

MGAIN

**Three views on mobile cross media
entertainment**

Version 1.0

22.3.2004

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Last modified on March 2004.

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UDK**Key Words** Mobile entertainment, cross media, multiple media

Abstract

MGAIN (*Mobile Entertainment Industry and Culture*) EU-project¹ studies the mobile entertainment industry from three viewpoints: a) technology, b) user cultures and geographical differences, and c) business. This report is an additional report to MGAIN Benchmarking report. It was stated at the benchmarking report that cross media content and multiple media technologies are seen the main drivers for future entertainment industry and information society, providing richer experiences than currently gained from pictures, voice and data on television, the Internet or third-generation handsets. Cross media refers to content distributed through multiple media. European companies as well as European Commission have already put emphasis on developing cross media solutions and have knowledge about it.

This report shall define central concepts; cross media, multiple media, integrated media and media convergence. Also technological and cultural enables are presented. The ideas will be taken into practise through three case studies and general cultural and technical development; utility games, hybrid media and pervasive communication.

¹ A European Commission User Friendly Information Society (IST) Accompanying Measures Project IST-2001-38846.

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1 Introduction

MGAIN (*Mobile Entertainment Industry and Culture*) EU-project² studies the mobile entertainment industry from three viewpoints: a) technology, b) user cultures and geographical differences, and c) business. We compared European mobile entertainment industry to the ones in Asia (China, South Korea and Japan) and North America (Canada and the United States of America) in the MGAIN-project. In view of the general development of mobile telecommunications and digital content industry, it is clear that cross media will be one of the future trends having an effect on mobile entertainment. Cross media refers to content distributed through multiple media. Europe has currently put emphasis on developing cross media solutions and has knowledge about it.

Cross media content is seen as one of the main drivers for future entertainment industry and information society, providing richer experiences than currently gained from pictures, voice and data on television, the Internet or third-generation handsets. Cross media entertainment will combine these devices in many different ways utilising third generation mobile, broadband infrastructure. However, to seize the opportunities offered by this new environment, a major effort is required to create new media that engages the user emotionally³. Simultaneously with technical cross media trends, media fragmentation and integration affect the way people use different media. Audiences are elusive and more mobile than before. The imperative to reach consumers with a consistent message across multiple points of contact comes in the midst of advertising or marketing budget cuts and intense competition. "Anywhere-anytime-anything" slogan is often used by telecommunication companies⁴, television producers⁵ and content developers to describe the entertainment and information markets of the future.

In this report we will give an overview on cross media technologies, mobile entertainment solutions and business opportunities. Our aim is also to structure and analyse the area of cross media. This report will be the basis for the cross media workshop, to be held at the closing seminar of MGAIN-project (Mobile entertainment conference: User-Centred Perspectives, March 2004).

1.1 Objective and scope of the report

The objective of the report is to provide an overall look on possibilities of cross media for mobile entertainment actors. Cross media in the field of mobile entertainment is an innovation that has its roots in Europe. Due to the technical limitation of GSM network and SMS communication, mobile entertainment players had to come up with a new approach that would enable rich content to be delivered to / used through a mobile phone. This approach connects to general trends of flexible mediated services enabling universal access to content and transaction management systems through alternative emerging

² A European Commission User Friendly Information Society (IST) Accompanying Measures Project IST-2001-38846.

³ EU: Opportunities Ahead 2003.

⁴ 3GSM 2003.

⁵ Seppänen 2003.

access devices. The goal is to access any information in real time, over any network, from any device⁶.

Cross media trend has also influenced marketing and publishing industries. Cross media publishing means publishing the same content to multiple channels. This means that content can be easily transformed into various media. For example, content can simultaneously be published in printed products (books, journals, magazines), electronic products (CD, wireless), web sites, and in formats accessible to visually impaired persons (voice translation devices).

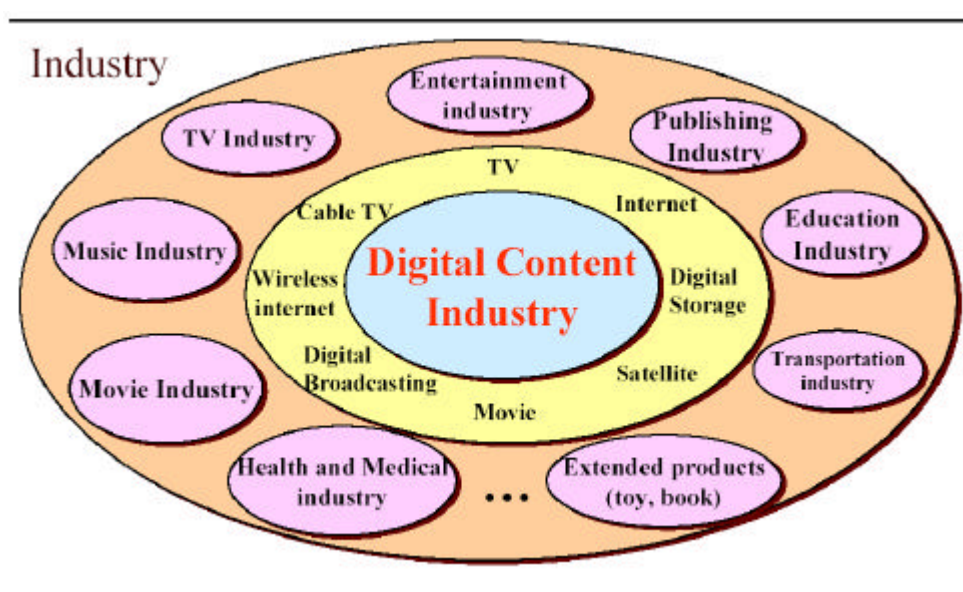


Figure 1: The scope of digital content industry: technology and market.

This report gives a state-of-the-art overview of cross media development in mobile entertainment business:

- Multiple media technologies;
- Examples of cross media applications;
- General technology trends affecting the development of cross media from the mobility point of view.

The purpose of the report is to study the feasibility of adopting and integrating cross media issues from the background of MGAIN project (based on findings in MGAIN-research reports (2003)).

1.2 Pan-European approach to cross media

The aim of the MGAIN-project was both to study the mobile entertainment industry and bring up the competitiveness of European mobile content industry. Cross media have

⁶ MGAIN Benchmarking Report, 2003b.

been brought up by companies as well as the European Commission as one of the possible future trends. At EU's IST2003 conference in Milan in October 2003, there was a special workshop held around cross media issues. Also the European Commission IST program funds 'Cross media leisure and entertainment' projects⁷. It is believed that cross media entertainment may be just what is needed to stimulate user demand for ICT technologies such as 3G and broadband. During the coming years, the Internet, mobile devices and television will be combined in many different ways. But the road to profit is impeded by economic, creative and technological barriers⁸. There is a general belief that the full digital content chain should be improved, covering creation, acquisition, management and production, through effective multimedia technologies enabling multi-channel, cross-platform access to media, entertainment and leisure content in the form of film, music, games, news and alike. It will accelerate take up in B2B, B2C and C2C, currently hampered by insufficient productivity, convergence and high cost.

In cross media production, entertainment applications are increasingly relevant, because often the main reason for people to use the Internet, watch the television or go to the cinema is to have an emotionally satisfying experience. They are not paying for the technology without the content. The mobile and the Internet do not yet match this experience, but games and interactive digital television might change the situation. The challenge for new technologies is how to mix interactive television, the Internet and mobile technologies to provide emotionally satisfying cross media content. This will require development in several areas including script writing, production workflow, business models, storytelling grammar for the new media, and the distribution and penetration of the new product⁹ – in other words, development towards multiple media technologies and cross media content.

European Commission sees cross media content to be undoubtedly the next generation of content, integrating devices such as mobile handsets, television, and PCs. There are several regulatory, technical and commercial challenges facing regulators, broadcasters, network operators, application developers, and content creators. The regulatory framework should be able to manage ownership of content and its delivery over traditionally separate platforms. To exploit the opportunities offered by cross-media content, all interested parties have to create emotionally engaging and satisfying content that users are prepared to pay for. The new media should enrich the experience of all members of the information society.¹⁰

⁷ Selected cross media entertainment projects will be announced in July 2004.

⁸ EU: Opportunities Ahead 2003.

⁹ *ibid.*

¹⁰ *ibid.*

2 Definitions

Cross media introduces a new way of interconnecting different digital medium. Compared to the passive use of television and interactive use of multimedia content, in the future one should closely focus on different levels of action. Cross media acts in between passive consumption of content and interactive action within a program. The user has a freedom to choose the level of involvement. Buckingham & Scanlon¹¹ created a scale of activity between the user and the content. They noticed there are considerable variations in the levels of interactivity depending on subject area, producer and target audience. Users activity was defined prorata the style of the medium. For example the Internet as an open media enables richer interaction between the user and the content. Television and newspapers are defined as instructive media. They tend to be more passive, focusing on reactive action instead of varied interaction.

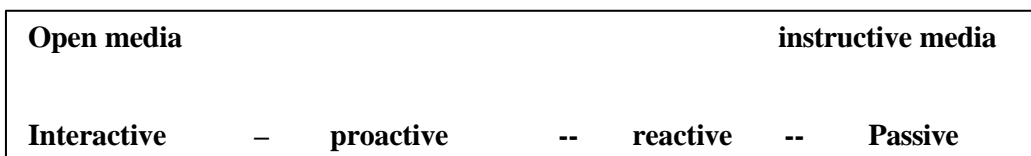


Figure 2: Buckingham&Scanlon model on different levels of interaction.

New modes of use connect to new cross platform ideas and content integration. BT Exact researcher Martin Russ has highlighted that today we all live and work in multiple media. We are surrounded by entertainment, games and news, from various channels, broadcast, the Internet, and mobile networks. On-demand model is gaining ground in all media consumption including TV. It is possible when TV sets are expanded into personal video recorders¹². Such computer-based devices make it possible to store digital TV content for later use, and TV programs can be watched when it best suits for the user. In the future, TV content will include metadata that allow users to watch content that interests them. It will also allow users to take part in creating content and sharing content with other users. The same phenomenon has already happened within the Internet and the trend applies also to gaming. If television and gaming move this way, it would have a radical impact on the use of broadband networks. If one augments the availability of material that is broadcast, taking advantage of the scope for customisation and flexible reworking that one gets from a broadband networked channel, one can deliver television programs that at the same time can be very responsive and compelling broadband applications.¹³

¹¹ Buckingham, D. & Scanlon, M., 2003.

¹² BT Exact 2003.

¹³ ibid.

2.1 Cross media

Cross media is a puzzling term used differently in various industries. In marketing cross media means both printed and digital content, for broadcasters it means possibilities to broadcast same content to different devices. Most often cross media refers to:

- Create once, publish anywhere
- The ability to leverage content over a variety of media
- The creation and implementation of single graphics for a variety of media

The term is also used in relation to COPE (*Create Once Play Everywhere*) where the same content is transmitted through different media drawing on the benefits of each individual medium¹⁴.

More generally cross media is defined as any content (news, music, text, and images) published in multiple media, be it most often mobile, print, web and TV. The content or information is posted once and it is available on other media, rather than having redundant material all over the place. Cross media adaptation means that media elements and also entire fragments of a multimedia presentation can be replaced by different media elements or fragments which can be of different media type.

Dondersteen media researcher Monique de Haas has aptly defined cross media through communication. Cross media communication is communication where the storyline will direct the receiver from one medium to the next. This makes it possible to transform from one-dimensional communication (sender -> receiver) to multi-dimensional communication (sender <-> receiver). Good cross media communication will enhance the value of communication in two ways:

- Financial profits through equal or decreasing costs for the same communication effects with single medium communication. It is possible to shift costs for communicating from the sender to the receiver, if the story is attractive enough for the receiver to want to interact with it.
- The level and depth of (brand) involvement will be more personalised and therefore more relevant and powerful.¹⁵

2.2 Multiple media

Multiple media has been another term widely used to specify the area of inter-platform or inter-device possibilities. Multiple media means that the same content is delivered to end-users in more than one medium. A medium can be defined as means of mass

¹⁴ Barkhuus, L., et. al. 2001.

¹⁵ De Haas, M. 2003a.

communications, such as newspapers, radio or television or more closely a system where transmission media is using more than one type of transmission path (e.g., optical fiber, radio, and copper wire) to deliver information. The content and the subsystems that are needed to manage and publish the content in various media are called a multiple media system. Alternative term for multiple media is multi-channel publishing. The same content is published on various channels, i.e. media. The main concept of multiple media is sometimes described by term cross media publishing.¹⁶

The term multiple media is broader than cross media expanding from the devices to content. Multiple media should not be confused with the term multimedia. Multimedia refers to content or services that consist of two or more basic media formats: text, images, audio and video. Examples of multimedia products are CD-ROMs and DVDs.

2.3 Integrated media

Another development worth of considering is integrated media. The view is that in digital world there will be no isolated media islands, from which the user cannot access publications or links to related information. Integrated media has been defined as technologies for creating, managing and using publications adapted both to various users and to various media platforms such as paper, the Internet, CD, radio, TV and mobile terminals. This means that television set will show newspaper content, as will mobile communicator and car radio. It also means that there will be fewer and fewer "dead-end" publications like today's newspapers, from which one cannot easily get to associate information. At the same time compatibility and interoperability with older platforms – like text television – should be maintained. All this puts great pressure on the publishing industry. From industry viewpoint, being a small player on the international scene, applying multiple technologies means better possibilities to come up with unique combinations¹⁷.

The development towards integrated media is essential in the context of cross media because integrated media is more like the opposite of cross media. Where in cross media the idea is to interlink different terminals to enable to use the same content through different devices, integrated media aims at integrating different devices. Through media integration the interoperability would not be such an issue anymore. The conflicts between integrated media and cross media will definitely affect the way cross media services will be accepted. It is anyhow relevant to point out that the idea of media integration has been around since the 1980s. At that time the vision was to integrate home entertainment devices into one central unit. Today the development circulates more closely around mobile devices. One expects different forms of content; broadcast, communicative, entertainment and games to integrate into one multipurpose mobile terminal.

2.3.1 Media convergence

Convergence can be seen in contents, terminal devices and networking systems. Within networking, convergence means that similar technologies will be used in different

¹⁶ Kojo, M. 2003.

¹⁷ VTT 1998.

networks. From the user's point of view, it means that TV and various mobile devices can be used also for accessing the Internet. In principle, all networks can mediate similar services. Also, various terminal devices, including PC, TV, mobile devices and game consoles are able to show the same digital content. The content can be adapted to various devices depending on the needs of the user. Convergence at different levels facilitates cross media applications, although the development has been slower than many had foreseen. Technological convergence has its implications especially on telecommunication, television and publishing industries. Digitalisation has been a major technological turning point offering a converged space that these industries have tried to take over. In process of time, the roles of players in the market place will clarify and co-operation will be established, making the market more efficient. From the user's point of view it should also lead to cheaper services.

The whole development of cross media asks for new interdisciplinary and interfield operation. The digitalisation of information means that previously separate industries are increasingly operating in the same market space and encroaching on each other, making an already complex picture even more confusing. Telecommunication, television, publishing, information and communication technology companies and others have all viewed the 'converged space' as offering opportunities for cross media synergies. However, progress towards this convergence has been slower, more uneven and more partial than many had anticipated (see figure 3).¹⁸

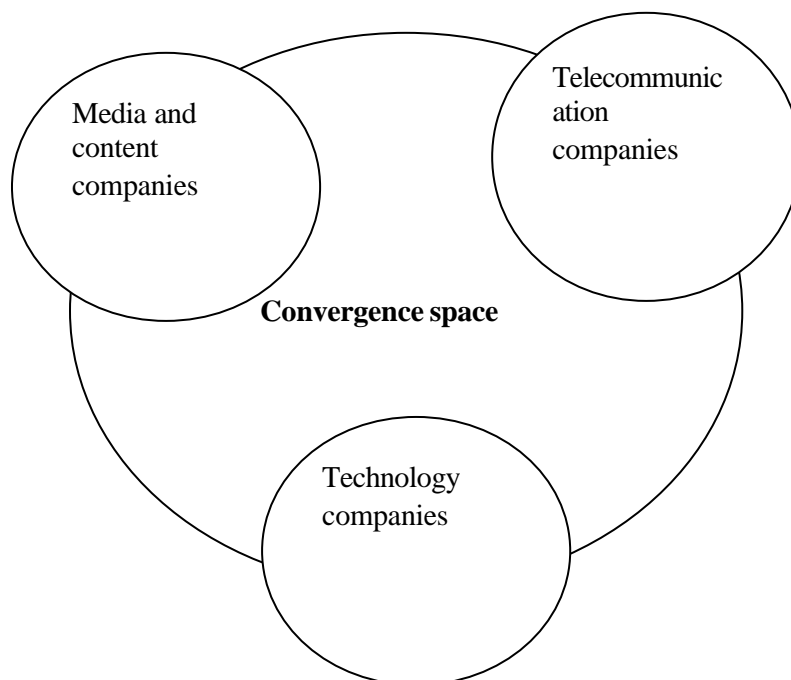


Figure 3: Media convergence integrates different fields of study.

¹⁸ EMCC 2003.

3 Drivers

Cross media entertainment is driven by technological, cultural and industry drivers. Cultural drivers mean ways of gaming (new styles of use, novel interfaces etc.), new needs, media day and mobile lifestyle. Cultural issues will be discussed more detail in chapter 3.1. Among other things, business issues include possibilities to broaden entertainment industry towards utility entertainment. Entertainment industry looks for new ways to broaden its market. One alternative is to integrate entertainment into information delivery, communication, education and advertising. Even though similar ideas have been brought up since the beginning of 1990s, for example in a form of infotainment (information+entertainment), utility games are still further in the future. Utility games will be discussed in chapter 6.

Technological notions were listed in MGAIN report *Emergent and Future Mobile Entertainment Technologies*¹⁹. For example the following emerging and future mobile entertainment trends were issued: standardisation and industry collaboration strive for interoperability of devices, services and applications. Through consortiums such as OMA (*Open Mobile Alliance*) and other international standardisation bodies, integration of digital services includes utilising the full potential of digital broadcast services and mobile Internet. This enables getting TV and other multimedia content to mobile entertainment devices. Pervasive and wearable computers are concepts that indicate that in the future mobile entertainment is more than handheld devices: mobile entertainment can be integrated into clothing. Context-awareness can be a new driver for emerging and future mobile entertainment applications. Enabling technologies include for example positioning technologies.

General technology trends have a strong effect on the level of content creation. Cross media approaches has been brought up by handset manufacturers, broadcasters, telecommunication companies and content developers. Currently, the views of cross media are different depending on the viewpoint. Viewpoint integration is needed in order to create a competitive business area of mobile cross media services.

3.1 Cultural change

General cultural issues as well as new patterns of employment of time are increasing the need for multiple media systems and anywhere-anytime situation. It has been noted that current digital media more and more supplement each other and certain devices are used at a particular time during the day. Changing styles of use have been described with the help of the media day idea. It has been noted that only mobile devices are generally available 24/7 in almost every user category²⁰.

¹⁹ MGAIN 2003a.

²⁰ Most often categorized by age and sex.

Day and night can be divided into three main categories that reflect the activity of individuals: Lean Back, Stand-by/move, and Lean Forward. The Lean Back period divides into sleeping (approximately 8 hours) and free time (5 hours) when one focuses on private life including entertainment, hobbies and mass media. The Lean Forward period of the day consists of working and studying (8 hours). Between the Lean Back and Lean Forward periods there is the Stand-by/move or transition mode (3 hours) that is characterised by commuting. It has been argued that the Stand-by/move mode has the most unused potential worth studying. It should be noted that mobile devices are available also when commuting.²¹

The diversity of different media is relevant because much of the content is more suitable for one medium than another. The rich audio-visual abilities of television, versus many-level contents of the Internet versus mobility of small pocket computers or mobile phones will affect the ways that one uses the media. Consumer research organisations have studied how a person is in reach of different media during the day. For example the following figure (figure 4) shows how media needs differ depending on the schedule of work and free time and accessibility on a media.

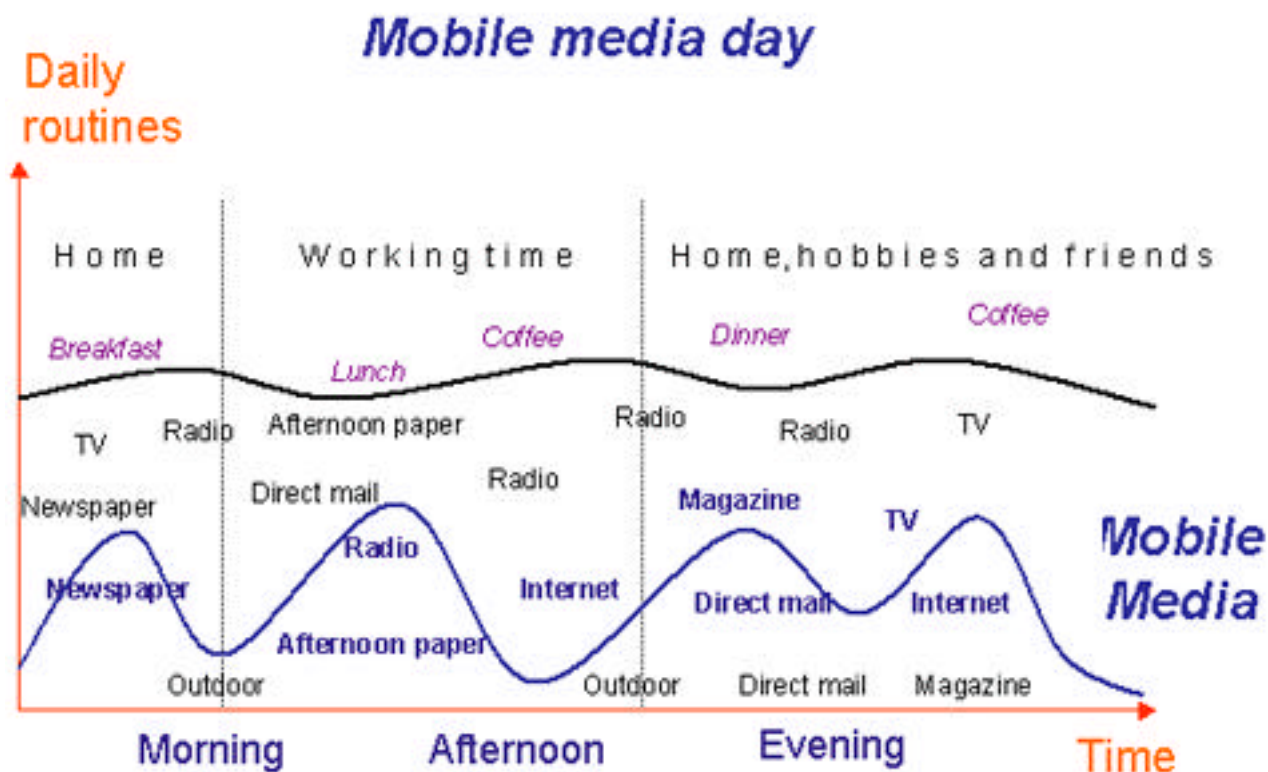


Figure 4: Media use presented in a form of 'a media day'.

Unlike PCs and games consoles, the mobile device is ubiquitous. While 14-30 year old males largely dominate the traditional software games market; mobiles are used by virtually everybody, with SMS particularly popular amongst teenage girls. To succeed, mobile games need to play to the strengths of mobile, namely its ubiquity, immediacy and

²¹ Oittinen, P. 2003.

personalisation. Mobile users will want to "snack" on games, whilst on a bus, in the pub or on a break from classes. As such, mobile games need to have broad appeal, short play times and a high refreshment cycle. Text flirting, quizzes, celebrity gossip, strategy games (e.g. Civilisation, Risk or Xcom) are likely to work particularly well on mobile.²²

3.2 Trends

Besides technological trends, change in use of different content effects the cross media approach. Most EU-15 countries have mobile phone penetration levels over 80%. Mobile phones are not only used as devices for calling and sending SMS, they are also devices for game play, alarm clocks and notebooks. Mobility is the defining word for this new lifestyle. Another telecommunications driven trend anytime-anywhere is closely connected to mobility. People have used to get information rapidly when needed. That asks for interoperability of different cross media devices. Also social communities and virtual gaming environments change the styles of use of digital entertainment. They are essential especially for the youth, as virtual communities in the Internet and game environments have become increasingly relevant ways for the youth to communicate. Lately more service-oriented uses have emerged: mLearning, utility games and new gaming genres like advertainment (advertising and entertainment).

From the viewpoint of mobile entertainment, one of the most relevant cultural changes has been the change in user groups. Since 1980s, digital gameplay has been stigmatised to be one of the most popular leisure activities for young boys. Later the studies have indicated that actually the average user is 21-28 year old white male²³. Lately by the new definitions connected to digital games and new marketing strategies, the user groups have widened even more. Currently the users make the definitions. Especially girls and young children have relatively different idea of a game. Many ideas connect experiences or gaming with social interaction with other players or self-created content. This will widen the field of mobile games towards more general forms of mobile entertainment.

3.2.1 Mobility

Mobility refers to the mobility of users, devices and contexts. The youth are currently the leading user group with mobile needs for usage. The uses of, and needs for, communication media are constantly on the move: youngsters change, as do their user patterns. Pondering alternative, more effective ways to communicate is going on all the time. Thus the only sure thing is the steady change, but this applies naturally to the communication tools themselves also. Young people have learned that the mobile phone is much more than a gadget held close to one's ear. It has increasingly become suited for many purposes, sort of a digital version of the Swiss army knife²⁴.

The first advantage of cross media communication is that one obtains more, diverse effects with the target group. The second advantage is that one will gain financial advantage. Because the user is a narrator and in control over which media channels are

²² SpectrumStrategy 2003.

²³ IGDA (2003), IDSA (2003).

²⁴ Coogan, K. & Kangas, S. 2001.

being offered to the consumer to engage in the interactive story, the user can choose efficient channels like the Internet or even make money on the reply consumers give by using premium rate telephony or SMS.²⁵

3.2.2 Anytime - anywhere

Today, file formats have developed to the point that allows content to be presented in different media. On the other hand, people are able to use various media, depending on their preferences and roles during the day. People have computers and laptops at work and at home, they carry mobile phones and PDA devices with them. To reach customers when it is most convenient for them, more and more companies are applying multiple media solutions. The concept of anytime - anywhere reflects this trend.

Serving customers anytime and anywhere influences on how companies should manage their content and offer services. In content management the trend is towards managing content items instead of managing one media channel at a time. This applies to all companies including media companies. Before the technological convergence, there was no need to manage multiple media. The focus was in the end products and optimising their creation, packaging and delivery. Now, there is a shift to customer-centric publishing and services. And moreover, it is not only the content process that is affected by multiple media. Also customer service and supply chain operations take place in several media channels depending on customer preferences.

The arrival of email, WWW, DVD, mobile services - including SMS and MMS - have shifted the focus towards multiple media publishing and cross media consuming of content and services. The shift is on its way, because it offers a way to make business processes more efficient and improve the quality of service.

Companies that own strong brands have started to offer their products in multiple media. The idea is to persuade new customer groups that can be reached through new medium and offer value-added services to existing customers. From the end-users' point of view, interactivity is an important factor. We all have well-established expectations on printed products and we already know how to interact with personal computers. However, many new digital gadgets such as PDAs, mobile phones and game consoles, are still evolving. In process of time, more and more people will learn how to use digital services in various channels. When the number of media channels increase, also the use of multiple media in creating one service entity increases. An example of this trend is TV-chat where watchers are able to participate in the chat by sending their comments using SMS.

3.2.3 Social communities

Mobile terminals are not only transferring speech or personalised entertainment between people. Today's relevant focus is communities and community members. Communities and content are closely related to each other. Content that interests communities has two main functions: to entertain and to promote skills. Communities may vary from participating to active community. An example of a participating community member is a

²⁵ De Haas, M. 2003b.

teenager who purchases ring tones favoured by his/her community. Internet chat or gaming are examples of active communities that focus on a certain subject or person. Gaming is becoming an increasingly social activity, with IDSA (*Interactive Digital Software Association*) results findings nearly 60% of gamers are playing with friends, 33% playing with siblings, and about 25% playing with spouses or parents. The PC was the first platform to allow networked multiplayer. Now Microsoft Xbox and Sony PlayStation 2 game consoles have joined the fun. Lately mobile phone manufacturer Nokia has followed suit²⁶. Nokia N-Gage Arena connects mobile users into game-related virtual community. Together with local area network or Internet gaming, other forms of social gaming are also becoming common.

For example Celebdaq is self-expressive and social conversational content that taps into the core reasons people communicate. Players are attracted to the content, and to the possibility of beating their friends and others with their superior celebrity knowledge. This media offering works, too, because interest in celebrity gossip is high, and multiple media outlets keep the game's profile high. Other cross-channel emotive networks are also starting up (a Formula 1 effort is currently underway), where broadcasters and other media advertisers are hoping to cash in on these audiences²⁷. More niche audience oriented Sooda.com is another example of cross media, expanding from digital medium to printed communication. Sooda.com is a cross media concept connecting a website including electronic commerce abilities to a paper calendar. One can share one's own ideas and contribute with one's own content to sooda.com. Alternatively one can find information about topics that interest the main target group of the web page: 12-22 year old girls²⁸. Information about anorexia, social life, everyday and popular culture is available there. One can also by ring tones and logos through the website.

3.2.4 Knowledge and learning get new mobile formats

New forms of interactive cross media make it possible to develop new and multi-functional e-learning services and environments. Advanced e-learning systems require the management of media interaction (interaction control, virtual world persistence and administration), knowledge management (ontologies) and learning process (tracking, recording, feedback).²⁹ New and creative learning based services can be integrated with existing learning channels such as classrooms and networks.

Teaching will be evolving from textbook-based teaching towards new learning methods, which teach critical thinking, problem solving, and gives the ability to work collaboratively. It is possible to move from passive, receptive learning towards active, exploratory/inquiry based learning. New learning paradigm moves from teacher-centred instructions to student-centred learning, including more information exchange and collaborative work than traditional teaching methods. It encourages students to critical and decision-oriented thinking.³⁰

²⁶ Mangis, C. 2003.

²⁷ Ulph Jennings, R. & Favier, J 2003.

²⁸ Lehtimäki et al 2001.

²⁹ Behrendt, W. et. al. 2003a.

³⁰ Behrendt, W. et. al. 2003a.

Learning is efficient when many different media formats (text, image, video, audio) and channels (web, mobile phone, PDA, TV) can be adapted to different learning situations and specific learning styles of the user. Multi-channel e-learning is not only how to publish multiple media content into different devices, but it should also take into account different didactic approaches. Learner's motivation can be improved by including tools such as interactivity, search, tests and forums into multichannel e-learning service. Rich media can capture non-verbal aspects of communication and increase trust and learner motivation.³¹

Advances in mobile communication and computer technology, intelligent user interfaces, context-modelling applications have created new possibilities for e-learning, especially from the viewpoint of mobile learning. In mobile learning, access to learning resources takes place via wireless devices like mobile phones, PDAs or laptop computers. There are plenty of different mobile devices in the market and many people are using these devices at work or on their spare time. Mobile phones are quite common among students. In Finland over 90% of teenagers and 28% of pupils of age 8-10 have a mobile phone³². From the usability point of view there are some concerns that small screens and restricted input methods of mobile devices do not facilitate easy access to content or does not support easy annotation of content. However the role of mobile device in learning is what determines its suitability. For example using smart phone or PDA for reading large documents is not an optimal use of the device, but using them to find or share documents are more feasible activities. Learning is not only about content, it is as much about communication as well.

The advantage of mobile learning is the ability to learn where you want and when you want (anywhere-anytime). Using multi-channel e-learning services, content can be adapted to different devices in different situations and requirements on "Just in time learning" (JiT) and "Learning on Demand" (LoD) can be easier realised. Mobile learning makes it possible to utilise books, manuals, discussions, simulations and games in more situations than they have been used traditionally. Mobile learning gives a possibility to learn just when needed. In mobile learning, the teacher can support the learner live (for example e-mail, Instant Messenger, newsgroup, phone, video-application, or shared-application software) or as a virtual support system (for example computer-based help-system, simulation-software).³³

³¹ Topland, K. 2002.

³² Lehtimäki, H. & Suoranta, J. 2003.

³³ Topland, K. 2002.

4 Technological enablers

The Internet's growth in popularity was in part a result of the simplicity and easy use of the web browser software. Businesses also saw the advantage of having a single, consistent user interface for their internal 'enterprise' networks, and introduced Internet technology for creating Intranets. The next step was to connect the intranet to the outside world and businesses started to establish extranets, with controlled access for external users - suppliers, customers and partners.

The Internet and WWW have made information delivery an efficient process with global reach. For publishers and other content providers, it has opened new worldwide markets. A major problem with digital content delivery is pirate copies and lack user-friendly DRM (*Digital Rights Management*) systems. Also, the Internet is still lacking an efficient micro payment system that would allow users to pay small sums of money at reasonable costs. Such small payments are possible within the mobile network technologies that have well established invoicing systems. Wireless payment is developing. In the future, mobile users will be able to buy their games and music (~10 euro sums) without one's own mobile operator as intermediary.

Despite of these shortcomings, the Internet has become a global marketplace and e-commerce both for businesses and consumers has developed rapidly. Within business-to-consumer market, entertainment - in its various forms - has developed in parallel with technologies that enable user friendly interaction and end-to-end communications. Today, handheld mobile devices, especially Internet-enabled mobile phones and PDAs, can increasingly access the Internet.

4.1 Technology roadmaps: towards cross media

Technical Research Centre of Finland (VTT) has produced several technology roadmaps. Also the evolution of multiple media has been forecasted from 2002 to 2010. The most relevant development is towards more personalised ways of consuming different media and social interaction with other users. The development of multiple media or cross media content also connects closely to parallel technology progression in broadcast systems, community media and new multimodal technologies.

4.2 Terminal devices

Cross media content need to be accessed by current terminal devices, PCs, PDAs, TV sets, mobile phones, and game consoles. The number of terminal devices is increasing, making it difficult to design content and services that work optimally on each device or to use their potential to display content, offer services, and interactivity varies.

For the time being, PC is by far the most important terminal device, when using the Internet. No news is that PC and other terminals are becoming more powerful and cost

less than their predecessors do. PCs have advanced input devices, keyboards and mouse, while remote controllers are used to control TV sets. Traditionally, TV has been watched passively, but when combining the use of SMS, TV has become interactive. Digital television with an upstream channel promises more interactive services that can be controlled by a remote controller.

Mobile phones and PDAs have small screens that are not suitable for large blocks of text. Unlike PCs or TVs, most of them still lack rich audio and video capabilities. A big challenge is the usability of handheld devices due to small screens, power consumption and low processing power. Mobile devices should be easier to use than they are. No matter what the reason is, if the user cannot use a mobile handset, he or she won't use any of the available services. This is a major problem for mobile operators and mobile service providers.

Convergence can already be seen in PC and TV devices. E.g. Microsoft has introduced Windows XP Media Center Edition 2004. This new operating system will be used along with home electronics, making up a system for managing digital media at home. Besides watching TV broadcasts alive, Media Center can be used to record TV programmes, films, music, photos, and radio. Digital content is accessible on either a PC monitor or TV display, using a remote controller (no keyboard). DVDs and CDs can be played and the system can even be used to show digital photos.

Technology	2002	2004	2006	2010+
Personalised, context-sensitive multiple media	Electronic identification Web-services using customer profiles Location based services Sensor based reactivity	Profile-driven services with learning features Wearable embedded sensors Awareness of device context	Trusted biometric identification Personalised context-driven services Personal navigation guides (enhanced reality) Portable private profiles	Digital me Awareness of social context
Broadcast systems	Digital TV Mobile TV in pilot phase Digital movies start	MHP breakthrough Interactive services using the return channel IP television emerging commercially	Analogical radio spectrum released for digital use VOD in broadband networks (TVAnytime) Mobile TV (TVAnywhere) Integrated services (4 G: DVB + UMTS + WLAN) etc Digital movies established	3D-television in pilot phase HDTV in pilot phase IP-television established
Community media and media production	XML based systems available, but in isolated environments Knowledge management in use in large corporations Mobile games	Sophisticated knowledge management tools available for companies Semantic web and web services emerging in commercial applications Multi-user game communities	Integrated XML based applications VR-games	Semantic web based integrated applications in use Semantic web in full use in knowledge management Immerse environments (3Dcaves, augmented reality)
Enabling technologies – image, audio, video processing – system integration – programming languages & methods	Speech recognition In limited use	Databases based on XML, RDF, ontologies	Distributed databases Video compression: VHS video quality at 100 kbit/s	Speech recognition integrated in user interfaces Efficient development environments Component libraries

Table 1: Roadmap of technologies vital to multiple media development (Juhola et al 2003)

Besides stationary PC devices, laptop computers have gained popularity. Today, most laptops are equipped with WLAN connectivity, as well as palmtop computers or PDAs, and Internet-enabled smart phones. So far, smart phones have succeeded better than PDAs in the competition for the market share. However, the usability of PDAs and smart phones is still behind laptops and stationary PCs. The amount of content needs to be limited on PDAs and smart phones, because of the small screens, smaller processing

power and limited memory. Also, the quality of audio and video formats is lower when played on PDAs and smart phones. Media types, video, audio, picture and text, can be stored on the device or streamed through the network, even to 3G mobile handsets.

Because the selection of devices is getting larger, the need to adapt content according to the device technology is growing. In principle, the smaller display, the smaller spectrum of content and services can be offered for the user. CC/PP is a W3C recommendation and it defines how to communicate device capabilities to content delivery system, which in turn is able to adapt the content to the user's device. Mobile handsets are under rapid development. Increasingly, mobile phones are hybrid devices that offer additional functionality to basic service, phone calls. Mobile phones equipped with cameras, MP3 players, FM radios and gaming hardware are already available. 3G mobile networks allow the user to play video clips. In a couple of years mobile handsets with digital TV (DVB-H) capabilities will become available.

Mobile phones with a camera have become very popular in a short time. The best camera phones include two megapixel digital cameras. These quality devices are available in the Japanese market. Vodafone has also introduced similar devices with very compact lens technology in Europe. Philips has introduced a variable focus lens system based on fluid. This new technology has no moving parts and it resembles the functionality of a human eye.

In Europe, mobile operators are taking a bigger role in defining the features of mobile handsets - similar to NTT Docomo in Japan. For example Vodafone is offering mobile handset with its own brand and features that are synchronised with its 3G services. At the moment, Vodafone has around 100 content providers, including music companies that provide content related to their music offerings. The role of Vodafone is to co-ordinate the mobile services whose generation requires co-operations on many parties.

The main problems with the usability of mobile handset are durability of batteries and the size of monitors. Battery life has increased steadily, but also the electric power consumption is increasing, because of the new functionality of mobile handsets. Lately, colour monitors have become common in new handsets and the size of the monitors has become larger. TFT technology will improve the quality of displaying colour content. However, there are limits to how large an integrated monitor can be. One idea is to use separate displays suitable for electronic books and similar applications. Philips has introduced a prototype display that can be rolled like a newspaper. The prototype is based on technology developed by E-Ink and it is said to be commercially available in the year 2005. This technology is at its best when displaying text and pictures. Video that needs continuous refreshing of the screen would consume too much power.

The number of radio antennas in one mobile phone will become higher in the future. Besides 2G and 3G radio apparatus, a mobile handset may include radios for WLAN, Bluetooth, GPS, UWB, RFID, FM and DVB-H. Handsets can be equipped with multiple radio antennas. Market requirements define what kind of combinations will appear. Lately, mobile handsets and PDAs with WLAN-interfaces have arrived to the market. These kinds of hybrid handset can access both mobile and WLAN networks. Until now, every network technology has its own handsets that are able to access the network.

From gaming perspective, a major improvement is that graphic accelerators for 3D graphics are appearing on mobile handsets. The experience from PC world proves that 3D

graphics was a major factor in extending the market of PC games. In gaming, the set of terminal devices include:

- Game consoles (Nintendo Gamecube, Sony PlayStation2, Microsoft Xbox), latest versions offering networking capabilities.
- PCs and PCs with networking capabilities in multi-user online games.
- Mobile game services (i-Mode games by NTT Docomo in Japan) and mobile games sold in shops (games for Nokia N-Gage).

4.3 Network technologies

Networks play a crucial role in distributing digital services and content. The bandwidth of networks is increasing and the services available through networks are steadily increasing along with the number of people using the services. The driving force is the rapid development of networking and information technologies, especially microprocessors and memories.

The bandwidth of the network determines how much data can be transferred. Bit rates of 2 Mbit/s are sufficient for most digital services. However, if one needs to transfer a full-size TV signal, 2 -10 Mbit/s (depending on the number of TV channels) is required. To transfer such bit rates, it requires an optical backbone network which is extended to the user. Or instead of an optical network, a copper-based subscriber line can be used. However, copper-based subscriber line must be short enough (typically under 2 kilometres) to allow high bit rates, e.g. 5 Mbit/s. If the subscriber line is too long, bit rates are respectively lower. At the moment, ADSL technology that uses copper-based subscriber lines, offers 512 kbit/ - 2 Mbit/s bit rates. These subscriber connections are regarded as broadband communication.

However, from the user's point of view, an important feature of ADSL and other broadband connections (e.g. cable modems in CATV-areas (*Community Area Television*)), is the fixed monthly fee regardless of the usage volume. Therefore the connection can be always on. Europe is behind Japan and South Korea, when comparing the bit rates of available broadband connections. Also, the prices are cheaper and availability among citizens wider in Far East than in Europe.

Social development emphasises availability of information anywhere and anytime. This means that both wired and wireless connections are needed in accessing networks. We have already witnessed the growth of wireless connections and mobility. Wireless connections are penetrating in several areas. There are several mobile network technologies, including well-established GSM (2G), GPRS (2.5 G) networks and emerging network technologies, namely EDGE (2.75 G) and UMTS (3 G and 3.5 G). Typically, these technologies cover a wide geographical area. GSM and GPRS are geographically extensive while EDGE and UMTS will be available in densely populated areas.

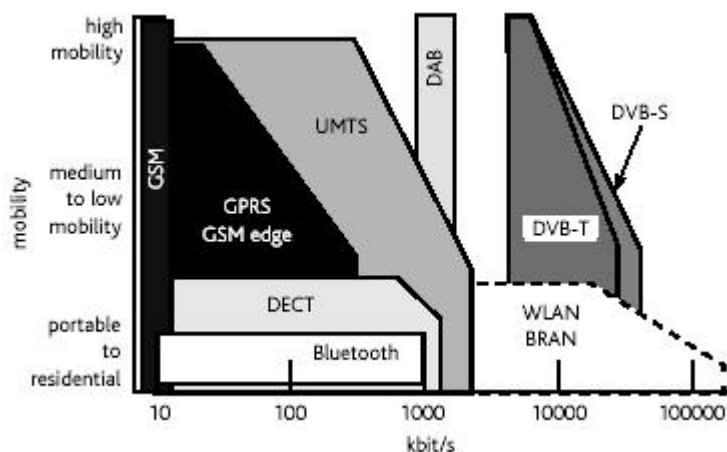


Figure 5: Bit rate versus mobility of wireless technologies. (Bircher et. al. 2003)

After GSM, GPRS was a major technological leap, because it introduced packet switched connections and mobile IP giving the users an always-on experience. The bandwidth of current mobile networks is limited. The practical bit rates of GPRS are rather moderate, 20 - 40 kbit/s. EDGE is an evolution of GPRS and it uses a better coding techniques resulting in higher bit rates, nominal bit rate 110 kbit/s, 20 kbit/s in practice. UMTS, which is emerging in Europe, will enhance the bit rates even more at least when so called 3.5G becomes available. Enhanced UMTS uses HSDPA (*high-speed downlink packet access*), a coding technology that allows very high, 8 Mbit/s downstream data rates. Japanese mobile operator NTT Docomo plans to introduce 3.5G in the year 2005, with major use expected in 2008. This bit rate is comparable to W-LAN (or WiFi) networking technology's nominal bit rate, 11 Mbit/s. These data rates are enough also for multimedia services.

Originally, Wireless Local Area Network, W-LAN was an alternative to wired local area networks. To date, W-LAN technologies are finding their way from companies to homes and home electronics, where W-LAN replaces wired connections and offers flexibility. Besides, W-LAN technologies serve also as an operator technology. There already are so called hot spots, e.g. in hotels, airports and cafes, where laptop computers and PDAs with W-LAN interface can be used to access the Internet. Compared with mobile networks, W-LAN network offers a higher speed alternative for mobile networks in urban areas. Often, the mobile network operators offer W-LAN access. Unlike mobile network operators who have licenced to use certain radio frequencies, W-LAN radio frequencies are free and in principle anyone can become a W-LAN operator.

Digital Video Broadcasting (DVB) allowing interactive services has not yet fulfilled its commercial potential it. The main obstacle is that currently digital TV devices do not support two-way communication. However, set-top-boxes supporting upstream communication are emerging. From the market point of view, another major problem is that terrestrial (DVB-T), cable (DVB-C) and satellite (DVB-S) signal transmission require different kind of set-top-boxes. Despite of the obstacles, at least in Finland the number of set-top-boxes has finally started to grow quickly during the last six months³⁴.

³⁴ <http://www.digitv.fi> (2004-19-03).

The latest entrant in DVB standards family is DVB-H, where letter H refers to the term Handheld. It means that mobile TV will get its own standard and there will be hybrid devices combining mobile TV and phone, although small handheld mobile TV sets are nothing very new³⁵. Especially in Japan, such gadgets have been on the market for several years.

Bluetooth technologies work at very short distances, within 10 metres, and it is sometimes referred as Personal Area Network (PAN). It can be used to interface computers or mobile devices with peripherals. They are also suitable for group communication within a range of tens of meters or less. For the user, such communication is free of charge. Also, there is a trend to apply Internet protocols. In the future everything is transferred through Internet protocols regardless of which network is used. Today, terminal devices operate through wired or wireless to access points that are connected to backbone network.

Technology	Note	Bit rate	Availability	Cost
ISDN	Mature technology, being replaced by ADSL	64 - 128 kbit/s	Broad	Moderate, price depends on use
ADSL	Widely available	256 kbit/s - 6 Mbit/s	Fairly broad	Moderate, fixed price
VSDL	Emerging	10 - 50 Mbit/s	Limited	
Optical fibre	Mature reliable technology	Hundreds of Mbit/s	Limited areas, mainly a technology for backbone networks	Fairly expensive, high investment costs, therefore it is economical to equip only new buildings with optical fibre networks
Cable modems	Available	Several Mbit/s, the available bandwidth is divided among many users, downstream data rate typically 0,5 Mbits/s and upstream data rate is 0,1 - 0,2 Mbit/s.	Limited, CATV areas only	Moderate
Digital broadcast	Different technologies for terrestrial (DVB-T), cable (DVB-C) and satellite transmission (DVB-S), mobile devices (DVB-H) Interactive services	Some Mbit/s or several dozen Mbit/s depending on the clock.	Broad	Affordable or moderate

³⁵ See also Mobile-TV project web site 2003.

	require a downstream data transmission channel that can be e.g. ADSL, GPRS or UMTS			
Mobile networks	GSM-data, GPRS, EDGE UMTS	GSM: 9,6 kbit/s GPRS: 20-40 kbit/s EDGE: up to 110 kbit/s UMTS: 50-100 kbit/s, rajoitetusti jopa enemmän	GSM: broad GPRS: broad EDGE: broad UMTS: densely populated areas	Expensive in heavy use
Wireless LAN	WLAN (802.11b) WLAN (802.11a)	Nominally 11 Mbit/s, in practice 6 Mbit/s or under 54 Mbit/s	Typically available at hot spots, limited reach	Moderate
Bluetooth	Personal area reach Current standard: Bluetooth 1.2	Up to 1 Mbit/s	Available in mobile phones and peripherals	No extra cost

Table 2. Networking technology alternatives.

Bandwidth implications

The bandwidth of networks is an important driver. The implications of broadband can be seen clearly in South Korea, where high-speed broadband connections have been developed during the last years. More than 70% of the population have a low-cost broadband access, making the country world's number one in broadband access in the year 2003. Broadband access has significantly boosted online gaming market that rapidly took one fifth of the overall gaming market in South Korea. Subscription based, multi-user online games have rapidly gained ground. Console manufactures have noticed the trend and they have launched online gaming services.

Besides gaming, broadband connections will affect other areas, where digital content delivery adds value to the users. Examples of such areas are music and film. However, pirate copies are a major problem as long as there are no DRM solutions that serve content creators, content distributors and most importantly, the end users.

Online games are offered also through 3G mobile networks (WCDMA). The bandwidth is sufficient for many gaming applications and there are no delays when playing. However, the price for many users is too high. In South Korea, it is cheaper to pop in a PC bar (PC Bang), where especially young men come together to play online against each other over the network. So, the network connection sets limits to amount of information that can be transferred. Korean PC Bangs are wired T2 lines (6,312 Mbit/s).

4.4 Publishing technologies

Since the 80s, publishing technologies has been under rapid development. New publishing technologies have shaped the technological infrastructure, publishing processes and publishing business. So far, the main driver of this development has been the huge advance in computing and ICT that have dramatically boosted the efficiency of publishing and brought along totally new publishing channels.

Mills Davies and Mark Walter have published an article that creditably assesses the past, present and future publishing technologies. They have analysed publishing technologies and identified five waves that have particularly shaped publishing industry. These waves are³⁶:

1. Desktop
2. Server
3. World Wide Web
4. Network Services and
5. Semantic Web.

The desktop wave started in the 80s. The focus was in creating content mainly for printed media. New off-the-shelf computer programs that could be run on a common PC where cheap compared to previous proprietary solutions and result was a dramatic cut down of page production costs. The server wave during the 90s, especially client server architecture and database technologies, improved the flow of information and workflow by allowing many user to work on the same content improving the productivity of work groups. Newspapers, magazines and broadcasting companies implemented publishing systems where content management was optimised respectively for print, TV and radio.

Internet and WWW have improved especially the efficiency of content distribution. The Internet, intranet and extranet have been harnessed to serve various publishing needs of all companies, not only publishers. Paper-based media got a competitor that was able to offer added value in terms of speed, interactivity and ability to carry on electronic business. Also personalised services, peer-to-peer content delivery and a new generation of publishing tools for creating and managing WWW content, efficient search tools and a wide range of mobile terminals enable easy access the Internet.

³⁶ Davis, M. et. al. 2003.

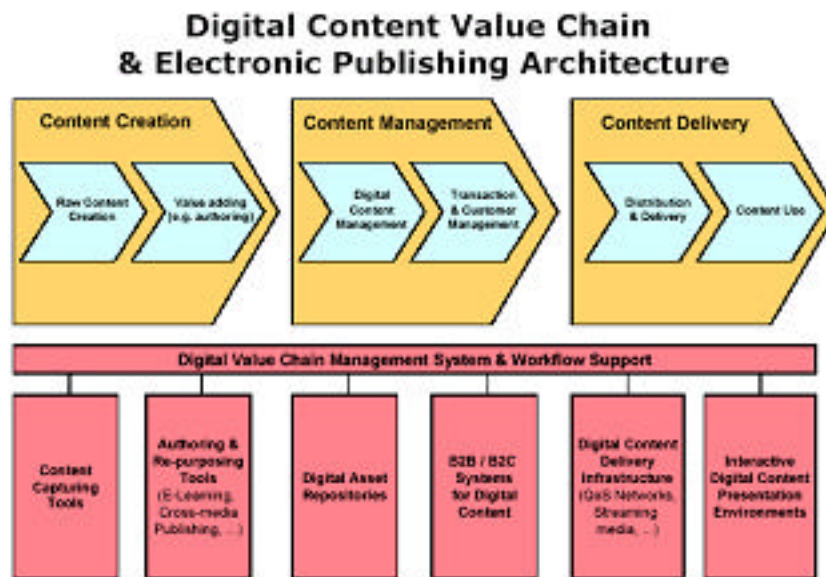


Figure 6. Digital content value chain according to Salzburg Research 2002. (Behrendt, W. et. al. 2003c).

Currently, we are in between the WWW wave and Network Services wave, which is currently emerging. Network Services will further transform publishing business, strategies, media channels, processes, platforms and infrastructure. In addition, Network Services make it possible to integrate processes and applications at reasonable costs. We are talking about A-2-A³⁷, B-2-B and B-2-C integration covering the whole publishing process and the whole business chain including customers and partners (Figure 5). An example of B-2-B integration is content syndication. The procedures needed in content syndication can be automated, and that, in turn, offers publishers new business opportunities by selling content to other publishers.

In principle, the technology for Network Services wave is there, but in practice many content providers are in need for cost-effective, cross-platform digital content production and delivery solutions that cover the whole lifecycle of the content. Current content technologies have several shortcomings on how the content can be manipulated and re-purposed for different environments³⁸:

- Lack of knowledge or metadata about the nature of the content (e.g. places, people, activities, and themes shown or referred in a video).
- Creation of feasible content is labour intensive and typically geared towards “use once”.
- Once created, content tends to be canned, because it has tool-specific encoding and is therefore often not re-usable and media-neutral.

³⁷ (A = application).

³⁸ Behrendt, W. et. al. 2003b.

- There is no easy way of knowing about the existence of content and there is also no easy way of making its existence known to the world, except for indexing it via a WWW search engine.

An essential feature of publishing during Network Services wave is the rich media content in multiple and increasing number of publishing channels. Therefore it's vital to keep the content in flexible and media-neutral format. This kind of content is created once and adapted automatically to various platforms. New media channels and support for new terminal devices are introduced according to the needs of users. There is a trend towards context sensitive adaptation of content together with increasing level of interactivity.

The ability to mix media in a single device will drive demand for better content management. Media producers will need to not only organise specific types of content but also keep track on relationships and dependencies between objects of different types. In other words, content needs to be managed at a very granular level, with a rich set of metadata surrounding each content object.³⁹

Semantic Web wave is already happening, but only its first steps. The idea of Semantic Web is to separate content and the semantics of the content. The semantics of the content gets coded separately from the content making it possible for computers to interpret semantics. This is done using ontologies that describe concepts and their interrelationships within a certain application area. Semantic Web will turn the content into knowledge that is independent from applications. The result will be that knowledge-based work will get more efficient.

In the European Commission funded project "The Future of Electronic Publishing Towards 2010"⁴⁰ the concept of smart content was elaborated. The concept implements the ideas of Semantic Web and the project envisioned smart content to be self-describing, smart content systems to be interoperable with all other content systems, and all smart content to be semantically compatible with other smart content while keeping its original identity, thus enabling content aggregation. The vision is that Smart Content could consist of self-descriptive units of knowledge that can be aggregated through standardised interfaces (Figure 6). This means that content becomes more like software, i.e. content includes also its behaviour.

³⁹ Davis, M. & Walter, M. (2004).

⁴⁰ Behrendt, W. et. al. 2003b.

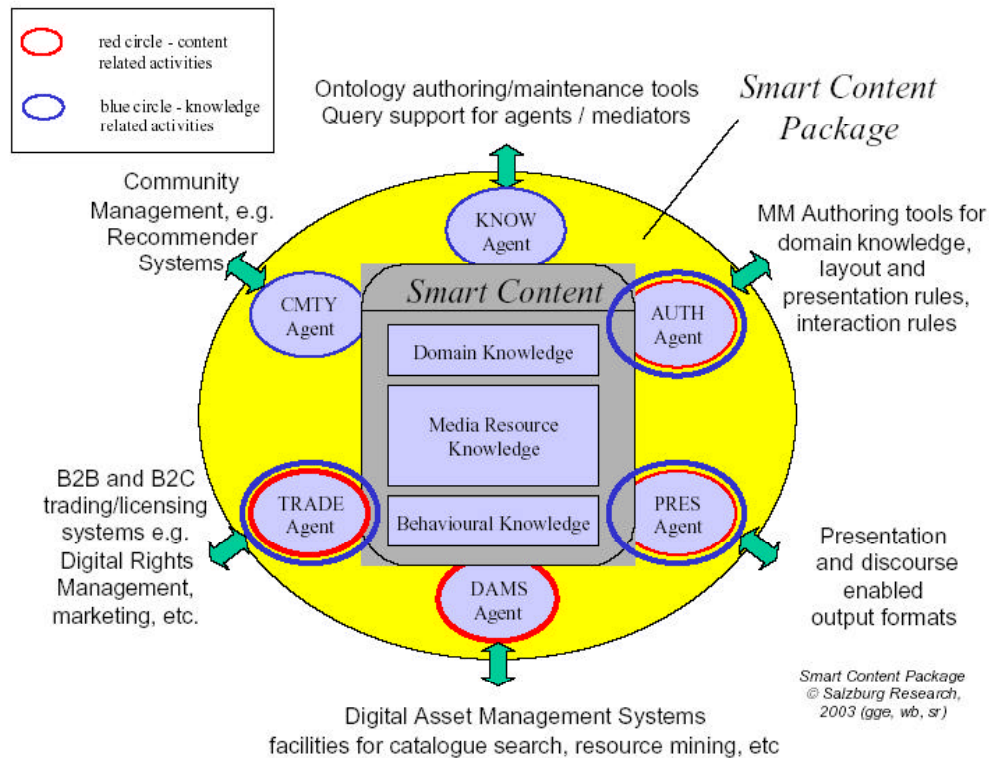


Figure 7: Smart Content architecture according to the EP2010 project aims at self-describing content. (Behrendt, W. et. al. 2003b).

5 Three viewpoints to cross media

In this chapter we present three viewpoints to cross media entertainment with the help of case examples. We are currently at the threshold of potentially significant growth in the mobile entertainment market. Music and games are the first new content genres to rise. SMS services built around TV shows, such as "Big Brother" or "Who wants to be a millionaire?" have been extremely popular. In Germany network D2, which recently launched downloadable mobile games, claims to have 500,000 games users. Secondly, the widespread launch of multimedia messaging (MMS) in 2003, coupled with the arrival of a growing range of handsets with colour screens and support for games downloads, will inevitably kick-start the mobile entertainment industry⁴¹.

We study three thematically selected cases: interactive broadcasting, socially driven services and cross context applications like mLearning. We have chosen these three themes due to the current state of the markets. Mobile gaming has been enhanced by television abilities. Also broadcasting industry has been very interested in the possibilities

⁴¹ SpectrumStrategy 2003.

of cross media. mLearning was chosen as the third case due to the fact that increasingly entertainment has been connected to other purposes: communication, education, information delivery and advertising.

5.1 Interactive broadcasting

Mobile phone chat or a game connected to television is currently the most typical cross media solution of mobile entertainment. First TV-SMS solutions were developed in so called Tvweb (in 1999) where a screen is created from Internet content: articles, weather and web camera images. Also information about television programs and other topical issues were viewed on the screen outside the normal broadcasting times.⁴² Soon after it was innovated that people would like to "be on television". True TV, TV-SMS chats and later on TV- SMS games were invented.

Besides SMS games and SMS chat, polls are a typical form of cross media, from the viewpoint of interactive television broadcasting. Later, more advanced and different forms of interactive broadcasting content were developed. Interactive television offers already many different possibilities to create interactive entertainment. It is in prospect that broadcasting industry will lead the development of richer cross media products in the near future as soon as digital television will have frequent user base.

Currently, there are several companies creating cross media for analogue television as well as interactive television content: polls, quiz but also SMS-television games and chat applications. Mobile interactivity can be used in live events as interactive games, polls, alerts and contests. For example at baseball game fans can SMS their favourite player and get voting results back to phone in real-time, or SMS to win by answering the questions related to the events e.g. "Who hit the most Grand Slams in a single season?". Mobile interactivity of the event increases the fun of being at the game or event allows fans to compete with friends gives possibilities to contest driven participation and gives new opportunities for sponsors to advertise.

5.1.1 Cross media broadcasting

SMS messaging and services based upon it have proven to be a killer application of mobile use due to its ubiquity and the great revenue generation possibilities. For example over eight (8) million people paid 50 cents each to vote on American Idol via SMS⁴³. Similar findings were collected around the world where Idols competitions were being held. The next generation messaging system MMS is supposed to bring richer abilities to participate: colour pictures, sound and video clips, and an even bigger revenue opportunities for content producers.

For example, Finnish companies Redlynx, Outer Rim and Fun2Phone⁴⁴ have all rather comprehensive but typical selection of cross media applications. Fun2Phone has private and public messaging (chats), dating, gaming and voting but also music on TV (jukebox)

⁴² Almamedia 1999.

⁴³ Netinformer 2003.

⁴⁴ Fun2Phone website 2004.

and Real-Time TV trivia and game shows. Their game WaterWar is the Multiplayer SMS-TV Game originally produced by Frantic Media in 2002 on Finnish TV Channel called SubTV. WaterWar has been licensed to several TV channels in European and Asian countries⁴⁵. Dutch Submarine also produces wide variety of cross media products, for example Moviemaker and Instant roadtrip game. Their idea is to enable the users to interact more freely and participate in the content creation process. Their product Instant roadtrip is a seven days long, personalised game experience. Game is played via e-mail and SMS.⁴⁶

Interactivity of television through mobile possibilities has been used to promote bands and brands. HewlettPackard's Mobile Bazaar and Fun2Phone produced Mobile Kemopetrol, an interactive TV program (SMS-TV) which expands an e-services set for the music industry. Mobile Kemopetrol is built around Finnish rock band Kemopetrol. TV solution collects all Kemopetrol-related value-added mobile services to one source; a television program called Music Chat, and adds some interactivity to it via mobile phones. Music Chat is an interactive TV program that comprises an interactive Phone-to-TV Chat, Live video broadcast and voting for the best video. The idea is to provide value-added services like ring tones of selected artists, mobile greeting cards, mobile games (e.g. Kemo Game), mobile diaries and interviews with the band. These services are promoted in the program and can be downloaded to the mobile phone⁴⁷. The service can be replicated for other artists as well. The goal is to strengthen the community of music fans, improve communication between artists and their fans, provide added value for legally-purchased music, and establish new revenue streams for mobile operators, record and media companies.

Except visual communication and television broadcasting, auditory cross media broadcasting is also increasing in volume. Interactive radio gives radio stations the power to interact with their audience. Text messaging is widely used across Europe. Through text messaging the audience has an ability to participate in the program for example by requesting a song or information about a song, voting and participating in polls for the best band, text chatting with DJs in real time or getting content like news, ringtones and games. Text messaging can also be used for advertising. Audience gets text alerts and information on events and concerts to a mobile phone. Examples of radio stations using SMS-based text messaging are SkyRock, France⁴⁸ (songs requests) via SMS, Power FM, UK⁴⁹ (SMS for requests and alerts), Today FM, Ireland⁵⁰ (polls and song info).⁵¹

Visual Radio is a new concept that integrates radio and mobile communication. The idea of Visual Radio is to add the possibility for users to request content that is transferred to mobile handsets through a mobile network. While listening to an FM radio enabled

⁴⁵ See WaterWar case study 2002.

⁴⁶ See Submarine website 2004.

⁴⁷ See Fun2Phone website 2004.

⁴⁸ See Skyrock webpage 2004.

⁴⁹ See PowerFM webpage 2004.

⁵⁰ See TodayFM webpage 2004.

⁵¹ NetInformer 2003.

mobile phone, users of Visual Radio are able to request text and pictures (later also streaming video) which may be related to music (extra information about the performer or song, advertisements), news, sports, financial news and even ecommerce. Within ecommerce, future vision includes selling not only ring tones, but also digital music through mobile services making Visual Radio a new channel for distribution of music. Shopping will be charged on the mobile operator's invoice. The radio signal is transmitted to the mobile handset through a conventional radio network.

The first pilots of Visual Radio will start in Finland during spring 2004. Radio station Kiss FM is ready to offer Visual Radio services when mobile handsets (Nokia 7700) go on sale. Later, Visual Radio will be implemented to other mobile handsets as well. The user interface of 7700 is a combination of a touch screen and pen, and it offers a browser and a screen of 640 x 320 pixels. So, it should be user friendlier than the current mobile handsets. The user may turn the Visual Radio feature on or off. The idea is that the mobile operator would charge a monthly fee that could be around 10 - 20 euros. Nokia's intention is to licence Visual Radio technology to mobile operators, radio stations and other mobile handset manufacturers.

The radio station will need to invest in a server program that manages Visual Radio content downstream to and upstream from mobile handsets. The potential of Visual Radio will be further enhanced when mobile networks with larger bandwidths will be in place (from GPRS to EDGE and UMTS). For example, upstream content deliveries from a camera enabled mobile handset allow radio listeners to send their pictures to the radio station. This, in turn, would allow the radio station to use these pictures, for example in reporting on accidents within their coverage area bypassing the services of picture agencies that traditionally have served various media. In the same way, pictures of celebrities taken by anyone with a camera phone are likely to appear to all media, especially within gutter journalism.

5.1.2 Info-alerts (SMS, MMS)

One widely used but rather simple cross media solution is to provide web pages for certain TV or radio programmes as well as printed newspapers. Audience can get more information of the subject on the web. Info alerts is a method that can be combined with these solutions. Nowadays SMS alerts are mostly used, but in the future MMS alerts will gain ground. The idea of the info alerts is to make the user aware of content available in different media. Media houses offer subscriptions for SMS-based news services. Through SMS messaging, the mobile phone may function as a channel for interactivity as well.

Cross media is used to get alert on one terminal (mobile phone) and then log on to another terminal (PC and the Internet) to follow up alerts and gather more information of the subject. The challenge of the alerts is to adjust them to the context of the user. Alerts need to be relevant to the location and interests of the user. Timing, context and relevance of content are very important factors. Other relevant aspects are the user's competence and media habits. Ideally the content or nature of the message would decide whether the alert should be sent to the mobile phone or to the PC, or any other channel. One possibility is to use alerts as advertisements, but this might be annoying for users. Advertisements might be experienced as trash-SMS. One important factor is that users must be able to control whether or not to receive the mobile alerts and what kind of alerts they want.

Personalisation is important for this type of service in two ways: the context and content of the alerts.⁵²

For example Telenor in Norway has evaluated two broadband pilots focusing on services offering news, sport and lifestyle issues. The main objective of the pilots was to test the attractiveness of new broadband content through the user's PC. They have published the research report called "Mobile alerts for cross media use: Wanted - or not?" based on the results of the pilots.⁵³ The Lifestyle pilot had its fundament in popular TV shows focusing on health, food, and consumer issues. The system includes the distribution of alerts using short messages (SMS), to make the user aware of content available over the broadband connection, or to add value to broadband content consumed on PC's. Lifestyle pilot users were able to participate in a chat session after TV programs and they had the possibility to ask questions and to write letters to the editor. In News and Sport pilot the nature of alerts was general news, alerts on live programming (news and sport), and a general reminder to visit the service (self-advertisement).

TV-SMS services are highly an interesting genre of cross media because digital television will be common in Japan and Europe within a few years. Current TV-SMS solutions are the basis for the future innovations for digital television add-on services.

5.2 Socially driven services

Communications driven cross media services are focused on new forms of mobile entertainment and communication. Social interaction between the users is becoming more general trend in digital gaming. Console and mobile game developers are actively promoting new ideas of social gameplay. Habbo Hotel is one of the most noticeable international success stories of an entertaining communication solution. Habbo Hotel is a playground for hundreds of thousands of youth. One can chat, play games, swim in a virtual pool or sit in a cafe or a club. Young hang around the virtual hotel in the form of a self-created figure. They can buy furniture, clown jumping tickets and pets by sending SMS messages.

Danish Pinkfloor⁵⁴ offers another cross media service interlinking mobile devices to the Internet and television. They focus strongly on creating cross media experiences for young girls. Their product PowerBabes is a gaming platform operating on the Internet as a chat cafe. One can enrich the experience by using mobile phone (SMS/MMS) to personalise and alter ones own character as well as the chat cafe. Also e-mail game possibility, linkage to television game show, PC/console game and illustrated novel has been designed as parts of the concept. PowerBabes and its predecessors strongly focus on developing specific multi-channel cross media experiences for a niche target group.

Except chat-type of solutions, one strongly growing genre of cross media services are different type of dating services. The trend is global and also the solutions are somewhat similar. A Finnish mobile entertainment company MatchEm focuses on matching peoples' hopes and dreams. Their first services and cross media concepts are being developed

⁵² Nilsen, S. et al. 2003.

⁵³ Nilsen, S. et. al. 2003.

⁵⁴ See Pinkfloor website.

around human relationships and communication. A Japanese Cyberz dating site has e.g. produced rather similar products.

The communication aspect of cross media has catalysed the possibilities for marketing. The Singapore-based Activate Interactive is developing services in the area of mobile cross media entertainment. The goal of the company is to help brand owners, telecommunication carriers and media companies increase their profit through the communication, content and community applications that can be enjoyed by anyone, anywhere, using any device including mobile phones, PCs, PDAs and television.⁵⁵

Activate Interactive offers various software platforms for companies that build their own services to reach customers (Figure 9). One of the software platforms is available for interactive TV. It allows TV audiences to interact with TV programmes using mobile handsets. There is another platform for building virtual worlds that are mainly targeted for young people. And finally, Activate Interactive offers a software platform, which enables WWW and mobile marketing through a single user interface. It makes it possible to offer alerts, information-on-demand, 2-way interactive broadcasting, content management, contests, lucky draws and surveys through web and mobile channels and more.

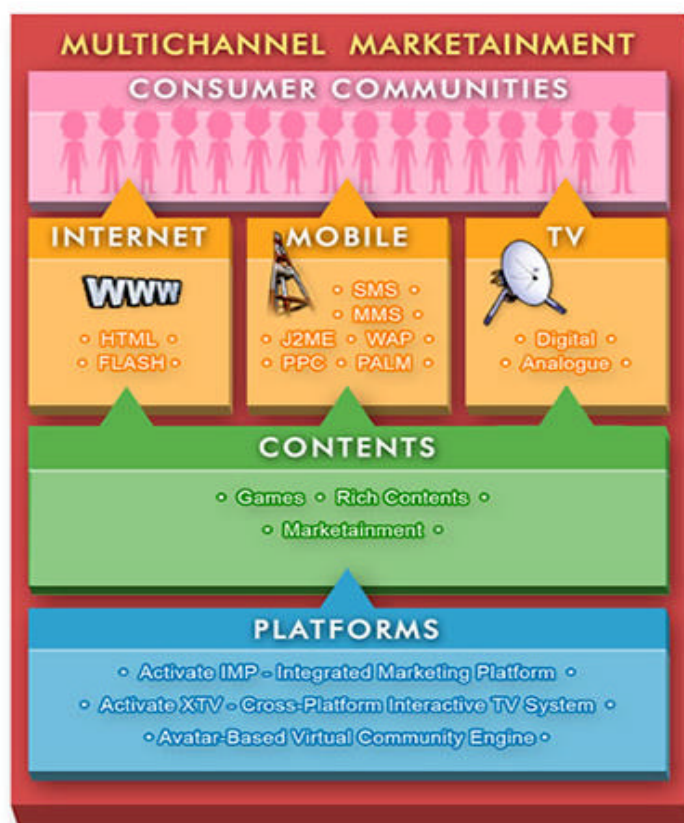


Figure 8: Active Interactive has built software platforms on which service providers can build their own services. The concept allows content to be pushed and pulled to the Internet, mobile channels and TV.

⁵⁵ See Activate website 2004.

“Marketainment” is the concept that increases marketing effectiveness through entertainment. The next-generation of young consumers are more responsive to marketing communications when they are delivered alongside compelling entertaining content such as games, contests, comics and mobile phone downloads.

StarHub, Singapore’s premiere info-communications company has made several marketing campaigns and services in co-operation with Active. One example of the campaign is the StarHub Burger King MMS Voucher. The campaign includes product promos via MMS and mobile viral marketing. The objective is to encourage new marketing avenue through mobile technology. Another example of the campaign is StarHub MTV SMS Promos which offer special events announcement (latest MTV News, LIVE and Promo messages) via SMS.

The advantages of mobile cross media can be utilised in the area of utility services. One example is a service that was built because of the SARS outbreak in Asia. StarHub wanted to develop an application for the benefit of the public by allowing people to track the establishments they have visited and taxis they have taken, by sending an SMS. This SARS Contact Tracing SMS Service is nominated at GSM Association Awards 2004, in the category of Mobile in the Community – Best Use of Mobile for Emergency Situations. An application was developed to allow public to send in SMS detailing either a taxi’s license plate number or a six-digit establishment code. Through this information, the system will capture the user’s location, hence allowing the user to track his locations in the future. To encourage usage of this service, a weekly lucky draw is conducted. The system will randomly select the winner from users who made use of the service during the week, and reward them with cash prizes from sponsors.

Some trade magazines have started to make use of SMS and email in delivering articles published in printed magazines to non-subscribers. When the reader of the magazine notices an article that is of interest for someone he or she knows, the reader sends an SMS message that identifies the article and the email address of the recipient to a mobile operator. Besides, the reader can add his or her covering note that will appear in the subject field of the email message. Based on the SMS message, the recipient soon receives an article in PDF format attached to an email message. The Finnish Taxpayers’ Association offers the service along with their trade magazine. They charge 1.5 euros per SMS message and user pays for it within the mobile operator’s invoice.

5.3 Cross context application

Cross context refers to the idea of connecting entertainment to more serviceable usage. Utility games have used as the umbrella term for different type of integrations between entertainment and utility purposes: education, advertising, information delivery and communication. Education and learning have been the strongest area of interest in mobile communication. Terms like mLearning and mobile edutainment have been used to address uses interlinking different purposes of use. Cross context applications are expected to be increasingly relevant area of application when the use of games and entertainment will broaden to new areas.

A learning technology research centre Ultralab, at Anglia Polytechnic University in UK is developing a prototype environment for mobile learning as part of the mLearning Consortium, EU 5th framework⁵⁶. mLearning infrastructure includes a Learning Management System which, together with the microportal interface layer under development, will facilitate access to mLearning materials and services from a variety of mobile devices plus web and TV access. Ultralab microportal interface, m-Portal allows participants to create their own microportals. The m-Portal gives access to learning materials, creative opportunities and collaborative areas for learners and it is specifically designed to be accessed by mobile devices. The web access is formatted for small devices but also SMS and audio handling will be integrated in some parts of the system.

The Games-to-Teach project is a partnership between MIT and Microsoft. The project is directed by MIT's Program in Comparative Media Studies, funded as a part of Microsoft iCampus and supported by the Learning Sciences and Technologies Lab at Microsoft Research. The idea is to develop prototypes for the next generation educational games. Part of the games-to-teach project's research mission is to explore how people learn through gaming. In the first year of the project 15 conceptual frameworks of games have been developed for engineering (4), physics (4), life sciences (2), history (1), foreign languages (1), psychology (1), systems thinking (1) and cultural anthropology (1). Most of the games are targeted at the Microsoft Xbox gaming console and/or PC. More detailed description of different games can be seen at the website⁵⁷. MIT & Microsoft produce e.g. a simulation game on environmental detectives. It is a simulation game for PDA (Pocket PC) and designed to be used in Environmental Education Courses. It covers content areas, such as global chemical flows and transport of toxins, as well as investigative and process skills, which are part of the environmental education. It uses a simulation platform, which is developed and verified in the Games-to-Teach project. The simulation platform is designed specially for handheld computers.

Also MOBILearn concentrates on mobile cross media utility gaming. It is an EU-project (IST-2001-37187, 2002-2004),⁵⁸ whose objectives are to define models for effective learning/teaching/tutoring in a mobile environment and content development for mobile learning, to develop a reference mobile learning architecture and a business model for deployment of mobile learning. The vision of the MOBILearn-project defines the properties of the mLearning architecture: "A new mLearning architecture will support creation, brokerage, delivery and tracking of learning and information contents, using ambient intelligence, location-dependence, personalisation, multimedia, instant messaging (text, video) and distributed databases."

As can be seen, a lot of research and development are done in the area of mLearning and also EU is supporting it. The advantages of cross-media in eLearning can easily be seen. Cross media supports learning in different situations and contexts. The mobile game-based eLearning, like simulation games can be seen as one big opportunity. Mobility makes augmented reality simulations more ubiquitous. The advantages of the mobility are:

- Portability - computer can be taken to different sites and move around a site

⁵⁶ See Mlearning website.

⁵⁷ See Games-To-Teach website.

⁵⁸ See MOBILearn website.

- Social interactivity – people can exchange data and collaborate with each other face to face
- Context sensitivity – data can be gathered unique to the current location, environment, and time, including both real and simulated data
- Connectivity – handhelds can be connected to data collection devices, other handhelds, and to a common network that creates a true shared environment
- Individuality – unique scaffolding that is customised to the individual's path of investigation can be provided.⁵⁹

Mobile game based training can be seen as a big opportunity in companies. Games2Train (US) is one example of the company, which provides game based solutions to training, marketing and communication in the corporate workplace. They offer business training solutions in the form of web/intranet single, multi-player and multi-team games, mobile games (handheld and mobile phone), classroom enhancement games, custom-designed games and videogame tutorials. Their games allow customers to create and change their own content. Examples of their mobile games are *Idea Tycoon!* and *Games2Train Cell Phone Challenge*. *Idea Tycoon!* is the "Idea Market" game in which players vie to share, collect and use the best and most valuable ideas from around the firm. *Games2Train Cell Phone Challenge* is a fun question-based game template⁶⁰.

6 Future opportunities

Just as Henry Ford reinvented car manufacture in the early 1900s, so broadcasters now need to adopt changes in production techniques that will enable them to address their niche audiences more efficiently.

Martin Russ, BT Exact

There are several technological trends advancing in parallel. This chapter "Future possibilities" will address weak signals and supposed progression. All of these do not necessarily and directly have an influence on the development of cross media markets. Anyhow, one cannot comprehensively understand the actuators and causal connections of cross media development until one see the development from a broader perspective. In this chapter we touch the areas of smart environment and pervasive computing. The idea of reactive everyday life environments where the user will be interacting with the environment with a mobile device. Hybrid media is developing side by side with cross media. Also hybrid media is a term defining the connection between digital and printed media. Utility games for one is more strongly mobile entertainment driven approach to widen games and entertainment services to other areas as well.

⁵⁹ See Games-To-Teach website.

⁶⁰ See Games-to-Teach website.

6.1 Pervasive communication

One future trend connected to cross media is the pervasive abilities of mobile entertainment. Terms ubiquitous computing, pervasive computing and ambient intelligence have all been used to describe the possibility to interact with smart everyday environment. Mobile games have been one area of interest because of the wide possibilities to play with reactive or interactive space with the help of a mobile device. This development will interconnect with cross media issues in a way that despite crossing between devices, cross media should extend towards crossing between mobile devices and environments or objects.

In their article 'Issues and Challenges in Ubiquitous Computing' Kalle Lyytinen and Youngjin Yoo pointed out that ubiquitous computing will integrate the advances in both mobile and pervasive computing⁶¹. They define mobile computing as the capability to physically move computing services with us, thus expanding our capabilities to inscribe, remember, communicate and reason independently of the device's location. The other dimension, pervasive computing, implies that the computer has the capability to obtain information from the environment in which it is embedded and utilise it to dynamically build models of computing. This requires that the environment is intelligent, i.e. able to detect and communicate with computers entering it. The main challenges in ubiquitous computing originate from integrating large-scale mobility with pervasive computing functionality. In its ultimate form, ubiquitous computing means that any computing device that we carry with us can anywhere dynamically build models of its environment and configure its services accordingly.⁶²

Ubiquitous communication means enabling anytime - anywhere communication of anything with anything else, not only peoples but also artefacts. Central technologies in ubiquitous communication are ad-hoc networking and wireless communication technologies.

6.2 Hybrid Media

When two or more of printed and digital platforms are used to distribute the same information, or when a different platform is used for the distribution channel and the return channel, this can be called hybrid media. The techniques underlying these communication platforms have been digitalized during the past twenty years. This development makes it technically much easier to implement new hybrid media solutions.⁶³

⁶¹ Lyytinen, K. & Yoo, Y. 2002

⁶² Norros, L. et. al 2003.

⁶³ Saarelma, H. 2003.

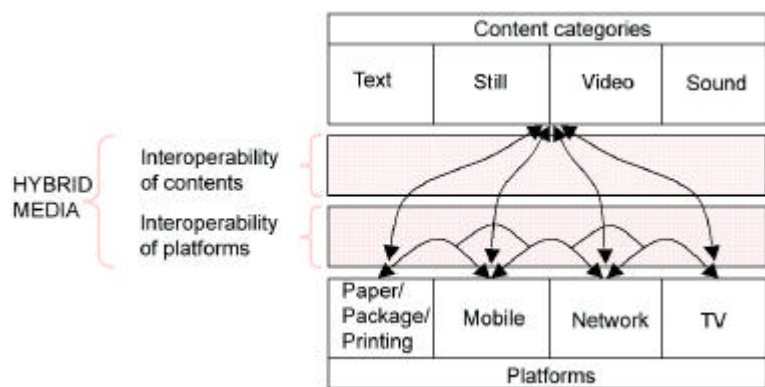


Figure 9: Figure on hybrid media systems. (Oittinen, P. 2003)

People's daily need for (image) information will be met through four communications platforms, which are print on paper, television, the Internet and the mobile terminal. The coverage of print on paper and television is in practice 100%. In Finland, also mobile terminals in practice have a coverage of 100%, and the Internet at present about 50%, though this is likely to grow, following the spreading and diversification of digital television, to 100% within the next 5 – 10 years.⁶⁴

The processes for producing print on paper have been digitised. The reader does not notice it, but it has brought the possibility of integrating print easily into other publication platforms. For example in Finland, already in 1997 VTT studied the idea of "print to Internet". The purpose was to study the possibilities to connect printed sources to digital ones. In the LINKER case study, EAN-pen scanner was used to obtain additional information on lesson topics. Later Tivik-project has continued the studies by using the camera of the mobile phone to read EAN-codes and give further information about a particular product or object⁶⁵.

The coverage of digital television in Finland is at present about 5%, so services are still limited. However, nearly every regular printed publication and television programme has its own web site, so in this respect, hybrid media are a reality. Television programmes allowing interactive participation by mobile phone have also become more common. In their present form, they do not require digital television.⁶⁶

6.3 Utility Games

It has been noted that game logics, graphical presentation styles and functional patterns will be more efficiently used outside game industry: in marketing, information delivery, communication and education. This development connects cross media development to the demand of more active participation from the user side. Utility entertainment is one

⁶⁴ Saarelma, H. 2003.

⁶⁵ See TIVIK web page.

⁶⁶ Saarelma, H. 2003.

supposed future trend of popular content⁶⁷. The development has been connected with the rise of local user innovations. Users are more and more into participating on content creation or creating content by themselves by the original content. Users have made different modifications and fan sites. Locality has been seen to strengthen the willingness to participate. Innovations in itself do not refer to brand new ideas but more to new ways of applying current participatory possibilities.

Besides entertainment, entertaining communication, advertisements, education and information delivery are areas where heavy growth is predicted. Future mobile terminals will be emergent media forms, but it is assumed that users are not yet ready for the level of activity required by the 4G network services. According to the technology forecasts, it can be estimated that in the near future local user innovations will face following difficulties: 1) The diversified media services and the custom of receiving 1>N delivery by major media companies will slow down the level of user innovations. 2) The copyright issues of the materials and 3G or 4G networking issues are not clear and will cause delays. 3) The global image of Internet vs. locality and personality of mobile terminals is developing but will take time⁶⁸.

Utility games are designed to separate relevant information in a nice way from the "information overload" situation, is one possible development. This will already in itself broaden the target groups of mobile entertainment. Also communication, dating applications and social possibilities (virtual communities) are heavily gaining popularity around the world.⁶⁹

7 Conclusions

The main lessons learnt from the report is that cross media is a necessity, convergence of technical platforms is essential to make it work, current platforms should be used, and business models should be developed. However, the main concern of broadcasters is the lack of content depth. A clearly identified requirement is to provide instant personal emotional experience. The main challenges for the cross media technologies, such as smart agents, are to work over different technical platforms, to target a specific market and to be commercially viable. Technical designers need to think business, and content designers need to think technical and be aware of the regulatory framework within which their content will be delivered⁷⁰.

Depending on the player within the content business value chain, the most important requirements that should be met number are, based ⁷¹:

⁶⁷ EU 2003, KDDI 2003, MacDonald 2003.

⁶⁸ E.g. Suzuki 2003, Ujin 2003.

⁶⁹ MGAIN 2003b.

⁷⁰ EU: Opportunities Ahead 2003.

⁷¹ KTM 2003.

- Users: easy to use, adds value, and price in relation to added value
- Service provider/business developer: possibility to earn money, understanding users' needs, and possibilities of distribution channels as well knowing customers
- Packaging products and services: knowledge in concepts, design and software tools, and how to combine basic content into the products and services
- Technology providers: The expertise of technology providers is related to software tools and devices including terminal devices.
- Basic content providers: Story telling in various forms, text, pictures, audio, video. Actually, copyright of content is exchanged for a certain sum of money.

Timing the efforts of these players is also critical. Timing is a even bigger challenge when technology needed for the services gets more complicated, as is the case in cross media services. In Europe legislation, taxation and different regulatories also effect the way services are being developed.

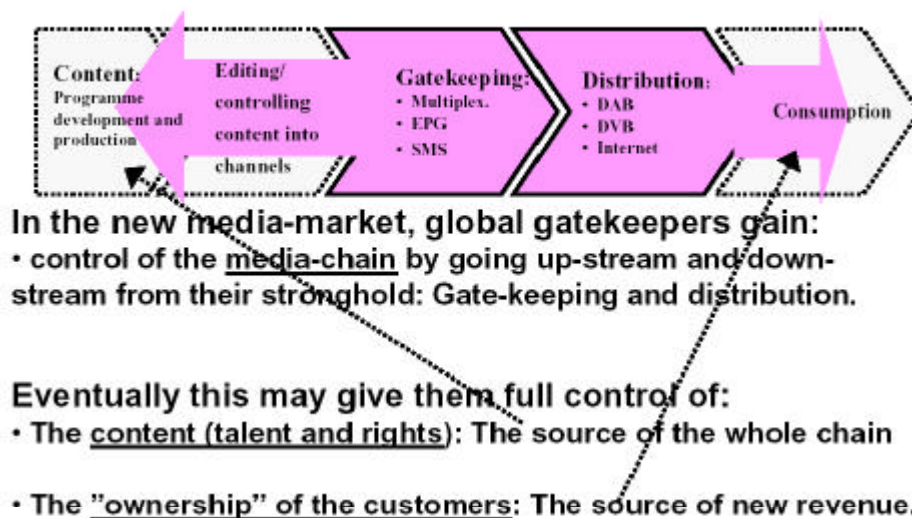


Figure 10: New media-chain.

Technological revolution especially within the mobile world during the 1990s has led to technology driven products and services. First, the technology has been developed, and after that the question of "what can be done with the cool technology" was raised. Now the focus is on analysing user needs and markets. Technologies are developed up to a certain point, after which extensive user tests are carried out before commercialisation (Mobile TV⁷²) or pilot customers are chosen as strategic partners (Visual Radio⁷³).

⁷² See Mobile-TV project website.

⁷³ See Visual radio website.

A flash of genius in cross media services is TV chat or games that combine broadcasting technology and SMS technology in one package. It uses TV channel capacity during the morning, early afternoon or night when there is unused capacity. But, without SMS-messaging there would be no TV chat, because SMS makes it possible to charge for TV chat or TV game. This should inspire us to look for other cross media applications that are able to offer business opportunities.

7.1 Challenges

Latest publishing technology is no longer an obstacle in offering content to users in preferred media and rich-media formats, and the content can be personalised. The number of online services has grown, and interactive games and mobile entertainment have arrived. With the support of new publishing technology, new content products and services can be brought quickly to the market. However, the conservative habits of end users as well as their unwillingness to pay, remind the reality and challenges of the market.

Future challenges in cross media are technological, contentual and communal. Mobile phone is a necessity. One has to have different digital media in use to be able to act effectively in the information society. There is also social demand for cross media content. Social relationships and communities as well as pleasure and games are the actuators of the current development. Entertainment shall be one of the leading market areas also in Europe expanding from game-use to multifaceted experience design. Through social interaction between the users, the relation of local to global and ready-made to self-made becomes essential. Several studies have shown that users learn to become more active and through experience, especially in the area of entertainment, the users want to co-create, richly interact and create own content at some level. For example user-designable or –programmable content: virtual quiz shows and running races at the Habbo Hotel, virtual Harley Davidson clubs at the i-mode in Japan and virtual horse stables created by teenage girls are all early expressions of the future development.

One challenge for companies is how they manage to position themselves in the changing digital content value chain. New players may come and the roles of old players may change. For example, the value chain of mobile games looks different than those of traditional video games. The value chain for video games have been similar to book publishing where most of the money has become from boxed products. The publishers employ distributors/wholesalers to efficiently transfer their products to the retailers. Online distribution allows publishers to sell directly to the end-users. Broadband Internet infrastructure will become more common and communications bandwidth will increase. This effects the value chain, because Internet downloading will become the dominant distribution mechanism. Broadband interactive gaming will emerge as a major entertainment format.

The network operators and larger manufacturers of game consoles will still have strong position, but the ease with which content can be downloaded to mobile devices will lead to a highly competitive third party content market. This has already been seen in the market of ringtones and wallpaper images that can be downloaded into mobile handsets. On the other hand, network operators have begun to offer mobile content services, which

have close integration of the phone menus to the network-based content. This allows easier access to content. Media companies are in the process of implementing multiple channels approach to their product and service offerings. This extension to new media is done by building new product and service platforms and establishing new partnerships.

The cross media demands of personalised, context-sensitive, ubiquitous, highly interactive and collaborative content creates challenges for content management. Traditional publishing is moving towards knowledge based publishing, where the content needs to be managed at very granular level. There is a need to track the interrelationships and dependencies of content objects. Semantically rich content and semantic content management are needed. The challenge that technology and content developers face are the interoperability of devices, smooth but user-driven content creation and limitless use of the content despite of the location of the user or time of use. The idea of cross media also challenges content developers to create totally new social and playful concepts.

7.2 Opportunities

There are product development opportunities in the areas of subscription-based mobile and online games. Relationships between games and learning, cross media integration and new game formats addressed specifically to female and so-called casual gamers⁷⁴. The strengths of European games sector are in the technological infrastructure. European has the lead position in the mobile sector and it has high broadband penetration in some countries, especially in the Nordic countries. Also iTV is already strong in some European countries.⁷⁵

As a part of utility games phenomenon, multi-channel e-learning can be seen as a big opportunity for the companies. Increasing mobile bandwidth together with new presentation possibilities like video broadcasting will enable more rich utility entertainment and mLearning to be created. Mobile communication and mobile learning including game-based learning make it possible to include real-world context to learning environment. One way is to utilise location-based systems to incorporate elements from physical world into mobile solutions. Online multiplayer environments help geographically distributed staff to build virtual teams and share information. This is a key topic in knowledge management.

Hybrid media will increase the possibilities of cross media. Another important area of growth is utility entertainment. In the multiple networks environment the user get information through different data networks: bluetooth, GSM, WLAN depending on the situation and location of the user. This enables better interoperability of different devices and richer content services. For example utility entertainment will highly benefit from this. Users will have more possibilities to participate into content development. Local user innovations will supposedly be one alternative development trend for mobile content developers to concentrate on. Multiple data network development will lead further towards pervasive computing and communication schemas.

⁷⁴ Casual gamers refers to opposite of hardcore gamers. Hardcore gamers are active users of electronic games. Casual gamers play occasionally, free on the Internet and during idle-moments.

⁷⁵ Behrendt, W. 2003.

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