Mobile Entertainment Industry and Culture

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EXECUTIVE SUMMARY

This document is the deliverable D6.2.1, Benchmarking Literature Review. This deliverable is a part of WP6 work including to the Information Society Technologies Project MGAIN – Mobile Entertainment Industry and Culture (IST-2001-38846).

This report addresses the state of mobile entertainment markets and cultures in Asia-Pacific, Europe and North America by reviewing literature and related studies. This report is the accompanying report of benchmarking report where the key players of mobile entertainment markets are interviewed and further comparison between different continents and countries are made.

In the benchmarking literature reviews we shall study:

* The technological differences influencing the differences
* The cultural differences, usage cultures
* The different mobile entertainment markets and business models

This deliverable will add additional material to MGAIN deliverables by introducing the technical, cultural and business differences between the different market areas.

1.
Market analysts still forecast multi-billion dollar industries for mobile games, mobile music and other forms of mobile entertainment. The most successful service to date is ring tones. Close behind the success of ring tones are mobile games. The European mobile game development seem to be too game-oriented where in Asia the range of content is wider covering very different types of entertainment. The youth segment will be the driving force behind the direction mobile gaming is taking as was experienced with SMS and ringing tones. The other segments will gradually enter the market for simplistic games.

2.
The industry of mobile games is placed in between telecommunications and games and currently there are not many best practice examples available. In the area of mobile entertainment there is relatively similar development going on in Asia-Pacific and Europe with the difference of technology. In Asia BREW, HTML and Java games enable a richer experience compared to the SMS and WAP games working in GSM-network. Only after the evolution of the network technologies the content will become competitive and thus mobile entertainment culture can be formed. In addition to the influential technical differences, the European way of thinking of mobile entertainment or entertainment in general is very different from the Asian way.

Asia-Pacific, especially Japan and Korea are well ahead of Europe and North America both in the adoption of the next generation networks and the technologically more advanced gadgets. All of the leading mobile entertainment countries are presumably heading towards the use of WCDMA networks in the future. Before that 2.5G networks will be adapted in the US and Europe.

3.
Japanese NTT DoCoMo has been able to create such business model, which encourages the content developers but is also profitable for the operator. The revenue sharing model for mobile gaming is expected to be much clearer than the system for mobile information services. Since revenues from bandwidth will be substantial, mobile operators could be satisfied with only a small portion of the service revenues for billing purposes. There are alternative models of using mobile phones in Europe. For example SMS-TV chats and other cross media innovations have been implemented in Europe.

4.
Cultural differences play a very important role in the comparison of mobile entertainment markets. The industry of mobile games and other forms of entertainment lie in between the interactive entertainment/games industry and the telecommunications industry. Mobile lifestyle has been well adopted in Japan. Also the culture of electronic games is more visible and has long traditions in handheld games because of Nintendo's role in Japanese game culture. The strength of North America comes from strong brands and knowledge of entertainment industry. While a brand game may initially attract new users, it will not guarantee the success of the game. In the end people will rate the game on the gameplay and the graphics rather than the brand itself.

5.
Currently the strength of Europe lies in the versatile range of mobile entertainment players: leading handset manufacturers, several large operators and content developers. Through co-operation they could affect the design and development somewhat similarly as Japanese NTT DoCoMo does. Through versatile and functional handsets and rich content development, European mobile entertainment companies would have similar possibilities to rule the international market of mobile entertainment.

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1. Introduction

Within the last 10 years the mobile industry has quickly developed world-wide. Small homogenous markets like Scandinavian countries were the early adopters with high growth rates in mobile phone penetration. Soon other Western-European countries followed. At the same time mobile phones became common in Japan. In Asia the number of mobile Internet users grows expeditiously in 1999 after a few years' slower growth. After Japan, the mobile penetration in South Korea (The Republic of Korea), Taiwan and China has risen rapidly. The high penetration rates of mobile phones have created expectations towards the economical profits from the content markets. The restraints of the progress are cultural, economical and technical.

The early adopters of mobile phones were business users with a high need for communication and users who bought mobile phones as a status symbol. After mobile phones became common around the middle of 1990s, new user groups arose and the young became the trend-setters and early adopters of SMS and innovative uses of mobile phones in Asia and Europe. North American users had pagers and PDAs instead of mobile phone partly because of haziness in regulatory issues and the technological incompleteness of mobile networks. The lack of services and diverse needs and purposes for use slowed down the fast adoption of mobile entertainment world-wide. A certain attribute has been the fact that still 60% of mobile phone subscribers claim that they have a mobile phone for security reasons. The change is however already visible in the age group of 8-10 year olds. One European study states the most important use of mobile phones is playing games (girls 70%, boys 73%). Phone calls, SMS and logos come just after the games (Suoranta 2003).

After the success of SMS, mobile games and music are expected to be world-wide blockbuster genres within the next years, while the market for ring tones and logos will be non-existent in 2005 (Cellular-news 2003). The changes in mobile entertainment cultures are even more visible in Asia, where certain sub-cultures have already been founded on mobile games. These early signals reinforce the belief towards the success of mobile entertainment. The young people and up-market customers are believed to be critical to kick-start the market for 3G mobile and get the masses to follow. But the breakthrough of mobile entertainment does not happen as quickly as the analysts have estimated. Mobile entertainment was supposed to be big in 2000, 2001, 2002 and now in 2003. Still it does not seem that the breakthrough is near. Several issues, other than business issues, effect the level of adoption of mobile entertainment.

In this report mobile penetration, state of mobile entertainment services and cultural factors will be compared with those of the less developed countries. The leading mobile entertainment countries in Asia-Pacific, Europe and North America are in focus. We shall reflect the experiences of early progress to countries where mobile phone penetration and the interest towards services are heavily rising.

This report is a literary review. The review will address the central issues differentiating mobile markets in Asia, Europe and North America. The idea is not to go through all the literature on mobile entertainment and benchmarking. Instead we shall analytically represent the technological differences and the state of the mobile entertainment markets world-wide. This report will support and form the

benchmarking study (D6.2.2). Benchmarking as a whole involves studying and comparing mobile entertainment core processes from three dimensions – the technology, performance and culture. The performance relates to the differences in output performance on relevant measures.

In this report we shall compare:

1) Usage cultures and cultural differences:
- Cultural differences
- User demography
- Key challenges facing mobile games market

2) Technology/networking:
- The number of mobile users/penetration
- The level of mobile entertainment services (makers & users)
- Mobile Internet / 3G development
- Key operators

3) Business:
- Size of the markets
- Support from the governments
- Central target groups
- Industry of interactive games
- Viable business model for mobile entertainment

Material for the report is collected from research studies on electronic libraries, books, Internet and other sources. In the report the central focus is on mobile phones even though the Nintendo's Gameboy, PDAs and other portable entertainment gadgets will be discussed. Mobile phones are in the centre of interest because of their high penetration rates world-wide, the range of available figures and the strong interest towards mobile entertainment. The findings made in this report will be further utilised in the Benchmarking Report (D6.2.2).

2. Methods and the scope of the data

There are lessons to be learned from benchmarking between different countries and the ways they structure and operate their framework conditions, because this will provide opportunities for learning and improving the policies that create them. This does not mean copying what is done in one country and replicating it in another – there are likely to be too many contingency factors (particular differences in national cultures) that make it impossible. There are also some differences in national policy objectives, although there is undoubtedly convergence around key themes such as increasing competitiveness, international improvement and level of innovation. Nevertheless, learning, what is done in one place and how these conditions operate, can provide new ideas and triggers for the development of the policy thinking (Bessant & Rush 1999).

The issues compared in this report were selected on the basis of their influence to the general competence of each area of mobile entertainment and local particularity. Currently the data available from various studies and research projects is diverse and even inconsistent and disassembled. As mobile technologies, business models for mobile services and the whole cultural constructions are underway, many studies are biased and overly positive. In this report we have collected data and studies on mobile usage cultures, compared the mobile content services in Asia-Pacific, Europe and North America to see how mobile Internet, technological level of the mobile gadgets and usage profiles have evolved. The meaning of this report is to offer analytic view to the mobile entertainment from three perspectives:

* Cultural differences
* Technology and networks
* Business trends, concepts.

The method used is literary review. The review will address the central arguments presented in the current literature on mobile entertainment. Europe has been benchmarked against Asia-Pacific and North America. Even though Asia-Pacific, Europe and North America will be looked as continents, certain areas are emphasised due to the varying level of development of mobile entertainment in different countries. In Europe the focus will be more on Scandinavia, the UK and Ireland, Italy and Germany. In Asia-Pacific we shall examine Japan, Korea, China, Taiwan and Singapore more closely. Australia will also be accuced in relevant points. And in North America the United Stated and Canada will be considered as one large market area.

The countries in this study were chosen with some or all of the following criteria in mind:

* Currently leading/heavily growing mobile telecommunications business
* Availability and freshness of data
* Speciality, best practice examples
* Advanced technical infrastructure
* User studies are available for comparison

3. Benchmarking literary review framework

In this chapter we shall view the continents involved in the benchmarking. We shall present the general state of different market, as only diverging countries of each continent will show in the comparison. As the mobile entertainment market currently lies in between the telecommunication and electronic games business there are no clear business models or ready answers available. That is why in this report we shall focus on mobile phones but also look at the mobile entertainment compared with the wider entertainment markets including PC games, consoles and handheld units. The countries in this report represent the highly advanced Asian markets. Strongly growing markets in Asia-Pacific and North America will be compared to Europe in order to highlight the best practice examples and Europe's current and future strength in the competition.

High growth expectations of mobile entertainment markets are the framework of this report. There are several research companies forecasting future wireless cultures and mobile entertainment markets. For example the ARC Group's predictions from the growth of the global mobile entertainment usage are given in Table 1. (ARC 2002). What is interesting in this estimation is that it lacks the current most profitable forms of mobile entertainment around the world: ring tones, logos and characters. The ring tone market was worth 590 million Euros in Europe in 2002 and accounted for 39% of mobile services revenue (Strand Consult 2003). Adult content, being the other presumably successful genre, is also often absent from the comparison tables.

Entertainment by application	2001	2006
Information services	47.2	901.0
Gambling	25.7	572.4
Gaming	42.9	848.0
Music	71.5	689.0
Pictures	34.3	636.0
Moving Pictures	1.4	318.0

Table 1: Mobile entertainment and gaming users (millions).

The most successful games by sub-application in year 2001 were SIM/embedded 34.3 million users (in 2006, 263.7) and in year 2006 Online (SMS/Net) approximately 508.0 million users (in 2001, 12.0). Downloadable games and multi-platform games have been seen as smaller trends even though there are several phone manufacturers currently believing in downloadable games. The high importance of SMS-content proves that especially in Europe many of the mobile phones are black-and-white gadgets where the mobile phone generation has not recurred yet from 2G phones. In China and Korea where 2.5G and soon 3G phones are available, multiplayer games as well as animations are bigger trends. Multiplayer games have not been as popular in Japan, but several technological developments including 3D screen technology, hologram displays and fingerprint readers, will supposedly advance 3G markets also in Japan (Collier 2003).

The estimations of mobile entertainment are based on the estimates by several market research companies. Market researchers have closely followed the penetration figures of mobile phones and have based their estimations on the number of possible users of

mobile entertainment on the number of mobile phones. For example recent market research by Datamonitor shows that by 2005 there will be 198 million mobile phone users playing wireless games in Western Europe and the USA. This represents a total market value of over 5.5 billion Euros within the next four years in these two markets alone. In proportion to world mobile game markets, Europe and USA represent only less than 20% of world's mobile phone users. Until now, remarkable differences on the interest towards mobile entertainment have not been found between different countries. The Yankee Group projects mobile subscriber usage to grow from 312 million users in 2001 to 649 million by year-end 2006. Service revenue growth will be stable, if not spectacular, with total revenues for the Asia-Pacific region rising from 98.5 billion Euros in 2001 to 225 billion Euros in 2006 (Yankee Group 2002). World-wide mobile games were worth 28.5 billion Euros last year and the UMTS Forum forecasts revenues in the Asia-Pacific to hit 39 billion Euros by 2010.

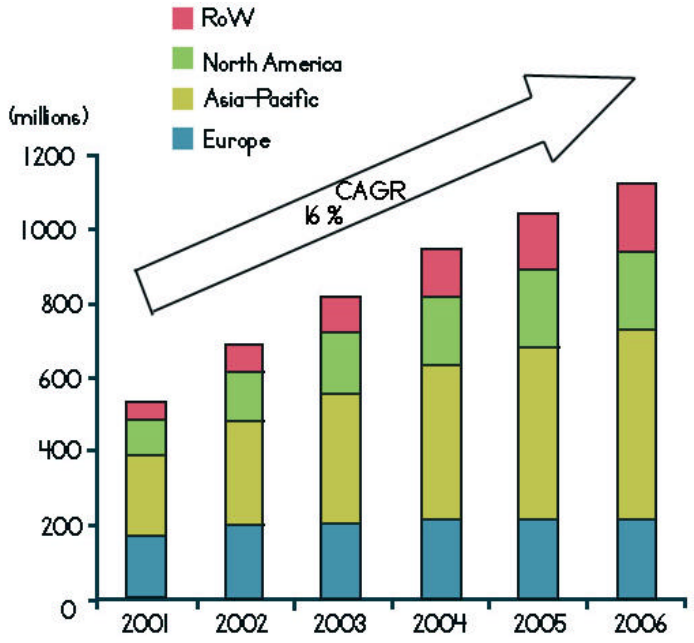

Table 2: Global mobile phone shipments 2001-2006 (ITU 2002). (CAGR = Compound Annual Growth Rate).

What is common to all the benchmarked countries is that currently there is both heavy hype and eagerness going on towards the mobile entertainment and other mobile content types. Entertainment has risen as of the most interesting genre and enormous growth expectations are expected of it. That for one will spur the mobile entertainment production world-wide as well as financial investments towards the industry. In the following chapters, we shall give an overview of the different continents from the viewpoint of mobile entertainment.

3.1 Asia-Pacific

In Asia-Pacific, Japan and South Korea are the leading countries for uptake and acceptance of mobile entertainment (Booz et. al. 2003). The central reasons for this are the long history of hand-held games and the fast rise of mobile phones. Many of the wireless entertainment innovations have been produced in Asia. Until now, Japanese Nintendo has been the most important hand-held games manufacturer. In 1980s it started the trend of pocket size electronic games along with Game & Watch product line having LCD displays, several game alternatives and a watch. Nintendo's next approach, Game Boy was introduced in 1989. It has sold close to 150 million units and has already over 700 game titles from various game genres (Nintendo 2003). Another successful Asian innovation was Tamagotchi-toy in 1990s; by the end of 1997 it had sold 15 million in Japan alone. It also brought up the issue of target groups. Especially in Europe and North America the player demography has been relatively limited compared to Asia. The average gamer has been some years under 30 white male (ESA 2003). Instead with mobile phones the user groups are wide -- girls and boys from pre-schoolers to pensioners. There is, anyhow, a notable cultural difference between Europe and Asia. Yong-Joo Kwun from Korean game company Actoz Soft Co. presents one reason for the edge of the Asian mobile entertainment. He emphasised that in Korea – and more widely in Asia – playing interactive games is a lifestyle more than a business. It connects to other forms of popular culture and entertainment and is more recognised and visible leisure activity than in Europe or North America.

Japan has been titled as the leading country of mobile entertainment both in technology and content. South Korea for one is the fastest growing ME market in Asia at the moment. China, Taiwan and Singapore are the countries with heavy increase in the mobile phone penetration, hardware and software manufacturing taking place. After some years the other Asia-Pacific countries are supposed to follow. Especially Taiwan and Singapore both present high mobile penetration rates as well as development of 3G networks and interest towards the mobile entertainment markets. Within the mobile industry the highest volume is in the mobile phone market. Also, in Asia hand-held game gadget markets are strong in addition to the long tradition of manufacturing gadgets. In the US pocket-PC’s and pagers are yet the most popular forms of wireless terminals, even though the mobile phone penetration is rising fast.

Nintendo ruled the hand-held game business for about 15 years before mobile phone manufacturers, small mobile entertainment enterprises, console game companies or Sony even got interested in the wireless entertainment markets. The mushrooming of mobile phone and mobile content markets was the evident reason for this. Millions of users have at least the possibility to play mobile games through mobile phones.

Currently the strength of Asia is in the area of mobile Internet and novel technical innovations for mobile terminals. Asia is well ahead of Europe and North America in acceptance of mobile Internet services. The Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT) in Japan released following figures on the mobile Internet penetration in 2001:

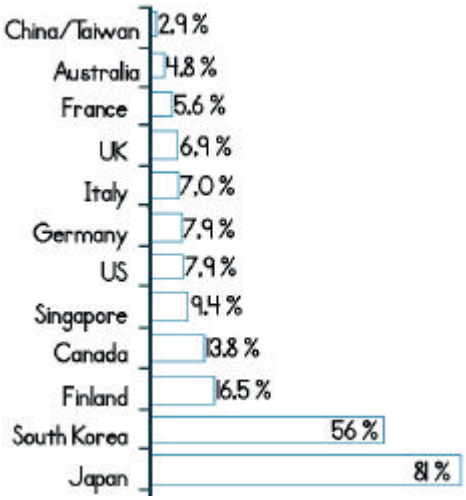

Table 3: Mobile Internet users (% of total mobile users) (Edited from figures provided by ITU 2002 and MPHPT 2001).

In Asia the problem and possible constraint on ruling the international mobile entertainment markets is the heterogeneity of mobile phone technologies in use and the diverse local cultures. For example, by some estimates, there might be as many as 31 Chinese mobile phone/content markets. What is popular in Beijing might be thought too simple or old-fashioned for the Shanghai audience. A wireless dating service may be acceptable in one part of China but lie beyond the interpretation of legal boundaries in more traditional markets (Bellows 2003). There is no winning network technology that would work in at least in most of the Asia-Pacific countries. ITU estimated that the mobile subscribers divide between the different network technologies as follows: Japanese PDC (Personal Digital Cellular, earlier JDC - Japan Digital Communications) 39% working mainly in Japan, GMS 31% e.g. in China and CDMA (Code-Division Multiple-Access) 30% in various countries in Asia.

3.2 Europe

Europe has been considered as the second area in accepting the mobile phones, with Scandinavia, the UK, Ireland, Germany and Italy being the most aggressive markets (compare to MEF 2003). One reason for the fast adoption and the heavy use of mobile networks is the extent of the GSM-network. GSM is the only network in use in Europe because governments agreed at an early stage to establish a single standard. The networks have been reliable and working widely especially in Western Europe. Western Europe has been more dominant in the area of mobile entertainment even though Eastern Europe is considered to be fast adopting mobile phones. It has been estimated that there are around 286.5 million active mobile subscribers in Europe. Currently five large countries in Western Europe generate over 70% of the mobile entertainment revenue (Partanen 2001). Early "test field" markets like Scandinavia are weakening in the tight competition because of the low population of the Nordic countries.

The thin tradition of interactive entertainment and the saturation of European mobile phone markets will have an influence on the development of the mobile entertainment

business. The uptake of new mobile phones is declining as penetration levels reach their limits. Concerted efforts must be made to retain the customer loyalty prior to the migration to higher-value devices and services. The level of known entertainment figures, brands and investment money is lower in Europe than in North America or Asia. That will be a threat to the European mobile entertainment production. If the phones will not renew fast enough, European home market might not be ready early enough for the competition with the US and Asian players.

In Western Europe mobile content and entertainment services will account for 2.2 billion Euros (2002). That is 16% of non-voice revenue and 2% of total mobile service revenue (Bond 2003). Through several user studies (Nokia 2001, Coogan & Kangas 2000) it has been stated that the general view towards mobile phones and mobile content is positive, but the lack of availability of handsets and software platforms with colour displays, GPRS, and compatibility for MMS and VM services has slowed down the implementation of mobile entertainment services (Baskerville 2003). Because of only black and white versions available, several mobile entertainment players in Europe have concentrated mostly on SMS, WAP and Java games.

3.3 North America

The US and Canada are one of the largest market areas in mobile entertainment. The benefits of North America are the high growth rates and the fast adoption of the 2.5G networks. The United States and Canada have a lower mobile penetration than Europe and Asia-Pacific but they are leaders in the use of wireless technologies. Pagers, networked personal digital assistants (PDAs), in-building networks, among other technologies, are prime examples of this. Several competing mobile phone standards exist in the US (e.g. CDMA, TDMA, iDen, GSM and AMPS). In North America wireless applications face problems in coverage and device standardisation. The general diversity of network standards generates unreliability of the networks and the diversity of gadgets and payment models has been problematic and slowed down the development of mobile communication.

However, the US mobile phone market has grown dramatically over the past decade, from 4.1 billion Euros in mobile phone service revenues in 1990 to over 48 billion Euros in 2000. The US is currently the leading country in mobile phone penetration in North America, though Canada is another similar, fast growing market area. CDMA, TDMA and iDen network standards are in use in Canada. The Canadian wireless phone industry has experienced rapid growth since 1997 with the number of Canadians subscribing to wireless products and service totalling over 8 million (every fourth Canadian has an access to a wireless device). The wireless industry is still relatively small industry in Canada (4.5 billion Euros). CWTA (*Canadian Wireless Telecommunications Association*) estimated that Canadians are using about 10 million wireless devices on a daily basis (CWTA 2003), as in the US, the number is divided between laptop and PDAs, mobile phones (7 million), pagers (1.8 million), mobile radios (1 million) and mobile satellite phones (10 000). A survey performed by Ernst & Young indicated that four per cent of Canadians currently use wireless Internet service, and 24 per cent said they would subscribe within a year (National Post 2001).

The North American mobile entertainment market is maturing quickly. Some analysts have estimated that over the next three years, the US will take the lead over Europe and Asia in terms of the total number of wireless subscribers on the advanced 2.5G and 3G networks (eMarketer 2002). One reason for this would be the advance in building third generation networks in North and Latin America. Analysts estimated that by 2004, the US holds a significant lead over Europe over the percentage of subscribers of next-generation networks as well (eMarketer 2002). The US has already shown its strength in the content market.

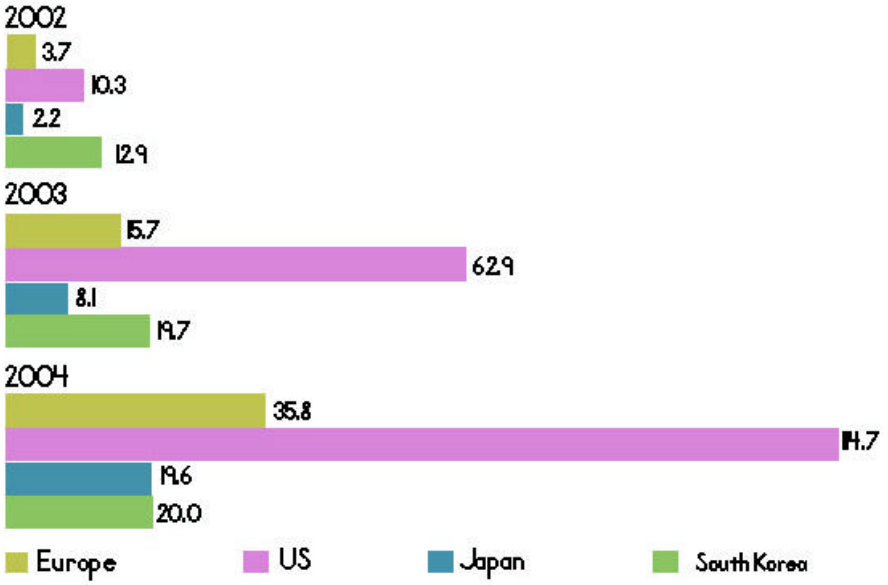

Table 4: 2.5G and 3G subscribers in the US, Europe, Japan and South Korea 2002-2004 (in million).

4. International comparison

Depending on the analysis, it has been estimated that there are about around 1-1.3 billion mobile phone users in the world. ITU has estimated that 38% of mobile phone subscribers are in Asia-Pacific, 31% in Europe, 28% in Americas and 3% in Africa. On the other hand Baskerville Communications estimated that the number of North American mobile phone subscribers is already the same as in Europe. Today, the mobile penetration rate is the highest in Western Europe (84%), followed by North America (44%). The overall penetration rate in Asia-Pacific is only 13%, although countries like Japan and Singapore have very high penetration rates of 72% and 78% (Rao 2003). The number of mobile phone users has been hypothesised to allude to the number of mobile entertainment users.

Table 5: Mobile Phone Subscribers World-wide by region (in million). (Baskerville Communications Corp, April 2002; Total Telecom, May 2002).

The cultural and economical issues generate differences in the frequency of use of mobile phones and other hand-held gaming gadgets. This has a direct influence on the interest towards mobile content, for example entertainment and games. Culturally the markets differ greatly. The utilisation of mobile entertainment depends on the stage of technical development of mobile networks and content. In Europe the beginning of the development of rich mobile content and entertainment was in 1999 when WAP was introduced to the general public. It was developed especially to make the Internet available for GSM-users, taking into account limitations of the handset and the connection, which can be characterised by low bandwidth, long delays, poor connection stability and limited screen size (Telematica 2002). At the same time NTT DoCoMo's successfully introduced i-mode in Japan and placed the best practice examples of mobile entertainment.

The issue of content is also being developed. Two current trends have been either to convert the old game arcade classics and successful console games into mobile versions, or emphasise mobility and games singularly designed for mobile usage situations taking into account the location-based services, GPR and active tags. These trends will develop with technological advancement. Also cultural differences are diversifying the situation. In Japan and in other Asian countries the culture of interactive games has been fundamentally different compared to Europe and North America. For example in Japan, games have been both the general form of

entertainment and closely connected to Japanese art forms Anime and CG-art. Pachinko is a great example of Japanese game culture even though it is not digitally interactive game. In the Encyclopaedia of Japanese pop-culture it was written (1997): “There they sit, in row after row, as bells clang, light flash, martial music blares, and clouds of cigarette smoke drift up toward the ceiling: salarymen, students, housewives, and punch-permed characters who looks as though they have just stepped of a police line-up.” Not only Pachinko but also Sega game rooms in Japan and PC-bangs in Korea are very visible in the street scene and the players are from different age groups and different gender. In Europe and North America there has been several attempts to attract especially teenage girls into playing games. Pensioners have appeared in the Playstation advertisements as this kind of a trick.

In the following chapters the European mobile entertainment industry, culture and the business of electronic games will be compared with North America and Asia-Pacific.

4.1. Cultural differences

Cultural differences have played a major role in shaping the adoption and the use of mobile services around the world. There are differences in the conception of mobile phones and mobile entertainment, in the content trends, in the usage cultures as well as general cultural differences. In regions of Asia-Pacific, e.g. Japan, services such as gaming, idol characters and horoscopes have been highly popular. In contrast, many North Americans spend a large part of their time behind the wheel of their car with the result that mobile phones are used primarily for voice conversations. In Europe long distances and the relative small language areas have an influence on the content production of interactive entertainment.

There are great cultural differences in the replacement cycle of mobile phones, which are partly affected by the disparate technologies. This will have a direct effect on the quality of mobile entertainment. Through the shorter replacement cycle in Asia new gadgets become common within a shorter time frame. Also in Asia mobile phone design has been more fashionable from the start and the operators spur the users to change their phones within a short cycle. Colour-screens and Internet abilities were considered and developed from an early stage. In Europe the business-use background of mobile phones kept the phones as objective work-tools for a long time. Also the business models of the mobile phones were different and in several European countries the mobile phones were sold separately from the telephone subscription and were relatively expensive. The replacement cycle of the phones is longer in Europe and North America compared to Asia due to the different business models. Not until now companies like Siemens have understood the issues of trend and fashion and started implementing it to the mobile phone design for European markets. Mobile device markets are beginning to be more and more driven by the short replacement cycle. Device manufacturers have to take the cultural, economic and social conditions in different markets under consideration. There are also major cultural differences in the demography and conception of electronic games. In Asia games are a part of the culture and close to the respected media art. In Europe and North America game playing has been stigmatised as a child's play. The games have been mostly targeted for the young (ESA 2003).

There are also major cultural differences in the player demography and conception of electronic games. In Asia games are a part of culture and close to media art and other forms of popular culture. But even there the industry of electronic games have faced a downward movement in the console and game sales. The same trend has happened in western countries as well. It is estimated still to drop until mobile phones and new game innovations will drive the industry. Another cultural difference is in the conception of game-play. In Europe and North America game playing have been stigmatised as child's play. The games have been mostly targeted for youth (ESA 2003). In Asia electronic games are a part of media culture and a popular for of leisure activity for housewifes as well as for teenagers or business men.

	2001	2002	2003	2004	2005	2006	2007
Europe	9770.7	10756.7	10879.1	9222.9	7394.2	6699.3	10253.9
Japan	7038.3	7856.7	6839.6	4945.0	4152.4	6418.4	7081.4
USA	10205.6	12472.2	10343.2	8562.1	6970.7	9476.9	10872.1
Total	27014.6	31054.5	28061.9	22730.0	18517.3	22594.5	28207.3

Table 6: Geographical breakdown of the world video games market 2001-2006 (IDATE 2001).

4.2. Conception and users

The boom of mobile entertainment has identified new target groups for electronic games especially in Europe and North America: casual gamers and hard-core gamers. The division between gamers and non-gamers is not as clear as in the western countries. Hard-core gamers can be defined as people who play games for more than 10 hours a week. There are around 1.2 million hard-core gamers in Europe and 3 million in the US, typically male teenagers (Andersen 2002). As mobile phones are almost as popular amongst girls as boys, great market values have been seen in the area of mobile entertainment. The introduction of mobile gaming is believed to broaden the group of casual gamers as gaming platforms (through mobile phones or PDAs) become ubiquitous. Hard-core gamers will only be attracted to mobile gaming once mobile games can compete with the experience offered by game consoles. Mobile hard-core gamers can be split into two different segments: the gamers coming from the traditional hard-core gaming and players coming from the mobile casual gaming background. The user groups and user cultures are so different in Asia that there is no rational way to compare the Asian user groups or cultures with the western ones.

Mobile casual gamers		Mobile hardcore gamers	
		From the mobile casual gaming	From the traditional hard-core gaming
Demography	Young, both sexes & all ages, both sexes	Young, both sexes	Young, male
Console gaming background	Some	Most	All
Reason mobile gaming	Time-killing	Hobby	Hobby
Type of game	Simple	Simple & Complex	Complex
Success factor	Gameplay	Gameplay & Graphics	Graphics
Mobile gaming user population	Majority	Minority	Minority
Uptake	Now	Gradual	An introduction in relevant handsets

Table 7: Mobile gaming customer segmentation (Andersen 2002).

In Asia there are numerous sub-cultures and trends for teenagers to follow. Tamagotchi pets, virtual boyfriend games and virtual idols like Kyoko Date shape also the culture of mobile entertainment. Japanese mobile phone culture, also called Keitai-culture is followed on different web sites (see for example Keitai 2003). The pervasiveness of mobile lifestyle and the forms of mobile entertainment differs from the ones in Europe or North America.

In Japan mobile terminals are highly personalised. A lot of personal data, including the user's preference on content viewing, terminal capability, or geometrical location, will be stored or signalled by a mobile terminal. Mobile content will be customised even more so that the essential information can be presented properly depending on user's environment (Etoh 2003).

In most European and Asian countries mobile operators have been the publisher and the marketer for mobile entertainment. Mobile portals have taken over the roles of both the distributor and the retailer in the traditional gaming value map. They mainly play the role of aggregator. Mobile portals can be made by anyone ranging from the game developer, the network operator, to the handset manufacturer. The portal can also be entirely independent or even a joint venture between any of the above-mentioned players. In Japan, mobile entertainment is advertised in mobile phone shops. Game developers like Disney Wireless Japan and Bandai produce small catalogues and distribute them to the users.

In countries like the UK and Scandinavia the source for mobile content are independent providers and web sites instead of operators. Mobile content is therefore sold in newspapers and web sites by retailers and network operators. The newspapers and web site advertisements dominate the advertising but also represent very high recurring costs.

5. Technology

Mobile and wireless technologies are in a discontinuous phase. Cellular mobile networks are about to evolve from the 2G and 2.5G standards to the next generation systems providing faster data connections, personal area networks (PAN) and wireless local area networks (WLAN). Several wireless technologies are emerging, but their success is unclear due to complex market dynamics, technology development and the risks related to both (Luukkainen 2003). This development foretells of the development of the so-called fourth generation (4G) networks. On the other hand the discontinuity also reflects the current situation of mobile entertainment. The range of the mobile entertainment terminals is very diverse. Several platforms have been used; Microsoft / Symbian / Palm, Java, BREW and ExEn and many games also work differently on different handsets. The technical base of the mobile entertainment will not supposedly firm up. Instead it is presumable that even more diverse gadgets will enter the market due to multipurpose devices like N-Gage and PSP and wider markets for mobile content. Further technological development of 4G networks has been set up for mobile television and micro-movie research project in Europe and Asia (Södergård et. al 2003, Nikkei Business Publications 2003). Together with current mobile entertainment content genres, new genres will arrive increasing the complexity of the technology. A more detailed report on mobile entertainment technologies can be found from mGain Mobile Entertainment Technologies reports (D4.1.1 and D4.2.1).

5.1 Common networking technologies

The development of mobile technologies has been one of the leading motives for the creation of wireless games. WAP in Europe and i-mode in Japan started the development of mobile Internet. North America has been behind Asia-Pacific and Europe because of their non-compatible network systems and disjointed telecommunications regulatory. Largest difficulties have anyhow been handled by now and there have even been estimations that USA will advance faster towards 3G than Europe or Asia by shifting to use EDGE that will give an advantage when thinking of mobile entertainment services.

Current technological quality creates significant differences between countries. It has been estimated that WCDMA might be the standard to finally unify the markets from the network side. After the more homogenous network technology, the international mobile entertainment markets are supposed to grow rapidly even though the gadgets will remain diverse. In any case new services and applications created by the 3G will exhibit distinct regional trends in terms of user take-up. Currently there are several different terminals in every continent and the situation is not about to change. Except the diverse network standards, the mobile entertainment manufacturers also face diverse gadget markets (Bienaime 2003).

Asia: CDMA / PDC / GSM, i-mode (wireless Internet) --> EDGE --> WCDMA
Europe: GSM --> GPRS / EDGE --> WCDMA
US & Canada: CDMA / TDMA / iDen / GSM / AMPS --> EDGE --> WCDMA

Together with the evolution of network technologies, also technological convergence will have an influence over the development. There are several industry forums formed just to administer the scattered situation. One of them, the MGIF (*Mobile Games Interoperability Forum*), was founded by leading mobile phone companies Ericsson, Motorola, Nokia and Siemens. It was established in 2001 to define mobile games interoperability specifications and application programming interfaces (APIs) that will allow game developers to produce and deploy mobile games that can be distributed across multiple game servers and wireless networks, and be played over many different mobile devices. The aim of the initiative is to specify a global standard and to develop certification procedures to encourage wide adoption of the standard (MGIF 2003). So far some industry forums have suffered from the inefficiency while enabling platforms like BREW have to break out and invade a large part of the markets.

5.2 Platforms and languages

In ARC Mobile Handsets Industry Survey 2003 (ARC 2003) the respondents from various telecommunications fields estimated the proportion of wireless application development on different platforms by 2006. The alternatives were preset even though one could name alternative technologies to the category "Other(s)". C, WIPI, XML and Proprietary were listed in the "Others". In other case the results do not seem that surprising. The high number of Java-enables phones encourages European game designers to continue with Java games, even though over half of the survey respondents were from Western Europe, where for example BREW has not been in use.

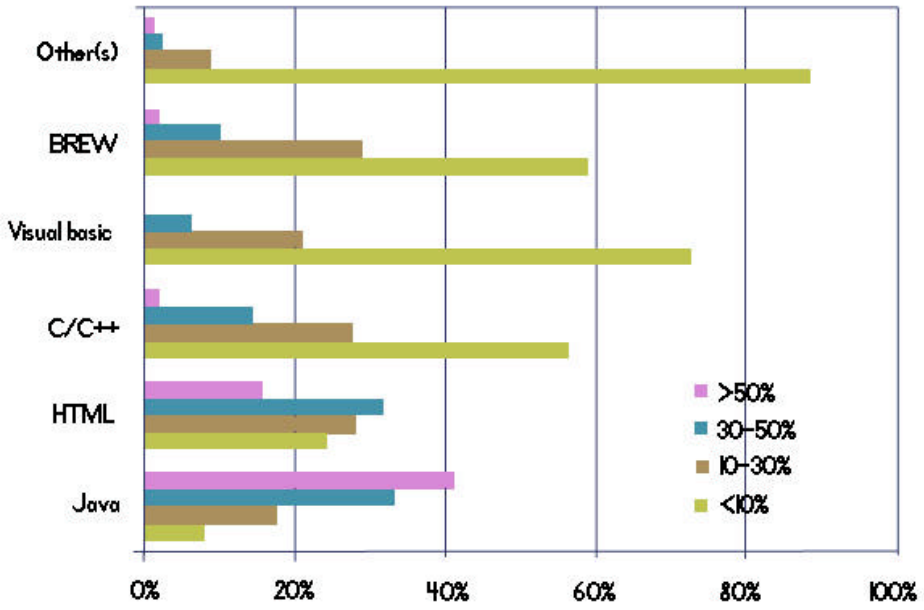

Table 8: Proportion of wireless application to be developed on different platform and languages in 2006. (Respondents %).

Virtually all of the analysts stated that Asia (primarily Japan and South Korea) is responsible for 80 to 90% of current mobile games revenues, with Europe responsible

for the remaining percentages. Outside of Japan and South Korea, the mobile games market is still at an early stage. However, several operators in both Europe and North America have recently launched Java or BREW game services, and early reports indicate that these services are generating substantial revenues for both operators and games providers (Nokia 2003). The mobile entertainment business started to grow through Java (J-Phone) and HTML-browser games (DoCoMo i-mode). In the North America it wasn't until the summer 2002, when leading mobile phone operators, Verizon Wireless and Sprint rolled out mobile games services heavily following the DoCoMo content and revenue model. AT&T amongst other large US operators followed just some months behind.

Technology has also been affective when determining the content. Currently SMS and Java games are in the European market but except early success of *Who Wants to Be a Millionaire?* -SMS game and later the cross-media television SMS games, there are no clear trends there. In North America BREW (*Binary Run-time Environment for Wireless*) games are advancing rapidly along with the higher penetration of mobile phones. Technically Japan is well ahead of the western countries introducing for example 3D and multiplayer games as well as fingerprint recognition technology.

5.3 Operators

Currently the largest mobile entertainment markets have been counted on the number of subscribers of operators. GSM is used currently by over 60% of all mobile phone users. The largest GSM market is in China where China Mobile and China Unicom share the majority of mobile phone users. In central-Europe Vodafone, T-Mobile, Orange and Telecom Italia Mobile, and in North America Verizon Wireless and Cingular are the largest players of the continents. Other network technologies are largely used in e.g. Japan (NTT DoCoMo), Korea (South Korea Telecom) and South America (Telesp Cellular).

Especially in Japan, the NTT DoCoMo has been in a very influential position. The country's largest telemonopoly has over 60% market share of all mobile phones. It is the only operator allowed to provide i-mode phones. It means that the terminals are all compatible with each other. That will enable the content manufacturers to create new services for certain platform in a short time frame. The other large operators in Japan are J-Phone and KDDI. More than 44 million i-mode cellular phones using HTML-browser and about 14 million Java VM-embedded cellular phones are currently in use (NTT DoCoMo 2003, J-Phone 2003). Besides the rapid spread of mobile phones, another issue advancing the mobile entertainment industry was that in 2000, the Japanese game industry was driven into a critical condition. The sales of consoles and games dropped for the first time in several years. The CESA (*Computer Entertainment Software Association*) in Japan issued a summary sheet attesting to the fact that from 1997 to 1998 demands for games increased for every type of machine. After 1999, the only demand to increase was the demand for portable machine games (Shimizu 2000). That put stronger emphasis on the mobile entertainment markets.

The Korean government has traditionally taken a hands-on approach when dealing with the country's telecommunications industry. Korea is now de-regulating and liberalising its telecom markets. However, the path to liberalisation has been a slow

one. The country's well-known protectionist attitudes, together with the opposition to the change from those with vested interests resulted in a protracted procedure of legislative debate (ITU 2002). There are three operators sharing the markets in Korea: (SKT 53.6%, KTF 31.7%, LGT 14.7%,). SK Telecom was the first to offer mobile data services over CDMA network.

In China the former Ministry of Post and Telecommunications (MPT) was the sole mobile operator until 1994 when China Unicom was established (ITU 2002). China Mobile (58%) and China Unicom (46%) have largest shares of the users. In China the GSM-network technology was in use. China Mobile and China Unicom even launched their nation-wide WAP service in 2000 (ITU 2002). Lately China Unicom has also started operating in the CDMA network enabling the richer use of mobile multimedia. Nokia and Motorola have 70% of the China mobile phone markets but the local manufactures have rapidly become commonly used. The age group of mobile subscribers is rather the same as in Europe. The young (15-25 year olds) are the heavy users (Chang 2003).

In North America the biggest mobile operator is currently Verizon Wireless (over 30 million subscribers), Cingular Wireless being the second largest in US (22 million subscribers). Their share of the US wireless markets is 21%. From the total mobile penetration of 44%, the variety of other network technologies consists of the rest. As in Asia, also the most of the European telecommunication companies are at least partly owned by the government. The majority of the European mobile phone operators are recovering from the UMTS auctions. Vodafone is one of the largest operators and also one that did not suffer greatly in the auctions. T-Mobile, Orange and Telecom Italia Mobile are the next largest operators in Europe. In Scandinavia Telia-Sonera is one of the strongest players.

Best practice example – Technology (Japan, NTT DoCoMo i-mode)

In 1999 NTT DoCoMo's i-Mode was presented and it became the best practice example of excellent operator activity and support for rich content. The evolution of mobile Internet has been the forward leading quality. The main applications available through i-mode-enabled handsets are e-mail, information services and applications such as Internet banking and ticket reservation. Although the most popular services remain those that enable person-to-person interaction, such as messaging, subscribers frequently download images of cartoon characters (mobile wallpaper) and ring tones.

Relative simple entertainment services are currently the most popular ones in i-mode. And yet research company Taylor Nelson Sofres (TNS) estimates that the share of the currently most popular content genres comes down. Currently SMS (define), downloading ring tones and logos as well as online banking are the most popular services. TNS estimated a dramatic drop in popularity for SMS (from 76% -> 9%) and ring tones (52% -> 18%). In the near future the Japanese youth are expected to download and play music (3% -> 48%), use e-mail attachments (3-> 45%) and use location-based services (2%->44%).

Soon after i-mode other Japanese mobile operators started their competitive Internet connection services (KDDI group launched EZweb and the J-Phone group launched J-Sky) using alternative technologies.

5.4. Media integration

Media integration has been under discussion as long as the different wireless devices have been at hand. In Japan, mobile phone seems to have become the de facto standard for integrated media. Models with all sorts of features such as camera or video camera, 3D screen, GPS, sound/music, memory cards with software, applications and services that allow the users to download, create and edit images and sound, sing karaoke, play games, or create artworks are available for modest price. Mobile phones are already the largest Internet platform in Japan. The rapid growth of the mobile phone culture in Japan is deeply related to its social and cultural background. It also shares features that are in common with the well-known popularity of digital pocket games. Mobile gadgets play an important role in promoting mediated communication amongst people (Kusahara 2002). Despite the development of mobile services, downloaded characters and ring tones still make up 38% of the total consumption. The adoption of new gaming possibilities is slowly increasing.

During the last year or two the world has seen a large number of licenses for 3G services being awarded through various approaches, such as auctions and other beauty contests. The deployment of the 3G or eventually 4G networks have an effect on the development of integrated media. Many different tasks are integrated into one device; on the other hand the device is an interface to wide range of information and services when it is interlinked with other media like television or the web. On a region-by-region basis, the major Asian economies are the first movers in the 3G-licensing, with Japan and Korea being the first to actually deploy 3G-services. Singapore is another early mover in the third-generation licensing, but may not make the move to 3G as rapidly as might be expected. Hong Kong also awarded 3G-licences early on, in an exemplary licensing process. Some of the less developed Asia-Pacific economies, such as China, the Philippines and Thailand are less ripe for 3G auctions, and are in no rush to award 3G licences owing to their particular market contexts (ITU 2002).

European countries are behind Asia a bit. In Europe several 3G networks have been launched on a test basis. The end of 2003 and beginning of 2004 is the critical time for 3G in Europe. After the adversity with WAP and high cost UMTS auctions, European operators are relatively cautious. The long awaited and much delayed 3G services are estimated to account for only 6% of the subscribers and 6.5% of the non-voice revenue in 2005. It does not only widen the opportunity for GPRS, but also gives the public wireless local area networks a greater opportunity to take hold. Research company Analysys forecasts that 1.5% to 2.5% of annual 2.5G and 3G non-voice revenue could be lost to public WLAN by 2008, and that the loss could be as high as 8% amongst business customers (Analysys 2003). By the development of 3G networks and WLAN, certain technological integration is supposed to happen advancing the network technologies towards 4G.

In North America AT&T will launch 3G network by the end of year 2004, alongside its EDGE network (AT&T 2003). AT&T has an agreement with NTT DOCoMo and the right to use its i-mode technology.

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6. Concepts and markets

Mobile phones create an appealing platform for entertainment and games because a large number of people already possesses terminals, thus yielding a huge potential market; mobile terminals are carried continuously and thus are always readily accessible; the in-built telecommunications capabilities provide possibilities to devise interactive multi-player games; and possibly the customers can be billed through existing systems (Gustafsson et. al. 2001). Brands have been named as the killer concepts of mobile entertainment. The value chain in mobile gaming industry can be roughly divided into five broad categories: 1) brand licensors, 2) game engine providers and other technology partners, 3) game designers and content providers, 4) mobile portals, and 5) mobile network operators (Gustafsson et. al. 2001). However, only few international brands exist and the mobile entertainment business still has not witnessed many successful approaches.

In this chapter different concepts and different markets will be observed. More far reaching studies on mobile entertainment markets, business models and barriers can be found in the mGain reports D5.1.1 and D5.2.1.

6.1 Mobile phone penetration

South Korea has one of the fastest-growing mobile penetration rates in the Asia-Pacific region: mobile phone subscribers topped 29 million at the end of 2001, representing over 56% of the total telephone subscribers, with a mobile penetration of 66.9%. It has also been estimated that some 59% of the Korean mobile subscribers already have phones equipped with mobile Internet browsers. However, according to some analysts, actual mobile Internet use may be lower than these figures suggest, owing to underdeveloped content, high charges and slow download speeds (ITU 2002). Mobile phone market value in South Korea is 47 million Euros (20 in 2001, growth 160%).

China has the largest mobile market in the world with over 200 million mobile users. While the absolute number of subscribers is impressive, it pales in comparison with the market potential - merely 15% of China's 1.3 billion people are currently subscribers. Operators are adding an average of 4.5 million subscribers a month. 55% of mobile users have been estimated to be young working adults between the ages of 25 and 35 (eMarketer 2003).

Although Japan is famous for its mobile Internet services, and Japanese mobile business is characterised by a lower prepaid rate and higher average revenue per user than any other major markets (see Table 7), at around 57%, mobile penetration is not relatively high when compared with the other major markets, where penetration rates of up to 100% have been attained (in Hong Kong and Taiwan, China, for example). Some analysts have concluded that the reason behind this is the difference in business strategy. Japanese operators have focused on maximising ARPU, while not placing much emphasis on promoting the prepaid card services that typically generate a lower ARPU than those generated by standard subscriptions (ITU 2002).

	Japan	France	Germany	UK	US
Penetration rate (%)	52	50	58	68	39
Prepaid rate (%)	3	45	60	63	10
ARPU (US$)	66	38	35	40	42
ARPU for data (US$)	5	1	4	2	1

Table 9: Average revenue per user (ARPU) in major markets (Total Telecom 2002).

In Scandinavia the frequency of mobile phones has been highest in Finland, Iceland and Sweden. Scandinavian countries were also the first countries where mobile phone penetration got up close to 80% at the end of 1990s. Later on the mobile phone penetration has also aggressively started in Norway and Denmark. Within the European context, the Nordic countries have been trend-setters, with Finland, Iceland and Sweden in particular attaining high levels of mobile penetration (around 80%).

Italy was the first country of a high mobile penetration rate in Southern Europe. After the fast adoption of mobile phones, Italians started using the phones also to other purposes than phone calls and SMS. An important aspect in this sense is the expected convergence between mobile phones and the Internet. Today 67% of all Italian families have at least one cellular phone (up by 75% against June '99) (Federcomin 2002). Research Company Ovum expects that in 2005 there will be 63.6 million mobile phones in Italy, which in fact is more than one mobile phone per resident. More than half of the Italian population (of 57.5 million people) will participate in mobile commerce in 2005. It is estimated that by 2004, 61% of the mobile phones in use in Italy will be Internet enabled (Forrester Research 2002). In terms of the leading applications, financial services such as mobile brokerage, mobile payment and mobile banking will be the second-largest revenue source (Durlacher 1999). Most mobile markets in Western Europe are approaching saturation. The emerging economies of Eastern Europe are likely to lead in the growth of new mobile subscribers. Across the European Union the level of mobile Internet use is slowly increasing. In Germany and the UK mobile Internet use is even more prevalent.

Due to diverse range of handhelds and mobile terminals, mobile phone penetration is still around 50% in the US. Anyhow it has been estimated that beside China, the heaviest growth will take place in the US markets. As commercial offerings increasingly mimic the flat-rate local calling plans familiar to U.S. consumers, cellular phones are even beginning to replace the traditional wireline family phone (Abelson 2002).

6.1.1 The young as a target group

Younger and younger children have been provided with a mobile phone. As in the early days of mobile phones, in the case of children, security reasons are also one of the most common arguments for buying a mobile phone for a child. Young people have not had the history of mobile phones for benefit purposes. And the limitations from parents form the way the young use their mobile phone. With low allowances alternative uses for mobile phones have been invented. The young 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 knife. The mobile has become a multi-tool, even when the phone has already turned into a gaming device, a watch and a calendar (Coogan&Kangas 2001). In Asia, mobile phone is already as much for entertainment as it is for communication. In Europe the technological limitation are slowing down the development. Even so mobile phone manufacturer Nokia is amongst the few developing multi-purpose entertainment device integrated with a mobile phone. Also other mobile phone manufacturers see the phone more as a multi-purpose portable device than mobile phone.

In a study conducted by the University of Tampere, it was visible that the most popular function of mobile phone was games (71%). Calling came second (58%) followed by SMS (36%) and composing ring tones (31%) (Suoranta 2003). Together with the different usage trends, the young have been estimated to be the central target group of mobile content. MobileYouth estimated there to be already 103 million mobile phone users between the years of 5 to 24. They also estimate that by 2004 there will be 36 million 5 to 24 year old mobile phone users in the US and 0.5 million in the UK (MobileYouth 2002). In the table 9 penetration figures have been presented in UK, US, Japan and Finland. In Japan and US there were not available data on under 10 year olds. That is why US figures represent the age group of 5 – 19 and 19-29 instead of more fragmented age groups.

Age (years)	**UK**	**US**	**Finland**	**Japan**
5 – 9	7%	45%	28%	-
10 – 14 (19)	60%		76%	
15 – 19	90%	89%	97%	90.9%
20 – 24 (29)	81%		99%	92.5%

Table 10: UK: target population owning mobile phone in the UK, Scandinavia (2002) (Nomura Research Institute (Japan) 2002, Tilastokeskus (Finland) 2002, Mobile the young (UK) 2002, Teenage Research Unlimited (USA) 2002).

MobileYouth also estimates the interest in application of 3G as follows.

	Western Europe	**Eastern Europe**	**USA**
Total	22%	26%	25%
Under 25	37%	30%	45%
25 – 34	27%	26%	26%
35 – 49	19%	25%	27%
50 and over	9%	24%	10%

Table 11: Interest in application of 3G in 2004 (MobileYouth 2002).

The interest towards mobile phones and their actual use seem to vary only little between different countries/continents. The number of young users will probably rise as the technology is ready for 3G and handsets become affordable. The young have been early adopters and trendsetters of SMS and mobile services. It only seems to be a matter of time before a more advanced mobile content will be consumed by the young.

6.2 Content branches

The mobile entertainment genres have been influenced by the earlier modes of the entertainment and games. The cellular phones strength comes from the number of subscribers as well as its portability and powerful network ability (Shimizu 2000). Currently, when talking about mobile entertainment, one talks about ring tones or mobile games. In Japan different payment models and colour-screen terminals have been named to be one of the reasons for the high interest towards mobile services. Still Nintendo's GameBoy has cornered more than 90% of the global market for hand-held games.

In the US, entertainment industry is highly networked in different segments of entertainment, and it leverages its content in many forms all over the world. The US has been very influential in the market of digital entertainment. It has also been stated that as entertainment will most likely to be a major part of wireless content, Los Angeles is going to be the place, where a large part of content is going to be generated (Pollari & Valli 2002). The biggest U.S entertainment field in 2001 was music, and after that digital gaming (sales of hardware and software) and movie ticket sales followed (Kushner 2002). The 3G service revenues of global markets are estimated to be 294 billion Euros, and mobile gaming’s worth is estimated around 21.8 billion Euros in 2010 (Bendas & Myllyaho 2002).

Japan dominates the use of the consumer Internet usage via mobile phones. Entertainment and shopping drive the current technology adoption, and customers are looking to carriers to provide the services that are well suited for mobile devices. The presence of an integrated payment structure provided by NTT DoCoMo is crucial and has facilitated a tremendous growth, but it may hamper further growth and innovation as the market stabilises. NTT DoCoMo acts as a trusted third party and facilitates payment via the phone bill for a commission of about 8%, a facility that, surprisingly enough, is not widely used in the U.S. and Europe (Andersen 2001). In Japan mobile phone game sales have been somewhat disappointing. NTT DoCoMo has 36.9 million subscribers, who generated a relatively small amount, about 92 million Euros, by buying mobile phone games in 2002.

The current trend in Japan is to sell games in bundles. For example, on DoCoMo`s i-mode "Games 1" menu, the top two categories are "Game Pack" and "Mini-games." An interesting pricing mechanism has developed for these. DoCoMo does not have an "event-based" billing system -- everything is by monthly subscription. One very successful site in this category is G-Mode`s "petit appli," which has a total of 60 games. However, you can only download three games per month for your 100-yen subscription and the games have a time limit to keep you coming back to the site (Collier 2002a).

Ring tones, characters and games are the most popular forms of mobile entertainment in Korea. The number of downloaded ring tones in Korea has come up steadily since late 2000, from approximately 8.4 million ring tones per month in the fourth quarter of 2000 to slightly under 9.3 million in the first quarter of 2002 (Baskerville 2003). In Japan and Korea operators have primarily committed themselves to subscription on a per-service basis.

Even though Korea is ahead of Europe in the level of mobile Internet and colour-screen terminals have already become common, ring tones also constitute a large segment of the total service market. Measured by volume, around 30% of the total mobile service market consists of ring tone sales (Baskerville 2003). It has been estimated that there are over 250 companies developing mobile games for the South Korea markets. Only a few of them have international sales. Mobile games have increased their turnover from a mere 7.3 million Euros in 2000 to an estimated figure of more than 47.4 million Euros in 2002 (Baskerville 2003). Mobile games are still estimated to be only 3% of the total market revenues but it is the fastest growing sector in gaming. This will attract many new companies to come into the markets (Baskerville 2003).

Short Messaging also helped to jump-start the mobile data market in China. The CMCC Network facilitated 80 billion SMS messages in 2002. The subscriber base is still increasing on average by 4.5 million each month and with the recent launch of GPRS, China's mobile data market will continue to experience exponential growth in the coming years. Both China Mobile and China Unicom, have established their i-mode versions of "Monternet" and "Uni-Info" business models where the operators bill mobile data users for content providers and share the revenue with them in a manner that encourages fresh development.

Best practice example -- Content (Korea/Italy/UK)
Successful and well-selling mobile phone game brings in about 91 000 Euros a month. The sales are the same even in Europe and Asia, where mobile games have been around longer than in the United States.

In Korea, the biggest-selling mobile phone game has been 1980s classic game, Tetris. Tetris is a presumable also a hit in Europe and the US as it is one of the great game classic with never-ending challenges to organize the dropping bars. It sold about 70 000 copies at 2,2 Euros each.

In Europe there has been a couple of successes. UK operator O2 (ex-BT Cellnet) renamed Picofun's game *Lifestylers* to fit in with the popular television show *Big Brother*. Within a month of launch the Big Brother gained 50 000 unique new users, 250 000 games sessions, five million page impressions and 2,5 million minutes for the O2 network.

Italy's Omnitel-Vodafone launched a game, produced by e-Muse, which incorporated the popular character "Megan", a well-known model, as a virtual lover. A hit game in Europe generates about 137 000 Euros in revenue.

6.3. Mobile entertainment

The mobile entertainment market is still in its infancy, but it is expected to grow rapidly with m-entertainment revenues exceeding 11.6 billion Euros by 2005 (Datacomm 2001). The US mobile entertainment market is predicted to follow the success of the European and Asian markets. Outpacing most predictions, mobile

phone usage has been skyrocketing in the United States with more than 120 million cellular phone subscribers. This number is expected to grow to over 160 million by 2004. According to a new study 58% of all Americans aged 12 and up own a cellular phone. The report also found that 51% of US teens own a cell phone and 61% of all college-aged Americans own a mobile phone. It is estimated that over one billion ring tones will be downloaded in 2002 (Strand Consulting 2002). Merrill Lynch recently predicted that the mobile phone content market will reach 23 billion Euros globally by 2005, with a world-wide community of 1.6 billion wireless web users. Merrill Lynch pegs the market at 0.9 Euros per subscriber per month for content services.

Ring tone sales have already reached 1.4 billion Euros in Europe and 276 million Euros in Japan (Strand Consulting 2002). In Japan, NTT DoCoMo has used the mobile market to pre-promote new releases of recorded music to target demographics. NTT DoCoMo succeeded in converting more than 60% of their basic mobile phone subscribers to wireless Internet subscribers. In Western Europe, both ring tones and graphics are available for direct download to cellular phones. While ring tones have led the mobile entertainment boom, new products are coming to market quickly. Games, dating services, fast Internet access and answering recordings are the latest hot items.

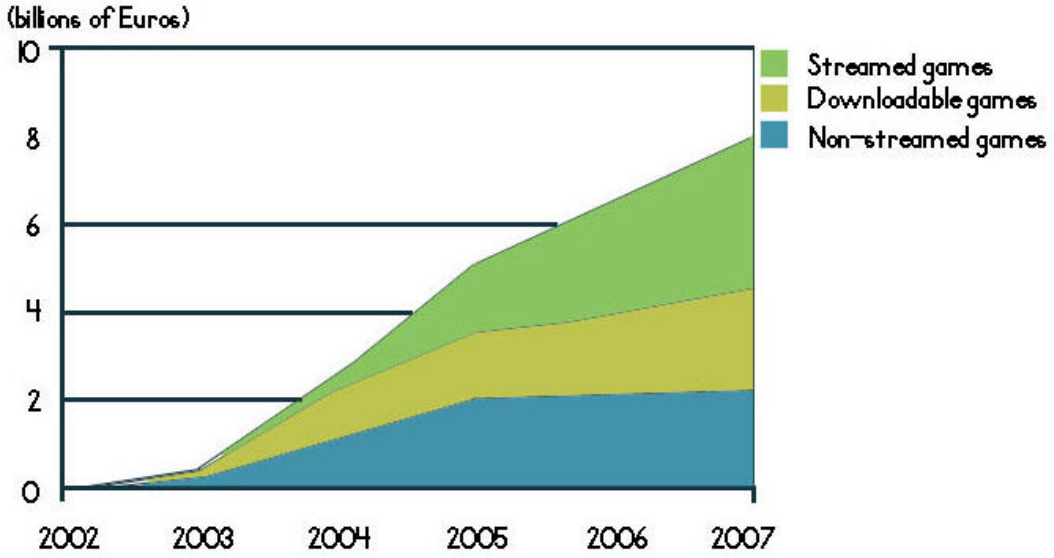

Table 12: The growth of gaming in Europe split by mode (Visiongain 2002).

Best practice example – SMS TV-chats (Finland)

Short Messaging Service (SMS) has been a runaway success in Europe for both wireless operators and for mobile phone users. It is cheap and easy to use for the user and has added significant revenues to the coffers of European wireless operators. SMS is particularly popular with young people and those using pre-paid mobile phones. Due to the low technical level of the gadgets, alternative usages were created for mobile phone entertainment. One example was SMS-television chat and games invented in Finland in 2001. SMS television chat has been exported e.g. to some eastern European countries and the Philippines. There are SMS-chat shows and games available on the television screen. One can participate the conversation or control own

game character via mobile phone. SMS-TV chats were invented when the technical abilities of mobile phones were low. Through television one could add almost real-time interaction and discussion with other people.

In Finland value added services were 59 million Euros business in 2002 (logos 25%, ring tones 25% tv-chat 15-20%, tv-sms games 10-15%). Other European countries somewhat follow the figures until the new mobile phones are in the markets.

Similarly to Asia and Europe, in the US ring tones were the first hit content for mobile phones. By Qualcomm's BREW solutions are pervading the US-markets quickly. With the growing market for online and downloadable games and other wireless entertainment also free-to-air and paid information services, personalisation services, content messaging and cross-media services follow growth figures of Europe and Asia.

7. Government support

This far risk financing has been the main source of funding for mobile entertainment companies. Increasingly also national governments have started to appreciate the fast growing industry of interactive games and games have been hoisted at the same level as movie or music industries. However, the level of governmental support varies greatly and the money is often targeted, not only for mobile games, but also for the industry in general.

7.1. North America

In large market areas like the United States and Japan there is also relatively more investor money available. In North America the gaming industry is most clearly run by investments. Government support is not possible due to the diverse regulation policy between the states. In the US the Interactive Entertainment Merchants Association (IEMA) is the only trade association dedicated to serving the business interests of leading retailers which sell interactive entertainment software (including video and computer games, multimedia entertainment, peripherals and other software) (IEMA 2003).

7.2. Europe

In Europe many major telecom companies are at least partially government-owned providing money for the research and development of mobile technologies. In Europe there are also various approaches towards financially supporting content creation. In UK the DTI's International Technology Service (ITS) helps British businesses to learn from leading organisations around the world to improve their competitiveness at home and abroad. Through the ITS programmes there have been three computer games missions - to the US, Japan and, most recently, to the US/Canada. Government supports the efforts by sponsoring country pavilions at central game fairs (e.g. E3). It also funds major International Technology Service fact-finding missions to Canada, the US and France and supports and facilitates a Pan-Industry Forum to promote communication and knowledge sharing across the industry (DTI 2003).

In other major games markets, for example in France, the French Government has announced plans to bolster the games development industry by offering grants (€4 million) towards the development of new titles, with the total amount available being four million Euros. The area of interactive games has been considered as a whole without allocating any special money for mobile entertainment. Although France has some of the biggest game companies and publishers there are (e.g. UbiSoft and Infogrames), the smaller developers are feeling the heat. With consolidation rife with the industry and the development costs increasing substantially, the smaller developers are finding it hard to survive. Under the terms of the grants the government will pay for up to 40% of the development costs of a single game. There are strict limitations on what the government will support, however; pornography is obviously first to be rejected, but violence is also not to be considered, which

drastically cuts the types of games that qualify for the money. The other obvious restriction is that the game must be developed in France (Digit 2003).

In other large market area for mobile games, Germany, the government supports the creation of open source software and different technologies but does not specifically focus on mobile entertainment. In Finland National Technology Agency of Finland (TEKES) has recently allocated 39 million Euros especially on mobility and entertainment research projects, technology development and game productions. Together with the industry money the budget for the research programme is 84M Euros. There are also Pan-European support programs for the audio-visual field. For example Media Plus is EU-funded initiative to support the production of European movies, television programs and new media: distribution, research and education. Also several European countries have curriculum on games funded by the governments.

7.3. Asia-Pacific

In Asia-Pacific there are several government-funded approaches towards the games industry. For example in Japan CG-Arts and government funded the ongoing "Toward a Culturally-Oriented Nation" program (CG-Arts 2003). Also “Japan Arts Fund” and “Arts Plan 21” play pivotal roles in providing financial support for performance expenses.

In Korea “Game Infinity” or “Korea Game Development & Promotion Institute” was founded in 1999. It is a government-backed, non-profit agency that fosters the growth of Korea’s games industry with technical support, overseas business support, joint research & development and professional training.

In Australia there are approaches to level up the game production. Already several digital cinemas and games productions have been made in Australia. Now Australian government tries to extend the business by introducing Game Developer's Conference in Asia, raising the profile of the local computer game industry in both Australia and overseas and also supporting local companies. Australian government have released three plans in sequential years titled: *“Game Plan: Game On”*, *“Game Plan”* and *“Game Plan: The Next Level”*, strategies to help position Victoria as Australia's computer games capital (Game Plan 2000, 2001, 2002).

7.4 Market trends

The UK represents the world's third largest market for games after the US and Japan. An often-quoted figure from the industry is that the UK interactive software market is currently twice the size of the video rental market and 1.5 times more than the cinema box office spending. The European mobile gaming market builds greatly on five big countries: Germany, UK, Italy, France and Spain. The target groups, people between 13 and 30, in these countries are almost equal in size, with only France deviating a little. The rest of Europe is divided among twelve other countries, where the actual shares are very small when compared with the sizes of the economies.

When talking about the number of users of mobile phones and/or mobile entertainment, they both are often counted in millions. That gives the rough idea of the stage of large market areas but lacks the understanding of areas or countries with lower population. Those countries can be technologically advanced and heavy users of mobile games, but they do not stand out in the international comparisons. Finland, Norway and Sweden have been rather visible small countries. Small countries are lacking in the brave risk taking even though several innovations have first seen the daylight there.

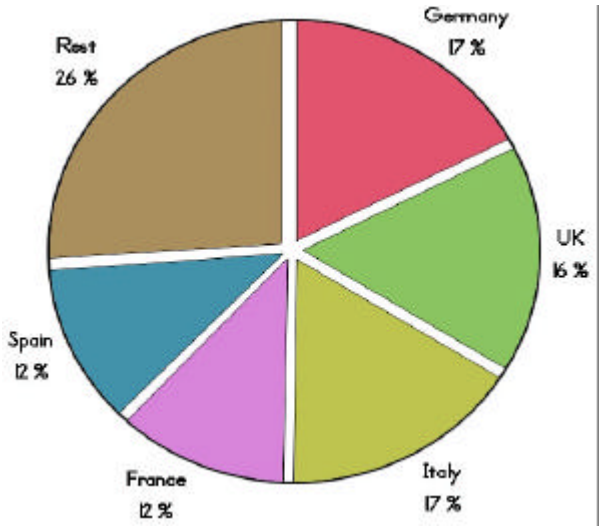

Table 13: Market size comparison (logos, ring tones, games).

Research companies have estimated Germany to become the largest market in Western Europe with 473 millions in a year. UK, Italy and France will become market areas of similar size, and Spain will remain slightly smaller (e.g. Baskerville 2003, Analysis 2003).

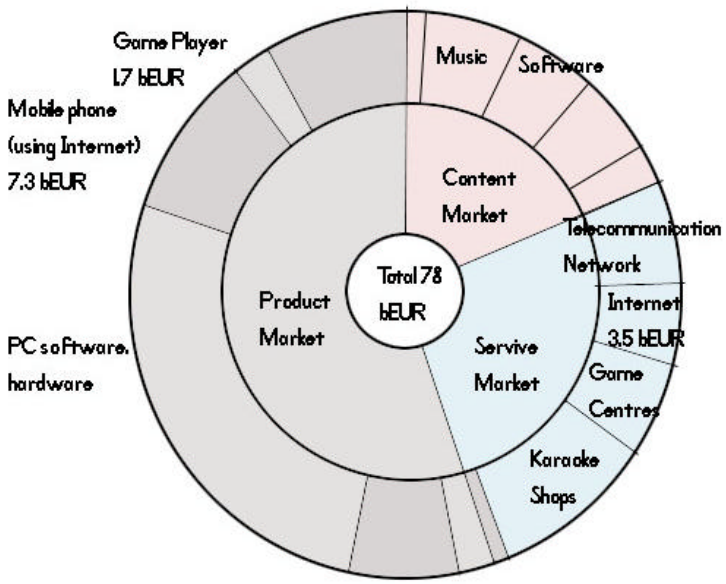

Table 14: Japanese Digital content market (2000).

The market of digital content was worth 78 billion Euros in Japan in 2000 (Keizai 2002). The largest section of the digital content market share was the product market (54.9%), leaving 18.5% share to the content market and 26.6% to the service market. In the product market PC software & hardware were the largest share worth 48.9% of the products market. Second largest was mobile phone (using internet) 17%. Audio-visual content (7.6%), music (28.4%), software (26.4%) and other (62,4%) constitute the rest of the content of the market. The service market is shared almost evenly between telecommunications & network, game centres and internet. The largest share of the service market is Karaoke shops (35.8% of the total service market).

Issues of standards, digital rights management (DRM), pricing, revenue sharing, platforms and content creation will continue to influence on the trends of mobile entertainment worldwide. The evolution of mobile terminals and content creation standards will advance the mobile entertainment markets and within the next few years more outstanding best practice examples and successful setouts will be visible. In 2004 the eclectical market will grow just by the fact that besides handheld game gadgets and mobile phones, also new portable entertainment devices like Nokia's N-Gage and Sony's PSP are in the market.

8. Summary

In this report the selected comparative data on North America and Asia-Pacific have been compared against Europe. There is a relatively similar development compared to Asia-Pacific and Europe with difference of technology. In Asia BREW, HTML and Java games enable a richer gaming experience compared to SMS and WAP games that work in the GSM-network. Not until the evolution of network technologies content will become competitive. Only after that mobile entertainment culture can be formed.

Besides the influential technical differences the way of thinking of mobile entertainment or entertainment in general differs greatly in Europe and in Asia. At this stage in Asia game-play is considered to be a lifestyle, whereas in Europe the common target group for electronic games and titled forerunners in mobile services are the young. So far also the young have been the central target group for mobile gaming devices like Nintendo's Game Boy Advance.

Market analyst reports are still forecasting multi-billion dollar industries for mobile games, mobile music and other forms of mobile entertainment. The most successful service to date is ring tones. Close behind the success of ring tones are mobile games. The industry is expected to grow from 1.5 billion Euros in 2001 to 15.4 billion Euros in 2005. IDC predicts that by 2006, 3 billion mobile phones will be in use, and 50% of Internet users will be mobile. Gartner Dataquest estimates that by 2007, nearly 120 000 Wi-Fi hotspots will exist world-wide, with Asia accounting for about a third of these (Rao 2003). The youth segment will drive the direction of mobile gaming as was experienced with SMS and ring tones. The other segments will gradually enter the market for simplistic games.

8.1 Key success factors

Based on the previous findings, in this chapter we shall present the expected success factors for European mobile entertainment companies. The factors have been chosen by the themes of this report.

8.1.1 Technology

On the level of networks, mobile phones and software there were considerable differences between the continents. Asia-Pacific, especially Japan and Korea are well ahead of Europe and North America in adopting both the next generation networks and technologically more advanced gadgets. All of the leading mobile entertainment countries are presumably heading towards the use of WCDMA networks in the future. Before that the 2.5G networks will be adapted in the US and Europe. Also the replacement cycle of mobile phones may be shortening due to the different market approaches in mobile phones marketing. Currently there are decisive differences in the level of mobile technologies but eventually technological differences will be compensated. Standardised platforms will advance the development of working content. Certain standardisation and industry forum activity would also activate more innovative and rich application development.

One of the main driving forces behind mobile gaming is the full compatibility of the application code with the different types of handsets. The use of the J2ME programming language is the first step in the standardisation process. It remains to be seen whether the different handsets will possess interoperable applications. Ericsson, Motorola, Nokia and Siemens launched the Mobile Games Interoperability (MGI) Forum, which will attempt to define a mobile game interoperability specification for network-based servers. The specification will enable game developers to produce and deploy mobile games that can be distributed across multiple game servers and wireless networks, and be played over different mobile devices (Andersen 2002).

8.1.2 Business Model

Japanese NTT DoCoMo has been able to create such a business model, which encourages the content developers but is also profitable for the operator. In relatively small markets in Europe the similar business model would not probably work as well. In any case, the business model could stimulate the growth of the business. Still, there are also several competing technologies and it is relatively difficult to estimate which one will be winning solution in the future. European developers could learn from DoCoMo's customer relationship/ownership model.

The revenue sharing model for mobile gaming is expected to be much clearer than the system for mobile information services. Since the revenues from bandwidth will be substantial, mobile operators could be satisfied with only a small portion of the service revenues for billing purposes. There are alternative models of using mobile phones in Europe. For example SMS-TV chats and other cross media innovations have been founded in Europe. That is the area with a lot of knowledge that could be processed for other markets as well.

8.1.3 Market strategy and culture

Cultural differences play a very important role in the comparison of mobile entertainment markets. The industry of mobile games and other forms of entertainment lies in between interactive entertainment/games industry and telecommunications industry. Mobile lifestyle has been well adopted in Japan. Also the culture of electronic games is more visible and Japan also has a long tradition in handheld games because of Nintendo's role in Japanese game culture. The strength of North America comes from strong brands and knowledge of entertainment industry. While brand games may initially attract new users, it will not guarantee the success of a game. In the end, people will rate the game on the gameplay and the graphics rather than the brand itself.

Anyhow, the industry of mobile games is situated in between telecommunications and games; and currently there are not many best practice examples available. European game manufacturers seem to have somewhat similar possibilities to create successful mobile games. The cohesive technological ground, efficient legislation and high technological know-how will be the advantages of the European mobile game companies. The cultural differences will still divide the game cultures for example in Japan and North America. For European mobile entertainment developers strong

partnerships with content / service providers seem to be the central issues at the moment.

8.1.4 Service Offer and pay model

Rich diversity of content / services is the current success factor of Asian game portals. There are hundreds of “game packets” available for the gamers. The most popular games are in the top of the list. Marketing and content developers could learn from Asian decisions. Secure applications and clear focus on end users are also important issues, which should not be forgotten. In Asia mobile subscription model is widely used. It has been established as a better alternative, when compared to pay per play model widely used in Europe. Together with the monthly subscription fees, extra fees could be asked for premium services. Currently many mobile gamers are young and most of them are pre-paid users in Europe. If the Japanese subscription model will not be employed, the success of many games will depend on their availability to the pre-paid customer. This requires pre-paid billing engines to be implemented.

8.1.5 Operational Facts

Currently the strength of Europe lies in the versatile range of mobile entertainment players: the leading handset manufacturers, several large operators and content developers. Through co-operation they could affect the design and development somewhat similarly as the Japanese NTT DoCoMo does. Through versatile and functional handsets and rich content development, European mobile entertainment companies would have similar possibilities to rule the international market of mobile entertainment.

9. REFERENCES

Books/articles

Andersen, E. (2001) 'Europe, the U.S. and Japan under the microscope'. (electronic version) *http://www.espen.com/papers/gwmobile.pdf*. Global Wireless September 01, 2002.

Baldi, S. & Thaung, H. (2002) 'The Entertaining Way to M-Commerce: Japan's Approach to the Mobile Internet – A Model for Europe?' (electronic version), *http://wwwfl.ebs.de/Lehrstuehle/Wirtschaftsinformatik/NEW/Courses/Semester8/Strategy/imode.pdf*.

Bellows, M. (2003) 'China's Mobile Market Potential' (electronic version) *http://www.mobenta.com/analysis/item-1080.html.*

Bendas, D. & Myllyaho, M. (2002) 'Games as Part of Mobile Entertainment'. PROFES 2002 Conference Proceedings.

Bessant, J. & Rush, H. (1999) 'Benchmarking Framework Conditions'. Centre for Research in Innovation Management, University of Brighton.

Bienaime, J. (2003) 'European Can Learn from Asia's 3G experiences'. 3G WorldCongress 2003.

Bond, K. (2002) 'Mobile Content and Entertainment: forecasting the market for gamers and other wireless content'. Analysys.

Bond, K.; Dajes, A. & Robson, J (2003) 'Western European Mobile Forecasts and Analysis 2003-2008'. Analysys.

Booz, Allen & Hamilton (2003) 'Future mobile entertainment scenarios' March 2003, MEF.

Collier, D. (2002a) 'WGamer Article: Tokyo Tama: Part One' (electronic version) *http://wgamer.com/articles/tokyotama111802*.

Collier, D. (2002b) 'WGamer Article: Tokyo Tama: Part Two' (electronic version) *http://wgamer.com/articles/tokyotama012703.php*

Collier, D (2003) 'Overview on Japanese Markets'. GDC Europe, 26 August 2003.

Coogan, K. & Kangas, S. (2000) 'Young Finnish communication acrobats believe in a wireless future'. Helsinki: Elisa &Nuorisotutkimusverkosto.

CWTA (2003) 'Wireless Telecom Magazine'.

ESA (2003) 'Facts on electronic games'. (electronic version), *http://www.theesa.com/pressroom.html.*

Etoh, M. (2003) 'Trends in Mobile Multimedia and Networks'. (electronic version) *http://www.docomolabs-usa.com/pdf/PS2003-009.pdf*.

Gustafsson, J.; Huotari, K. & Schildt, H. (2001) 'Games in mobile business. Case: Riot Entertainment'. (electronic version) *http://www.hut.fi/~jgustafs/SMTIAssignment2.pdf.* Espoo: Helsinki University of Technology.

ITU (2003) 'Internet for a mobile generation'. ITU Internet reports. International Telecommunication Union.

Kalyanaraman, R. (2002) 'A perspective to Mobile Entertainment Services'. Wipro Technologies white paper.

Kodansha (2001) 'Japan access: High-Tech Games' (electronic version) *http://jin.jcic.or.jp/access/culture/games.html.* Kodensha International Ltd.

Kusahara, M. (2002) 'Japanin pelikulttuuri' in Mariosofia – elektronisten pelien kulttuuri, Helsinki: Gaudeamus, pp. 269-295.

Kushner, D. (2002) 'The Wireless Arcade'. Technology Review. July/August 2002. Cambridge 46-52.

Luukkainen, S. (ed.) (2003) 'Emerging Technologies in Mobile and Wireless Data Network Evolution Proceedings of the Research Seminar on Telecommunications Business' (electronic version) *http://www.tml.hut.fi/Studies/T-109.551/2003/Proceedings.pdf*.

Meyer, R. (2002) Wireless China: Japan + 400 million (electronic version) *http://www.japaninc.net/article.php?articleID=832*. Japan.Inc.

Nintendo (2003) 'Nintendo news June/09/03'. (electronic version) *http://www.nintendo.com/print/news_article.jsp?articleID=8824.*

Partanen, J-P. (2001) 'Mobile gaming: A Framework for Evaluating the Industry 2000-2005' Gaptime Century.

Pikula, V. (2001) 'Mobile Internet services in Japan. Identifying industrial organization as a key factor for success' (electronic version) *http://www.pikula.com/MobileInternetServicesinJapan.pdf*. Erasmus University Rotterdam.

Rao, M. (2003) 'Japan: The Birth of the Wireless Information Society' (electronic version) *http://www.electronicmarkets.org/files/cms/50.php*.

Schilling, M. (1997) 'Encyclopaedia of Japanese Pop Culture'. New York: Weatherhill.

Shimizu (2000) 'Online game design for mobile phones'. (electronic version) *http://www.shi3z.net/gdc/RShimizu_PC_dist.pdf*.

Suoranta, J. (2003) 'Verkkososiaalisuus ja nuoret'. In Teknologisoituva Nuoruus (Technologizing youth). Sonja Kangas & Tapio Kuure (eds.). Helsinki: OPM, Nuorisotutkimusverkosto, Stakes & Nuora.

Södergård, C. et. al (2003) 'Mobile digital television in the fourth generation networks'. Final report. VTT Information Technology. Research Reports.

Pollari, T. & Valli, V. (2000) 'Content Generation in the Wireless Space - With a Focus on Southern California 97/2000'. Helsinki: Tekes.

Tesch, M. (2001) 'Mobile Entertainment - I- mode in Japan and the impact for German market'. DiamondCluster.

Thomas, A.; Goroner, C. & Dyson, S (2002) 'U.S. Electronic Media and Entertainment'.

Wiener, S. (2003) 'Business Briefing: Wireless Technology 2003' (electronic version) *http://www.mobileentertainmentforum.org/pdf/state_of_mobile_entertainment.pdf*.

Research Report/Surveys

Andersen (2002) 'Mobile Multimedia Study'. European Commission. Directorate-General Information Society.

ARC (2003) 'Mobile Handsets Industry Survey July 2003'.

AT&T (2003) *http://www.att.com*.

Baskerville (2002a) 'Mobile Phone Subscribers Worldwide 2001'. Total Telecom 2002'. Baskerville Communications Corp. April 2002.

Baskerville (2002b) 'Mobile Market Status Report'. Research Report.

Baskerville (2003) 'Mobile Music Report'. Research Report.

Chang, N. (2003) Game Developers Conference Europe. London 26.8.2003.

Datacomm Research Company (2001) 'Wireless Streaming Media: Markets & Business Opportunities'. Research Report.

Durlacher (1999) 'What is mobile e-commerce?' Research Report.

Durlacher (2001) 'UMTS Report'. Research Report.

eMarketer (2002) 'The European Wireless Report' (electronic version) *http://www.gii.co.jp/sample/pdf/em11846.pdf*.

Federcomin (2002) 'E-Family 2001'. (electronic version) *http://www.federcomin.it/sviluppo/Produzio.nsf/all/01297DE5D8096861C1256B2900 3BFF85/$file/e_family_2001.PDF*.

Forrester Research (2002) 'Italy: Catching up with Europe'.

GCA (2002) Survey of mobile portal services Q4 2002 (electronic version) *http://www.gsacom.com/downloads/MPSQ4_2002.pdf.*

ITU (2002) 'Internet for a mobile generation'. International Telecommunication Union.

Keizai Koho Center (2002) 'An international comparison: Japan 2002'.

MobileYouth (2002) 'MobileYouth 2002 report'. Wireless World Forum.

Nokia (2001) '3G Market Research Mobile entertainment: An end user perspective. Key Learnings from global market research'.

Nokia (2003) Introduction to the Mobile Games Business. (electronic version) *http://ncsp.forum.nokia.com/downloads/nokia/documents/mgb_intro.pdf*. Version 1.0; March 20, 2003

OMSYC (2002) 'Market Report. The Asian Mobile Market 1996- 2009'.

Radicati (2002) 'Wireless Devices and Operators Market Trends, 2002-2006'. *http://www.gii.co.jp/english/rd11085_wireless_device_operator_toc.html.* Radicati Group, Inc.

Strand Consult (2002)'The Korean Mobile Market, a window to 3G'.

Strand Consult (2003) 'Lessons from Korea'. Chapter 2 & 10. Baskerville Strategic Research, Strand Consult.

Telematica Instituut (2002) 'Business models for Innovative Telematics Applications (BITA). Overview of Mobile Information and Entertainment Services'. (electronic version) *https://doc.telin.nl/dscgi/ds.py/Get/File-27217/BITA_Overview_of_MIES_D1_1_3_final_anonymised.pdf*.

Visiongain (2003) 'The Japanese Cellular Market Report'. Research Report.

Yankee Group (2002) 'Asia-Pacific Mobile Subscriber and Revenue Forecast 2002: An Oasis of Growth'.

Other references

Asia.Inc (2003) *http://www.asia-inc.com/.*

CG-Arts (2003) *http://www.cgarts.or.jp/.*

Cellular-news (2003) ‘The market for Ring tones and Logos will be non-existent in 2005’ (electronic version) *http://www.cellular-news.com/story/8037.shtml.*

Digit (2003) (electronic version) €4m for French game-makers. *http://www.digitmag.co.uk/news/display_news.cfm?NewsID=3059*.

Digital Content Europe (2003) *http://www.digitalcontenteurope.com/.*

DTI (2003) Computer games (electronic version) *http://www.dti.gov.uk/industries/computer_games/***.** DTI Digital Content and Publishing Unit, UK.

Gameinfinity (2003) *http://www.gameinfinity.or.kr.*

Game Plan (2000). The Victorian Government's statement of support for the computer game industry.

Game Plan: The Next Level (2001).

Game Plan: Game On (2003) A blueprint for growing the Victorian computer game industry. *http://www.mmv.vic.gov.au/gameplan*.

Games Analyst (2003).Volume 2, Number 4, February 21.

Games Analyst (2003). Volume 2, Number 6, March 21.

IEMA (2003) *http://www.iema.org/*.

J-Phone (2003) *http://www.j-phone.com/scripts/english/top.jsp*.

Japanese Government Policies in Education, Culture, Sports, Science and Technology 2001. Educational Reform for the 21st Century. (electronic version) *http://wwwwp.mext.go.jp/eky2001/index.html#toc1.7.1*.

Keitai (2003) *http://nooper.co.jp/showcase/gallery.php?s=34&l=en*.

Keizai Koho (2002) Japan `2002´. Digital contents white paper 2001.

MGIF (2003) *http://www.mgif.org*.

Mobile Entertainment Analyst (2003). Volume 2, Number 2, February.

Mobile Media: messaging, content and applications (2003). Volume 4 Number 4 February 21.

Mobile Media: messaging, content and applications (2003). Volume 4 Number 6 March 21.

MPHPT (2001) Communications News. October 8, 2001, Vol.12, No.13.

National Post (2001) Surfing in the Palm of your hand: Critical link missing. (electronic version) *http://www.ca.cgey.com/knowledge_centre/insights/fn_feb20_01.htm*.

Nikkei Business Publications (2003) Nikkei New Media.

Nomura Research Institute (2003) (electronic version) *http://www.nri.co.jp/english/.*

NTT DoCoMo (2003) *http://www.nttdocomo.com/home.html.*

WGR Media Inc. & Gamelet.com `The world tour of mobile games´. (electronic version) *http://www.mobenta.com/articles/worldtour_files/frame.htm*.

Wireless Watch Japan (2003) (electronic version) *http://www.wirelesswatchjapan.com*.

10. ABBREVIATIONS USED

2G (*Second-generation mobile network or service*). Generic name for second generation networks, for example GSM.

2.5G (*Second generation enhanced*). For example GPRS and CDMAOne.

3G (*Third generation network or service*). For example WCDMA.

4G (*Fourth generation network*). Connecting cellular and wireless data networks with digital television. Also other intepretations made.

AMPS (*Advanced Mobile Phone System*). An analogue cellular telephone service standard utilising the 800-900 and 1800-2000 MHz bands.

ARPU (*Average Revenue Per User*). This measure is used by the network operators to express potential profitability and revenue accrued for each subscriber and is one of the measures scrutinised by the financial community closely to gauge future performance of a network.

BREW (*Binary Runtime Environment for Wireless*). Qualcomm's open source application development platform for wireless devices equipped for code division multiple access (CDMA) technology.

CDMA (*Code Division Multiple Access*). A technology for digital transmission of radio signals based on spread spectrum techniques where each voice or data call uses the whole radio band and is assigned a unique code.

EDGE (*Enhanced Data Rates for GSM Evolution*). An intermediate technology that brings second-generation GSM closer to 3G capacity for handling data speeds up to 384 kbit/s.

ExEn (*Execution Engine*). ExEn is the software dedicated to mobile gaming. It is developed by In-Fusio.

GPRS (*General Packet Radio Service*). A 2.5G mobile standard typically adopted by GSM operators as a migration step towards 3G (WCDMA).

GPS (*Global Positioning System*). Refers to a constellation of 24 Navstar satellites launched initially by US Department of Defence. The location accuracy ranges from 10 to 100 meters.

GSM (*Global System for Mobile communication*). European-developed digital mobile cellular standard.

IDEN (*High Speed Circuit Switched Data*). A digital phone technology developed by Motorola. iDEN phones can be used as two-way radio communications using cellular telephony network. Most of these phones usually feature a built-in speakerphone.

JAVA, Programming language developed by Sun Microsystems. Java is primarily characterised by the fact that programs written in Java do not rely on a specific operating system.

JDC (*Japan Digital Cellular*). See PDC.

N-Gage, Hand-held game device, MP3 player, FM radio, mobile phone entertainment & communication gadget developed by mobile phone manufacturer Nokia.

PAN, The ‘human body network,’ the ‘human modem’ is a network computer concept that uses the human body as a conductor for transmitting electronic data either to other human beings or to inanimate objects.

PDA (*Personal Digital Assistant*). A generic term for handheld devices that combine computing and communication functions.

PDC (*Personal Digital Cellular*). A Japan-developed digital mobile cellular system. It has been adopted exclusively in Japan. Previously known as Japan Digital Cellular.

PSP (*PlayStation Portable*). Sony's effort for the mobile gaming markets. Will be released in 2004.

SMS (*Short Message Service*). A service available on digital networks, typically enabling messages with up to 160 characters.

Symbian, a joint venture between Nokia, Motorola, Ericsson, Matsushita and Psion, with Nokia as one of the founding members. Symbian was established by leaders in the computing and mobile industry to enable the mass market of Communicators and smart phones.

TDMA (*Time Division Multiple Access*). A digital cellular technology that divided frequency into time slots. It is the prevalent technology of the 2G digital cellular with three main versions: North American (IS-136), European (GSM) and Japanese (PHS/PDC).

UMTS (*Universal Mobile Telecommunications System*). The European term for 3G mobile cellular system.

WAP (*Wireless Application Protocol*). A licence-free protocol for wireless communication that enables the creation of mobile telephone services and the reading of Internet pages from a mobile phone.

WCDMA (*Wideband Code Division Multiple Access*). A 3G mobile standard under the IMT-2000 banner, first deployed in Japan. Known as UMTS in Europe.

WLAN (*Wireless Local Area Network*). A wireless network whereby a user can connect to a local area network (LAN) through a wireless (radio) connection.

APPENDIX A: CONTRIBUTORS

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