a first step towards convergence between media, the Internet and mobile people. For more on 3G see for instance www.ericsson.com/3g.

Convergence of new media and the evolution of the media industry is fruitful to be explored from a mobile informatics perspective. Therefore, this paper claims that mobile informatics is a powerful research field to explore the convergence of media and evolution of the media industry. This claim is illustrated with three examples, which

comprise large groups of media consumers in a temporary mobile context, that is, events of various sorts. The participants have chosen to be mobile since they share a common interest for an event, i.e. their main interest does not lie in the media, but in the event itself. Media brings additional information that enhances the event experience.

4 Research methodology

Three different events were studied guided by the methodology of interpretive case study (Walsham 1995, Klein and Myers 1999). The results presented in this paper are selected excerpts from the three cases.

The fieldwork was conducted during the period February to July 2000. Empirical data was collected through field observations at the three events which each lasted for an extended weekend. Between five and seven conversational interviews with people attending the events were conducted in each of the cases.

5 Results

In this section we present the results from the three case studies. The three cases all include the implementation and evaluation of a multi channel content management system for event visitors, where mobile IT serves as one channel. In order to take advantage of these services, the user had to be equipped with WAP-enabled cellular phones. WAP makes it possible to request, or pull, information over a GSM telecommunication network. In addition, SMS was used so that the service provider could push information to the users. The cases show examples of mobile IT converging of media.

5.1 The Swedish Rally

The Swedish Rally is an annual motor sports event in Sweden. It is part of the World Championship, which also includes the Safari Rally in Kenya and the Monte Carlo Rally. This three-day event attracts close to half a million spectators every year. Almost 100 drivers race each other in 20 special stages. Most of the drivers are professional and part of multinational teams, but some are amateurs racing on a very limited budget.

The Swedish Rally covers an area of around 8000 square miles. The spectators have to travel for hours to reach their favorite spots during the race. Long caravans of vehicles drive through the woods, sometimes creating traffic jams.



Figure 1: A racecar at the Swedish Rally

The Rally is by tradition covered by the Swedish national public radio (SR). They use radio broadcast, digital radio broadcast and more recently the Internet as channels to support the audience. This year the situation was slightly different since a local commercial radio station started to fight SR for the listeners.

During the Swedish Rally a multi channel content management and distribution system was implemented and evaluated. The ambition was to make use of the editorial staff competence by adding new, commercially available channels to reach listeners attending major events.

Available Information was history of the rally, entry lists for current and previous races, maps of the area, traffic recommendations and the broadcast schedule for the radio coverage. Dynamic information included race-results, penalties, retirements, area traffic information, service information (e.g., parking possibilities) and Rally news. The dynamic information came from three different sources: A traffic and service system at SR, the editorial staff at SR and the World Championship Race System. The research material gathered from this case included among other things the following story.



Figure 2: A user with the WAP enabled cellular phone

As the second day of the Rally was coming to an end, people gathered in the woods to watch the last stage of the day. The sun was setting and darkness fell over the crowd. They waited for the first car, trying to keep warm by moving around talking to each other or by drinking hot coffee from plastic cups. Dressed in bulky parkas, caps, gloves and boots, the crowd soon became as one with the black woods. Only cigarette glows and occasional camera flashes showed that the wintry forest inhabited eager Rally fans. The back lit WAP telephones proved to be easy to use in the dark when checking the program. As the night rolled in, it became obvious that the race was delayed. Ten minutes after the first car should have turned up; still no reason for the delay was given through the radio. But then the cellular phones started to beep. SMS-messages were received, telling the subscribers that the reason for the delay was spectators crossing a photocell, thus disturbing the race-timer. The race should start any minute, and so it did.

5.2 The Roskilde Festival

The Roskilde Festival is an annual four-day music festival with a 30-year history, in Roskilde, Denmark. The number of participants at the festival of year 2000 was around 100,000, distributed among 74,000 audience members, approximately 17,000 volunteers (working in teams with camping, parking, stage construction), 4,600 media and industry representatives, 3,000 artists (170 bands) and their staff.

The festival is held on a vast, flat field. The visitors' camp on the enclosed, pre-prepared camping sites in tents or in campers, although some stay in hotels in the vicinity. The festival area is fenced and accessed only through controlled gates. There are eight different stages, all with different musical focus, ranging from Ethnic to Contemporary Heavy Metal.

Information about the festival is distributed through a newsletter ten times a year to over two thousand different printed media. The Roskilde Festival Internet site had more than one million hits per month in 1998. This site contains the newsletters, history, chat rooms, facts and much more.

During the festival it is possible to access the Internet (WWW) through terminals placed in the area. There is also a dedicated daily Festival newspaper as well as public terminals placed in bars, at gates, where information related to the festival is displayed.

To this year's festival, a version of the multi channel content management system as used during the Swedish Rally was set up. Through the WAP service it was possible to monitor what show was currently on at the different stages. The user had only to select applicable stage and the name of the current show was displayed. It was also possible to view the entire program. To be able to use the SMS service, the user had to enter a specific web site, where it was possible to "check" the shows the user found interesting. The user would then be notified a couple of minutes before the show started. Here follows a short description of a situation at the Roskilde festival.

Nine persons tragically lost their lives during the US rock band Pearl Jam's performance during the 2000 festival. That Friday started out as any other Friday in the history of the Roskilde Festival. A crowd of more or less tired, worn out youngsters woke up and started to prepare for another party day with music and dance. When the Pearl Jam concert began in the afternoon, the huge field in front of the stage was crowded with people dancing and singing in the rain. So far it had been fairly easy to get a grip of the happenings. The WAP service had been up and running. Every now and then an SMS-message was received, indicating that a certain band was about to start playing somewhere. And of course, the printed program was thumbed and eyed continuously. The Pearl Jam concert was held at the largest stage. Around 80 000 people were present in front of the scene or in the very vicinity of the stage. For the part of the audience who only took a remote interest in the band, it was still the place to be for the moment. The majority of the festival participants, lingered in the outskirts of

the field, listening wearily to the music. As the rain kept pouring down from the dark sky, the crowd suddenly started to feel uneasy. The band had stopped playing. The band had stopped playing and none of their mayor hits had been heard! Something had happened, but what? Knowing that the band had a reputation of being particularly touchy, it did not really come as a big surprise when they terminated the show. Someone had probably thrown something at the singer, or maybe shouted an insult. These things happen. People started to ask around. *Have you been up front? Did they play "Alive"? Wasn't that a bit of a short concert, do you think?* Pretty soon rumors started to flourish, and the crowd collectively changed their objective for the night. Concrete and trustworthy information from someone who knew what was going on was being sought after. Mouth to mouth gave at hand that fifteen persons had been injured. Everyone knew someone who once had been a great fan of Pearl Jam. Had he or she been involved? Where were they? Any news about what's happening? People killed? The printed programs soon covered the mud. Shows were cancelled. People drifted around trying to figure out what was going on or sharing the latest rumor with passers-by. SMS messages kept coming, but the content did not reflect what was going on. The same did apply for the WAP service, where it was impossible to find updated information about the situation.

Late at night representatives for the festival entered the stages and made formal statements, saying that a number of persons had been hurt and urging everyone to call home to let relatives know that they were all right. This same statement was then displayed over the monitors. As a result, the telecommunication networks broke down, further isolating the festival participants. The insufficient information strategy and infrastructure proved to be a cause for quite some nuisance and sufficient worries during the festival.

5.3 The Swedish Match Cup

In mid June, the small and beautiful island of Marstrand on the Swedish West Coast becomes the focal point for sailing enthusiasts. For a sheer week a sailing competition, called the Swedish Match Cup, dominates the waters around the island. The sailing form is Match Racing. This means that two boats in each heat sail against each other for about 30 minutes on a predefined, relatively small course. The Cup is unique in the way that the spectators easily can follow the race from the Marstrand shore, from boats or from any of the small islands surrounding the course. In a way, the setting is shaped as an arena.

The multi channel platform used during the Cup was similar to the ones used during the Roskilde Festival and the Swedish Rally described earlier. In addition, live video from the match cup was also broadcasted via the Internet. The content providers were volunteers working for the organizer of the cup, GKSS, the Royal Gothenburg Yacht

Club. They were located in a tower at the shore and got constant updates and information from the race control, on the top of the tower. Information concerning the match cup was made available on the Internet site, in local newspapers and over WAP. A number of huge arena monitors and loudspeakers were strategic placed on Marstrand. The researchers studied the WAP and SMS users in general and the quality of the content. Below is an excerpt from the study.

The day of the quarterfinals was sunny and windy. The ferry to the island of Marstrand had been carrying spectators since early morning and now they crammed the warm cliffs waiting for the battle to start between Magnus Holmberg, the popular Swedish skipper and world renowned Peter Gilmour from Australia.



Figure 3: The spectators at the Swedish Match Cup

During the race, Gilmour and his crew was in the lead but had earned a penalty, which meant that they had to make another turn around one of the marks. As this happened, the two boats came in close encounter and Gilmour was forced to make way for Holmberg, who then went on and won the race. However, Gilmour had hoisted the yellow and red striped flag and handed in a protest! The umpires pondered the protest and during the lunch break, this was the main topic in Marstrand. People kept glancing at the monitors and discussed sailing rules and the last situation. Those equipped with WAP-phones could ad information on the WAP site to the discussion, and when the outcome of the protest finally came, they were the first to know. The protest was overruled.

6 Discussion

In this section we discuss and analyze the results and discuss the findings. The three cases in the results section aims to exemplify the nature of mobile information technology as mobile media. The event setting is interesting for a couple of reasons. First, in the three cases the user has to travel and spend time at a location away from home. The media available can only be the one offered at the site or mobile technology carried by the user. Further, the purpose for going to an event is to participate in the event. Either as a spectator, an organizer or as an active contestant or performer. The use of media becomes of secondary interests, it is a supplement to increase the event experience.

As a result, media is competing for attention during events since the media technology is different from the media channel chosen when not at the site of the event. The user primarily participates in the event and is not consuming media to any greater extent, and since the captive and addictive interaction between human beings is intensified. This competition for attention puts challenging requirements on mobile media. The technology must be easy handled, accessible and equipped with a functional interface. When discussing mobile IT, this means the possibility to carry a mobile client at all times. It should be robust and able to access information instantly. In the three cases above, WAP enabled cellular phones were used as mobile terminals. The phones filled the requirements of being portable and robust but lack functionality for instant access of information. With GSM, the time to establish a connection to the WAP service take frustrating long.

The user is willing to move from one channel to another to obtain the information sought after, rather than demanding that the currently used channel shall provide the information. Mobile media convergence is consequently the result of the users' mobile behavior. This is exemplified in the Swedish Match Cup case when the audience leaves the race area for a lunch break, but still expects news concerning the event wherever they go.

Interaction with the mobile media takes place in extremely diverse conditions. In the Swedish Rally case it was dark and cold. The printed program was hard to use because of the darkness, but the cellular phone worked flawlessly. The key to success was the simple interface that the phones were portable and there were adequate GSM coverage in the woods surrounding the rally.

In the Roskilde festival case the mobile channel was discarded as soon as it became obvious that the content was incorrect. The Roskilde festival organizers had two major obstacles. First, the mobile media part of the content management system could not meet the demand for information when the situation turned extreme. This made it impossible to keep up to date and operational, as expected from an official information

channel. And second, it was a difficult task to formulate a message to the event participants concerning the tragedy.

7 Conclusions

This paper has discussed mobility and mobile information technology in the context of media convergence. The research question set out in the introduction of the paper was:

What influence does use of mobile information technology have on media convergence?

From the analysis of the three case studies we claim that people's mobility, for instance as exemplified when visiting an event, and mobile information technology is converging with the traditional media and how media is used. Users of mobile information technology in the context of events have high demands for accurate, timely and qualitative information through media channels that are easily accessible. Of course, this is also the case in other contexts than events.

Traditional media have set the standards for the level of information quality and accuracy. A mobile audience is as much information demanding as a stationary or even more so. The demand for qualitative media support and the increasing mobility clearly affect the convergence between the media and mobile information technology.

Since mobile IT is rapidly growing and is getting more and more sophisticated, and since the mobile IT user have the same or higher demands on content and technology as stationary users, it is likely that a new research area is emerging. We refer to this area of research as mobile media.

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