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MOBILE GAMING: A Framework for Evaluating the Industry 2000-2005

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Abstract (English)

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A mobile game is a commercial product that is distributed to the customer using mobile operator's network. The game is an interactive product; many kinds of entertainment services are not covered by this report, such as joke or comics services or the popular ring tone and logo services. What distinguishes mobile games from other kinds of entertainment services is that the interactivity creates so-called stickiness for the service. The games may be addictive and offer something more than "disposable" fun, as operator logos do.

The target of this study is to give an introduction to the mobile gaming industry and build a framework for analysing the success of mobile game products and companies. Currently the mobile gaming industry is in the introduction phase. Many start-up companies are developing different games and technologies and believe that they will be the winners when the market moves from introduction to the growth stage. At this point the company must have the critical mass in order to flourish, otherwise the companies with bigger better partnering networks and marketing and sales forces are eating the smaller one.

The framework depends on the following methods: the industry and mobile game life cycle model, value distribution in the value delivery network and external company analysis. In the study these methods will be applied to the industry segments taking factors such as technological development and mobile connection penetration in the target group of mobile games into account.

The key findings of the study are that the players in the mobile gaming industry see the future scenarios very differently: some believe in text-based games and some believe that premium 3D-games will take over the market very soon. Very few companies have made definite strategies that they would be pursuing; it seems rather, that the industry is currently lacking persistence and changes the focus whenever a new technology is introduced. The framework introduced by this study can be helpful either for the companies entering the market or for the existing companies. It presents questions and problems that the management of a company has to tackle, if it wants to be successful in the industry.

Keywords: Mobile gaming, wireless gaming

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Gaptime Century, Ltd. is a consulting company, that offers software engineering and consulting services for companies related to IT and telecommunications industry. It is doing extensive research on various subjects to be able to apply the most recent industry knowledge in the projects.

In Espoo, 6.6.2001

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1 Introduction

1.1 Background

This report introduces the current situation in the mobile gaming industry and takes a look in the near future. It states the opportunities for different parts of the mobile gaming industry value chain and finally by using the developed framework it proposes concrete actions that can be performed by the industry companies.

The old personal computer and console based industry is facing the challenge of new ways of offering their content, but also new companies such as mobile service providers and mobile content providers seem to be interested in this market. The market itself isn't fully developed yet, and the technologies are developing all the time. At the moment, there are a few games offered for the mobile terminals. Due to the technical limitations, the games are mostly of poor quality and rather expensive to play. Due to the development of mobile phones, but also other hand held devices, the consumer group attracted by mobile gaming will grow larger and larger.

1.2 Research problem

The mobile gaming industry has been introduced to the financing companies and to consumers. It has gained very much attention, because of the lucrative market forecasts done by many market research companies[3] [24]. Currently it is very hard to value the companies in the mobile gaming industry. The traditional industry methods cannot be applied successfully, for example return on investment (ROI) figures are negative and hard to be predicted because of several unknown factors of the industry. This raises questions: How to value the companies' strategies? Do we have to buy the

[3] Durlacher. UMTS Report: Investment perspective. 2000.

[24] DigiTrends.net. Wireless Games Worth $6 Billion by 2005. http://www.digitrends.net/mna/index_11031.html

numbers provided by the research companies; how are those numbers generated?

In order to solve the problem a framework for valuating the companies in mobile gaming industry must be defined. The framework in this study will base more on qualitative than on quantitative analysis.

The framework takes the following three elements of the companies as parameters:

- **Current situation –** Current number of employees, level of funding and stage in product development in the company
- **Progress –** The current progress of making the company profitable; the evolution of the cash flow
- **Target –** Which market is the company targeting (SMS, WAP or Java)?

By applying the parameters to the framework it is possible to see, if the company is entering the opportunity window with correct momentum, or is it missing it completely.

1.3 Objectives of the research

1.3.1 Building the framework

The primary objective of this study is to define a framework for evaluating the potential of mobile gaming industry companies. In order to know the different factors affecting the framework, the following sections must be covered

- **Market analysis -** The primary objective is to define the mobile gaming value chain and to divide the companies to the corresponding parts of the value chain. The value chain companies are analysed: challenges, opportunities and threats that companies in different parts of the value are facing are listed. Also the market size and mobile penetration forecasts are made.

- **Key technologies -** The secondary objective of the research is to list the current technologies and find the emerging technologies affecting the industry. One has to understand the different possibilities and restrictions of the different technologies, to be able to analyse the future market. In the research different future technologies are presented, and winners and losers are picked among them.
- **Industry driving companies -** Today the mobile gaming industry has the characteristics of new developing market. The number of players is big and constantly growing. The average size of companies is small, and the market is very fragmented. When the market starts to mature, the amount of companies decreases, and finally few big players will dominate the industry.

1.4 Scope of the research

The research will focus on mobile gaming industry in European countries. To some extent the results may be used also for other geographical areas or market segments, such as Japan or USA, or other forms of B2C mobile services.

The forecasts in this report will be done until 2005. Year 2000 is included in the diagrams, because it shows the latest situation, about which information is available.

1.5 Research methodology

Interviews with executives of the leading mobile gaming industry companies are made to see different aspects of the relationships between players in the industry. Literature study, publications, articles etc. in the Internet and in magazines, will be the main source of collecting information about the market and the industry.

1.6 Framework

The methods or tools - value delivery network, external analysis and life cycle modelling - are used to define the framework. The framework isn't supposed to give any absolute answers about the companies in the industry; rather, it is impossible because of many unknown elements in the industry. The qualitative analysis will make it possible to do benchmarking between the companies, without knowing the absolute figures.

Theoretically, the framework presented by this study is used to evaluate the transition of the mobile gaming industry companies[7] from the present to the future mobile gaming market. In order to do that, the present situation, and the future scenarios must be known.

1.6.1 Value delivery network method

Michael Porter defines the value chain as a tool for identifying ways to create more customer value for the specified product[7]. He divides the value-creating activities into five primary and four support activities.

Primary activities:

- Inbound logistics – bringing materials into the business
- Operations – converting the material into final products
- Outbound logistics – shipping out the final products
- Marketing and sales
- Service

Support activities:

- Firm infrastructure
- Human resource management
- Technology development
- Procurement

According to Kotler, the competition is between networks, not companies. The company with a better network will be the winner[6]. The value network - is a group of companies, who are related in making and delivering the product to the customer. Each stage in the network adds value to the product, and the final value of the product is a sum of the network.

[7] Porter, M. E.. Competitive Advantage: Creating and Sustaining Superior Performance. Free Press. 1998.

[6] Kotler, P. Marketing Management, the Millennium Edition. Prentice Hall. pp.44-46

1.6.2 External analysis of companies

Hitt, Ireland and Hoskisson define company's external environment as general, industry and competitor environments[4].

The general environment consists of elements that can influence an industry and the firms within it, but which cannot directly be controlled by the firms. The general environment can be divided into following segments [4]:

- Demographic – Population size, age structure, income distribution
- Economic – Inflation rates, interest rates, GDP, personal savings rate
- Political / Legal – Deregulation and deregulation philosophies
- Sociocultural – Concerns about the environment, Shifts in work and career preferences, shifts in preferences regarding product and service characteristics
- Technological – Product innovations, New communication technologies
- Global –Critical global markets, different cultural and institutional attributes

The industry environment is a set of factors that directly influences a company and its competitive actions and responses. The greater a firm's capacity to favourably influence its industry environment, the greater the likelihood that it will earn above-average returns. The industry environment factors, so-called Porter's five forces, are:

- Threat of new entrants
- Power of suppliers
- Power of buyers
- Product substitutes
- Intensity of rivalry

The competitor analysis bases on the results of the general and industry environment analyses. It consists of the following components[4]:

[4] Hitt, M.; Ireland, D.; Hoskisson, R.. Strategic Management: Competitiveness and Globalisation. 3rd Edition. International Thomson Publishing. 1999. pp.43-77

- Future objectives – How do the goals compare to the competitors' goals? Where will emphasis be placed in the future? What is the attitude toward risk?
- Current strategy – How is the company currently competing? How doest the strategy support changes in the competition structure?
- Assumptions – Do the company assume that the future will be volatile? Is it operating under a status quo? What assumptions do the competitors hold about the industry and themselves?
- Capabilities – What the company's strengths and weaknesses? How does the company rate compared to the competitors?
- Response – What will the competitors do in the future? Where does the company hold an advantage over the competitors? How will that change the relationship with the competitors?

1.6.3 The life-cycle model

According to Kotler most product life-cycle curves can be portrayed as bell-shaped, and can be divided into four stages: introduction, growth, maturity and decline[6].

In the introduction phase the sales start to grow slowly as the product is introduced in the market. The product is not profitable, because of the production costs that were required to develop the product. The marketing strategies for the introduction phase are, according to Kotler, rapid skimming, slow skimming, rapid penetration and slow penetration. For the mobile gaming the rapid strategies will be most successful. The rapid strategies should be used, when the market is big and a large part of the market is unaware of the product. The skimming strategy suggests a high price, and the penetration strategy a low price. The price should be in the

[4] Hitt, M.; Ireland, D.; Hoskisson, R.. Strategic Management: Competitiveness and Globalisation. 3rd Edition. International Thomson Publishing. 1999. pp.73-75

[6] Kotler, P. Marketing Management, the Millennium Edition. Prentice Hall. pp.303-316

middle, such as in the music industry; the price of a new CD fixed, independent of the artist.

In the growth phase the product starts to attract users and the product gains acceptance among the consumers. The generated revenue increases rapidly, and the product turns profitable. During this stage, the company uses strategies to sustain the market growth as long as possible. In mobile gaming the companies improve product quality and add new product features. They may introduce differentiated products targeted for slightly different market segments. They move from creating product-awareness to product-preference marketing. Finally they lower the prices to attract more price-sensitive buyers.

The sales start to slow down in the maturity phase, because the product has gained acceptance by most potential buyers. Profits stabilize or decline because of the competition by other similar products. In the decline stage the sales go down and the profits are disappearing.

1.7 Structure of the study

The first part, chapters 1 and 2, introduces the research and the concept of mobile gaming. The chapter 1 defines the research problem and gives a theoretical background to the methods used for creating the framework. The terminal and mobile game types are defined in chapter 2

The middle part of the study focuses in creating the framework. The chapter 3 presents the current situation and chapter 4 creates future scenarios using the analysis methods presented in section 1.6.

Chapter 5 applies the framework to the different parts of the value delivery network. It tries to list some properties of winners and losers and also gives concrete recommendations and ideas for players in the mobile gaming industry. Chapters 6 analyses the results of the framework and the framework itself. Chapter 7 summarises the research.

2 Mobile gaming

2.1 Definitions

2G 2nd Generation. Currently available digital communication networks

2.5G 2.5th Generation. The phase between 2nd and 3rd generation network, GPRS.

3G 3rd Generation mobile network technology, UMTS

API Application Programming Interface

ARPU Average Revenue Per User

ASP Application Service Provisioning

Bluetooth Low price short-range radio technology

CAGR Compound Annual Growth Rate

CHTML Compact HTML – a HTML-compatible mark-up language for hand-held devices developed by NTT DoCoMo.

EDGE Evolved Data for GSM Evolution.

EMPS Electronic Mobile Payment System

EMS Enhanced Messaging Services

ETSI European Telecommunications Standards Institute

GPRS General Packet Radio Services

GSM Global System for Mobile communications

GSM 1800 GSM operation at 1.8 GHz

HDML Handheld Device Mark-up Language – XML-based mark-up language

HSCSD High Speed Circuit Switched Data.

IM Instant Messaging

i-Mode Leading Japanese mobile data service provider, owned by NTT DoCoMo.

ITU International Telecommunications Union

Java A programming language allowing multiplatform programs

LAN Local Area Network

MexE Mobile Execution Environment

MMS Multimedia Messaging Services

PDA Personal Digital Assistant

PKI Public Key Infrastructure

OS Operating System

RAM Random Access Memory

SIM Subscriber Identification Module.

SMS Short Message Service. Facility for sending text messages on GSM handsets

SMSC Short Message Service Centre

STICKINESS The amount of time that a user spends using the service in one session

UM Unified Messaging

UMS Unified Messaging System

UMTS Universal Mobile Telecommunications System; the 3rd generation mobile standard

WAP Wireless Application Protocol

WASP Wireless Application Service Provider

WML Wireless Mark-up Language. The mark-up language used in WAP services

2.2 Mobile terminal types

The mobile terminals, including mobile phones and PDA devices, are the appliances that the consumers use to access mobile games. The common factor between these devices is that they offer an open environment for service and content providers. It is possible for anyone to make content that can be accessed using these mobile terminals.

Dedicated terminals, such as Nintendo GameBoy, are not included in this study. The characteristics of these are, that the operating systems are, at least at the moment, closed, and only support games especially designed for the GameBoy. Although, also these devices will converge with mobile devices; they will soon have a wireless connection.

2.3 Game types

The results of this report only apply to mobile games. The mobile games can be characterised as entertainment applications that offer some kind a challenge to the users and by solving that the user receives some kind of a prize.

Ring tones, operator logos or other kinds of entertainment services, such as SMS-based lotteries, are not included in this report. Thus, for example the famous fish-game, is not considered as a mobile game. Examples of mobile games are WAP-based poker game or SMS-based Trivial Pursuit provided by CodeOnline.

3 Current market situation

According to James Doyle, managing director of AerSoft, the main market dynamics are content, delivery technology, bearers and handsets[25]. Mobile gaming is immature market with low penetration, many new players and undeveloped partnering networks. Also, the business model for entertainment services is unproven; the majority of entertainment services are deployed on WAP and WAP penetration is still well below five per cent.

Despite these current market problems SMS technology is already gaining users, with a growing young demographic group driving the usage. SMS is a widely accepted and ubiquitous service: it has proven revenue and billing models and the high bandwidth premium quality transmission and service technologies are still a few years away from mass market penetration.

3.1 Industry Structure

3.1.1 Value chain

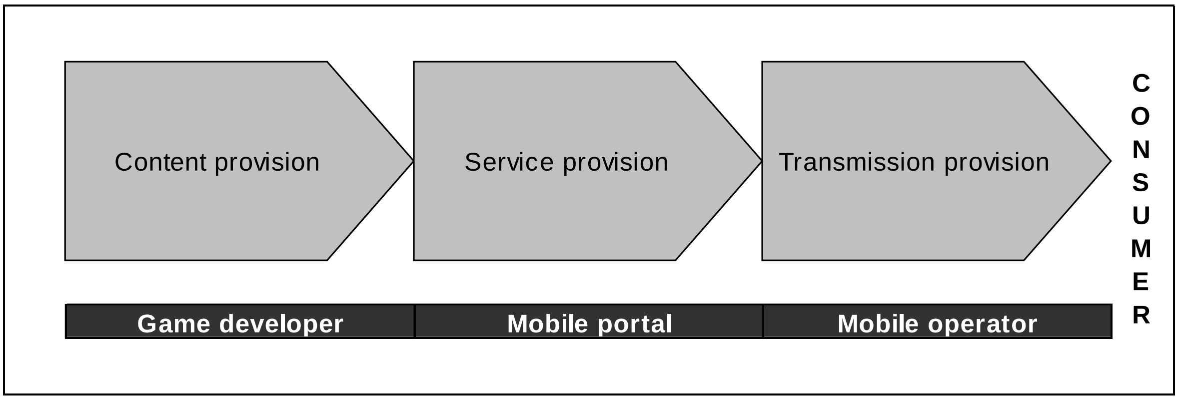


FIGURE 1 - Mobile gaming industry, current value chain

The current value chain for mobile gaming consists of three main players, which are presented in the figure 1. As it shows in the figure, usually game developers only concentrate in the content provision part of the value chain. Thus they have to pay mobile portals a fee because the portal is a

[25] Doyle, J.. AerSoft. SMS-based Mobile Entertainment Services. SMS Conference. 28.-29.9.2000.

distribution channel for their content. In addition, consumers have to pay mobile operators for the data being transferred while playing central server-based games. This means that the revenues that are created by offering games to the customers are divided among a number of players, which forms the mobile gaming value chain.

3.2 Business logics

3.2.1 Revenue model and value distribution

At the moment in SMS-based games revenue sharing is the revenue model that is mostly used[9] [11] [13] [14] [15] [16] [17]. In revenue sharing the generated revenue is shared among the value chain companies according to the fixed percentages stated in the contracts. The good side about this model is that if a game really is successful, the whole value chain will benefit from it accordingly. Currently the situation is not that good though; the content or service providers are not making profit from games.

Currently another possible revenue model is that the service provider buys the rights for that game for a fixed price. The game developer might also receive a certain royalty according to the sales of the game. The ordinary game industry relies very much on this model, and it is possible that after the mobile gaming really starts creating revenue, the revenue model in mobile gaming industry will also develop into this direction.

3.2.2 Content providers

The content providers are software development companies, which may be specialised in game development. Currently the companies developing

[9] Bowes, D. COO, Riot Entertainment. Interview. 2001.

[11] Hytönen, P. Managing director, Grip Studios Interactive. Interview. 2001.

[13] Niinimäki, H. CEO, Cube Entertainment. Interview. May 2001.

[14] Peltola, M. CEO, G-Cluster. Interview. May 2001.

[15] Riihimäki, H. New operations director, Cube Entertainment. Interview May 2001.

[16] Råmark, M. President, Enlightment Entertainment. Interview 2001.

[17] Tuovinen, J. Communications officer, Orchimedia. Interview 2001.

mobile games are start-ups, which have usually have received a good amount of venture capital.

In revenue sharing content providers get 15-30 percent of the revenue, depending on the marketing efforts done by the service provider. The operators or service providers may also buy games for a fixed price, but those are used for promotional purposes and are not supposed to create direct revenue.

3.2.3 Service providers

Mobile portals, such as BT Cellnet's Genie and Sonera ZED, have been the traditional way of offering the mobile services to the customers. The portals have also had a strong presence in Internet. Publishing model is a new of operating in mobile gaming market; the model is very commonly used in other industries though. The publishing companies promote the specified and probably create a cross media presence for the game. The service providers currently get 20-35 percent of the revenue.

3.2.4 Transmission providers

Transmission providers have been very strict about their portion of the income in mobile services; they get up to 50 percent of the income. The situation is similar also in mobile gaming. Currently the operators' share is very big, but according to the interviews it is getting slightly lower in the near future.

3.3 Current technologies

3.3.1 Network Technologies

Circuit switched technologies, GSM900 and GSM1800 are the nowadays standards accessing mobile network in Europe. GSM standard allows only 9,6 kbit/s data speed so it can be said that it lacks the speed that is needed by the state-of-art services of the date. Also the high prices of calls, because of billing method - bill by time online instead of amount of data transferred - have caused the low interest on GSM-data based game services available today. HSCSD is based on GSM with the difference that it can use up to four 14,4 kbit/s channels simultaneously, so that the resulting data transfer rate is 57,6 kbit/s. HSCSD is a standard that is used for applications and services that require bigger data transfer capacity than GSM before new technologies like GPRS or UMTS emerge. HSCSD can be considered impracticable for mobile gaming, because of its extremely high price.

Packet switched technologies will form the basis of the development of the mobile gaming industry. GPRS is a packet switched protocol that allows data transfer rate up to 115 kbit/s (or even 171 kbit/s), but in the first phase transfer speed will only be 20-40 kbit/s. The two main advantages are that billing is based on the transferred data and that the terminal is always online. This suffices the requirement of instant connectivity, which will be appreciated by consumers. The terminal vendors have already introduced the GPRS terminals and some GPRS networks already exist. New cost-efficient way of accessing mobile gaming services will entice severely more customers. EDGE is a high bandwidth version of GPRS. It offers transmission speed of 384 kbit/s. GPRS is a standard similar to HSCSD, which extends the life of and of standard before representing a new one - UMTS. EDGE will allow multimedia services for mobile terminals. It will be available during year 2002 and the fixed line based multimedia services will move from "ordinary Internet" to "mobile Internet". EDGE would make it possible to offer high quality streamed games, such as G-Cluster is offering.

3.3.2 Service Technologies

SMS (Short Message Service) makes possible sending messages containing up to 160 characters. SMS will hold its current position also in the future, mainly because of its easiness; it is fairly easy for the users, and it is easy for the companies providing the product because of the working billing model.

WAP (Wireless Application Protocol) was the most hyped acronym a year ago. Currently many content providers are building WAP-services and it is believed that adoption of GPRS with the new billing model will launch the growth of WAP-based services.

3.3.3 Middleware Platforms

The SMS-services are accessed through SMS-gateways. They are so-called service access points, which communicate with Short Message Centres. The gateways access the service hosting computers using ordinary Internet connections.

Multiple software vendors are developing mobile billing solutions, but similar problems remain as in Internet - no universal cash is available.

Security and authentication are an important part of mobile communication. The market leader is Sonera's SmartTrust that uses PKI (Public Key Infrastructure) technique. Digital signatures are going have a role in advanced gaming services and especially in billing solutions. Sonera has implemented PKI on a SIM (Subscriber Identification Module) card, which is placed in a mobile phone, so that no external card reader is needed.

3.3.4 Operating Systems

Nowadays the operating systems in mobile devices are more or less custom built systems made by device manufacturers. They are not following any standards, which leads into a situation, where software cannot be published for multiple devices, or the software has to be tailored and integrated for the different platforms.

3.3.5 Game technology

Current service technologies, SMS and WAP, make only possible to offer turn-based games. This sets very strict limitations to games that can be provided; for example no real-time interactive games can be offered. Furthermore SMS-based games may use only messages that are 160 characters long and no graphics can be displayed. WAP-terminals can display graphics, but only very low quality.

In case of SMS games the billing is done according to messages sent by the user. One message usually costs between ½ and 1 euro. The total cost of a game session can thus go up to several euros.

WAP over GSM-based games are billed by the minutes that the terminal is online. A data connection costs around 1/3 Euros / minute, so ten minutes of playing costs approximately 3 euros.

3.4 Players in the industry

The players in the mobile gaming industry are various. The players vary from big government owned and regulated corporations, to small start-up companies.

3.4.1 Content providers

Content providers are independent, mostly start-up companies financed by VC-companies. At the moment very few games make it past the break-even point and game development is not profitable.

See Appendix II for a list of players targeting the content provision.

3.4.2 Service providers

Service providers are currently mostly subsidiaries owned by the transmission providers (Sonera ZED, BT Cellnet's Genie, Telia's MyDOF), although also independent companies, such as Riot Entertainment exist. At the moment service provision isn't creating profit; the companies are looking forward the SMS-gaming to take off very soon and to become profitable.

Nokia's "Club Nokia" is a terminal manufacturer owned portal[32]. It aims to offer a personalised service offered to European owners of Nokia mobile

[32] Hamilton, A.. Red Herring. NTT DoCoMo's i-Mode goes global. 15.3.2001. http://www.redherring.com/index.asp?layout=story&channel=10000001&doc_id=1400019340

phones. It features a wide variety of services and Nokia gamers can converge at this site and either compete against each other or view their standings in the overall competition. This was one of the features specifically targeted for younger market and has worked quite well. Nokia is also able to identify new opportunities in gaming as a result of feedback collected from the site.

See Appendix II for a list of players targeting the service provision.

3.4.3 Transmission providers

Transmission providers such as mobile operators are very big companies, and they continue to consolidate into even bigger entities. Transmission provision for mobile gaming is creating some, but very small revenues for them. This is due to the fact, that the current size of the mobile gaming industry is very small. But since the infrastructure is the same, as in other entertainment services, no big investments must have been done; even little usage generates profit.

See Appendix II for a list of players targeting the transmission provision.

3.4.4 Handset manufacturers

It seems that at the moment all the major handset manufacturers are starting to realise the potential of mobile entertainment services, especially gaming. They are partnering with the value chain companies, or creating their own subsidiaries for offering mobile content.

See Appendix II for a list of players manufacturing terminal equipment.

3.4.5 Middleware software developers

Middleware software developers are making the business enabling technologies, such as billing solutions or new gaming technologies, such as Sun Microsystem's Java-environment.

See Appendix II for a list of players developing middleware software.

4 Industry evolution

According to the Datamonitor's study wireless gaming appears to be a winner for all[68].

- **Mobile network operators** get increased usage from mobile players – the mobile operators can attract customers and gain competitive advantage by offering premium mobile gaming content.
- **Game developers** find a profitable new platform – mobile gaming starts to attract also traditional game development studios, and for example Nokia has a respectable list of partnerships with game developers making content for Club Nokia.
- **Terminal equipment manufacturers** are assured demand for next-generation hardware by linking their phones with popular entertainment

The key success factor in mobile entertainment industry is to change course to meet the needs of a younger more wireless generation.

4.1 Trends in mobile gaming

4.1.1 Java

The big thing for the whole entertainment field will be the introduction of Java supporting mobile phones, which enables adding external software such as games to the phones[65]. It is going to change drastically the mobile game field since it enables rich, non-static features to be included in the games. Already this spring Nokia is bringing to the market its new Communicator, which supports Java and to which it is possible to add external software, and already a few games fine-tuned for Communicator

[68] Sutherland, E.. M-CommerceTimes. Wireless Gaming. 26.2.2001. http://www.mcommercetimes.com/Services/90

[65] Sun Microsystems. Java technology goes wireless. 2000. http://www.sun.com/sp/features/wireless.html

exist. The low-end phone models such as Nokia's 3000 series will have similar kind of operating systems.

4.1.2 Ubiquitous gaming

The value proposition of mobile gaming is that it can be done independent of the place and time. This is also a reason, why the market potential is so big: even people, who do not want to dedicate time for gaming, can play mobile games in buses and on breaks.

Another point of view to ubiquitous gaming is that technology for location-based games is developing. In next few years we will most likely see live gaming where the participants are bound together by a certain service provider and the game happens in the real life.

4.1.3 Community model

Most service providing companies believe that building communities is necessary, if one wants to succeed in service provision. Communities consist of people with common interests. They fulfil the need of human interaction and create stickiness for the services.

Durlacher identifies the following as characteristics that need to be fulfilled in order to create a successful community[49]:

- **Self-generated evolution -** Members of the community generate content for the site, influence its growth and determine its evolution. Visitors to community sites should be able to sense the presence of others like themselves who have visited or are currently visiting the same site, and see the results of their participation in the growth of the site. This is the difference between portals with unidirectional communication and mature portals with true community established.

[49] Marathe, J.. Durlacher. Creating Community Online. 1999. http://www.durlacher.com/research/resrepdetail21.asp.

- **Involvement and interactivity -** Visitors are given the chance to participate in discussions and interact with other visitors / members or the community. This is currently achieved through the use of community tools such as discussion boards, live chat, and member mailboxes. Information may also be collated across multiple users, and be relayed back to visitors. Also in mobile gaming the interactivity will be one of the success factors.
- **Frequency and duration of visits -** A good community experiences repeat visits from users and is able to attract their attention for long periods of time.
- **User generated content** - Ratings or reviews also build community. The portal may provide tips and advice based on other users behaviour, which can be used to promote new game products.

The effects of communities for the providing companies, according to Durlacher, are[49]:

1. Communities create value by allowing the users participate in content provision
2. Companies can learn from their community and they can offer products suited better for the targeted user group
3. Users enjoy community, which makes them come back in the future to meet the friends and see what's happening in the community
4. Users are expanding the community by so-called viral marketing
5. Communities build barriers to entry by increasing customer loyalty, which makes it hard for the new entrants to attract aware customers
6. Community lowers the learning curve

[49] Marathe, J.. Durlacher. Creating Community Online. 1999. http://www.durlacher.com/research/resrepdetail21.asp

4.1.4 Cross media gaming

At the moment the most successful games in Finland are launched and promoted in cooperation with TV-programs, such as Tilt-program produced by Intervisio.

The operators are not willing to spend money in advertising the games. The service providers operating only through Internet are not creating enough visibility for the games. The best, and perhaps the only way to reach big audience is by being present in different media. The most important medium is TV, which provides highly interactive and visible content - the top 40 player listings are shown, and the best players are brought in the air and are awarded.

4.1.5 Industry dualism

Half of the content providers believe, that the SMS will be the most successful technology for mobile gaming even year 2005. The other half believe, that the technology development will be fast, and advanced 2- and 3-dimensional games will emerge in the near future.

These two opinions might not be mutually exclusive. SMS markets are still opening and developing in many countries. The main target group for SMS-games are persons looking for 5-minute fun. The price for these disposable low end games will be low. The volume of this market will be high.

The target group of advanced games is men between 20 and 30 years, which is the primary target group of ordinary games also. They can, and want to be the early adaptors of new technology, and they also can afford the expensive PDA devices. The premium games are sold on higher price and the volume of the market will be lower.

4.2 Market evolution

4.2.1 Market lifecycle

The idea of playing games in mobile terminals was introduced to consumers year 1997, when Nokia introduced the 6110-model with it's Worm-game. Year 2000 the SMS-based mobile gaming started to take off and move from introduction to development phase. The user base started to grow and year 2001 there has been games that have made past the break even-point.

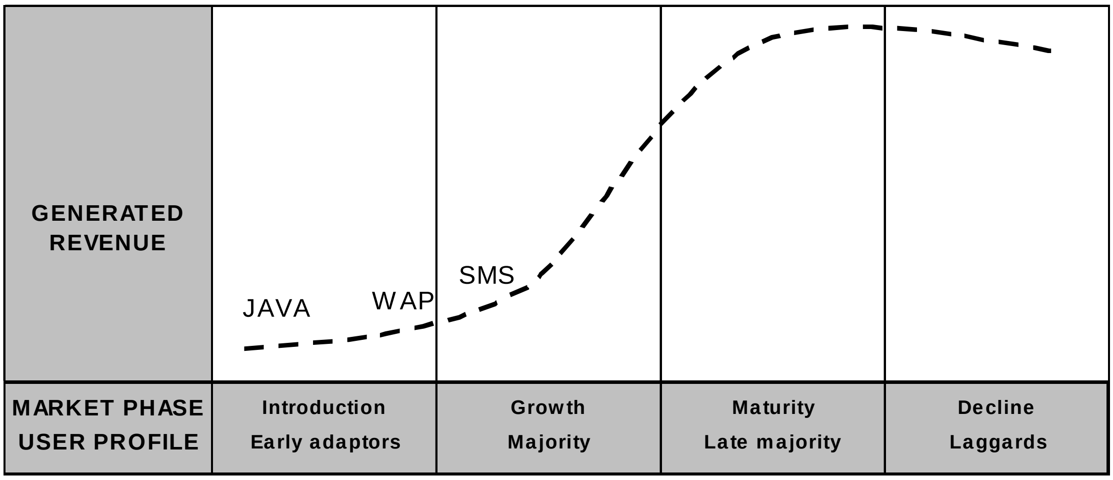
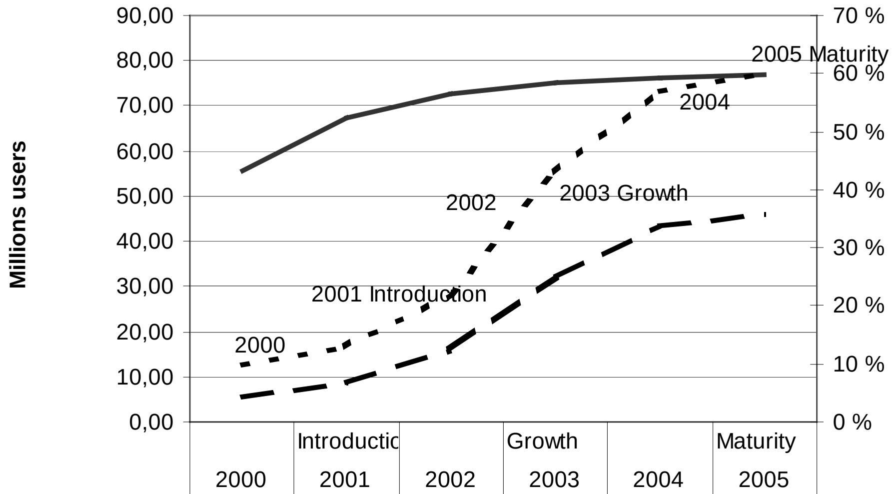


FIGURE 2 - Service technologies positioned in the life-cycle model

Year 2000 the content and service providing companies tried to push the WAP technology to the users, who didn't buy the idea. The reasons for this were: The billing model wasn't reasonable – nobody is willing to pay several, even 10 euros for one gaming session (1/3 EUR / minute * 30 minutes = 10 EUR). The technological development was too fast – the terminals weren't ready, and also for SMS it took ten years to reach the current level. WAP technology is still in the introduction phase, and is waiting for the GPRS technology to change the time-based billing to the traffic-based billing. WAP has attracted some early adaptors, but it has not yet reached the development phase. It will most likely take a year, before the WAP-services start to gain real attraction. In the end of year 2002 the WAP-services are growing fast, and starting to eat the markets from SMS-based gaming; SMS remains to be the major service technology in mobile gaming until the end of year 2003.

Java technology is in the introduction phase. There are very few handsets available, and the content providers haven't used Java for any real content, yet. For Java it will take at least a few years, before the early adaptors start using Java in commercial applications and a year before it reaches the development phase. Java-based gaming will be in the fast development phase in the end of year 2004.



	2000	2001	2002	2003	2004	2005
Target group size	55,65	67,31	72,59	75,01	76,33	76,99
Active players	5,57	8,75	15,97	32,26	43,51	46,20
Percentage	10 %	13 %	22 %	43 %	57 %	60 %

FIGURE 3 - Mobile gaming industry evolution (mill. subscribers)

Currently, from the consumer's point of view, the whole mobile gaming market is in the introduction phase. The first early adaptors are using mobile games, but the majority is just starting to become aware of such market.

The IDC study shows that year 2000 10% of the SMS traffic in Finland is value added services[5]. It can be estimated, that year 2000 10% of the value added SMS messages are generated by mobile gaming. This results in market size of 1,6 million euros.

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5 IDC Finland Oy. Short message market 1999-2002. Publications of the Ministry of Transport and Communications 20/2001. 2001.

4.2.2 Product lifecycles

The life-cycle model can be used for distinguishing the different phases in the life cycle of one game in the mobile gaming market.

The life cycles of mobile games will most likely resemble the standard bell-shaped curve. The introduction phase is short, and if the game is about to became a hit, it reaches the phase of fast development very quickly. When the product reaches the maturity stage, already some early adaptors and first part of the majority start moving towards new games.

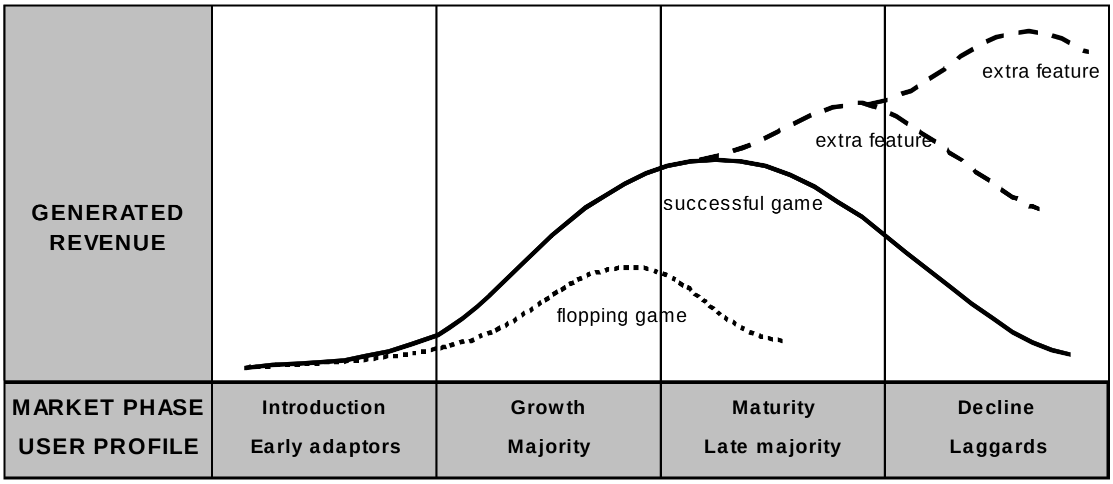


FIGURE 4 - A single game life-cycle

At the moment, the life cycle of a mobile game is relatively short. The generated revenue may have peaks, if the game is promoted for example in TV. In the future, the length of the life cycle will remain short. It will take from one to two months, before the newer games replace the older ones.

Major portion of the games are not making big profits, or may not be profitable at all. The situation will be the same in the mobile gaming industry in the future, as it is in the ordinary game industry at the moment. Most likely the “80-20 rule” is also applicable in mobile games: 20% of the products are making 80% of the profits. If a content provider makes several, unpopular, games in a row, it is out of business because no publisher is going to publish their games. This situation can also be compared with music and movie industry, no movie or music maker can make many bad products in a row.

The music and the movie industries offer a good market for analogy; most of the produced music or movies are not profitable, but the few big hits generate so much profit, that the publishing companies make their living. The other thing is also that the life cycles of movies and music are short. It takes only a couple of months a product to go from the introduction to the decline stage.

4.2.3 Value Delivery Network

The value delivery network can be divided into three major parts: content providers, service providers and transmission providers. Each part has a specified task and adds value to the final product.

Content provision can be further divided into three parts. Packaging companies take the game engines from game development studios and use the licensed or their own brands to make a branded game package.

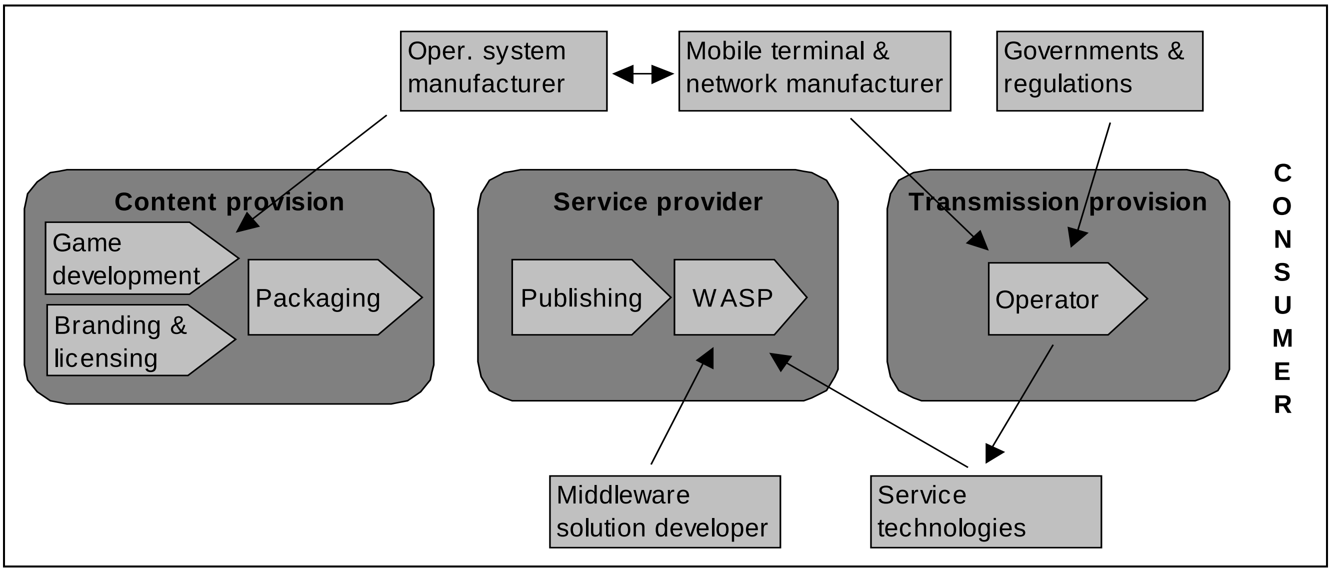


FIGURE 5 - The future value delivery network of mobile gaming industry

Service provision consists of two parts. The publishing companies buy the games from content providers and promote and distribute them using wireless application service providers as a distribution channel. WASP-companies distribute the games further to the consumers using the mobile operators as transmission providers.

Usually the companies combine some of the value delivery network activities. Mobile portals are often WASPs and publishers. Publishers may also host their own games and can thus be responsible for packaging, publishing and providing the service.

4.2.4 Revenue and pricing model

Kevin Bradshaw, founder of Digital Bridges lists the following as possible future revenue and pricing models[21]. The choice of a certain model depends on the carrier:

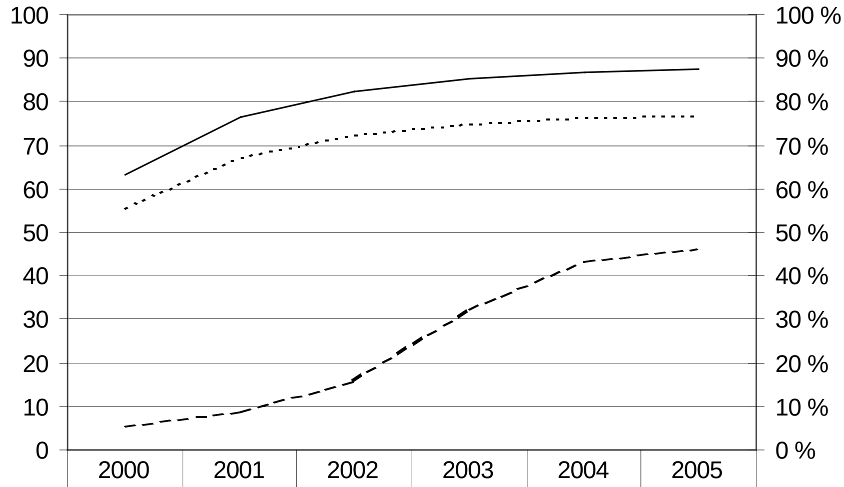
- **Revenue sharing** – each part of the value chain receives a fixed portion of the total income. This can also be considered as risk sharing, where each company bears the risk of flopping. The pricing model of services is per session, per product, per level or per time on-line pricing. The revenue sharing model is used in association with phone bill-based billing.
- **Direct charging of the end user** – The service providers may charge the user directly using the same pricing model as revenue sharing. The revenue model is slightly different: operator charges the data transferred, but collects no extra costs from the service. Content providers may be paid a share of the income also in this model, but most likely the service providers get the biggest part of the income.
- **Subscription-based charges** – The pricing model in subscription-based charging is different from the previous two models. The services may be used for a certain period of time by paying the subscription fee. The revenue model is the same as in the direct charging of the end user.
- **Free and advertising dependent** – Mobile games are used for promotional purposes. The content providers may receive a fixed

[21] Bradshaw, K. Digital Bridges. Advances in Wireless Gaming. Wap Congress 2000. 3.-4.5.2000.

amount for the game. The advertisers get their profits indirectly; customers may for example prefer an operator offering premium free mobile games, not an operator that doesn't offer any content. The pricing model doesn't exist for free and advertising dependent charging; the users get the services for free, only paying the data transmission fee for the operator.

4.2.5 Mobile connections penetration

The mobile connection penetration in the target group in Europe will grow slightly bigger next few years. The growth will stabilize in little less than 90% penetration[3].



	2000	2001	2002	2003	2004	2005
Target group	55,655	67,314	72,593	75,013	76,333	76,993
Active Users	5,57	8,75	15,97	32,26	43,51	46,20
Penetration	63 %	77 %	83 %	85 %	87 %	88 %

FIGURE 6 - Mobile penetration, target group and active users (mill. subscribers) in Europe

4.2.6 Customer base

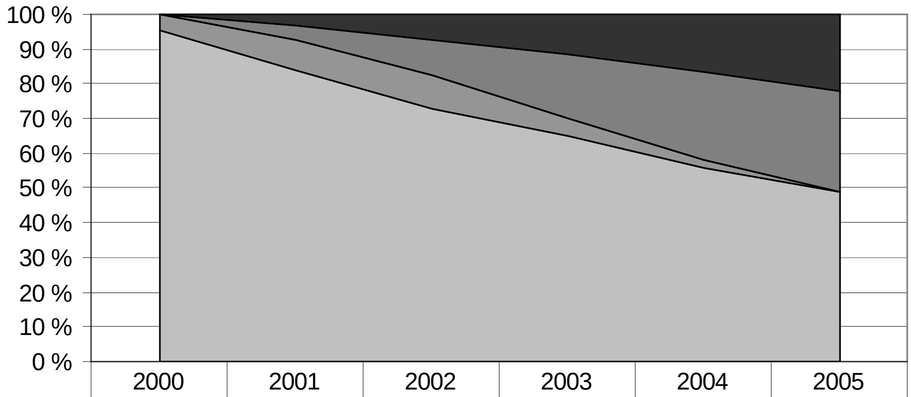
Figure 7 represents the installed customer base of different service technologies. The figure shows, that virtually all users have a terminal

[3] Durlacher. UMTS Report: Investment perspective. 2000.

capable of messaging. Year 2005 45% is Java-compliant phones, and 60% a phone that supports WAP-technology.

The phones that are introduced year 2001 containing WAP will use GSM as transmission technology. Nokia 3330 is an example of this type of phones. As GPRS phones are introduced, WAP over GPRS starts to take off year 2002 and will soon replace the circuit switched technology.

Phones using Java-technology are introduced year 2001; only high-end low sales phones will contain it. Nokia has stated that year 2003 50% of their new phones sold will contain Java-environment. Year 2005 the percentage of phones owned by the customers are Java-enabled.



	2000	2001	2002	2003	2004	2005
JAVA	0 %	4 %	10 %	18 %	30 %	45 %
WAP-PACKET	0 %	5 %	14 %	28 %	45 %	60 %
WAP-CIRCUIT	5 %	10 %	13 %	8 %	4 %	0 %
SMS	100 %	100 %	100 %	100 %	100 %	100 %

SMS WAP-CIRCUIT WAP-PACKET JAVA

FIGURE 7 - Customer bases of service technologies

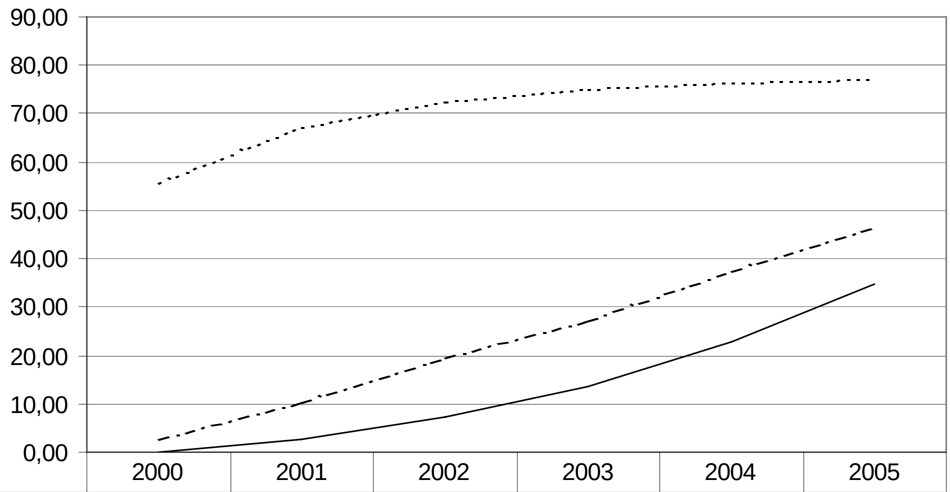
4.2.7 Target group users

The potential target group sizes for different service technologies are:

- SMS, 60 million – Virtually all handsets are SMS enabled. At the moment this group is the most attractive
- WAP, 5 million – Currently a small portion of users have WAP-technology implemented in their phone and all of those are GSM

based. In the end of year 2001 the phones with GPRS and WAP will become more popular and the number of WAP handsets starts to grow rapidly.

- Java, 0,5 million – There are very few Java-enabled handsets at the moment, but the number starts to grow during year 2002.



	2000	2001	2002	2003	2004	2005
SMS	55,65	67,31	72,59	75,01	76,33	76,99
WAP	2,78	10,10	19,60	27,00	37,40	46,20
JAVA	0,00	2,69	7,26	13,50	22,90	34,65

FIGURE 8 - Target group users (million) in Europe

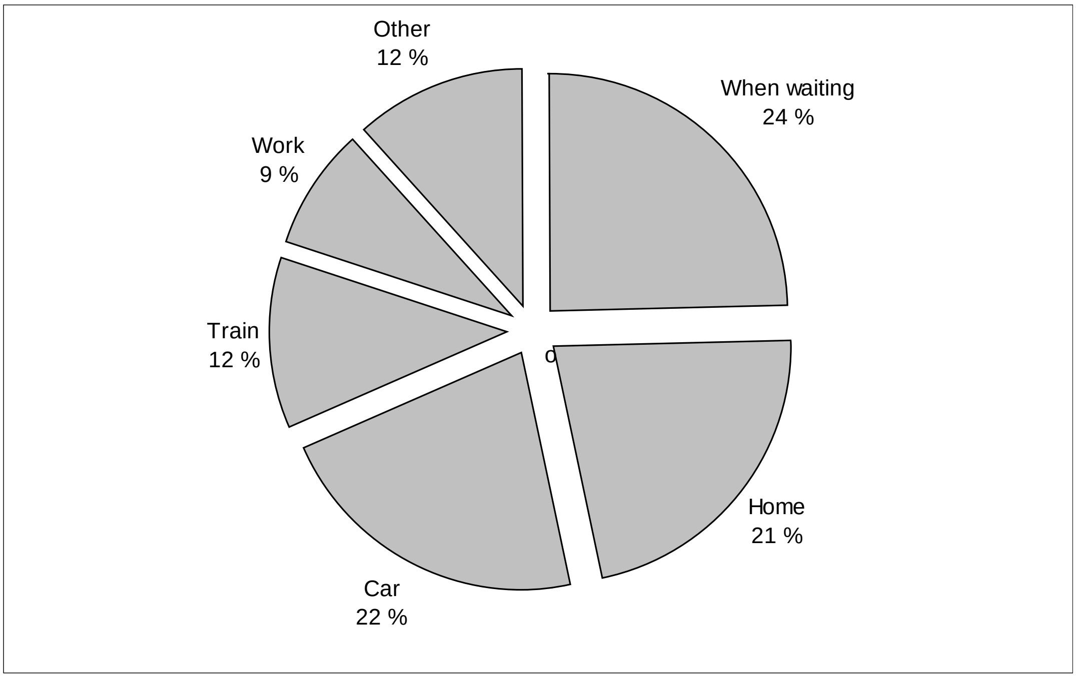


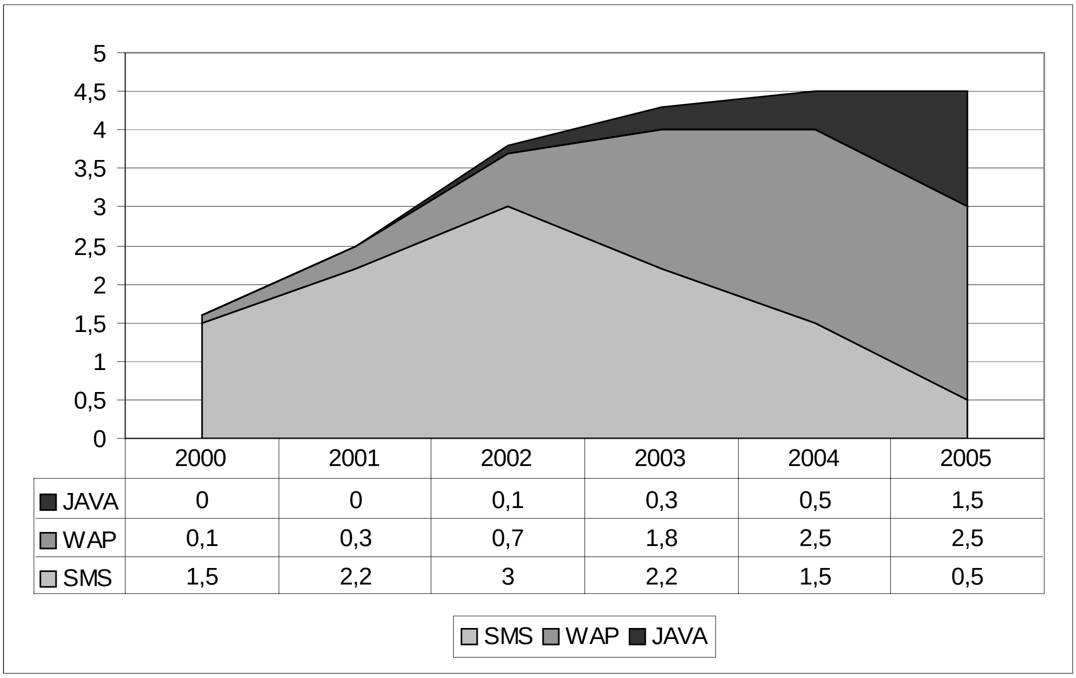
FIGURE 9 - Places where people play games (source: Nokia Mobile Phones[32])

The results presented in figure 9 justify that consumers tend to play games whenever they have any free time. As such consumers free time could be exploited further with a range of games offering interactivity and challenges.

Combined, when waiting, train, car and home, stand for 80% of the total time spent for playing the games. These are also places, where people most likely have the time, but lack the communication with other individuals with same interests. Especially gaming communities can be used for reaching this audience.

[32] Graham, T. Nokia Mobile Phones. Visions and Concepts – The Future of Mobile Gaming. SmartPhones Conference. 5.-6.12.2000.

4.2.8 Money spent on mobile games



	2000	2001	2002	2003	2004	2005
JAVA	0	0	0,1	0,3	0,5	1,5
WAP	0,1	0,3	0,7	1,8	2,5	2,5
SMS	1,5	2,2	3	2,2	1,5	0,5

FIGURE 10 - Monthly ARPU (euros) in Europe

"Gaming is a bipolar activity. People either play games very frequently, (i.e. more than once a day), or very infrequently (i.e. less than once a week.)," says Nitesh Patel, an analyst with Strategy Analytics wireless Internet applications strategic advisory service[44]. The money spent on mobile gaming will increase in the future, when the technological development makes it possible to offer premium games for handsets. The amount of young people playing games more frequently grows as the mass-audience becomes aware of mobile gaming.

SMS-based games will be most successful until the end of year 2003. 2004 WAP based games are taking over the market; Java-based games start to grow their share year 2005 and will be growing its share rapidly after year 2005.

[44] Kerr, D. Strategy Analytics. Business Models and ROI for Transition to 3G. 3G Mobile Conference. 14.-16.6.2000.

4.2.9 Market size and growth rate

According to a research from Datamonitor, by 2005, 200 million people in Western Europe and the United States will be playing Internet games on their mobile phones[68]. Datamonitor predicts rapid development of the market, reaching $6 billion in 2005. Sponsorship of the games is expected to be the most lucrative revenue stream. Nokia predicts, that 100 million customers will be using Nokia's mobile phones for gaming year 2003[32].

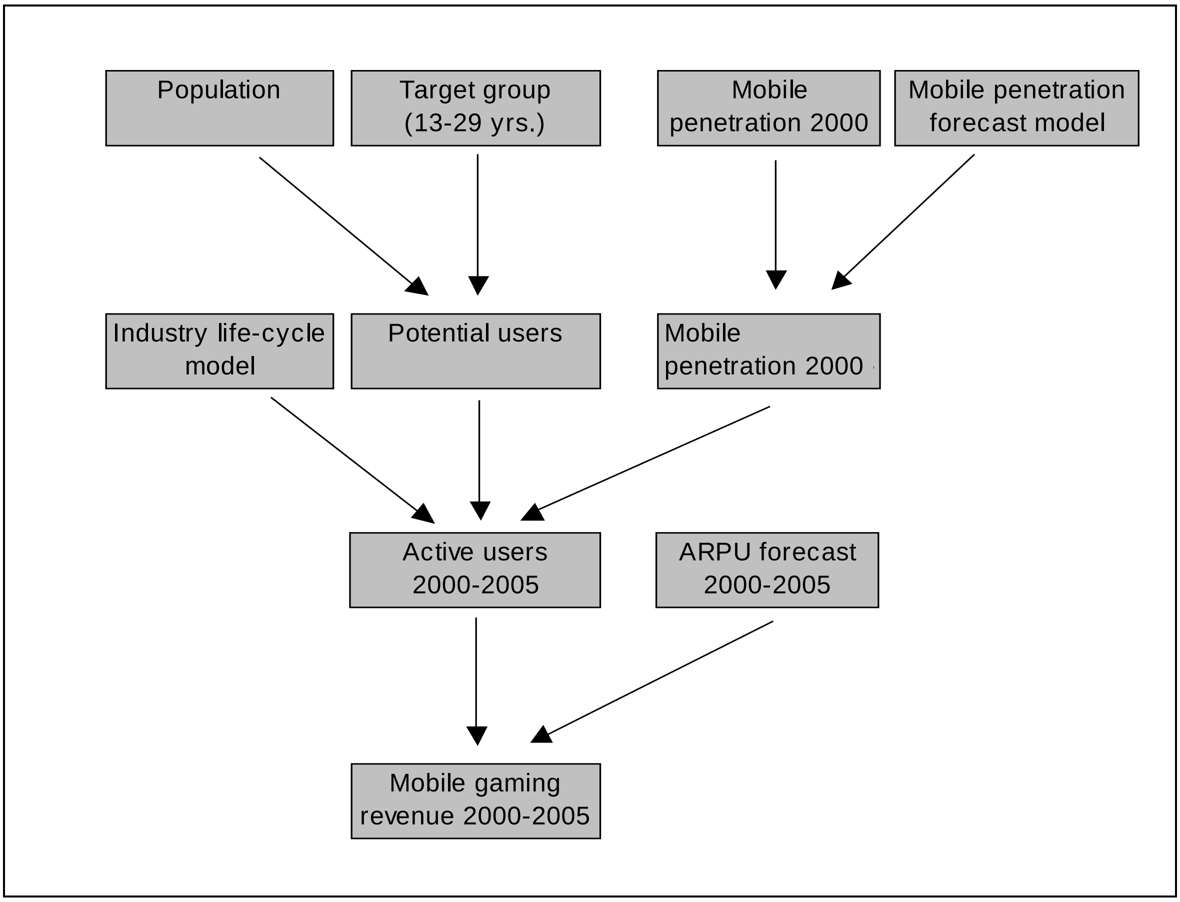


FIGURE 11 - Mobile gaming industry revenue forecast model

Wireless technology is developing rapidly, but fragmented markets and disagreements over standards require simplified content. Because of the

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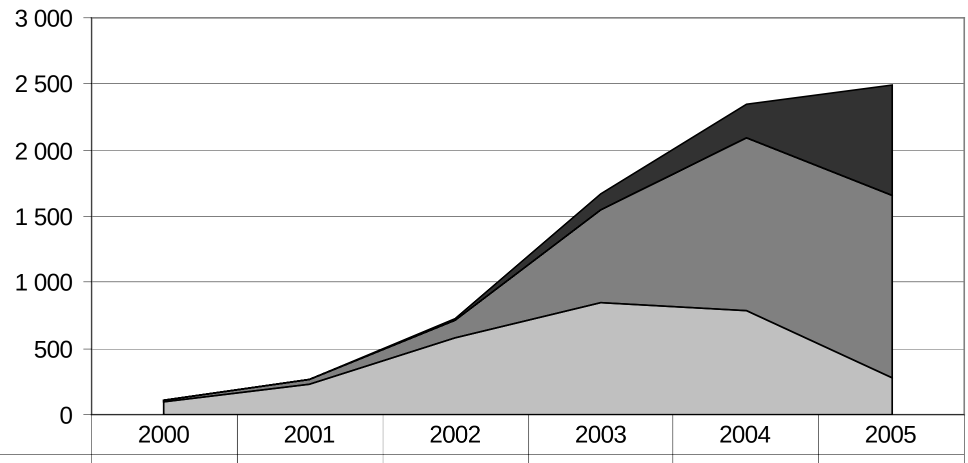
[68] Sutherland, E.. M-CommerceTimes. Wireless Gaming. 26.2.2001. http://www.mcommercetimes.com/Services/90

[32] Graham, T. Nokia Mobile Phones. Visions and Concepts – The Future of Mobile Gaming. SmartPhones Conference. 5.-6.12.2000.

limited technology, the Datamonitor report suggests the most popular games will be simple games like bingo, cards and quizzes. Games will also develop using the communicative properties of the phones. Datamonitor expects multiplayer and location-specific games to develop as a result. Datamonitor expects customers will be willing to pay for playing the games, and most wireless gaming revenue will come from two sources: sponsorship and subscriptions. Datamonitor believes, however, that the priced games will probably be limited to networks that can offer faster service, and therefore higher quality games.

Datamonitor games consultant Frederic Diot says the market will be buoyed by new technology: "The advent of WAP and the coming of high-speed wireless networking technologies GPRS and UMTS promise richer content being displayed on consumers' handsets.” "Lured by the prospect of a mass-market audience and ever-improving technology, game publishers are ramping up their efforts to penetrate the wireless gaming market. Similarly, mobile phone operators and manufacturers are eager to have a head start in providing their customers with online games, which are considered premium online content."



	2000	2001	2002	2003	2004	2005
Total size	107	263	728	1 664	2 350	2 495
JAVA	0	0	19	116	261	832
WAP	7	32	134	697	1 305	1 386
SMS	100	231	575	852	783	277

FIGURE 12 - Market size forecast (mill. euros)

Strategy Analytics, the technology consultancy, projects that mobile gaming users will reach 100 million by 2006 and games themselves will improve dramatically[44]. In addition, mobile gaming experience will improve over the next 2-3 years, as 2.5G networks are deployed and Java enabled devices proliferate. Currently wireless devices are not designed for absorbing gaming experiences; and networks are slow and expensive for users. It is expected that as mobile games become more sophisticated the cost of development will originate from handset manufacturers, service providers, or third party application developers.

Durlacher believes that entertainment services including mobile games will be key to unlocking the revenue opportunity in the B2C market[3]. To date, revenues from mobile entertainment services are very limited indeed. The transition towards an “always on” environment and higher speeds, in combination with the emergence of gaming-centric devices, will result in features that will particularly appeal to young people in the market. Durlacher expects mobile games to become the number one service and generate annual revenues of around € 8.1 billion by 2005.

4.3 Market size comparison

The European mobile gaming market is very much building on the five big countries: Germany, UK, Italy, France and Spain. The target groups, people between 13 and 30, in these countries are almost equal of size, with only France deviating a little. The rest of Europe is divided among twelve other countries, where the actual shares are very small.

[44] Kerr, D. Strategy Analytics. Business Models and ROI for Transition to 3G. 3G Mobile Conference. 14.-16.6.2000.

[3] Durlacher. UMTS Report: Investment perspective. 2000.

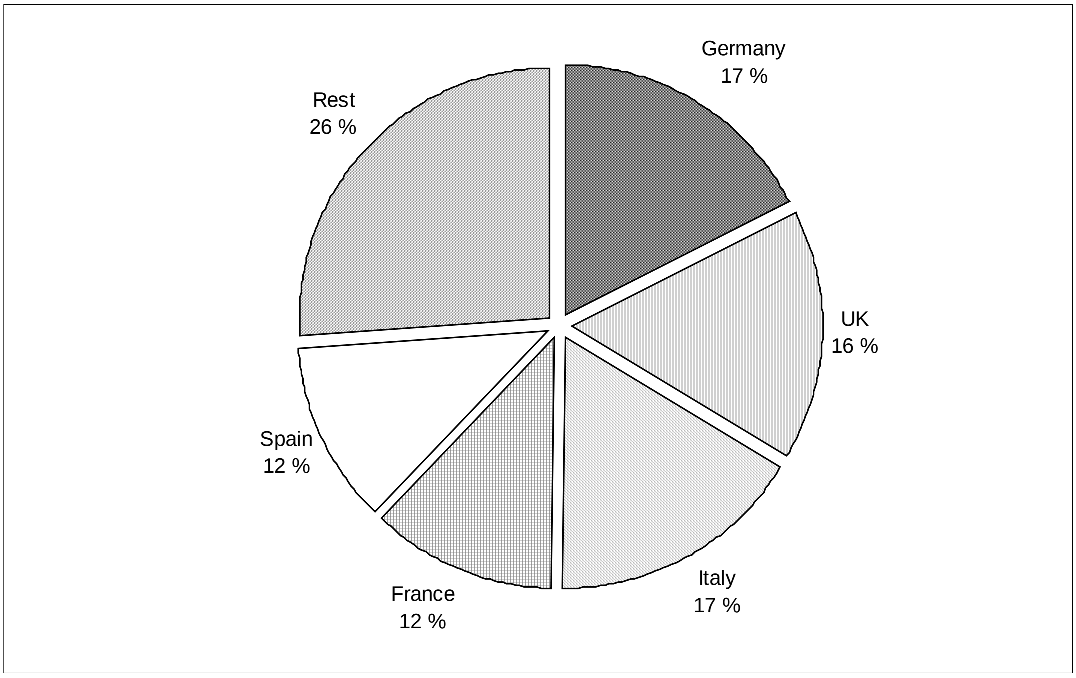
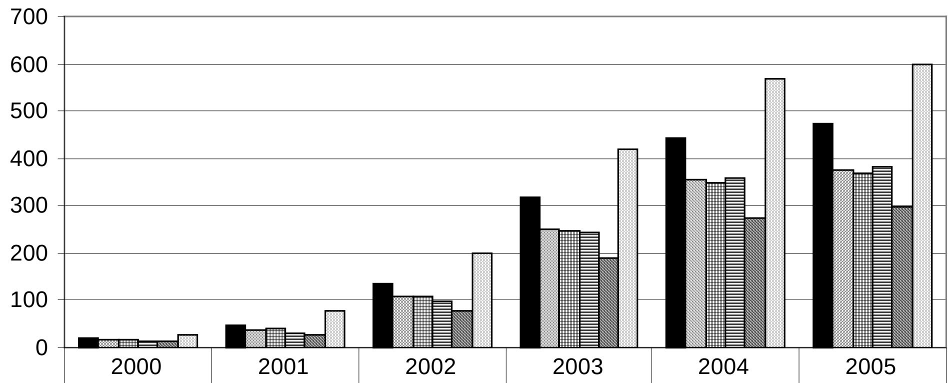


FIGURE 13 - Market size comparison

The chart characterises the current situation, but the proportions won't change much in the future either.



	2000	2001	2002	2003	2004	2005
Germany	19	47	135	317	445	473
UK	17	39	108	251	356	377
Italy	18	39	107	246	348	370
France	13	31	99	242	357	381
Spain	13	27	79	189	275	296
Rest	28	79	200	420	568	598

FIGURE 14 - Market sizes 2000-2005 (mill. euros)

Germany grows to become the largest market in Western Europe with 473 million in a year. UK, Italy and France become market areas of similar size, and Spain will remain slightly smaller.

4.4 Emerging technologies

4.4.1 Network Technologies

The future of mobile communication will base on packet switched technologies. UMTS is the worldwide standard for high-speed packet switched network. At the moment competition of UMTS radio spectrum licences is going on. The operators have to make big investments long before any revenue is created, but UMTS is believed to enable the entertainment services, including gaming, for real. Some open questions about UMTS remain between different service providers and terminal equipment manufacturers. UMTS is believed to be commercially available in Europe in 2003 and in Japan in late 2001. UMTS is so called third generation of mobile communication.

See appendix II for list of transmission providers and UMTS licensees in European countries

Bluetooth and WLAN (Wireless Local Area Network) can be considered as fourth generation in mobile communication. At the same time they bring new dimensions to mobile gaming. Services don't have to be accessed anymore by traditional operators but they can be accessed using local Bluetooth or WLAN connections.

4.4.2 Service Technologies

The next generation messaging technologies Enhanced Messaging Service (EMS) and Multimedia Messaging Service (MMS) give an opportunity to extend the lifetime of messaging-based entertainment[52]. These technologies support multimedia messaging, which will an important feature when competing with WAP-based services.

	SMS	EMS	MMS
Communications type	Person-to-Person	Person-to-Person	Person-to-Person
Supported media	Text and binary	Formatted text, B/W Pictures, Pre-defined sounds and animations	Text, voice, video
Associated technologies		Smart messaging (Nokia), M@gic4	
Availability	1993	late 2001	early 2003

FIGURE 15 - Messaging technologies comparison

I-Mode is developed by Japanese NTT-DoCoMo and it has over 20 million subscribers[28]. I-Mode offers a cheap Internet access with billing by the actual amount of data transferred. I-Mode has also made some efforts to overtake the European market, but it seems very unlike that the European operators would discard the technologies that they have been investing in very much, and start using I-Mode instead. I-Mode is based on packet switched data network, which also forms the basis for UMTS. The major phone manufacturers have launched an I-Mode handsets for Japanese market.

MExE is a standardization process lead by ETSI. Sun is working closely the ETSI to implement JavaPhone technology into the MExE platform. Java will enable advanced mobile terminal services by offering fully programmable environment for content and service developers.

4.4.3 Middleware Platforms

Nokia Mobile Entertainment Service gives game developers an easy way of developing and deploying applications. The Java based platform facilitates rapid development and deployment of services, and the infrastructure supports the creation of new forms of wireless networked WAP-games.

[28] ElectricNews.net. Japan passes 20 million mark for i-mode. 5.3.2001. http://www.electricnews.net/news.html?code=1317522

Nokia Mobile Entertainment Service is a pre-integrated and easily deployed Nokia hosted service for operators and service providers incorporating games, platform, facilitation, server hosting and a developer program. Game application developers and publishers can create interactive entertainment for WAP enabled mobile devices with the Nokia Mobile Entertainment Service. Mobile network operators can provide a vast amount of new, comprehensive value-added services for their customers via the Nokia hosted solution. Operators, including Finnish Radiolinja and Swedish Telia, have already adopted Mobile Entertainment Service[58]. Nokia has also made several agreements with game development companies, who will start making content on the platform[37].

Ericsson, Motorola and Siemens have also launched a project aiming to create an API for mobile gaming[27]. Their intention is to create an environment similar to Nokia's Mobile Entertainment Service, which can be used for rapid development for multiple platforms. The three companies said that their early work would concentrate on agreeing to open application programming interfaces and on a software development kit, which could then be licensed to software developers. The coalition expects to have specifications available in the third quarter of 2001. Once the game platform will be formally launched, the companies are planning to work with other companies in the areas of mobile phone and infrastructure vendors, technology providers, games developers, games service providers and mobile phone service providers. "We believe that offering compelling mobile games will act as an effective catalyst for the mobile Internet market as a whole, so we are convinced that operators, as well as the game developing community, will benefit greatly from this initiative," says Jan Lindgren, vice president of Ericsson Internet Applications. "Our aim is to promote an open

[58] *Nokia. Nokia* to supply its Mobile Entertainment Service solution to Telia Mobile bringing the latest WAP games to its customers. Press Release. 9.5.2001.

[27] EETimes.com. Mobile giants pick each other for universal games. *2001.* http://www.eetimes.com/story/OEG20010321S0069

approach to the mobile games market by supporting current and future standards, and by collaborating with all interested industry players."[27]

Several other players, such as Digital Bridges, In Fusio and Springtoys are targeting in making and selling their own service platforms. Also almost all start-up companies related to mobile gaming industry are developing some kind of a platform either for internal only use or also for licensing it for other development companies or mobile portals.

Akumiitti and More Magic Software are examples of companies that are developing mobile payment methods. So far they haven't made big breakthroughs.

Visa is also showing signs that it wants to be a player in the billing and micropayment market[24]. It is working to produce a secure payment method for WAP and is currently piloting several different payment mechanisms with partners, including Nokia, MeritaNordbanken and Gemplus. One of the payment mechanisms Visa is currently focusing on is a virtual card used in combination with a smart card. The virtual card would hold all a user's details that needed to be secure and would be stored virtually, to be used when the user paid for something using their mobile device. Within the WAP Forum, Visa is also driving a new e-commerce expert working group ECOMEG that includes banks, telecom operators, payment associations, merchants and manufacturers. The objective of the group is to ensure that WAP enables the development of the m-commerce potential including enabling different business models, being adopted by merchants and being endorsed as the best way to do mobile e-commerce; this could also solve the billing and pricing problem related to mobile gaming.

[27] EETimes.com. Mobile giants pick each other for universal games. *2001.* http://www.eetimes.com/story/OEG20010321S0069

[24] Degiovanni, B. Visa International. Keynote Address. Wap Congress 2000. 3.-4.5.2000.

4.4.4 Operating Systems

In the near future the operating systems can be divided into major categories: Microsoft PocketPC-based, Linux-based, PalmOS-based and EPOC-based[3]. In PDA machines PocketPC and PalmOS-based operating systems will be very commonly used. The mobile phone manufacturers will use EPOC-operating system, which is developed by Symbian, a joint venture of all major mobile phone manufacturers. Currently Linux doesn't attract major manufacturers to implement it to their terminals.

The biggest question of operating systems will be their ability to run multiplatform programs such as Java-programs. This would allow developers to publish the same software for all platforms, but for example Microsoft's behaviour is unclear, because they have run into troubles with Sun Microsystems.

Despite that Motorola has announced that it is going to cooperate with Palm to create a smartphone using PalmOS, all the major mobile phone manufacturers will use EPOC as an operating system in their mobile phones. Ericsson and Nokia have already adapted it in their smartphones. Ollila, CEO of Nokia, says that year 2004 50% of their 3G mobile phones will contain EPOC operating system[18].

4.4.5 Game technology

The biggest change between the current game technologies and the future ones is that in the future it will be possible to offer also games with real-time interactivity. This will most likely be the key success factor in making the killer game applications.

The interactive games can be divided into three categories: standalone, server-based and streamed games. The games can be either downloaded from service providers or they can be preinstalled in the factory.

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[3] Durlacher. UMTS Report: Investment perspective. 2000.

The streamed games are using advanced video decoding systems for delivering audio and visual data from servers to terminals. Streamed games require a certain fixed bandwidth, but they will provide more advanced graphics and audio for the games on terminals that itself don't have the processing power for rendering demanding visual data. G-Cluster is pioneering the streamed games concept, and is currently piloting the service with Sonera[14].

The standalone games are single-player games, that don't require a network connection to play the game. They are running in the mobile terminals and thus the consumer doesn't have to pay any data transmission fees after downloading the game. They will extend the current variety of preinstalled games on the phones, such as Nokia's worm-game.

The server-based games can be either single- or multi-player games. The usually are connected to the service provider's server while the game is played. The server contains the information of the game's current situation. For example chess-game might have a user interface in the phones, but the actual situation in the game would be stored in a server. This way the players might be able to interrupt the game and continue it next day.

In Japan it can be already been seen, that Java-enabled terminals are going to emerge. The scenario will be the same also in Europe. As low-end Java-enabled phones are launched, they are going to be very successful. Thus Java-based games will be killer applications of 2,5th and 3rd generation networks.

As figure shows SMS and its successor messaging technologies will be the major service technology in mobile gaming years until the end of year 2003. Year 2004 WAP-based technologies will gain the leading position over SMS and Java-based mobile games increase their market share year 2005 and 2006. The service providers are very eager to offer SMS-based games

[14] Peltola, M. CEO, G-Cluster. Interview. May 2001.

in the near future, because of the large installed customer base – almost 100% of the mobile terminal owners have SMS-enabled handsets – and because of the proven billing method – current entertainment services, such as ring tones and logos have been very popular in the target group.

From technological point of view, the mobile games aren't very difficult to create, after the problems with different terminals and payment methods have been tackled. Developing one game can't take too long: otherwise it won't be profitable. A life cycle of a certain game will quite short, and will be replaced by more trendy games very promptly.

4.4.6 Mobile terminals

Nokia's new communicator is a good example of a terminal, which will offer a good platform for playing mobile games[42]. The communicator has a big 4096-colour screen, which makes possible to provide games with rich content. It also supports JavaPhone API[66]; Java-based games can be downloaded and installed into it. The only negative side about the new communicator is that it only supports GSM connections, but a model supporting also GPRS will most likely be introduced very soon after the release of the GSM model.

The Nokia 3330 model incorporates gaming capabilities allowing users to play individual or interactive multi-party WAP games. In both Europe and Africa, Nokia phone buyers can register with Club Nokia. Exclusive membership allows Nokia 3330 owners to download a totally new game 'Bumper' or new game packs for Space Impact and Snake II. Once this is accomplished, users can send their high scores to Club Nokia to compete with other players.

[42] Kaartinen, K. Nokia Mobile Phones. 3G Terminals. UMTS *2000 Conference. 11.-13.10.2000.*

[66] Sun Microsystems. JavaPhone API. 2001. http://java.sun.com/products/javaphone

Currently it seems, that Microsoft's PocketPC is gaining rapid growth in PDA and smartphone sector. The market share of Palm and its partners has dropped, and Palm has reported difficulties in shipping the new m500 and m505 products[70]. Palm said delays in shipping for its new m500 family of hand-held computers stalled sales of existing products in all regions and accounted for the bulk of its reduced revenue outlook. Palm's problems may give a great opportunity Compaq's iPaq with Microsoft PocketPC-operating system to take over the high end PDA-market.

Vendor	Q1 2001 units	Q1 2001 share	Q1 2000 units	Q1 2000 share	Growth (units)
Palm	347 262	41 %	215 153	52 %	61 %
Compaq	100 362	12 %	8 978	2 %	1018 %
Casio	79 870	10 %	29 330	7 %	172 %
Nokia	78 280	9 %	49 510	12 %	58 %
Psion	74 820	9 %	78 720	19 %	-5 %
Handspring	60 262	7 %	N.A.	N.A.	N.A.
Ericsson	38 735	5 %	N.A.	N.A.	N.A.
HP	34 210	4 %	16 515	4 %	107 %
IBM	18 265	2 %	9 235	2 %	98 %
Other	8 437	1 %	5 170	1 %	63 %
TOTAL	**840 503**	**100 %**	**412 611**	**100 %**	**104 %**

FIGURE 16 - PDA & smartphone market shares (source: Canalys.com, Ltd. 2001.[19])

4.5 External analysis: Threats, opportunities and challenges in the industry

4.5.1 Content providers

THREAT: Different standards

Different standards on visualizing the content may make it more difficult to develop multiplatform games. For example I-Mode, HTML and WML are competing standards, and are adopted by different terminal vendors. Different standards cause the market to fragment, which makes it harder

[70] TheStandard. Palm Cuts 4th-Quarter Revenue Outlook in Half, Blames Shipping Delays. 17.5.2001. http://www.thestandard.com/article/0,1902,24581,00.html

for content providers. On the other hand, this could be considered as an opportunity to position the game for a certain market segment.

THREAT: Not profitable

The current content providers are start up companies that have been financed by venture capital companies. The current big game developers making games for example for Sony PlayStation or for Nintendo GameBoy have not yet indicated that they would start offering games for mobile terminals, although some minor game development studios have announced partnerships for example with Nokia. This is mainly due to the fact, that the mobile gaming market is very young, and the revenue model has not yet proven to be successful. The big game development studios won't start providing mobile game content, before they see that it is profitable.

The threat of mobile gaming of not being very profitable has to be considered very carefully. Even in Japan, where I-Mode has been regarded extremely successful, biggest part of the revenue is coming from messaging. The key question is, whether the customers accept the value proposition of mobile entertainment, and are willing to pay for it.

CHALLENGE: Easy and fast deployment

To be able to react on the trends on the market it is going to be vital for the content providers to be able to make a framework for fast development and deployment of mobile games. Major phone manufacturers, including Ericsson, Motorola, Siemens and Nokia are building solutions for game development and deployment.

The content providers should be very closely integrated into the service providers. The target is that the content providers can easily deploy their applications to the services provider's portal without having to go through long negotiations or technical matters before releasing new games.

CHALLENGE: Multiplatform games

Content providers' target is to make their games available for as big group of customers as possible. Java is a basic solution for developing multiplatform applications, but the different technical specification of mobile terminals makes it hard to make games, which would work well on all platforms. The screen resolution and amount of colours available gives restrictions: some terminals have a small black and white screen and some have a big screen with 32 million colours. Another aspect to this is that the processing power varies very heavily between different terminal equipment.

CHALLENGE: Branding & licensing

Branding will be also very important for content providers, if they want to be successful in the market. A good example could be that Pokemon mobile games could be very successful among children, even if someone could offer more entertaining and technically advanced games.

Existing brands can also be licensed, as Motorola and CodeOnline have done it. They are offering for example 'Trivial Pursuit' and 'Who Wants to Be a Millionaire?' mobile games, which have proven to be very successful.

Riot Entertainment is adding an extra layer to the value chain. It obtains licenses from entertainment content creating companies such at 20th Fox, and applies them to the content providers games; then it markets the games to the service providers, such as telco operators' portals.

4.5.2 Service providers

Service providers, such as different kinds of portals, are the connection point between content providers and end users. Problems are caused by the capital requirements that are needed to establish an initial customer base and a brand.

THREAT: Not profitable

It may happen that the revenue model doesn't work. Customers may not be willing to pay for games, which can be downloaded also for free. Even if the games would offer some added value to the customer, it might be that the free services become more popular. This trend can be seen for example in music industry, where people are willing to spend lots of time searching for lower quality “free” music from Napster, rather than buying it from conventional stores or web-stores.

CHALLENGE: Building a community

It seems that the community model is the best way to attract customers to the services. The major task of mobile phones is to bring people together, or as Nokia puts it “Connecting People”. Even if games serve a slightly different need, the communication between people is still one of the key issues. Game sites targeting an definite customer segment can be successful in creating loyal customers and increase stickiness.

USA based TheGlobe.com has put very much effort in creating online communities, but has failed in other parts of the business, such as incorrect revenue model.

CHALLENGE: Branding

Service branding is an alternative to content branding. In service branding, the portal itself has a well-known brand, but the games might be “non-branded”.

There will be a few major portals, which will offer a big variety of mobile entertainment, and also other kinds of services. There is also an opportunity for specialised portals, which offer games and entertainment services for a certain subculture.

There is also a niche market for games built for the state-of-art technology. The primary target group would be rather young men aged between 20 and 30 owning the very newest technology. They also have the purchasing power that is needed for paying the premium prices of the state-of-art games, including for example 3D games.

CHALLENGE: Building a revenue model

Since none of the current revenue models has been proven ultimately successful, different service providers may try different kinds of revenue models.

A fixed monthly fee could be an easy solution, but is not very attractive to customers. The market is young and developing and customers want to be able to change service providers rapidly. In this model the content providers could also be paid a fixed amount for a game that the service provider is offering.

A time-based revenue model wouldn't necessarily either make big success; people tend to like fixed-price services, where one transaction is pretty small, but may result in bigger amounts in case of many transactions.

Download-based charging model will most likely be the mostly used revenue model. The customer pays a fixed amount per transaction i.e. downloading a game. Also extensions to the current games can be made available, or some other premium features such as neater graphics or multiplayer functionality with an extra charge. Content providers are paid a certain provision of each transaction. This way the content providers income is directly related to the success of the game among the end users, which would give the content providers the pressure of making higher quality games all the time. Service providers itself would have to take the risk of developing games.

CHALLENGE: Billing

The billing solutions are very underdeveloped at the moment. The GPRS-networks are opened and a number of services are available though them, but absence of decent billing technology poses a serious threat for the complete industry.

In the beginning SMS will offer a billing method, which has already been approved by the customers. They know how it works, and are willing to use it as a payment method. In the future though a more advanced method is required.

THREAT: Slow service

One lesson learned from WAP over GSM is that users are not willing to wait long for the service to start. It can be estimated that target group users want to spend up to 2 minutes downloading a game in maximum. This also means, that complex and difficult billing system, such as current credit card payment methods, won't be accepted by users. To be able to offer priced content, the product must be easily accessible and the payment should be transparent.

THREAT: Billing

If a reasonable billing method can't be developed, the customers get used getting things for free, as it is now in case of Internet-based entertainment services. After this point it will be impossible to attract large masses to services that are not free of charge.

Currently the transmission providers are collecting very big percentage of the revenue to themselves: they take up to 50 % of the price of the current SMS-services. Operators are going to try to maintain the situation as it is also in the future, because of the costs of building the 3rd generation networks.

OPPORTUNITY: Billing

The service providers that can offer an easy way for billing have a great competitive advantage. This will be critical especially because the target group of mobile games is young people, who don't have for example VISA-cards.

The most successful billing method will most likely be the phone bill, as it is currently in case of SMS-based services. The service provider that can offer the easiest way of billing will be the most attractive to the target group customers; the services that are available through "one-click technique" will be much more successful than services which need lengthy paying protocols.

4.5.3 Transmission providers

THREAT: 4th Generation access methods

Mobile operators are currently the only ones that provide a covering wireless access. The future technologies, such as WLAN or Bluetooth communication technologies can threaten the mobile operator's position. Already there are first introductory wireless networks available, for example by Jippii in Finland.

OPPORTUNITY: Attract new mobile subscribers

By offering premium content for the customers, the mobile operators may gain competitive advantage over the competitors.

4.5.4 Terminals vendors

OPPORTUNITY: Attract new customers

By offering premium content for the customers, the mobile operators may gain competitive advantage over the competitors.

THREAT: Complexity increases

New technology also brings more complexity into phones. The competition between the manufacturers is fierce, and they don't want any bad publicity by selling non-working phones, or even phones that would expose the customer to a threat of outside hackers accessing the personal information in the phone. The increased complexity may bring the "blue screen effect" known from Windows-machines also to mobile phones, i.e. the programs in phones start crashing and losing data.

OPPORTUNITY: Offer Java-enabled mobile terminals

Nokia has stated, that up to 50 % of their mobile phone models will contain EPOC operating system year 2004[18]. This means, that all the other major phone manufacturers must support some kind of an open environment, or they will offer Nokia a great competitive advantage. This also means, that 2004 50% of their new models are able to run Java-based games.

5 Applying the framework

5.1 Entering the market

The mobile gaming market is very underdeveloped at the moment and many more players will be entering the market in the near future. Considering the threats, opportunities and challenges stated by the framework, the following concrete recommendations could be proposed for the companies entering the market.

5.1.1 Content providers

Entering content provision market is easy at the moment, but is getting more difficult in the late 2001 and will be hard in the end of 2002. Currently the service providers are looking for content providers and are willing to cooperate. In the future, though, they have already established networks, and it will be harder to enter the market.

At the moment mobile games are creating very little revenue. If content providers decide to enter the market at the moment, the fixed costs should be kept low. Otherwise they won't survive until the games start generating revenue, especially if they are targeting the future service technologies, such as WAP or JAVA.

According to Ovum content providers have a number of routes to market, depending on their size, brand and strategy[59] :

- Form partnerships with mobile operators. This is a low-risk entry strategy, which capitalises on carrier infrastructure, technical expertise and an established subscriber base
- Form partnerships with suppliers and equipment vendors. This offers a head-start on new technology trials and builds on their relationship with operators

[59] Ovum. Wap Market Strategies. Press white paper. May 2000.

- Become operator-independent by either owning a WAP gateway or having a hosted mobile gateway. This will allow them to control content and security, and market services to users directly.

5.1.2 Service providers

Entering service provision market is moderately difficult. Companies need to establish relationships to transmission and content providers and also create presence among the consumers. Companies entering the service provision market need to create billing contracts with transmission providers. They need to get enough content providers to be able to compete with other portals and service providers and finally they need to spend big money in advertising their services to consumers.

The fragmentation of transmission provider market makes it difficult to build the relationships with the mobile operators. There will be over 80 UMTS licensees in Europe and a pan-European service provider must establish connections to all of those.

Angus Cormie from BT Cellnet's Genie portal lists keys to success among the target group consumers[22]:

- Delight the customer
- Differentiate offerings
- First to market
- Leverage economies of scale
- Know your customer
- Create long-term value

Cormie also points out, that branding the portal as Genie rather than BT Cellnet makes it much easier to cooperate with other operators. Normally mobile operators are reluctant to adopt services offered by subsidiaries owned by the competing operators.

[22] Cormie, A. BT Cellnet Genie Internet. Developing a Global Integrated Mobile Portal. MobilePortals Conference. 23.-24.10.2000.

5.1.3 Transmission providers

Entering transmission provision market is extremely hard. This can be only done by buying an existing player with a proper licence or by cooperating with them as a virtual mobile network operator.

I-Mode is central to DoCoMo's aspirations to become a global wireless power. As a late entrant to the worldwide telecommunications market - it incorporated in 1991 as a separate entity from parent and majority stakeholder NTT-DoCoMo has not followed the path of costly acquisitions of rival operators, as others have. Instead, DoCoMo opted to take minority stakes in several foreign cellular operators; NTT-DoCoMo has invested in the Netherlands's KPN Mobile and Hutchison 3G UK, which holds one of Britain's 3G licenses.

Ovum suggests the following entry strategies for mobile operators to mobile entertainment market[59]:

- Network operator and value-added provider of entertainment services
- Network operator with a lesser-known brand or fewer resources that prefers to license and co-brand a third-party portal rather than build its own
- Network operator only, providing airtime and WAP bureau services to WAP content providers.

5.2 Avoiding the traps

In order to successfully enter the mobile gaming industry, the following traps must be avoided. The industry seems to have several misconceptions about the market.

5.2.1 Zero revenue trap

The mobile gaming can become a similar bubble, as the so-called dot-com companies have been. Money can be spent enormously, without gaining a pence profit. The company should have a target in the near future to

[59] Ovum. Wap Market Strategies. Press white paper. May 2000.

become profitable; targeting further than two years away in the future has too many uncertain factors and thus is too risky.

5.2.2 The pioneer trap

It is very commonly believed, that the pioneers of the industry gain so-called first mover advantage. In very many cases this is true, for example Xerox, Coca-Cola and Amazon.com dominate their industry.

According to Schnaars, there are markets, such as portable computer manufactured by Osborne, which were taken over by the companies that enter the market in a later phase[8]. Schnaars described the weaknesses of the failing pioneers by following : new products were too crude, weren't positioned properly or appeared before there was strong demand; product development costs exhausted the innovator's resources; a lack of resources to compete against entering larger firms and managerial incompetence.

Most of the current players in the mobile gaming industry can be described by the previous properties. Thus it is not likely, that the present companies could survive, when the bigger players enter the market. It seems that the market is already overpopulated and even more players are entering it all the time.

5.2.3 Overkill trap

The cost of software development increases exponentially as the level of complexity becomes larger. On the other hand, the value of the software doesn't increase even linearly. This means, that the production cost grows much faster than the generated revenue; besides this the target group users are not willing to spend lots of money on one game. Based on this, the games should be fairly simple, and the production costs should be low.

[8] Schnaars, Steven P.. Managing imitation strategies. Free press. 1994.

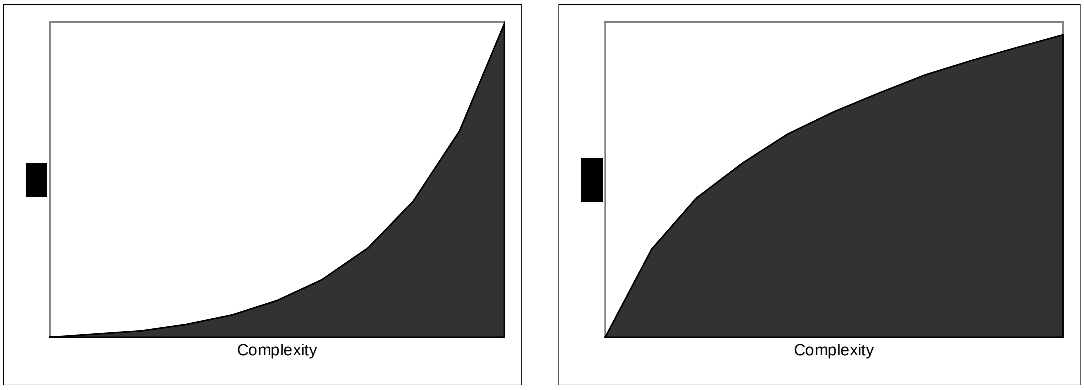

FIGURE 17 - Value and cost of complexity

The interviews show that it is common to believe, that experienced user pleasure would increase linearly as the games become more complex. Palm has realised and carried out the opposite strategy: excess complexity of mobile applications reduces the experienced user pleasure. In order to achieve the best possible result, the "sweet spot" of the target group should be found. The sweet spot of ordinary mobile entertainment (ring tones and logos) target group is completely different than the target group of PC and console games.

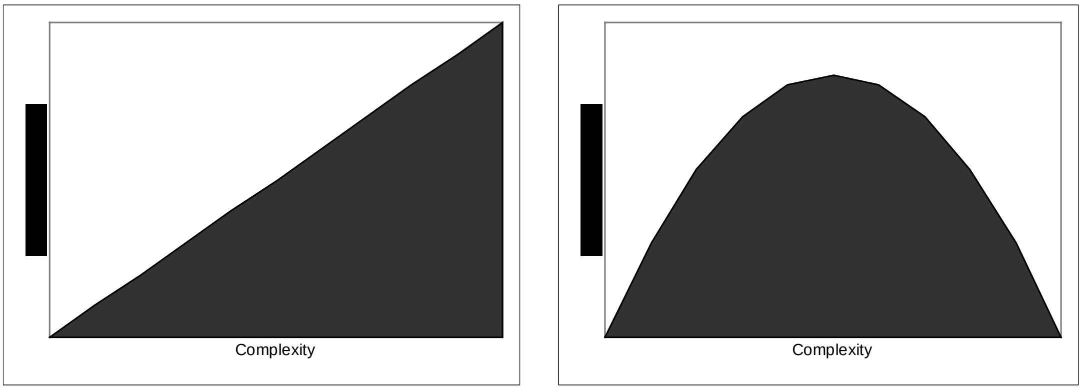

FIGURE 18 - Models of experienced user pleasure in mobile gaming

Because the target group of mobile games is teenagers, the sweet spot lies in the simpler, rather than in the more complex part of complexity axis. This puts a question mark after 3D gaming in mobile devices.

Combined these two hypotheses – the sweet spot theory and the exponential cost curve – it can be assumed that developers of complex games for mobile terminals can't attract the mass-audience. This would put for example CUBE Entertainment's Short Format Games concept into very good light.

5.2.4 Marketing trap

In the dot-com business, it was believed, that the business was always on the verge of taking off. A good example of spending money on totally wrong place is that many dot-com companies had commercials in TV during the Super Bowl championship game. This has shown, that pouring money in TV commercials doesn't necessarily create any revenue, if the model itself is completely wrong.

The marketing trap doesn't mean, that products could be launched successfully without marketing. Instead, the cross media presence is the key for introducing games for large heterorganic consumer groups. Also by encouraging existing customers to perform viral marketing can be very effective in attracting customers and creating communities.

5.2.5 Technology trap

Many companies in the mobile gaming industry seem to think, that their main competitive advantage against competitors is technological superiority. This will lead into a situation, where companies are developing new technologies and innovations for each other, not for customers.

Customers' needs should be the number one in the priority lists. The lesson learned from WAP is that the users won't adopt new technologies, if they don't meet the user expectations and needs. The services targeted for the mass-audience should be inexpensive and easy to use with low a learning curve; they should not be expensive, complex, state-of-art solutions.

5.3 Creating the killer application

5.3.1 Product

The first principle in mobile gaming is that it is so called five-minute fun. If a game wants to hit the big market, it must be easy and fast to download and install, easy to play and shouldn't last for too long. There are, of course, niche markets for high quality, state of art games, which can only be played with the hi-tech PDAs, but the actual size of this kind of market is small. Thus it is a dangerous misconception to believe, that the hi-tech games would be generate more revenue than the low-end mass-audience targeted games.

The second principle is that production costs of one game should remain very low. Most likely the situation will be, that only 10% of the games will be profitable, but they generate revenue so well, that the losses made by other games are covered. Developers must also be able to react on consumer trends, which means that the time between the idea and the ready game should be only few weeks.

5.3.2 Price

In Internet people have been very reluctant of paying for services, because of Internet's long tradition of offering free of charge services. On the other hand, it has been shown, that people have accepted the very high costs GSM voice and data connections, and also the high costs of SMS-based services. The high cost WAP services have not been that successful, though.

The feasible billing methods should be developed in very early stage of offering services. This is one of the reasons, why NTT DoCoMo has been so successful of billing the customers - there hasn't been a free i-Mode before, which would have made people unwilling to pay for the services. The situation will be the same as in case of Internet, if many free services will be available, before the service providers start charging for their services; people won't start paying for the services, if they get used getting them for free.

The mobile entertainment and gaming industry have a good basis for offering services for a certain fee because of the current entertainment market situation. The icons and ring tones have been sold in very high price, compared to the costs of producing them.

The service providers should charge for their games, especially in case of well-branded high quality games. There is certainly going to be many smaller players offering games, but they will be mainly free of charge, because they lack the credibility of offering high quality games and charging for them.

The mobile gaming markets' target group is young people around 12-25 years. This puts some restrictions on the price of the mobile terminals. Teenagers are willing to pay much for their phones, and it is very unlike that they will be using art-of-state PDA devices. Thus the games will be most likely played in phones such as successors of Nokia 3000 series.

5.3.3 Place

The games targeted for mass-audience should be available through different channels. It is not enough to put up an Internet-portal, and wait the mobile users to come. The average mobile game user doesn't want to spend hours searching for games in the web – instead it prefers the easiest way, even if it's not the cheapest one.

5.3.4 Promotion

Marketing and branding will be even more important in the future, when the amount of games and services grows. The cross media promotion with existing brands will be the most efficient way of introducing new games to the mass-audience.

If the service is targeted for a niche market, other replacing ways to promote should be searched. Especially viral marketing is efficient when building a community dedicated to a selected target segment. Mass marketing in TV isn't efficient for this type of games or services.

5.4 Future winners and losers

5.4.1 Content providers

The content provision market will be very fragmented. It is likely, that there isn't going to be big dominating players; instead the framework suggests that small players who can react better on the changes in the industry will survive better. Service providers will use small content provider companies to

The product life cycle modelling shows, that the lifetime of a game product is relatively short, which leads into a situation, where new competing products emerge all the time. Only by having a light organisational structure, the content providers can tackle these changes and keep the production costs low.

5.4.2 Service providers

In the future, when the market reaches the fast growing stage, the big players are able to grow their market share substantially faster than smaller companies. This leads into a situation where a few major companies will gather from 80 to 90 percent of the industry revenue.

Few big players will dominate the service provision market. They must have the negotiation power against operators and also resources for enabling cross media promotion of the games.

Big companies like AOL, Disney and MSN will most likely enter the service provision market, if the market growth meets the expectations. Club Nokia will also be an interesting player, because of it's inherent delivery channel. The bigger companies will most likely use acquisitions as an entry strategy for the service provision market. The major players will thus buy the current service providers, or they start serving a special niche market.

The revenue starts shifting from transmission providing to service providing in the next few years. The users will pay for the content, instead of the data transmission. The service providers will collect

5.4.3 Transmission providers

The transmission providers will be winners in any case. For them, mobile gaming is just another value adding service that attracts customers to their network. The main source of their revenue is not coming directly from the mobile games content - operators offer value-adding services to attract new customers.

6 Discussion

The resulting framework by this research can be used for analysing the current companies in the mobile gaming industry. It can be used as a guideline for entering a certain market as well. The framework provides certain elements that have to be taken into account when entering the market.

The framework is very much based on qualitative analysis, which makes it impossible to predict the actual market shares or potential of different companies. The companies can only be ranked against each other, but it is not possible to calculate absolute numbers even for the next few years. The reason for this is that there are so many unknown factors, including technological development and the consumer acceptance of different concepts, such as the pricing model.

The following reasons limit the accuracy of the framework:

- Companies are very reluctant to give away strategic information – It is very hard to get even approximate information about the current sales of the mobile gaming industry companies. Thus the market size analysis cannot be considered exact; it should be used as a guideline instead.
- Consumer behaviour is very unpredictable regarding different technologies – It is often very hard to predict, how fast the consumers are adopting different technologies. Even if there is a brilliant technology, it is not certain if the users want to change the old and proven technology to a newer one.
- Consumer behaviour is very unpredictable regarding pricing models – It is still an open question, if the consumers are willing to pay for mobile games, or is there going to be a "Napster-effect" as the mobile networks are connected to Internet.
- Market segments are very fragmented – in order to do a complete analysis of the market, one should gather information from hundreds of companies, which cannot be included in the scope of this research.

- Technological limitations may hinder the development of the market in certain countries – According to the study, there are operators, who don't have a working SMS-billing infrastructure; either there isn't a billing infrastructure at all, or it cannot handle the exponentially growing SMS-traffic. This will cause major difficulties in the current revenue model, revenue sharing.
- Regulatory limitations may hinder the development of the market in certain countries – Countries might restrict mobile services by some regulations, which might cause extra delay, or prevent completely the development of mobile gaming.

Compared to other studies the attitude towards the growth of mobile gaming industry is a little more pessimistic in this study. It seems, that making lucrative market forecasts works as a marketing trick: the bigger the market forecast, the more referenced the study becomes.

Despite of the limitations and inaccuracies the framework can be considered useful: The research has shown, that many existing companies involved in the mobile gaming market are very unaware of different factors affecting their success in the future. The technological side is usually known the best, but for example the market dynamics is very poorly understood. Using the framework presented by this study at least helps the companies to ask questions about their current and future position in the industry.

A suggestion for extending and redefining the framework is to make specific consumer study about different technologies and pricing models. This would make the market size analysis more reliable.

7 Summary

Mobile gaming will be the key driver of B-to-C mobile services. It can be seen that the entertainment solutions will be the first B-to-C applications to emerge for third generation mobile terminals.

The mobile gaming industry is in pre-mature stage. The development of the industry will be highly dependent on the development and especially consumer acceptance of different technologies, such as network technologies and middleware solutions.

The biggest hole in the business model is a fully functional billing solution. Until the payment process becomes transparent for the user, the supposed revenue model is lacking credibility.

The current circuit switched GSM network and time-based billing is slowing down the process of offering new mobile services, including the mobile games. The GPRS with traffic-based billing will be the key network technology that will speed up the use of mobile entertainment services. Nokia is releasing its first GPRS capable phone in the fall 2001, but it will most likely take from half a year to a year before the lower end phones, such as Nokia 3000 series will be able to communicate over GPRS networks.

Overall, the mobile gaming should be considered as a natural development from console and PC game market into handheld terminals. As the distribution channel develops, the mobile gaming market is going to be dominated by the publishers and the value chain will be similar to the ordinary gaming industry. The publishers, big media companies, own the proprietary rights for the brands.

The players in the mobile gaming industry see the future scenarios very differently: some believe in text-based games and some believe that premium 3D-games will take over the market very soon. Very few companies have made definite strategies that they would be pursuing; it seems rather, that the industry is currently lacking persistence and changes the focus whenever a new technology is introduced. The framework introduced by this study can be helpful either for the companies entering the market or for the existing companies. It presents the questions that the company management has to ask itself, if it wants to be successful in the industry.

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Appendices

Appendix I : Per country market size forecasts

NOTICE: All the numbers here are expressed in millions

The figures in this section are based on several interviews within the industry and on existing research reports. The numbers presented in here are approximations; only major factors have been taken into account. Thus these numbers do not necessarily represent the real situation.

Germany, United Kingdom, Italy, France and Spain generate over 70% of the mobile gaming revenue in Western Europe. The mobile phone penetration is stabilising in little below 90% in all of these countries in next few years.

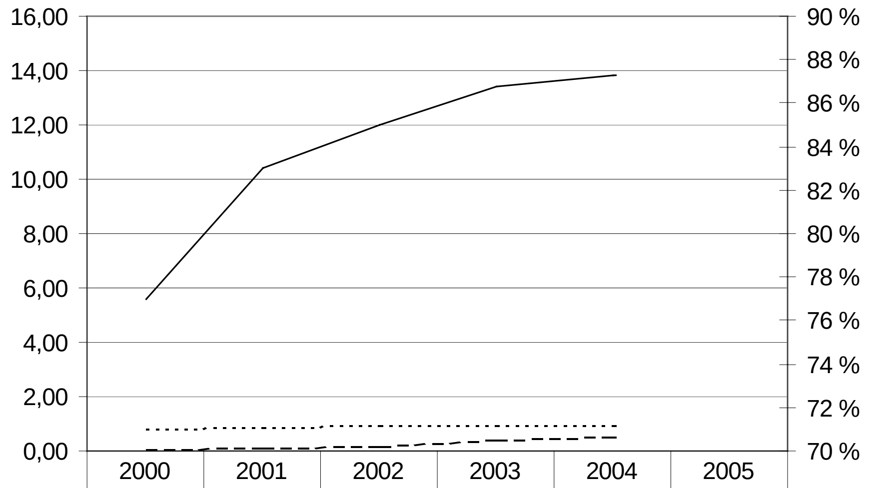
The target group size is calculated by summing the demographic group of people between 13 and 30 years. It represents approximately 23% percent of the population in Western Europe, varying between 20% in Germany and 28% in Ireland. Active users group is based on market growth forecast and target group size. It is assumed that year 200 10% of the target group are active users i.e. 2% from the mobile handset owners. Year 2005 60% of the target group is believed to do mobile gaming.

Service technologies diagrams represent numbers of users that own handset that is compliant to the given service technology. The figure gives an estimate, how many potential users a company has, if it decides to target a certain service technology.

Market size diagram tells the market size of different service technologies and the total market size in the country.

Finland

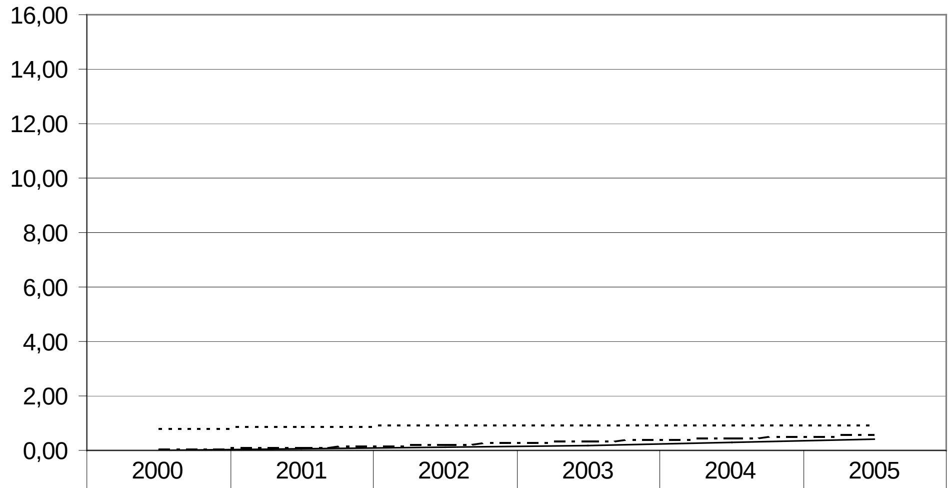
Finland has pioneered in GSM penetration and SMS growth and is a good test bench for mobile services. The market is very small in Europe's scale, but prototypes can be launched before entering the bigger market. The growth of mobile penetration has stabilised already in Finland, and according to IDC study also SMS technology has reached the maturity stage[5].



	2000	2001	2002	2003	2004	2005
Target group	0,85	0,91	0,93	0,95	0,96	0,96
Active users	0,08	0,12	0,21	0,41	0,55	0,58
Penetration	77 %	83 %	85 %	87 %	87 %	88 %

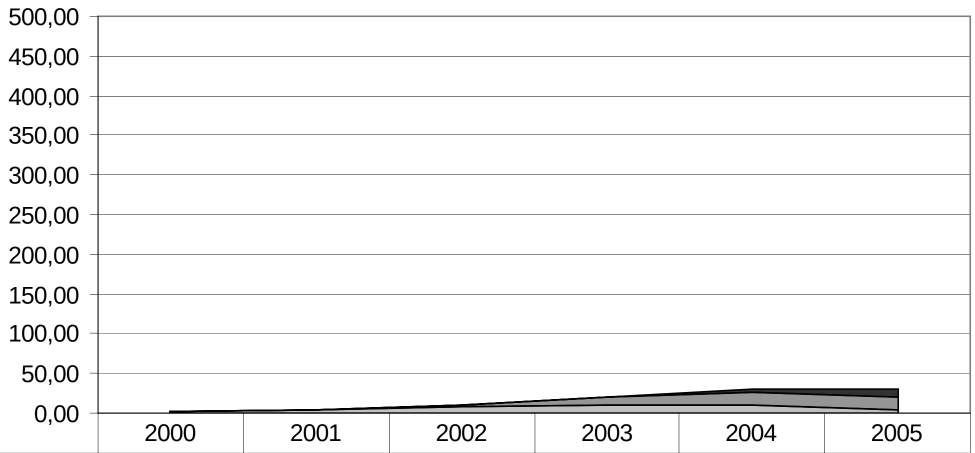
FIGURE 19 - Mobile penetration, target group and active users (mill. subscribers) in Finland

[5] IDC Finland Oy. Short message market 1999-2002. Publications of the Ministry of Transport and Communications 20/2001. 2001.



	2000	2001	2002	2003	2004	2005
SMS	0,85	0,91	0,93	0,95	0,96	0,96
WAP	0,04	0,14	0,25	0,34	0,47	0,58
JAVA	0,00	0,04	0,09	0,17	0,29	0,43

FIGURE 20 - Service technologies in Finland

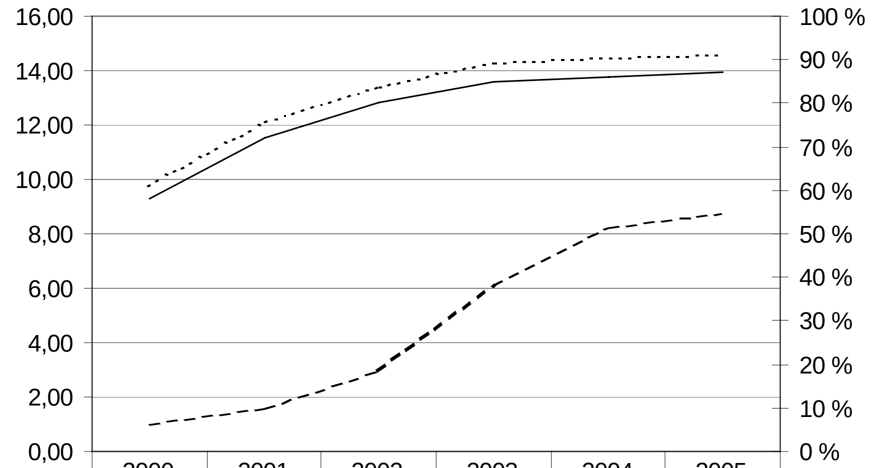


	2000	2001	2002	2003	2004	2005
Total size	1,62	3,55	9,36	21,14	29,51	31,13
JAVA	0,00	0,00	0,25	1,47	3,28	10,38
WAP	0,10	0,43	1,72	8,85	16,39	17,30
SMS	1,52	3,13	7,39	10,81	9,84	3,46

FIGURE 21 - Mobile gaming market size (mill. euros) in Finland

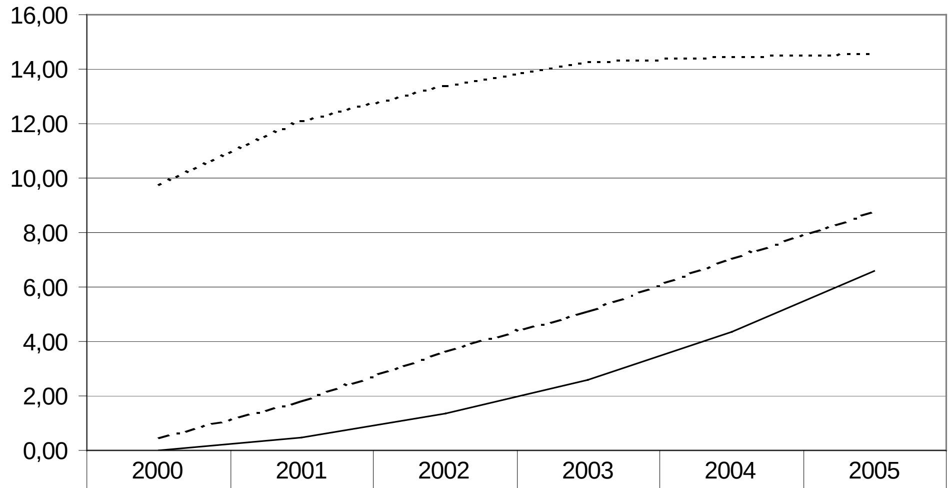
Germany

Germany has had mobile penetration rate below the European average, but it is gaining more users in fast pace.



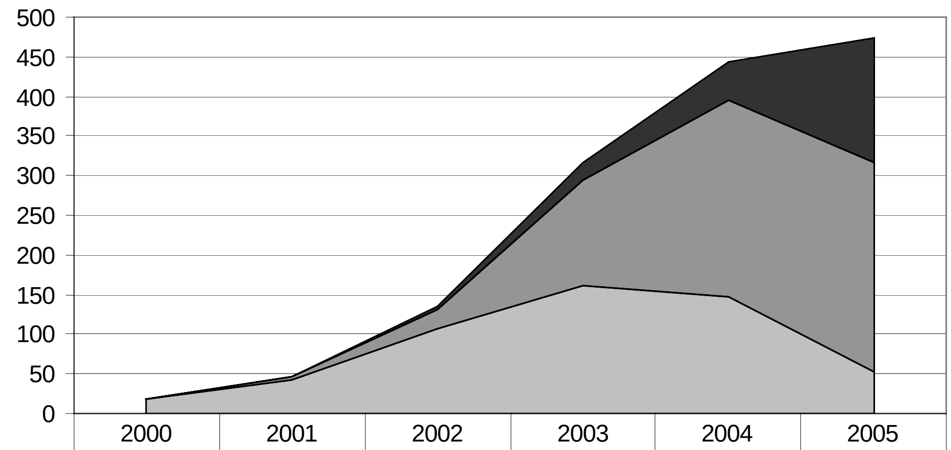
	2000	2001	2002	2003	2004	2005
Target group	9,74	12,09	13,43	14,27	14,44	14,61
Active users	0,97	1,57	2,96	6,14	8,23	8,77
Penetration	58 %	72 %	80 %	85 %	86 %	87 %

FIGURE 22 - Mobile penetration, target group and active users (mill. subscribers) in Germany



	2000	2001	2002	2003	2004	2005
SMS	9,74	12,09	13,43	14,27	14,44	14,61
WAP	0,49	1,81	3,63	5,14	7,08	8,77
JAVA	0,00	0,48	1,34	2,57	4,33	6,57

FIGURE 23 - Target group size (mill. subscribers) in Germany

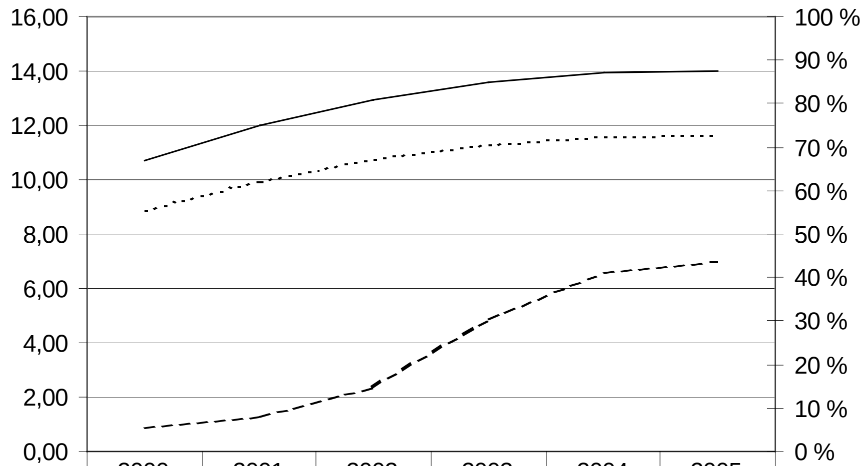


	2000	2001	2002	2003	2004	2005
Total size	19	47	135	317	445	473
JAVA	0	0	4	22	49	158
WAP	1	6	25	133	247	263
SMS	18	41	106	162	148	53

FIGURE 24 - Mobile gaming market size (mill. euros) in Germany

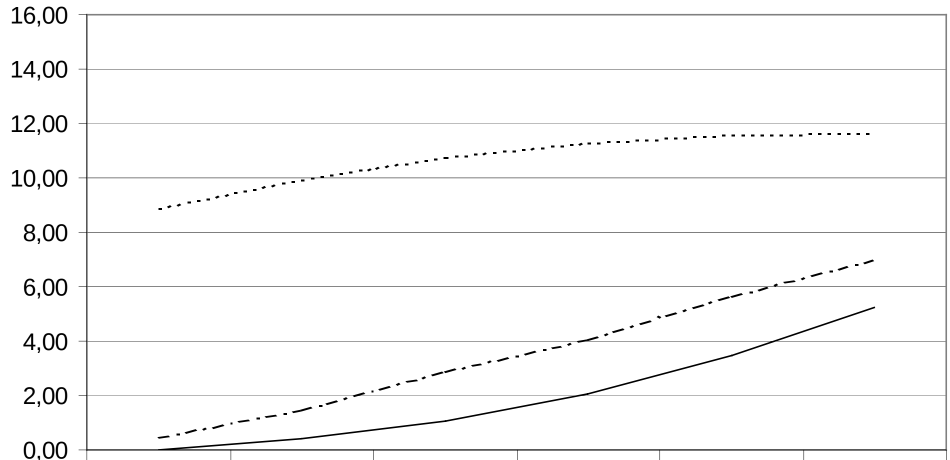
UK

The penetration rate has been quite high in United Kingdom. The consumers have also been keen to take advantage of new services. This is also the reason for the extremely high price of UMTS licenses in UK; year 2000, the price per customer was almost 1000 euros.



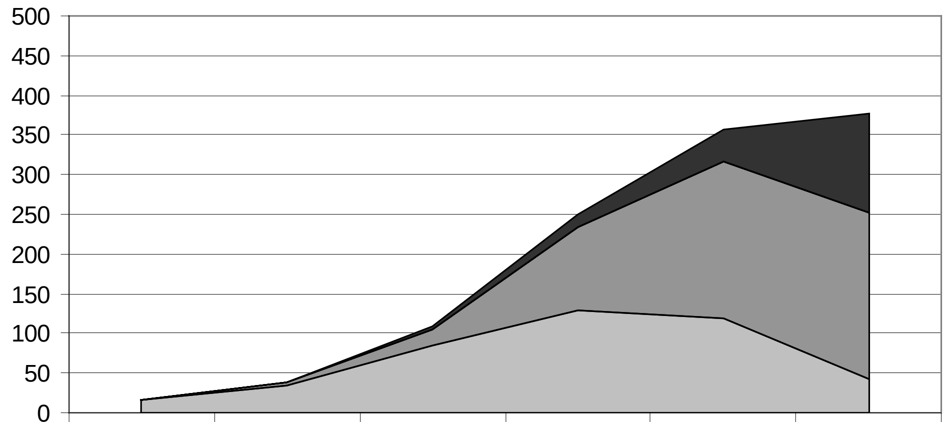
	2000	2001	2002	2003	2004	2005
Target group	8,90	9,97	10,76	11,30	11,56	11,63
Active users	0,89	1,30	2,37	4,86	6,59	6,98
Penetration	67 %	75 %	81 %	85 %	87 %	88 %

FIGURE 25 - Mobile penetration, target group and active users (mill. subscribers) in United Kingdom



	2000	2001	2002	2003	2004	2005
SMS	8,90	9,97	10,76	11,30	11,56	11,63
WAP	0,45	1,49	2,91	4,07	5,67	6,98
JAVA	0,00	0,40	1,08	2,03	3,47	5,23

FIGURE 26 - Target group size (mill. subscribers) in United Kingdom

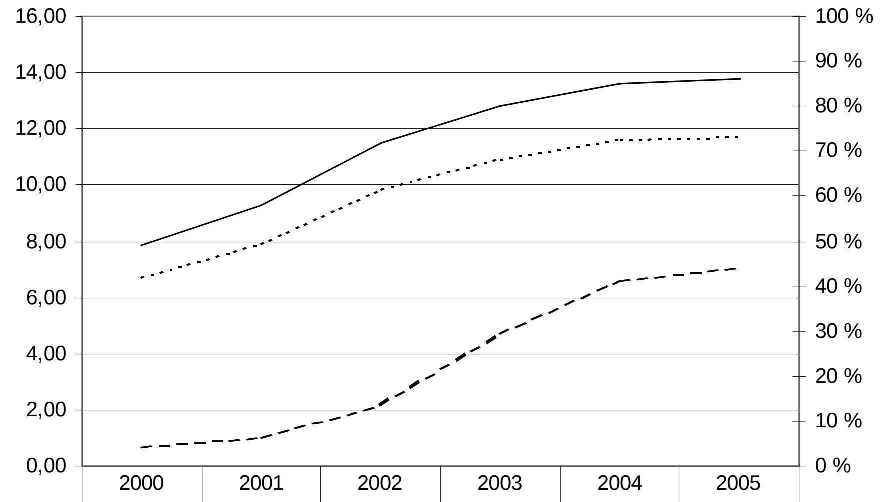


	2000	2001	2002	2003	2004	2005
Total size	17	39	108	251	356	377
JAVA	0	0	3	17	40	126
WAP	1	5	20	105	198	209
SMS	16	34	85	128	119	42

FIGURE 27 - Mobile gaming market size (mill. euros) in United Kingdom

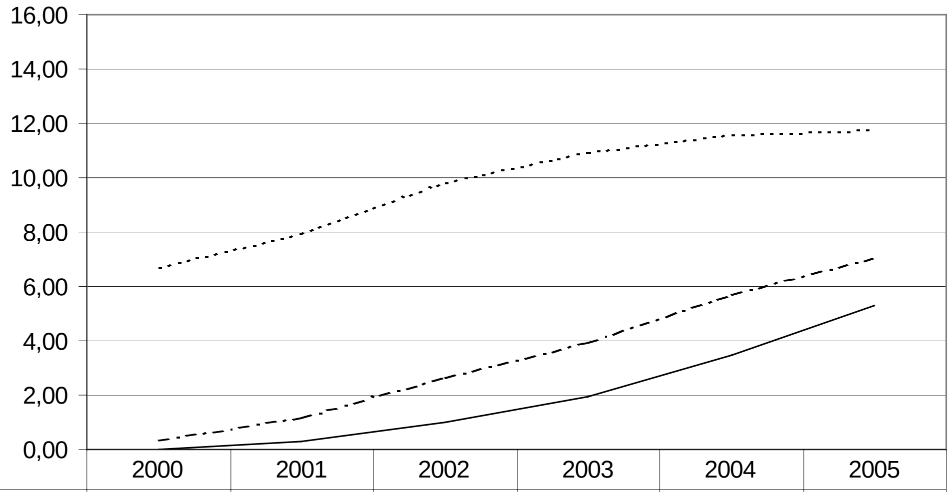
France

In France the penetration rate is one of the lowest in Western Europe.



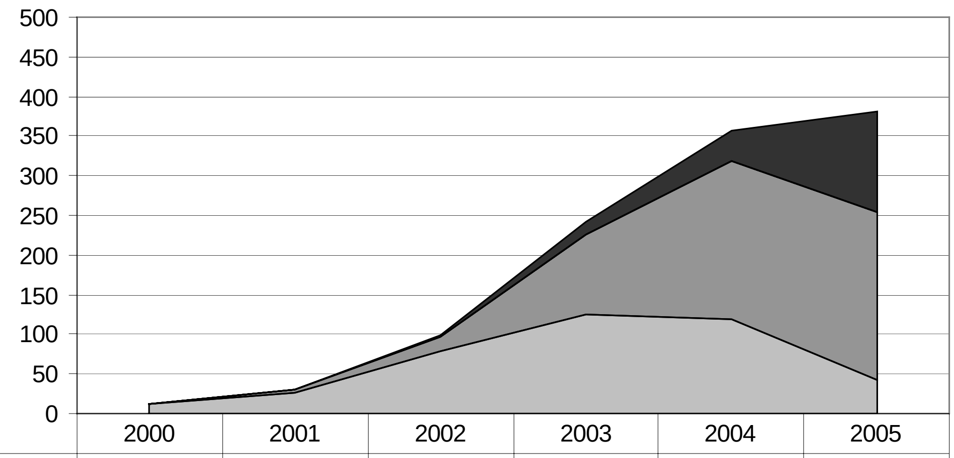
	2000	2001	2002	2003	2004	2005
Target group	6,69	7,92	9,84	10,93	11,61	11,75
Active users	0,67	1,03	2,16	4,70	6,62	7,05
Penetration	49 %	58 %	72 %	80 %	85 %	86 %

FIGURE 28 - Mobile penetration, target group and active users (mill. subscribers) in France



	2000	2001	2002	2003	2004	2005
SMS	6,69	7,92	9,84	10,93	11,61	11,75
WAP	0,33	1,19	2,66	3,93	5,69	7,05
JAVA	0,00	0,32	0,98	1,97	3,48	5,29

FIGURE 29 - Target group size (mill. subscribers) in France

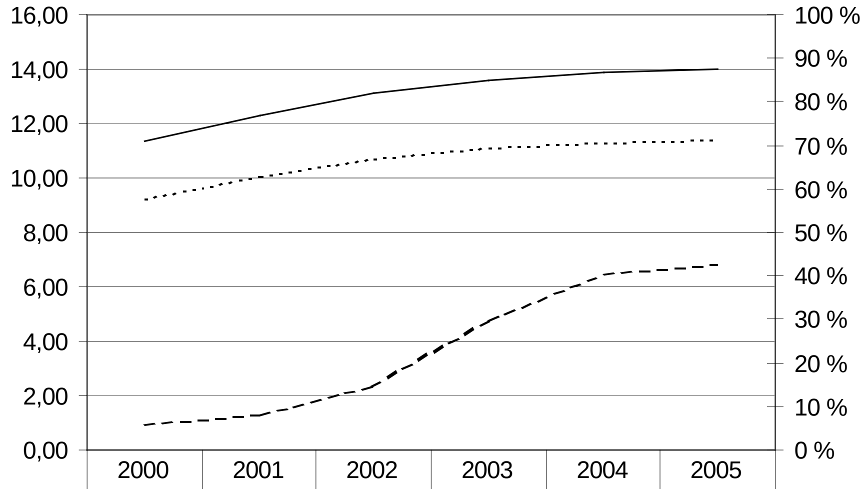


	2000	2001	2002	2003	2004	2005
Total size	13	31	99	242	357	381
JAVA	0	0	3	17	40	127
WAP	1	4	18	102	199	211
SMS	12	27	78	124	119	42

FIGURE 30 - Mobile gaming market size (mill. euros) in France

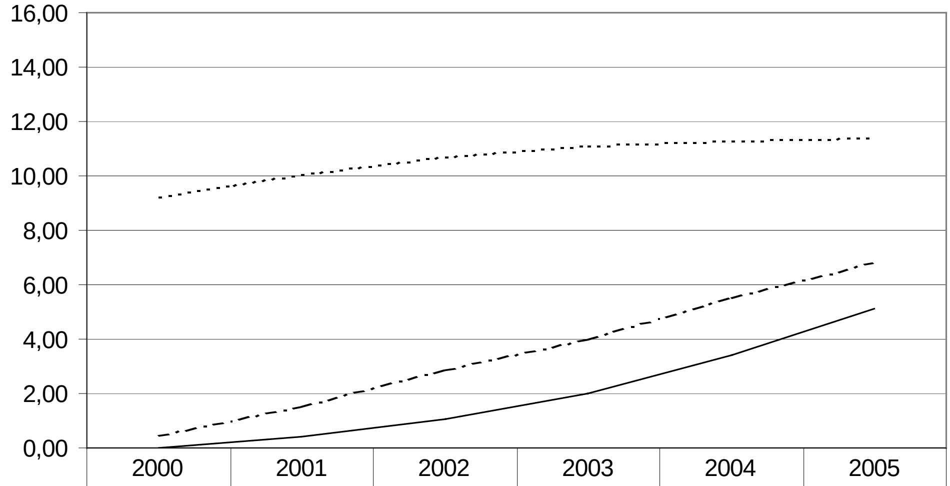
Italy

Italy has been one of the pioneers of mobile services. The low Internet penetration makes people to adopt mobile services faster than in countries, where the Internet penetration is high.



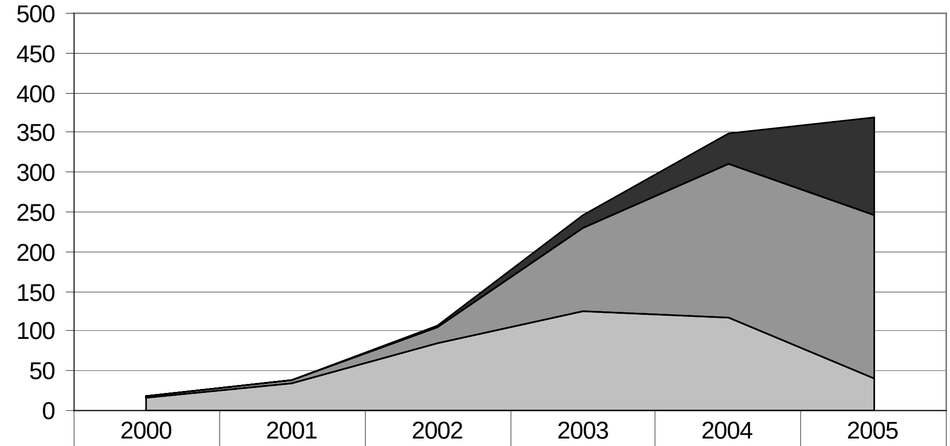
	2000	2001	2002	2003	2004	2005
Target group	9,26	10,04	10,70	11,09	11,32	11,41
Active users	0,93	1,31	2,35	4,77	6,45	6,85
Penetration	71 %	77 %	82 %	85 %	87 %	88 %

FIGURE 31 - Mobile penetration, target group and active users (mill. subscribers) in Italy



	2000	2001	2002	2003	2004	2005
SMS	9,26	10,04	10,70	11,09	11,32	11,41
WAP	0,46	1,51	2,89	3,99	5,55	6,85
JAVA	0,00	0,40	1,07	2,00	3,40	5,14

FIGURE 32 - Target group size (mill. subscribers) in Italy

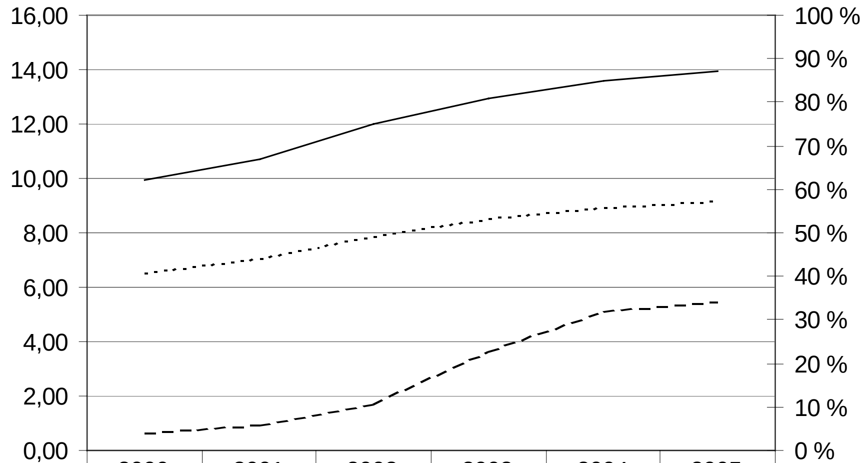


	2000	2001	2002	2003	2004	2005
Total size	18	39	107	246	348	370
JAVA	0	0	3	17	39	123
WAP	1	5	20	103	194	205
SMS	17	34	85	126	116	41

FIGURE 33 - Mobile gaming market size (mill. euros) in Italy

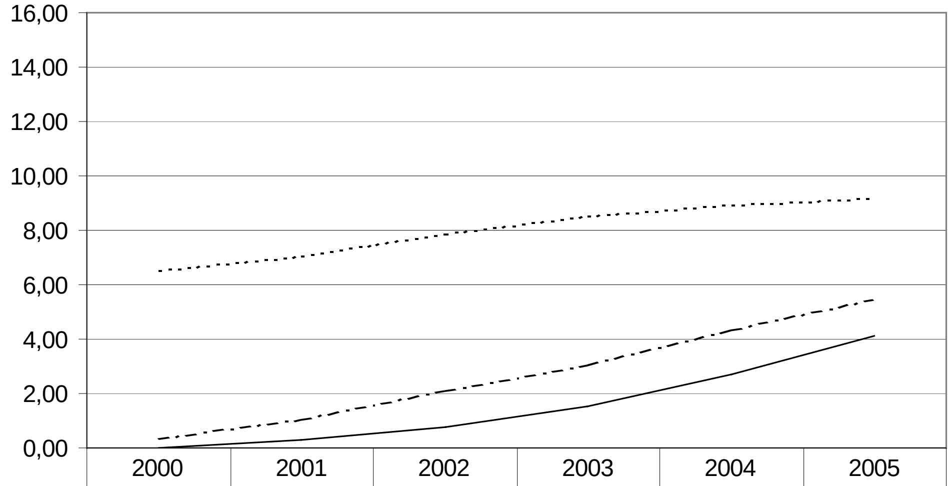
Spain

Spain is also a county of low Internet penetration, but mobile penetration hasn’t been as high as in Italy.



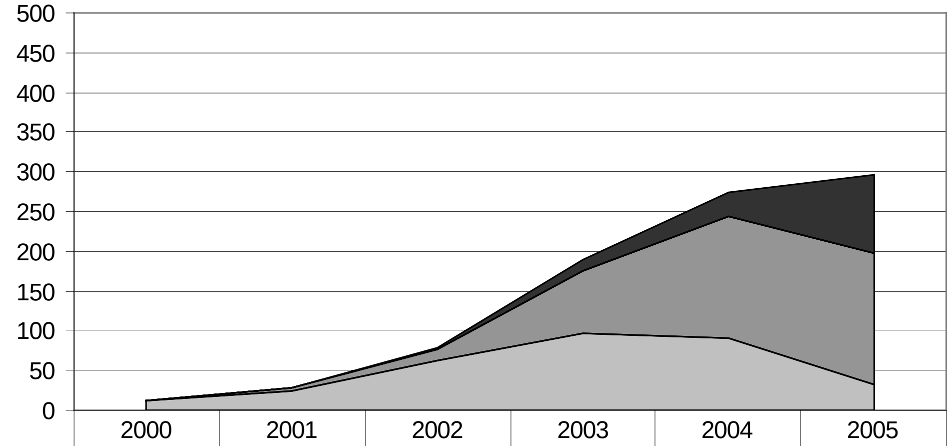
	2000	2001	2002	2003	2004	2005
Target group	6,52	7,05	7,89	8,52	8,94	9,15
Active users	0,65	0,92	1,74	3,66	5,09	5,49
Penetration	62 %	67 %	75 %	81 %	85 %	87 %

FIGURE 34 - Mobile penetration, target group and active users (mill. subscribers) in Italy



	2000	2001	2002	2003	2004	2005
SMS	6,52	7,05	7,89	8,52	8,94	9,15
WAP	0,33	1,06	2,13	3,07	4,38	5,49
JAVA	0,00	0,28	0,79	1,53	2,68	4,12

FIGURE 35 - Target group size (mill. subscribers) in Spain



	2000	2001	2002	2003	2004	2005
Total size	13	27	79	189	275	296
JAVA	0	0	2	13	31	99
WAP	1	3	15	79	153	165
SMS	12	24	62	97	92	33

FIGURE 36 - Mobile gaming market size (mill. euros) in Spain

Appendix II : Current mobile gaming industry companies

Content providers

SPRINGTOYS

Description	"Springtoys, headquartered in Helsinki, is a leading first-wave creator and enabler of interactive games and entertainment content for mobile, wireless platforms, including SMS, WAP, EPOC and PalmOS."
Owners	Private (Sonera Corporation 20%, HouseMarque 16,5%, Eqvitec Partners 14%, Boyden International 1%, management 38,5%, 10% for employee stock options)
Employees	
Products	"Springtoys offers its customers, which include handset manufacturers, network operators and mobile Internet service providers, new and ingenious entertainment applications to enhance existing product offerings. For game developers and content houses Springtoys offers elegant technology to deliver their creations to mobile environment."
Customers & Cooperation	Add2Phone, Agency.com, Akumiitti, Ericsson, Eqvitec Partners, Grip Studios Interactive, Hewlett-Packard, Housemarque, IBM, Iobox, More Magic Software, Motorola, Palm, Setec, Sonera

CODEONLINE

Description	"Codeonline is a leading provider of interactive wireless games and entertainment. We specialize in intellectually stimulating trivia games."
Owners	Private
Employees	
Products	Trivial Pursuit, Who Want's to Be a Millionaire?, Zobmondo
Customers & Cooperation	Nokia (Nokia Entertainment Service)

CUBE ENTERTAINMENT

Description	Cube Entertainment is the creator of the Short-Format gaming concept and produces games for PDAs, the Web, and mobile phones.
Owners	Private (PCA Infocom 10%, Forifina 2%, management 85%, employees 3%)
Employees	20
Products	Current products include games for PocketPC and Palm OS PDA devices
Customers & Cooperation	

ENLIGHTMENT ENTERTAINMENT

Description	"Enlightment Entertainment Ltd. is a Finnish software development company focused in creating high quality games and gaming communities for the mobile platforms." EE´s products are built on using company´s own game development tools and technology, which allow fast and easy development process.
Owners	Private
Employees	13
Products	WAP and SMS based games. Cross media concepts by combining Mobile, Internet and TV.
Customers & Cooperation	Company´s customers and partners include companies like Nokia, Motorola, HP Bazaar, Radiolinja, Sonera Zed, Mobile Mode, Open Mobile, Swelcom and Riot Entertainment.

ORCHIMEDIA

Description	Orchimedia currently develops own mobile gaming platform and SMS-, WAP-, and PDA-games. Their products combine different medias in cross-media concept.
Owners	Private
Employees	25
Products	Alusta mobile gaming platform, SMS and WAP games (e.g. TopAgent, Wapomb, turpasauna) and PDA games (T-Force Platoon)
Customers & Cooperation	Sonera Zed, Intervisio, Sonera, Mtv3-Tele, Packetvideo

IN-FUSIO

Description	In-Fusio is acting as a content provider and middleware software developer.
Owners	Private (private investors, Banexi Ventures, Codexi, Expanso, Natio Vie et Développement III, ParTech International, Viventures)
Employees	70+
Products	Execution Engine (ExEn) is a software that is integrated to the mobile phones. It allows users to download games over the mobile phone network and run them on their mobile phones. Gamezilla is a server platform, which handles the communication between the game and the server, the contests currently in progress, scoring, prices and billing. In-Fusio also has a portfolio of around 20 games.
Customers & Cooperation	France Telecom, SFR, Sunday.com, T-Mobile, Telefonica, Telstra, Alcatel, Mitsubishi Wireless, Schlumberger, Phone.com, Webraska

PICOFUN

Description	"Picofun is a leading provider of cutting edge mobile games. We focus on the needs and desires of the mobile generation to create top quality entertainment from both the fun and technical perspective." "Picofun is not only a developer, but also a publisher and distributor of games and entertainment, mainly (but not limited to) those applications that complement our own portfolio."
Owners	Private (employees, SOFTBANK Europe Ventures, Carphone Warehouse and Startupfactory)
Employees	
Products	PicoFun offers some innovative WAP games, which are fine tuned for GPRS-networks.
Customers & Cooperation	PicoFun divides partners into three categories: development, distribution and technology partners. Their partners include many telco operators, some phone manufacturers and middleware software developers.

nGAME

Description	"nGame Productions develops content for mobile phones, PDAs, Web, and digital TV, and is fully conversant with all the major middleware components."
Owners	Private (private investors, Oxygen Capital Partners)
Employees	
Products	nGDK (Game Development Kit) and nCGS/2 (Connected Games Server) are technology solutions for rapid game development made by nGame.
Customers & Cooperation	Several UK & USA based distributors and a few technology partners.

GRIP STUDIOS INTERACTIVE

Description	Grip Studios Interactive is a game development studio for emerging digital media. The company specializes in wireless entertainment applications and has development agreements with leading enablers of mobile and cross media.
Owners	Private
Employees	15
Products	SMS-, WAP- and internet games
Customers & Cooperation	Sonera, Iobox, Omnitel, Springtoys, Cash-U

RAGE SOFTWARE

Description	Rage Software is one of the ordinary game development companies that have announced that they will start making games for mobile terminals.
Owners	Private ()
Employees	
Products	
Customers & Cooperation	Nokia (Nokia Entertainment Service)

Service providers

CLUB NOKIA

Description	Club Nokia offers premium content for Nokia phone owners. It already has a possibility of downloading game levels for Nokia 3000-series phone.
Owners	Private (Nokia 100%)
Employees	
Products	Snake game etc.
Customers & Cooperation	Many game development studios including Rage, Iomo, Supedo and Kuju.

JIPPII GROUP

Description	Jippii Group is the biggest ISP in Finland. They have developed Pasiworld-gaming portal for Internet, and they are going to take it wireless in the near future.
Owners	Public (HEX:)
Employees	
Products	Pasiworld
Customers & Cooperation	"By the end of 2002 Jippii Group expects to have more than 500,000 mobile game users. Because of existing gamers Jippii Group will be in a unique position to provide those same customers with wireless games."

SONERA ZED

Description	Sonera's mobile portal concept that they are selling to telecom operators. Zedaamo.com is a part of ZED and it is currently offering various SMS and WAP-based games.
Owners	Private (Sonera 100%)
Employees	
Products	ZED-portal
Customers & Cooperation	KPN is offering ZED in Netherlands

CASH-U

Description	"Cash-U is a hi-tech pioneer, specializing in enabling technologies for mobile entertainment - one of today's hottest markets"
Owners	Private
Employees	
Products	"Pecan - our "up and running" carrier grade entertainment platform is deployed with several European cellular operator and Wireless ASP networks, where it is creating new revenue streams by delivering interactive high-traffic mobile applications."
Customers & Cooperation	Cellcom, OpenMobile, Mobile Solutions, EuroFun

INTERVISIO

Description	We concentrate in creating cross media concepts, fitting the service to each medium yet maintaining it recognizable to the consumer. We start the process from the mobile and internet solutions and take it further to other media to make it more accessible for the public.
Owners	Private
Products	Tilt TV program and web community for the game enthusiasts containing reviews on the latest PC, PlayStation, Nintendo and Dreamcast games, chat, club, contests, SMS-games and icons.
Customers & Cooperation	Finnish mobile game developers and publishers

RIOT ENTERTAINMENT

Description	Mobile publisher RIOT-E offers a distribution channel, a content licence and marketing services to companies developing mobile games. They are partnering with entertainment industry to acquire licenses for existing brands, such as "Bridget Jones" and with telco industry to achieve a distribution channel.
Owners	Private (Nokia Ventures, Softbank UK, Carlyle Internet Partners, CDB Webtech, Stratos Ventures, Lago Ventures)
Employees	90
Products	"RIOT-E creates, publishes and distributes entertainment, such as games and leisure services, to be used globally in any mobile device. The products are based on SMS, WAP and other emerging technologies." "RIOT-E has exclusive global rights to create the wireless dimension around Marvel Entertainment's superhero library of over 4 700 characters. These services are released in conjunction with movie and video releases of all products, such as the X-Men."
Customers & Cooperation	Radiolinja, Telecom Italia Mobile (TIM), Marvel Comics, 20th Century Fox, Globe Telecom

DIGITAL BRIDGES

Description	Digital Bridges is a technology developer and game publisher with a vast partner network. It sells UNITY platform and publishes games using Wirelessgames.com-portal.
Owners	Private (management, Apax Partners Funds, Argo Global Capital)
Employees	
Products	UNITY interactive content server platform. Several WAP-based games published through Wirelessgames.com, which is a subsidiary owned by the company.
Customers & Cooperation	Digital Bridges has great amount of partners, including all the major cell-phone manufacturers, telecom operators and game development companies.

THEGLOBE.COM

Description	A big USA-based company offering different Internet and mobile entertainment services.
Owners	Private (Nasdaq: TGLO)
Employees	
Products	Owns many sites, recently opened one dedicated to mobile gaming.
Customers & Cooperation	

WANOVA

Description	"We position ourselves as a Games Wireless Application Service Provider (G-WASP), that provides integrated, low risk end-to-end games solutions for next generation mobile network operators and service providers."
Owners	Private
Employees	
Products	Platform for mobile game developers and publishers
Customers & Cooperation	

OPENMOBILE

Description	OpenMobile is focused on building a complete global network which will enable the efficient distribution of all wireless services, offering wireless content developers and wireless operators exciting new possibilities. By bringing together operators and content providers in an open and non-exclusive environment, the company will provide mobile value-added service users with global distribution and an information system that has endless possibilities.
Owners	Private
Employees	
Products	
Customers & Cooperation	

Transmission providers

As it can be seen in the figure, the mobile operator market is very fragmented in Western Europe. There are 4-6 operators per country, totalling in around 70 licensees in the market.

Country	Criteria	Licences	Price (million)	Winners
Austria	Auction	6	€ 832	Connect Austria, Hutchinson, Mannesmann, max.mobile, Mobilkom, 3G Mobile
Belgium	Auction	4		
Denmark	Auction	4 (?)		
Finland	Comparative selection	4	€ 0	Sonera, Telia, Suomen Kolmegee, Radiolinja
France	Comparative selection	4		
Germany	Auction	6	€ 50 519	T-Mobil, Mobilcom, VIAG, Group 3G, Mannesmann, E-Plus
Greece	?	?		
Ireland	Comparative selection	4		
Italy	Auction	5	€ 12 163	Ipse, Andala, Wind, TIM
Luxembourg	Comparative selection	4		
Netherlands	Auction	5	€ 2 685	Libertel, KPN Mobile, Dutchtone, Telfort, 3G Blue
Norway	Comparative selection	4	€ 43	Broadband Mobile, Netom, Telenor, Tele2
Portugal	Comparative selection	4	€ 339	Telecel, TMN, Oni Way, Optimus
Spain	Comparative selection	4	€ 0	Telefónica, Airtel, Retevisión, Xfera
Sweden	Comparative selection	4	€ 0,05	Europolitan, Tele2, Orance, Hi3G Access
Switzerland	Auction	4	€ 136	Swisscom, dSpeed, Orange, Team 3G
United Kingdom	Auction	5	€ 38 306	BT, Vodafone, Orange, One-2One, TIW
CURRENT TOTAL		**71**	**€ 105 023**	

FIGURE 37 - Status of UMTS licensing in Western Europe

Handset manufacturers

NOKIA (MOBILE PHONES)

Description	The biggest mobile phone manufacturer with soon to be 40% market share.
Owners	Public (HEX: NOK, NYSE: NOK)
Employees	
Products	Smart phone 9000 Communicator-series, low end 3000-series and high end 8000 series. 3310 phone is the first low-end mobile phone released by Nokia that is containing WAP-browser. Most likely next version of 3310 contains also GPRS functionality, which makes it ideal for mobile gaming target group users.
Customers & Cooperation	

SIEMENS

Description	A major handset manufacturer
Owners	Public (NYSE: SI)
Employees	
Products	Variety of phone models. New SL45 multimedia model includes an MP3 player and 32 Mb memory card.
Customers & Cooperation	Siemens, Motorola and Ericsson have established an alliance to create a mobile gaming platform that would compete with Nokia's Mobile Entertainment Service.

SONY ERICSSON

Description	In the spring 2001 Ericsson decided to stop manufacturing mobile phones. Later it also announced that it will start selling the phones with Sony under a common name "Sony Ericsson". With Sony's ability of creating consumer electronics, especially game related, and with Ericsson's distribution network Sony Ericsson may be an important player in the industry few year from now on.
Owners	Public (NYSE: SNE)
Employees	
Products	A series of mobile phones including R520m with GPRS, T29s with WAP and R380 smart phone.
Customers & Cooperation	

MOTOROLA

Description	A major handset manufacturer
Owners	Public (Nasdaq:)
Employees	
Products	Motorola has recently published a mobile phone that uses Java 2 Micro Edition. Motorola has also a large variety of models, including GSM and GPRS capable phones.
Customers & Cooperation	Siemens, Motorola and Ericsson have established an alliance to create a mobile gaming platform that would compete with Nokia's Mobile Entertainment Service.

PALM

Description	Palm is a former subsidiary of 3COM and produces the PalmOS operating system and personal digital assistant devices.
Owners	Public (Nasdaq: PALM)
Employees	
Products	PalmOS and Palm PDA devices, new Palm 500 and 700-series
Customers & Cooperation	Several PDA manufacturers use PalmOS, including Handspring.

COMPAQ

Description	Compaq represents the cutting edge technology with its iPaq PDA-device. It has joined forces with Microsoft, and belongs to the group, that is trying to maintain Microsoft operating systems as leading technology also in PDAs.
Owners	Public (Nasdaq:)
Employees	
Products	Compaq iPaq. IPaq has increased its market share during last few months as the Palm’s market share has dropped dramatically.
Customers & Cooperation	Cooperation with Microsoft, using Microsoft’s Windows PocketPC operating system.

Middleware solution developers

SYMBIAN

Description	"Symbian's mission is to set the standard for mobile wireless operating systems and to enable a mass market for Wireless Information Devices." Despite of the impressive owner and partner portfolio, Symbian is suffering from lack of credibility. Currently Nokia is starting to adopt EPOC in its mobile phones, but it remains to be seen if EPOC truly can fulfill the expectations.
Owners	Private (Ericsson, Nokia, Matsushita Communication Industrial Co. (MCI), Psion)
Employees	
Products	EPOC operating system is fighting against Microsoft's operating systems and Palm's PalmOS.
Customers & Cooperation	Many partnering programs virtually with all mobile software developers and hardware manufacturers. The current licensees of Symbian technology are Ericsson, Kenwood, Matsushita, Motorola Inc, Nokia, Philips, Psion, Sanyo, Siemens and Sony.

NOKIA (NETWORKS)

Description	Nokia offers Mobile Entertainment Service
Owners	Public (NYSE: NOK, HEX: NOK)
Employees	
Products	Mobile Entertainment Service (MES)
Customers & Cooperation	Telia's MyDOF-portal, Radiolinja

MICROSOFT

Description	Microsoft is the leading operating system developer for personal computers. It also tries to take over the PDA market with its Windows CE.
Owners	Public (NASDAQ: MSFT)
Employees	
Products	PocketPC operating system for PDA devices.
Customers & Cooperation	Compaq, Casio, HP

SUN MICROSYSTEMS

Description	Develops Java-related technologies for server- and client-side machines.
Owners	Public (NASDAQ: SUNW)
Employees	
Products	Java-related products, including J2ME (Java 2 Micro Edition) that can be used in small devices.
Customers & Cooperation	All the major companies developing software for mobile gaming industry use.

G-CLUSTER

Description	Develops a technology, which will allow real time streaming to mobile terminals.
Owners	Private
Employees	15
Products	G-Screen is used to stream 3D-games from a centralized server to mobile terminals.
Customers & Cooperation	G-Cluster is offering a piloting their technology with Sonera.

FATHAMMER

Description	Enables 3-D graphic games from PCs and gaming consoles to be played on current and future mobile devices
Owners	Private (management, 3i Group)
Employees	
Products	
Customers & Cooperation	Intel, Symbian, Nokia