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Introduction

Mobile Entertainment: User-centred Perspectives

Jason Rutter

Throughout Europe mobile phone penetration rates are running at 70-85% of the population. In certain states there are now more mobile phones than land lines and the affluence and unusual demographics of Luxembourg have pushed adoption to little short of 100%. Given that mobile phones were only seriously launched to the consumer market in the early 1980s this rate and breadth of adoption is certainly impressive if not revolutionary. Telecommunications has become mobile, handset markets are approaching saturation and, with 20 billion text messages being sent in the UK alone in 2003, there is every indication that not only are users adopting mobile technologies but they are routinely assimilating them into their everyday practices.

However, the mobile telecommunications industry is not one prepared to stay still for any length of time: Over the last twelve months we have seen 3G networks begin to roll out as speculation about their financial success, competition from Wi-Fi and even 4G technologies have received significant attention. Consumers are now enjoying colour screens on their handsets, built in cameras, gaming and digital diary functionality and the ability to swap memory cards between mobile phone, PDA, digital camera and mp3 player.

What makes these developments so fascinating is the way in which technological development is impacting on end users. While Alvarion and the Swedish Space Corporation has pushed Wi-Fi connections to a distance of 310km, consumers are integrating new-to-market devices and mobile services into their routine practices. They can now vote (either for parliament or Pop Idols) using their handsets, roam across national boarders but remain in contact, check and synchronise email and access data services which are location sensitive. The networked potential of mobile telephony is beginning to be exploited to enable monitoring of health care patients, offer direct marketing opportunities and facilitate commercial transactions. It is hard to imagine that the impact mobile telephony has had on the everyday life of people during the last two decades will not continue to be felt.

Mobile entertainment is one area in which this impact is already very clear. Leisure activities, disposable consumer income and the desire to add texture to our everyday interactions is driving the adoption of new technology and user explorations of the potential of mobile media. The first wave of these new mobile entertainment services have seen offerings similar to those available through fixed
line internet access including e-greeting cards, single and multiplayer games and chat avatars. However, newer ideas which exploit the ability of mobile handsets are getting ready to be launched into the market. If such developments are successful it seems likely that mobile entertainment will be able to create mass market demand by exploiting mobile entertainment’s unique selling points of mobility and timeliness along with their potential to deliver on-demand content to a technology profoundly linked to a single person.

Some of these issues have been explored through the mGain project out of which this conference comes and papers in the collection detail some of this work\(^1\) as well as reflecting other high level research that is being done. This collection is the proceedings for the conference *Mobile Entertainment: User-centred Perspectives* which was organised by the ESRC Centre for Research on Innovation & Competition (CRIC) and held at the Museum of Science & Industry in Manchester during 25-27\(^{th}\) March 2004. The papers reflect some of the healthy heterogeneity within mobile entertainment research as they draw on disciplines including computer science, sociology, economics, governance, psychology and design. It is rewarding that the conference has attracted such a range of researchers who are willing to share and develop their ideas within a transdisciplinary forum. Such enthusiasm can only bode well for the future of research in this area - it is an enthusiasm which we can share with others and exploit to develop future cooperative projects.

Conferences are always the product of more than one person’s labour and I would like to take the opportunity to thank, on behalf of myself and the Conference Committee, those people whose efforts have made *Mobile Entertainment: User-centred Perspectives* possible.

We gratefully acknowledge the support of the European Commission’s IST Programme and the UK’s Economic and Social Research Council (ESRC) whose financial and scientific support has made this event possible. In addition to this we thank Fabien Petitcolas and Microsoft Research for their sponsorship of the conference and provision of the student paper prize.

We have been very fortunate in attracting such a high calibre of keynote speakers for the conference all of whom have taken time out of very busy schedules to share their insight and knowledge. We are most grateful for the contributions of Andrew Bud (mBlox), Patricia Charlton, (Motorola Labs), Patrice Chazerand (ISFE), John Chasey (IOMO), Bo Karlson (Wireless@KTH), Anna Polishchuk (New Millennium Investment) and Tim Regan (Microsoft Research).

\(^1\) Several papers from the mGain project are contained in this volume (Ylianttila; Kangas; Moore & Rutter; Bryce, Moore & Rutter) while all project reports are available electronically from www.mgain.org.
Also, I would like to take the opportunity to thank those individuals who donated their time and expertise to this event especially the following members of the Scientific and Programme Committee: Jo Bryce (University of Central Lancashire), Kurt Englmeier (German Institute for Economic Research), Karenza Moore (University of Salford), James Orwell (Kingston University), Manfred Tscheligi (Centre for Usability Research & Engineering). My personal thanks also are due to Sharon Hammond, Lee Wright, Angie Lewis and Joyce Wilson at CRIC as well as the conference designer, Mat Bend, whose commitment to this project and attention to detail has ensured that everything from booking the conference venue to the printing of this book actually got done.

Finally, I would like to welcome you to Manchester and sincerely hope that you enjoy the conference, these proceedings and your stay in the city. The conference team has worked hard to ensure that the event is not only a scientific success but a very pleasant way to spend a few days. I hope that you manage to leave the conference a little wiser than when you came and that the people you meet here will continue to inform and help you develop your own work.

I look forward to meeting you all. Please do not hesitate in contacting myself or Karenza Moore if your work takes you in directions that you think we can contribute to.

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Part 1

Business, Markets & Regulation
Emerging and Future Mobile Entertainment Technologies: Drivers and Barriers in the Technology Evolution

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Abstract:
Technology evolution of devices, hardware, networking and services is progressing. The technology evolution process is driven by research and development, standardisation, implementation and production work done in various companies, academia and industrial bodies. Technology evolution takes place in many parallel lines of enabling technologies, such as processor and memory technologies, display technologies, integration and miniaturization technologies, networking technologies and software technologies. Also the way that people use and adapt the technology is changing. This article identifies and discusses issues that are important drivers and barriers for the emerging and future mobile entertainment technologies. The evolutionary path of different technology enablers is discussed with future development hypotheses.

Keywords:
Mobile, Entertainment, Technologies, Evolution, Drivers, Barriers

Introduction

Since the time of our grandfathers, the technology evolution has taken major steps towards teleinformatics-aided society. The first computers in the 60’s were size of a room, they cost millions, and they could do 78 000 mathematical operations in a minute (i.e., 1.3 kHz). Today the computer and communication device can be carried in the pocket, it costs couple of hundreds of Euros, and it can do more than several hundreds of millions calculations in a second (i.e., 400 MHz). Nowadays, ten years is a long time in this evolution process, especially when the product life-cycles are shortened noticeably. However, major evolutionary steps still take place in a long-term process. As illustrated in Figure 1, technology evolution takes place in many parallel lines of enabling technologies, such as processor and memory technologies, display technologies, integration and miniaturization technologies, networking technologies and software technologies. The technology evolution process is driven by research and development, standardisation, implementation and production work done in various companies, academia and industrial bodies. This evolution process will produce tangible products such as mobile handsets, networks, platforms, and mobile entertainment content that will
go through the test of consumer acceptance when they enter the markets. The technology evolution is affected by many factors in many areas of both technology and business (MGAIN D531, 2003).

Figure 1: Technology evolution process

Figure 1 illustrates the technology evolution process as a whole from the technological perspective. It shows that while technological evolution is taking place in many areas of processor, memory, system integration and miniaturization, networking and software technologies, new products and innovations are always tested in the consumer markets. Best technology does not always win the consumer acceptance. This is an issue to keep in mind when evaluating the emerging and future mobile entertainment technologies. Many investors would be very pleased to see the future of mobile entertainment now. However, in reality only predictions can be made certain probability to be right. Some have tried to see general principles in the history of technological development. A famous Finnish emeritus professor Osmo A. Wiio has presented his first law of predicting future in the following way: the near future is usually overestimated, and the distant future is usually underestimated (Wiio, 2003, p.41). The beginning of third millennium started with great technology hype with clearly overestimated near future predictions. Keeping the lessons in mind, we should not underestimate the possibilities that the future of mobile technologies hold. Without a major devastating crisis to encounter human kind (major wars, natural disasters or economical), the technology evolution shall go on irresistibly, step by step.

In this article we look what are today’s successful mobile entertainment technologies, and the foundations of the evolutionary path. The reader is advised to read MGAIN WP4 reports ‘Existing and Imminent Mobile Entertainment
Drivers and Barriers in the Technology Evolution

Technologies’ (MGAIN D411, 2003) and ‘Emerging and Future Mobile Entertainment Technologies’ (MGAIN D421, 2003) for more complete discussion. In this article, section 2 discusses about the technological barriers, while section provides some near future insight about the most potential drivers. Conclusions are given in section 4.

**Mobile Entertainment Technology Barriers**

As the current mobile entertainment devices (e.g., cellular handset technologies with colour screens facilitating MP3 music and mobile games) have been on the customer markets for some time, it has become evident that one of the greatest barriers in the field of mobile entertainment is the lack of mobile content of good quality. The quality of the mobile entertainment content is many ways connected to technology: device technology, display size, processing power, battery power, mobile platform, networking, and interoperability. Furthermore, mobile handsets and mobile services go through a test of consumer acceptance. The consumers simply won’t pay for services and technology that do not bring some added value to their daily usage. Mobile entertainment experience has to compare to the standards set by console games and home computers, and portable multimedia devices.

There are currently several technology related limitations that hinder the widespread acceptance of mobile entertainment. User interface is limited by the display technology and the problems with small keyboard, pen control or voice recognition systems. Power consumption and battery technologies set usage time of the mobile device. The limited nature of this resource sets trade-offs to the hardware specifications, leading to limited display size, limited processing power and memory usage, and limited application complexity. Bandwidth limitations of the used network connection set limitations to the multimedia content that can be downloaded or used on real-time bases. Internetworking enables global roaming between different networks in different countries, but is not yet achieved. More specifically, one can distinguish between several types of technology related barriers and their importance to mobile entertainment technology evolution. Limited battery power is an important technology barrier, as it sets restrictions on how long one can use the device without recharging. Limited processing power is an important technology barrier, as it sets restrictions on the game and application quality. Small screen size is an important technology barrier, as it limited the amount of graphics that can be presented. Screen technology in general (price/quality) is an important technology barrier, as a better screen technology results in more expensive price. Graphics and sound quality, and disruptions to data transfer are important for user experience of mobile entertainment. Limited bandwidth is an important technology barrier, as it set restriction to the amount of data that can sent or downloaded in a given time.

Also, there is a need for original mobile content, not imitated from elsewhere. Sometimes the consumers do not understand service because the technology
jargon can be overwhelming; manuals and instruction insufficient, and the user interface (and even the service setup) can be complicated. Limited abroad roaming possibilities are an important factor for travelling people. Internet connection is slow compared to desktop is a very important factor as the people compare the mobile Internet experience to it. Compromises with processing and battery power are important technology barriers, as the mobile device technologies set restrictions for the usage of them. Inter-operability between platforms is an important technology barrier, as in most cases the games for example do not inter-operate between different platforms. These are some of the technology barriers today that affect to the end-user experience and service quality.

Drivers and Emerging Technologies

This chapter discusses the latest developments and trends in enabling technologies for emerging and future mobile entertainment as technology drivers that will improve the end-user experience and enable new mobile applications and services.

Device technologies

Handling of multimedia and game content set ever-growing demand for mobile device processor performance. Digital Signal Processor (DSP) is the key component in the development. The development of this central component is hindered by somewhat controversial aims. On the other hand DSP should have as high performance as possible, measured in MIPS (Million Instructions Per Second), on the other hand it should maintain conservative energy consumption in order to avoid battery drain. Following subsections discuss about the technological trade-offs that are unavoidable with the current state of technology evolution.

Increased processing power

The evolution of processor technologies is following roughly a pattern that is known as Moore law. This means the ability of the microprocessor industry to double the number of transistors on a chip and processing power every 18 to 24 months. Moore predicted back in 1965 that this exponential growth would continue (Moore 1965). No exponential growth will continue forever, but will reach a saturation point somewhere. The exponential speed may slow down in the future due the finite size of atomic particles in the manufacturing processes. ‘The physical limitations could be reached by 2017’ (Kanellos, 1997). While the Moore’s law has shown its power till now with the mobile computers (McDonald 2002), the case with mobile phones and PDA’s is less straightforward. The mobile device manufacturers try to find compromises between size and usability, performance and energy consumption, and richness of features and memory and processing power requirements. Also the hard facts of the business are guiding the process. What could be implemented today may not be economically viable, and the new products are brought into market in a way that takes into consideration
the market situation of the existing product family and entire business area. An example of this is that while Texas Instruments has introduced a ‘single cell phone chip’ concept for mobile phones, Motorola ‘does not necessarily see a one- or two-chip solution as cost-efficient, considering development costs’ (Lyman, 2002). Also, the performance increases are also affected by the standardization of wireless technology generations. Performance increases between generations can momentarily exceed the speed of Moore’s law, but the long-term situation is also depending on the consumer and market acceptance of the new technology standards. The costs for entering new technology markets may be excessive, producing cumulative effect to the prices and resulting slower penetration rate in the consumer markets.

**Smaller-size and low power**

The size and the weight of the mobile handset is one of the key factors dominating when customers distinguish between phones (Lewis, 2001, pp. 333-348). This requires balancing of the processing demands against the requirement of low power consumption. Mobile handset manufacturer R&D (Research & Development) work is thus aiming at small size, low-power and increased processing power through low power VLSI (Very Large Scale Integration) design. Circuit design is based on digital cellular communication standards such as GSM (Global System for Mobile communication), and implementation includes complex control and signal processing functions, filtering, error correction, speech compression, protocol management, and in an increasing manner additional functions such as voice recognition and multimedia capabilities (Lewis, 2001). There have been historically two distinct approaches for implementing cellular handsets and infrastructure technologies: one emphasizing DSP (Digital Signal Processor) technology, the other ASIC (Application-Specific Integrated Circuit). While ASIC dominated the two first generations of GSM systems, the trend has been towards using more and more DSP in the implementation of physical layer functionalities. The usage of DSP has been limited by the power dissipation, which has however also followed a halving time of 18 months defined by the Moore law. Shift from 2G from 3G is expected to cause the physical layer MIPS that reside in the DSP to grow from 10 % of GSM to nearly 100 % of WCDMA (Wide-band Code Division Multiple Access). The advantage of DSP lies on its flexibility to adapt new updated versions of the standards, but system designed needs to balance the power and flexibility requirements (Gatherer, 2000, pp. 84-90).

**Paradigm shifts in IC and micro-electronics**

(Uvacek 2002) suggests that implementation of 3G wireless calls for a paradigm shift to a new class of IC – the adaptive-computing machine (ACM). ACM enables on-the-fly reconfiguration, and introduces an efficient way to implement 3G (and beyond) wireless and communications designs. As a future trend, the mobile technology hardware evolution is affected by the evolution of semiconductor technology via advances in DSP and ASIC technologies, and
miniaturization of non-electronic components. Notable futuristic trends in paradigm shift from micro- to nano-technologies include (Dascalu, 1998, pp.3-12):

- Fabrication of nano-structures shows big promise, because new quantum devices may offer new attractive solutions for information sensing, storage, computation, transfer, processing and display.

- Non-electronic structures, including sensors and actuators, can be brought down in size and fabricated with the same way as the electronic devices paves the way to monolithic integration of systems (i.e., a complete system on a chip).

- The nano-technology brings us much closer to the chemical and biological world, and may result new innovations such as biomimetic systems and revolutionary technologies inspired by the nature.

These new trends may produce in the future more efficient mobile entertainment devices with more efficiency in processing power and energy consumption.

**Longer battery durability**

Ni-MH batteries used commonly in the current mobile devices have limited usage time. Depending on how big display and high efficient processor the mobile device has, this type of battery can survive from 2 hours (laptop) to several hundred hours (mobile phones) of usage. However, mobile devices that are most suitable for mobile entertainment and multimedia content (video, pictures, games), suffer from the limitations of current battery technologies. Big LCD displays and powerful processors are power-hungry; even there are efforts to minimize the energy consumption of this and other factors. New ways for producing mobile electricity are thus needed. One potential future power source for mobile devices can be hydrogen, which is derived from methanol. For a laptop computer this technology could produce power enough for 15 hours or more. Currently there are some prototype implementations of direct methanol fuel cell (DMFC) battery technologies (The Hydrogen & Fuel Cell Investor, 2003). DMFC batteries are entering markets around 2004, and will be applied both for laptop computers, PDA and mobile devices. The word ‘direct’ refers to the direct conversion of the methanol into hydrogen, and the power generating reaction occurs on the catalysts on the fuel cell electrodes (EVI Energy Visions, 2003). Introduction of more efficient battery technologies is one of the key issues for better quality mobile entertainment in the future. Currently, the most fancy mobile entertainment devices with big LCD display can not survive without recharge longer than some hours, forcing a longer quality mobile entertainment (such as watching a full feature film) to be supported with external power sources (e.g., a car battery or household electricity). While the power efficiency of mobile handsets can be optimised by down-scaling the power consumption of unused or less important functionalities of the device, the need for additional power for emerging and
future mobile entertainment applications is so evident that technologies such as DMFC give only a short relief for the future needs of mobile entertainment.

**Advanced display technologies**

OLED (Organic Light-Emitting Diode) technologies show big promise for producing slim and filmy display (yet durable), that has both lower power consumption and higher image quality than the LCD (Liquid Crystal display) technology currently used in mobile devices. Variations of OLED technology includes flexible OLED (FOLED) and transparent OLED (TOLED) technologies that enable further usage scenarios such as transparent display in sunglasses or car window. Implementation of this technology can be done with SOLED (Stacked OLED), where pixel is based on stacking the red, green, and blue sub-pixels on top of one another instead of next to one another as is commonly done in CRTs and LCDs. Low cost for fabricating OLEDs uses OVPD (Organic Vapor Phase Deposition) technology (Universal Display, 2003). Currently the energy consumption of the LCD displays is a problem. It leads to compromises with the display size. Smaller LCD display size means lower energy consumption and slower power dissipation time. The small display size, however, sets limits to the applications and user experience. OLED and especially TOLED type of transparent displays implemented into sunglasses type of head-mounted displays can bring the needed technology jump into a new level of mobile entertainment experience. The major obstacle then is the price of these devices, which can be lowered with cost-effective bulk production. It is estimated that OLED displays will be a fast growing market in the becoming ten years.

**Wearable computers**

A notable trend for emerging and future mobile entertainment is about how the communication devices are carried. **Wearable computers** are a concept that is beginning to get realized by the introduction of small-size and low-power communication technologies such as Bluetooth. Wearable devices can include wristwatch terminal, see-through head-mounted displays, ear-bud and microphone, as in Motorola wearable concept. Wearable devices can communicate wirelessly with Bluetooth standard. While these types of devices are still at the concept level, they illustrate the emerging and future mobile entertainment directions and possibilities. Wearable communication devices are not limited to wristwatches and head-mounted displays; they may be also integrated into clothing.

**Software and content technologies**

Content and presentation formats and enabling software technologies (such as Java) are discussed in (MGAIN D411, 2003). Here only some brief notes can be done, but it is evident that enabling software and content technologies are in key role for the success and evolution of mobile entertainment technologies. They form the graphical user interface and effect how the ‘look and feel’ of the device. Enabling software technologies include programming languages (e.g., Java, C++, etc.), software development kits (SDK), integrated development environments
(IDE), and various application programming interface (API) and protocol specifications produced by major companies, industrial consortiums and standardization organizations. Application interoperability is one major objective for the software technologies to achieve, and this is where standards are aiming at. Mobile games and multimedia messages (MMS) are currently where operators are looking for their new revenues. SMS is still, in many countries very important source of income. IP convergence is leading to situation where more and more Internet content can be used in mobile handsets. From the user point of view, currently the Internet experience in mobile handset is more limited by the hardware limitations than software and content technology limitations. The popularity of Internet was based on its free content, such as images, text and video that could be browsed and downloaded from www-sites. Mobile handset just adds mobility to that. Now it is interesting to follow how the mobile multimedia messaging will evolve, and see if sending home-made multimedia messages such as video-clips will become a popular application. Content and presentation formats go through their own evolutionary battle. Formats that received widest consumer acceptance will survive, while other will wither away.

New encoding and decoding software such as DivX shows some promise that video can be stored in a compact form without that the quality would noticeably suffer other than caused by the limitations of mobile device hardware (display size, memory, storage size). A bit similar to MP3 format, Divx was first considered an illegal format used for Internet piracy, but is now beginning to reach a wider acceptance. First Divx compatible DVD players are now in the consumer markets. Divx technology can compress the content of 4,7 giga byte DVD movie into 700 mega bytes without the quality would suffer noticeably. Divx can stream DVD quality movie at 784 kbps rate. Divx Networks is working to integrate H.264 (which is part of MPEG-4) into Divx, which can add to compression efficient up to 75 %. Divx Networks assumes that DVD quality video can thus be streamed at 384 kbps rate in the Internet (Dvorak, 2003). DivX encoding software DrDivX² can alter the video resolution to fit into portable and handheld devices, downscaling both the file size, resolution, and frame rate as configured by the user. A full-featured movie could be viewed in a mobile device with a movie streamed via network or stored to a memory card. The question in mobile context is that is portable and handheld TV/movies a service that consumers would like pay for (and how much is of course a relevant).

**Standardisation and Collaboration**

There are a number of standardisation and industry collaboration organisations that pave the way for new technology standards. Lack of open and common standards may be an important technology barrier in some areas, such as game interoperability. However, standardisation work is not always efficient, may result compromised solutions as they need to take into account wishes of various

² http://www.divx.com/divx/drdivx/
manufacturers. Yet, standardization is one of the key drivers for technology evolution. In the following some essential standardisation organisations are shortly described. OMA (Open Mobile Alliance) is very important for mobile entertainment scope as it is representing the mobile entertainment industry in a broad scope. By its own statement, ‘OMA delivers open standards for the mobile industry, helping to create interoperable services that work across countries, operators and mobile terminals and are driven by users’ needs.’ (OMA, 2003). Internet Engineering Task Force (IETF) is an important forum, as it designs and standardises many enabling software protocols for mobile entertainment. 3rd Generation Partnership Project (3GPP) is important, as it has designed and standardised protocols and specifications for 3G mobile industry. Another example is a recent new alliance called Mobile Industry Processor Interface Alliance (MIPI). MIPI defines an open standard for components that plug into cell phones and deliver multimedia capabilities, such as playback of MP3 audio files and video clips. As part of the MIPI Alliance, 10 working groups will be established to develop specifications in such areas as camera and display interfaces, software abstraction, communications interfaces and system control. (Ryan 2003).

**Networking technologies**

The first WP4 deliverable (MGAIN D411, 2003) illustrated the evolution of cellular networking technology, as well as development of current and emerging wireless local and personal area networks. The evolution of networking technologies is discussed shortly here to mention some of most notable future directions of networking technologies.

**Evolution of cellular technologies**

Many technical analysts have pointed the reality behind the 3G technology that was once hyped as a revolutionary technology with high speed multimedia communications applications and services to wireless users and widespread consumer demand and extensive market acceptance in the near future. 3G roll-out and marketing have to face the following facts (Benson, 2002):

- Maximum achievable data transmission rates are not what users will get on a routine daily basis
- Hype fuelled high expectations of 3G service and performance will be disappointed
- There may not be nascent massive demand for 3G services
- The next generation of cellular services will be evolutionary, not revolutionary
- Phased 2.5G and 2.75G service improvements will occur first and will be around for quite awhile
• Competing standards may prevent interoperability and nationwide/international roaming will be difficult
• Coverage will continue to be an issue in non-urban areas

Next phases to realize in technology evolution in cellular networks are the widespread usage of 2.5G (GPRS) and 2.75G (EDGE/GERAN) services. 3G roll out and marketing is evolving as it is becoming more and more economically viable business for the operators. However, this process is taking more time that was expected in beginning of the millennium.

**IP convergence results better services for the end-user**

Major evolutionary steps in technology evolution include deployment of a new version of the Internet Protocol (IPv6). As part if IP convergence where mobile handsets and Internet are integrated in various ways, IPv6 enables larger address space (enabling connecting more users and devices to the mobile Internet), advanced routing, security and mobility functions. It is estimated that mobile applications and the expanding global user space will exhaust IPv4 addresses by 2009 (Dunn 2002). Also other devices such as home appliances are assumed to have an IP address, and they can be thus remotely controlled via secure connections through mobile Internet. Furthermore, one of the most desirable but not yet perfectly achieved features to mobile networking is the introduction of fixed-Internet quality of service. High end-to-end latencies and limited data rates are hindering the usage of wireless data connections for everyday usage (MGAIN D411, 2003), in addition to cost of these wireless data services. The introduction of new cellular data systems such as EDGE and UMTS shall alleviate this problem by supporting higher data rates and thus better quality of service. At the same time new service classes are introduced to IPv6 and also to IPv4 to support more efficient routing in the Internet backbone network for different kind of Internet traffic (real-time, non-realtime). These evolutionary steps aim to make mobile Internet more efficient and more reliable for also the purposes of future and emerging mobile entertainment applications.

**Local range, ad hoc, peer-to-peer and hybrid networking scenarios**

Local range, ad hoc, peer-to-peer and hybrid networking scenarios are one of the most interesting emerging and future networking concepts. They both refer to the ability of peer networking nodes (such as mobile or portable devices) to establishing wireless communication link with neighbouring nodes in a spontaneous manner. Ad hoc networking is reality today with peer-to-peer connections in for example communication devices such as Bluetooth that are aimed to form ad hoc connections with neighbouring Bluetooth devices. Another
example device that utilizes ad hoc connections is Cybiko\textsuperscript{3}, which allows the user to chat wirelessly with neighbouring Cybiko devices in a local virtual network.

Introductions of new 802.11 higher date rate technologies (such as 802.11g) aiming at theoretical maximum date rates up to 54 Mbps, the 3G up to 2Mbps data services can’t compete with them. The usage of WLAN together with 3G or 2.5 services is a realistic scenario for the operators. Integrating cellular and WLAN networks will produce hybrid networks that are both capable of wide coverage and high data rate services in hot spot locations. Even 3G do not promise the highest data rate at every location, so hot spot strategy is what is needed in any case. Hybrid networks benefit by the strength of both networking technologies. For example authentication, access control and billing in WLAN can be implemented using 2.5G or 3G signalling (e.g., GPRS/UMTS over WLAN access) (MITA3, 2002, pp. 289-296). Seamless integration of local and personal area networks (such as WLAN and Bluetooth) and wide area cellular networks (such as UMTS) is considered by many as 4G (fourth generation). 4G standardisation has also started. ITU-R has started tentative work towards system beyond 3G in its workgroup WP8F. ITU-R aim to develop the existing IMT-2000 based systems so that WCDMA downlink capacity would be 8 Mbps, and in CDMA2000 downlink capacity would be 2,4 Mbps. Commercial products of 4G are expected to be available around 2010, with local wireless connections up to 100 Mbps (Penttinen, 2002, pp. 43-48), while academic and industrial prototypes are being developed already.

Research and development for even higher data rate local area wireless connections are evolving. Most notable emerging and future short range technology is called Ultra Wideband (UWB). UWB technology produces high-speed electro-magnetic pulses that use a very wide frequency domain, resulting high data rates (over 100 Mbps) yet maintaining conservative energy consumption. Standardisation and regulatory approval is progressing, and in the future we will see how the UWB technology will be used in the mobile communications. Another new technology is called D2D\textsuperscript{4} (Direct to data), that promises to improve the signal quality of a wireless network such as IEEE 802.11 WLAN.

\textit{Digital TV integration into Mobile Handsets}

One of the most interesting new application scenarios for mobile entertainment is the integration of digital TV broadcast content into mobile handset technologies. This content could be transmitted with 3G data rates with legacy IP applications and streaming technologies. Problems with this options are, however, latencies and delay variance of the packets. Another alternative with better quality of service expectations is Digital video broadcasting (DVB), which enables point-to-multipoint type of networking and sending video broadcast also to mobile devices

\textsuperscript{3} http://www.cybiko.com
\textsuperscript{4} http://www.direct2data.com/d2d_2.asp
equipped with appropriate receivers. This technology is based on a combination of DVB and Internet Protocol (IP) technologies (MITA1 2002, pp. 201-206).

Integration of digital services includes utilizing the full potential of digital broadcast services and mobile Internet. This enables getting TV and other multimedia content to mobile entertainment devices. As in hybrid networking, integration holds possibilities for hybrid solutions ranging from device-based integration to network-level integration. In Finland there is pilot program to test what is called fourth digital broadcast network, which is reserved for mobile datacasting services (such as IP datacast, IPDC). Digital network enable also bulk delivery of services other than conventional TV and radio programmes (Kohtala, 2003). NEC has developed a prototype of a mobile phone that is capable of receiving terrestrial digital TV broadcasts (NEC 2003).

**Trends in using location information with mobile handsets**

Nokia has announced to deliver assisted GPS with every handset within next couple of years. Nokia drops cell-based positioning since there is little or no demand on markets for such service. First Nokia mobile phones that have GPS are expected to enter markets 2004. It is expected to come first to most expensive models, and then within couple of years also to cheaper models. Updating the cellular networks starts 2004. Mass markets of positioning services are hindered by the fragmentation of technologies. For example, roaming of positioning services between operators and different countries do not yet exist. It is expected that location based services will bring within couple of years 7-10 % of the mobile service revenues. Nokia estimates this figure to be 10% in 2006 (Kauppalehti, 2003, p. 10.).

**Conclusions**

This article has identified and discussed about barriers and drivers as important factors for emerging and future mobile entertainment. Development in emerging and future mobile entertainment technologies was discussed. Evolutionary path was evident in many cases, while some new technologies (such as display technologies) showed some promise of technology revolution. Examples demonstrated the current and near future developments on the path toward more advanced mobile technologies.

Important key drivers for the success of new generation of mobile entertainment services include new content through technology integration, global standardisation work that strive interoperability, global collaboration of telecomm operators to enable global roaming of both voice and data services, and further technology evolution that enable longer battery life-time without recharging, advances in display technologies, and new communications concepts such as wearable computers.
Drivers and Barriers in the Technology Evolution

Open standards are important for widespread acceptance as they promote security and cost-effectiveness, thus producing potentially cheaper products for consumers. Standardisation and industry collaboration strive for interoperability of devices, services and applications, through consortiums such as OMA and other international standardisation bodies. Interoperability of devices, platforms and protocols is the major next goal for mobile entertainment technologies industries to achieve. Common platforms enable implementation of interoperable applications.

Developments in DSP and ASIC technologies and miniaturization of non-electronic components devices pave the way to monolithic integration of systems (complete systems on a chip). This will make the future devices smaller and more efficient. Display technologies are one of the key factors for improving the mobile entertainment user experience. OLED technologies show big promise for producing slim and filmy display to replace LCD technology. Power consumption and battery technologies set usage time of the mobile device. The limited nature of this resource sets trade-offs to the hardware specifications, leading to limited screen size, limited processing power and memory usage, and limited application complexity. Battery technologies are currently a technological bottleneck in using mobile entertainment devices for a longer time period without recharging. DMFC technology shows some promise.

Bandwidth limitations of the used network connection set limitations to the multimedia content that can be downloaded or used on real-time bases. The problems with current wide-area wireless networks such as GPRS are due high latency peaks and low data-rate compared to the Internet experience with PC connections. These problems are alleviated with becoming wireless technologies such as EDGE, UMTS and WCDMA. Internetworking enables global roaming between different networks in different countries, but is not yet achieved. Networking technologies evolve beyond 3G to include seamless integration of local high-speed connections, wide deployment of IPv6 and higher capacity local and personal area wireless connections with new technology such as UWB and D2D. Integration of digital services includes utilizing the full potential of digital broadcast services and mobile Internet. This enables getting TV and other multimedia content to mobile entertainment devices.

Positioning technologies such as GPS will be integrated into mobile handsets within couple of years. This will enable new location-aware services. Pervasive and wearable computers are concepts that indicate that in the future mobile entertainment is more than handheld devices: mobile entertainment can be integrated into clothing. There are also other important aspects, such as context-awareness can be a new driver for emerging and future mobile entertainment applications, and that security, privacy and access technologies are keys to success of the mobile entertainment industry, as they affect in building consumer trust in products and services. These issues are discussed in more detail in the mentioned MGAIN deliverables.
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Innovative Entertainment Services in the Portuguese Mobile Communications Sector – the Examples of MobiComp and YDreams

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Abstract:
We are presently at a turning point in mobile communications – the third generation (‘3G’ or UMTS) is imminent. The implications of UMTS for the Portuguese multimedia entertainment sector could be particularly relevant - mobile communications in Portugal have a penetration rate above the European average. Portugal is already a laboratory for testing new products and services in the mobile entertainment sector, because of this large penetration rate and because of the small size of the market. Several Portuguese enterprises have already been successful, locally and internationally, in mobile entertainment services for the ‘2.5G’ GPRS generation. The paper analyses two case studies, and their innovative entertainment services and business models. The theoretical framework for the analysis is economics of innovation in services. The two enterprises, MobiComp and YDreams, are presented – they were founded in 2000 and are focused on mobile computing services; they were already responsible for several international innovations in the field of mobile entertainment services, which have attracted the attention of main international players. These innovative services are discussed. The similarities between the two enterprises are analysed - both have university links, and have similar dynamics of innovation in several areas. Their distinctions are also studied - they are from different regions in Portugal and have different business perspectives and cultures. Finally, a model for the innovation in the mobile entertainment services sector is presented, based on the two case studies.

Keywords:
Entertainment, Media; Information and Internet Services, Computer Software; Telecommunications; Technological Change; Innovation and Invention; Management of Technological Innovation and R&D.

Introduction

The third generation of mobile communications will be commercialized in Portugal on the 1st of July 2004. Meanwhile, ‘generation 2.5’ or GPRS technology is being adopted by an increasing number of users. This technology already allows the implementation of multimedia services, opening a new channel to interactive entertainment producers. Technology is evolving fast, but, for the mobile sector as well as for other multimedia platforms, ‘it is the creation of innovative multimedia services and concepts that is the driving force behind the multimedia market’. (den Hertog & Schaffers 1996, p. 1). Within these services,
content, in particular entertainment content, could be an important factor of success – ‘interactive content is the element of the multimedia value chain with greatest value added and is expected to drive multimedia growth’ (Kinder & Molina 1999, p. 285). The theoretical framework the economics of innovation in services will, therefore, be useful to analyse innovation in the mobile entertainment sector.

In order to study innovation in Portuguese entertainment services for mobile communications, it is necessary to characterize the diffusion of mobile phones in Portugal and the diffusion of other multimedia entertainment platforms. After that contextualization, two case studies, MobiComp and YDreams are presented, based on interviews taken place between May 2003 and January 2004. These two case studies are then compared and analysed. The paper concludes with a model that represents innovation in entertainment services within the Portuguese mobile communications sector.

Multimedia entertainment platforms in Portugal

Internet

The diffusion of the use of Internet depends on a number of factors, such as the penetration rate of IT equipment; the quality and diffusion of the communications infrastructure; and the information technology culture. Portugal is situated below the 15 OECD countries with the highest rates of investment in ICT (Information and Communication Technologies), as can be observed in Figures 1 and 2. Although this rate has increased between 1990 and 2001, the comparative situation of Portugal with the remaining OECD countries has aggravated in this period. This loss of territory regarding the investment in ICT in Portugal compared to the main OECD countries helps to understand the comparison figures in terms of Internet access, currently the main platform of distribution of multimedia entertainment contents and services.
Figure 1: Percentage of investment in ITC in total GDP

(1 or latest available year) Source: OECD 2003a, p. 37.

Figure 2: ITC investment in selected OECD countries

(as a percentage of non-residential gross fixed capital formation, total economy) (1 or latest available year) Source: OECD 2003a, p. 37.
Portugal is below the OECD average in terms of Internet access in general terms (Figure 3) and in broadband (Figure 4) – less than 20% of the Portuguese population had access to the Internet in December 2001, and less than 2% had access to broadband in June 2002. More recent data, relative to the third quarter of 2003, reveal that 63% of the Portuguese population has access to Internet; broadband, however, is accessible to only 4% of the population (Anacom 2003).

Figure 3: Internet subscribers per 100 inhabitants, December 2001 - Source: OECD 2003b, p. 121.

Figure 4: Broadband access per 100 inhabitants, June 2002 Source: OECD 2003b, p. 123.
If in terms of Internet access the Portuguese situation presents some frailties, the presence of Portuguese contents on the Web tells an even darker story, in comparative terms. In what concerns the production of content for the Internet, measured by the number of Web pages for each one thousand inhabitants (Figure 5), Portugal is situated among the five OECD countries with worse results (less than 5 Web pages for each one thousand inhabitants).

Figure 5: Web sites per 1000 inhabitants, July 2002 - Source: OECD 2003b, p. 126.

Figure 6: Secure servers per 100,000 inhabitants, July 2002 - Source: OECD 2003b, p. 127.
The use of electronic commerce is also very scarce in Portugal. The diffusion rate of electronic commerce in Portugal, measured by the number of secure servers, is one of the ten lowest in the OECD (Figure 6).

Therefore, there is in Portugal a scenery of low investment in ICT, that limits the infrastructure and the Internet access, factors that also limit the creation of Web contents and the creation of business models based on electronic payments by consumers (using secure servers).

**Interactive TV**

After a promising start in 2001, with an agreement between Microsoft and Portuguese cable operator TV Cabo (owned by Portugal Telecom - PT), digital interactive television suffered two severe setbacks between 2002 and 2003 – the penetration rate of interactive TV was far behind its objectives and the TDT (Terrestrial Digital Television) is in a limbo after the cancellation of the licenses attributed in 2001. These setbacks will have negative consequences in the entertainment services development sector for interactive TV.

**Mobile phones**

If in terms of Internet access, Portugal is below the OECD average, in terms of mobile phone use Portugal is above the OECD average and the UE average (Figure 7). In 2001, almost 80% of the Portuguese population were mobile phone users, which put Portugal in the group of 10 OECD countries with the highest penetration rate of mobile communications. Portugal is equally among the ten OECD countries with the highest weight of mobile communications revenues in global communication revenues – more than 45% in 2001. In the third quarter of 2003, Portugal was one of the ten countries above the EU average in terms of mobile communications penetration – 86% (the European average being 83%) (Anacom 2003).

![Figure 7: Cellular mobile subscribers per 100 inhabitants, 2001 - Source: OECD 2003b, p. 90.](image-url)
Innovative Entertainment Services

This framework of a high penetration rate of mobile communications and high weight of mobile communication revenues in total telecommunications revenues creates a favourable environment for the diffusion of entertainment contents and services through mobile phones in Portugal. The first steps were taken in 2002, with the availability of the first GPRS (‘generation 2.5’) services, based on MMS (Multimedia Messaging Service). Portugal was the first country in the world to allow MMS between the networks of the different national operators, in February 2003 (Público – Computadores 2003). Afterwards, several multimedia services for mobile platforms were launched in Portugal, some developed on purpose for GPRS, others expanding the functionalities of older services, developed initially for GSM (‘generation 2’) WAP technology. However, Portugal’s communications regulator, Anacom, has not yet published data about GPRS data traffic, which makes it impossible to quantify the volume of services or profits generated. The commercial launch of UMTS (‘generation 3’) in Portugal on the 1st of July 2004, can, through the increase in bandwidth, constitute a milestone in the access to multimedia entertainment by mobile phones.

The case studies: MobiComp and YDreams

MobiComp

MobiComp was created in 2000 in Braga, a city located in the region of Minho in the north of Portugal, with the purpose of creating solutions for mobile platforms. The MobiComp project started in the Summer of 1999 and the firm was formally created in June 2000, some months before executive director Carlos Oliveira finished his course (in Universidade do Minho, which has a strong tradition in IT).

Two ideas have been present since the origins of MobiComp: to create innovative solutions and internationalization. On one hand, MobiComp has the aim of introducing something new in each solution it creates, because it believes it will become a distinctive factor. On the other hand, it considers that Portugal as a market is too small for its ambitions, and that the sector where it is rooted allows for an adaptation of solutions to other markets.

MobiComp started by developing business solutions for PDAs. One of its first products won a main innovation prize in the Portuguese IT industry (ANETIE) in its first year – 2000. By the end of 2000, Lusomundo, Portugal’s largest cinema distributor (and one of its main media groups, later bought by PT) launches its WAP ticket service, which allows the user not only to buy tickets but also to choose the seat in movie theatres. This service uses MobiComp’s AMI (Adaptive Mobile Interface) technology, which allows the adaptation of the format, presentation and navigation of the contents to any mobile device that is used – the contents are optimised for the identified device. The inclusion of the seat choosing functionality was a initiative of MobiComp, and the client was pleasantly surprised. This was the first Portuguese m-commerce service.
In 2001, TMN (a subsidiary of PT for mobile communications) launched the Internet and WAP portal MyTMN, developed by MobiComp. In 2002, MobiComp develops for TMN MMS-based services, namely a goal information service related to the World Football Championship. MobiComp was one of the first companies in the world to conceive a MMS-based service.

In 2003, TMN launched its GPRS portal, called ‘i9’ (read ‘innovate’ in Portuguese), an evolution of MyTMN. MobiComp again develops several services included with this portal. For example, all MMS-based content services; pre-written MMS easy messaging; a service that allows sending a traditional postcard with an MMS; and all premium contents billing. The Lusomundo mobile ticket service was integrated by MobiComp in the i9 portal, and now also provides movie trailers. MobiComp developed content management and billing software for i9 that allows content providers to create MMS services.

MobiComp is also working with Portugal’s biggest private bank, Millenium BCP, on its mobile banking solutions. It is also developing services for mobile operators, namely ‘Mobile Keeper’, which allows the user to store its data in the operator, avoiding the loss of information. MobiComp is preparing its internationalization, based on local partnerships. An office in Spain was the first step in this direction.

**YDreams**

YDreams was created in June 2000. YDreams’ CEO is António Câmara, who had his PhD from Virginia Tec, USA. After his PhD, he returned to Portugal, to teach in Lisbon’s Universidade Nova, and worked in several environment and geographical information systems projects. António Câmara and four other Universidade Nova researchers wanted to create an IT laboratory similar to the MIT MediaLab (where some of them had worked), but concluded that this kind of structure would be difficult to set up in Portugal, due to the lack of corporate/university ties. YDreams was created in Universidade Nova’s Technology Park, not as a university laboratory, but as a private firm. The location allows the creation of synergies between Universidade Nova and YDreams, in terms of investigation and work force (both University students and teachers work at YDreams).

YDreams’ mission is to give life to the mobile lifestyle, developing innovative interactive applications, services and entertainment. In the beginning of its activity, YDreams was contacted by Portuguese mobile operator Telecel (now Vodafone) to create a map channel to its Web/WAP/PDA portal. This map channel was a success, and was given by Motorola its highest rating – Motorola considered it ‘superb’. The company has two main business areas – Mobile Location-Based Applications and Entertainment/Image Processing. In terms of mobile services, YDreams has the advantage of employing experts who have studied applications for wireless communications at least since 1993. Additionally, YDreams has state-of-the-art technology for real time image processing in mobile phones.
In 2001, YDreams developed a WAP portal for the Seville trade show ‘Feria de Sevilla’, enabling visitors to find stands and people, which proved to be a success. Since 2001, YDreams has been working with the Portuguese National Water Institute to provide a mobile information service about the water quality in Portuguese beaches, first in GSM WAP and recently in GPRS. Users can also access the information online or through SMS. Regarding location based services, YDreams has developed several applications for the Dutch Agricultural Ministry and Lisbon City Hall.

In 2002, YDreams started commercializing games for mobile phones. The company has a distribution deal with Vodafone Portugal, which can be extended to other Vodafone branches; a deal with Portuguese operator Optimus; a distribution deal with a network that is present in 60 countries; a deal with Germany’s biggest games portal; and a deal with one of China’s biggest mobile operators, China Unicom. The business model for mobile phones gaming is based on a 50/50 split between operator and game producer. YDreams implemented a new business model, with an innovative billing system based on SMS, issued by each time the game is played. These SMS are billed to the customer, who is not aware that SMS are being sent.

In 2003, YDreams created YLabs, in charge of the R&D side of the company, and of making the connection with Universidade Nova. YLabs projects are funded by different entities, like the European Union and Portugal’s Agência de Inovação (Innovation Agency). YLabs created several installations, demos and participated in a theatre play. YDreams is collaborating with several hardware manufacturers (Alcatel and Nokia, for instance) to prepare demos and services for UMTS.

YDreams also created Web-based services (for example, the reality show ‘Big Brother’ Web forum for Portuguese Channel TVI and Endemol) and Interactive TV services (namely, a game room for TV Cabo Portugal). YDreams also participates in less traditional projects, like a project for European Space Agency that involves creating suits for civil protection and firemen with an integrated communications system.

YDreams is expanding its international network, and plans to create a branch in the US – because of the connections its management has there, and also because of the potential of the North American market. Brazil is another strategic market for YDreams, and a branch is being opened there, with several projects in the pipeline (for instance, contents for Brazil’s largest mobile operators).

**Comparison**

Both MobiComp and YDreams were founded in 2000 and both have university ties; the former to Universidade do Minho and the latter to Universidade Nova. MobiComp’s university links are weaker and function essentially as a source for qualified labour. On the other hand, YDreams’ management have teaching
positions at University Nova and the company conducts R&D in conjunction with Universidade Nova – its premises are situated inside the university campus.

Although MobiComp has a mobile focus in its activity, entertainment and media is only one of its areas; the others involve banks; retail; mobile operators and professional services (its final clients are in the corporate and consumer sectors). YDreams’ activity is centred on mobile entertainment services (its final clients are mostly consumers).

MobiComp is situated in Braga, in the north of Portugal – the quality of living of Braga and Universidade do Minho had an influence on the localization of the enterprise, since most of the clients of mobile-based services are located in Lisbon and Porto, Portugal’s biggest cities. YDreams is located in Almada, to the south of Lisbon.

MobiComp has 14 employees; YDreams has 32. All of MobiComp’s employees have a technological background. YDreams employees have a more diversified background (for example: environment, design, management); 72% have a technological background. One of MobiComp’s employees has a post-graduate course. One third of YDreams employees are post-graduates.

Both enterprises grew, in number of employees, sales and profits, during a period of crises in IT and in the economy as a whole.

**Innovative behaviour, innovation sources and innovation obstacles**

MobiComp and YDreams consider themselves to be among the most innovative companies of their sector internationally. The innovations they introduce are mainly international innovations. The types of innovation introduced by both enterprises are diversified: new technological options, new concepts of service; new forms of interacting with costumers; use of new distribution channels; new business models. Organizational innovation is scarcer, although YDreams considers that it innovates through the use of a multi-functional custom-built Intranet.

The most important innovation source for both companies is internal and external R&D, followed by qualified labour. Contact with technological partners and information feeds are also important. YDreams puts an emphasis on the relationship with costumers. Key competences are open-mindness, creativity and technical know-how.

The main obstacle to innovation, for both companies, is the small size of the market – even though this small size of the market is also cited as responsible for Portugal being an excellent test market. YDreams also cites the reduced dynamism of demand, the inadequate policies for the sector and the peripheric Portuguese localization as obstacles for innovation.
Innovation and knowledge management and innovation protection

Innovation and knowledge management, in a formal manner, is rare. Both companies have R&D departments (YLabs, in the case of YDreams). Due to the small dimension of the enterprises, knowledge management is informal and often based on meetings and e-mail. YDreams makes use of its Intranet for innovation and knowledge management uses.

Neither MobiComp nor YDreams consider the registration of intellectual property important to protect innovation. The following innovation protection methods are considered very important: confidentiality; maintaining human resources; being ahead of competitors; market reputation.

Innovation and competitiveness

Both companies consider innovation to be fundamental for its competitiveness, and base their mission and strategies on innovative behaviour. Both enterprises estimate that more than two thirds of their sales result from innovative products and services.

Model for innovation in entertainment services in the Portuguese mobile communications sector

Figure 8 shows a model for innovation in mobile-based entertainment services, based on dimensions of innovation, sources of innovation and innovation environment (obstacles and incentives). The dimensions of innovation were adapted from the four dimensions of the den Hertog and Bilderbeek innovation model (cited in Mamede 2002, p. 18): new concept of service; new interface with client; new system of service (new business model) and new technological options.

The fact that the companies deal with emerging technology and platforms determines that they innovate in terms of new technological options. These new technological options, associated to the creativity of the companies, generate new business concepts – concepts that, by the interactive nature of the services, explore new forms of interface with clients. The exploration of new technologies and new concepts of service, associated to the need of profitability, can generate new business models (generally, variations of mobile commerce, or m-commerce). The key competences of both companies (open-mindness, creativity and technical know-how – University ties having an important role in this regard) help them through the innovation process.
This innovation process in mobile communications has another important incentive: the high penetration rate of mobile communications, coupled with the small size of the market, turn Portugal into a good test market. International players can establish partnerships with innovative Portuguese companies to test a service, and then leverage that experience internationally. MobiComp and YDreams are, apparently, trying to ‘ride the wave’ of internationalization, since the small size of the Portuguese market is often an obstacle to accomplish a critical mass of profitability through innovation.

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*Público – Computadores* (2003a) Portugal foi dos primeiros a trocar MMS entre todas as redes, 10/2/2003, p. 7.
International Comparison of Mobile Entertainment¹

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Abstract:
This paper presents the central findings of MGAIN (Mobile Entertainment Industry and Culture) -project Work Package 6: Benchmarking mobile entertainment: technology, business and culture (MGAIN D622). International comparison was made between Asia-Pacific, Europe and North America. Information was gathered in 2003 from available literature, industry seminars and depth interviews.

MGAIN focuses on future possibilities of mobile entertainment. Still communication is a central driving force of mobile technologies, but the use of wireless applications is highly fragmented and depends on user demographics and lifestyles. The most common tool for wireless communication is a mobile phone. The basic premise of a mobile phone is that it is a voice-centric device. User's first instinct to extend the concept of communication is to include new services such as instant messaging and e-mail (IDC 2002). In the near term, communication applications will remain closest to being a ‘killer application’ of the wireless world. Development in the area of mobile entertainment (ME) is also increasing globally and locally. Especially local differences and phenomenon will determine the future authority relationship of ME industry. Only Japan has been able to form a type of mobile entertainment culture with magazines and cultural events connected to ME content. Instead the technological standard development and shared visions of technological development are general. Technological focus is on pervasive computing, mobile multimedia communication/computation devices, location/context-/group-awareness, security, broadband and smart environments. Europe should create some kind of shared ways to promote and support European mobile content industry in able to remain competitive.

Keywords:
Asia-Pacific, North America, Europe, comparison, mobile, entertainment

Basic premise of the study
Currently the interest in wireless applications spans a broad spectrum, especially towards entertainment solutions. Ringtones, logos and games are most strongly advancing the development of mobile entertainment (ME). Mobile Entertainment is in the range of entertainment, games industry, technology development and telecommunications. The development of mobile entertainment is relatively technology driven because the mobile content industry is still immature. For example mobility has not been extensively used, and the tendency has been first

¹ IST-2001-38846 – Mobile Entertainment Industry and Culture EU-research project.
Towards more powerful and capable handsets. Users and cultural factors are crucial even though currently the ME industry is heavily driven by technological development and innovations. Mobile content have been one of the technological genres where the usage cultures between boys and girls have been different from each other. Also the digital content user base is different in Asia when compared with Europe and USA. This is due to more general cultural trends and habits. An average US mobile phone user is on the phone 458 minutes in month compared to Germany at 72 minutes, France at 156 minutes and Japan at 170 minutes. Even Canada, at 270 minutes per month, is well below the US average (eMarketer 2003). What is also characteristic to North American markets is that it is enterprise solution driven, where Europe and Asia (Japan) are more consumer application centred markets.

There are one billion mobile phone users in the world but not all of them are willing to play games or enjoy entertainment content as such. Anyhow the division between hardcore gamers and casual gamers – despite the naivety of the division – is usable for understanding the young, active, entertainment-driven users, and other possible target groups. But the division between these two groups is superficial, it is integral to study user groups of mobile content much deeper. The future of mobile entertainment is not only ringtones and logos or games but it is developing more towards experience design for several purposes. Cultural issues, content and technological factors will be closely inspected.

**Local cultural factors**

For the international comparison we chose three areas; Europe, North America and Asia Pacific because these three areas represent in average the three stages of development of mobile entertainment industry. Especially Japan and South Korea as the follow-up have already advanced mobile phone and mobile Internet, Europe has several technical and content-based innovations but the industry is developing differently because of e.g. cultural and network technological differences. North America, especially the United States is a strong player in entertainment industry and communications but has been lagging behind other countries because of the disorganized domestic markets and the broad range of technological solutions. Anyhow, it is already visible that the roles are about to change and new markets like China are rapidly developing.

**Asia-Pacific**

The selected countries: China, Japan and South Korea are the most active ICT societies in Asia. Japan in the current trendsetter in mobile connectivity and mobile entertainment. Japan is also globally very influential country by its popular culture. China is the largest consumer market in the world and it has been heavily developing since the 1990’s. Even though China is behind of Europe on level of mobile phone penetration, rich content development or foundation of user cultures, China is taking examples from Japan and Europe but also soon developing own type of user cultures and services. South Korea has its own specific character
through the high broadband penetration, unique online role-playing market and rich visual culture besides gaming.

- Japan (population 127.2 M, mobile phone penetration 65%, internet penetration 46.4%)
- China (population 1.2 B, mobile phone penetration 8.1%, internet penetration 5.2%)
- South Korea (population 48.3 M, mobile phone penetration 82%, internet penetration 56.1%)

**EU-25**

European Union population stands at 548.1 million (from May 2003). From the viewpoint of telecommunications, Europe is significantly uniform because of the broad use of GSM network standard. Linguistically and culturally Europe is a fragmented market. From the viewpoint of mobile entertainment, when counting the number of consumers but also the number of leading developers, the central market areas are Germany, France, Spain, Italy and the UK. Due to the early rise of mobile phone penetration in Scandinavian countries in the beginning of 1990s, Scandinavia is still one of the leading countries when counting the penetration of whole ICT spectrum. Also several new mobile innovations – advancing the ME market -- have been developed in Scandinavia.

- The UK (population 59.8 M, mobile phone penetration 84%, Internet penetration 41%)
- France (population 59.8 M, mobile phone penetration 65%, Internet penetration 37.2%)
- Germany (population 83.3 M, mobile phone penetration 72%, Internet penetration 53.9%)
- Italy (population 57.7 M, mobile phone penetration 93%, Internet penetration 34.2%)
- Spain (population 40.1 M, mobile phone penetration 82%, Internet penetration 33.7%)
- Scandinavia (Denmark, Finland, Norway, Sweden) (population ~24 M, mobile phone penetration ~89 %, Internet penetration ~59.6 %)

**North America**

The United States and Canada constitute the largest Internet market in the world and are rapidly obtaining a more significant role in mobile content consuming as well. The US and Canada have been grouped together in the paper because they are in many ways different from each other, but in the mobile communications these countries have been found to be rather similar when looking at the user
habits or network grounds. CDMA and TDMA network standards have been developed in the US. North America has a long history of mobile communications in use for a long period of time with pagers and several mobile business devices like Palm Books. What is characteristic to North American markets is that it is enterprise solution driven, differing greatly from Europe and Asia, which are more consumer application centered markets.

- United States of America (population 280.6 M, mobile phone penetration 50%, Internet penetration 63.2%)
- Canada (population 31.7 M, mobile phone penetration 37%, Internet penetration 53.1%)

**Global technology trends, local barriers**

General technology trends are global. Pervasive computing, mobile multimedia communication/computation devices, location-/context-/group-awareness, security, broadband and smart environment were brought up many times in expert interviews and seminars. The technological development will not be the leading force of the differentiation of mobile entertainment markets. More than that, the phase of general technological development and the development of information societies will be leading the differentiation. It is evident that countries like Japan, Korea, Germany, Sweden, and Finland will remain as the leaders of innovative technological concepts and content.

Mobile entertainment is advancing worldwide by the development of network technologies and other relevant mobile-related technologies. The development towards integrated media devices is comprehensive and thus different forms of mobile communication and computing should not be looked as separate development but understood in the context of integrated devices. There are parallel mobile platforms available for various purposes. Palm is not anymore a credible competitor even though iPAQ type of Pocket PC’s has their uses. The handset is central to a customer’s experience of mobile services. The experience will further develop through virtual communities and social interaction that are global trends on the Internet and soon also in mobile phones. Virtual community of content using customers is beneficial for the content developers. In the past, mobile operators decided how good or how bad the game was, and gave visibility to the content providers based on their own evaluation. Now, the customers in virtual communities evaluate and decide for themselves. Virtual community includes services to the customers such as reviews of the games, critiques, and evaluations. This all together has created a new mechanism for game popularity, and it has changed the earlier situation dramatically.
Technology trends

Technology will remain as a form of competing. Network and basic enabling technologies will develop similarly but new innovations like the Japanese idea of using mobile phone’s camera in a mobile game was unique and developed the concept for the whole industry. Technically Japan have certain advantages, one of them is the fact that NTT DoCoMo invented i-mode in the early days of mobile communications (1999). The integration of Internet into mobile phone created a totally different starting point for the development of mobile content, again not to forget the cultural issues as well. General techno-savvyness advances the employment of new mobile technologies. Currently, one of the most popular mobile (entertainment) devices is a car navigation system that is installed in almost every new Japanese car, and is widely seen in use. In mobile phones, one of the most popular technically advanced ability has been the same, location-awareness. On mobile phones gourmet-seek and classical (arcade) games are the most popular forms of content. User identification in general and biometrics are also another trend that seemed to be very central, especially in China. Similarly to Europe, also Japan develops digital television system advancing at the same time the development of mobile technologies. In Japan and in Europe there are e.g. versions of mobile television. Mobile television and other device integrations will technically shape the future form of mobile entertainment. Entertainment is also believed to be use for serviceable purposes. Utility games, designed to separate relevant information in a nice way from the ‘information overload’ situation, is one possible line of development. This will already in itself broaden the target groups of mobile entertainment. Also communication, dating applications and social possibilities (virtual communities) are heavily gaining popularity around the world.

Currently Europe is not united in the ME markets. Without unity Europe cannot compete with other regions in the field of global ME markets. The advancement of technological unity is partly complicated by the cultural, lingual and economical differences. Europe as one large market should understand the values of local cultural issues for the production of valuable mobile experiences for international users. The good thing in Europe is that there is a lot of technological and content-based development going on but the lack of involvement in BREW (Binary Runtime Environment for Wireless) can be fatal. BREW is utilized in North America and South Korea and to a lesser degree in Japan by KDDI and in China by China Unicom. BREW is a very strong platform but at this phase the global dominance of networks and interoperability between different communication networks is believed to be the key to global success (Tercek 2003, Costikyan 2003).

Three trends in handset evolution

General Manager or Service Development Department au Strategic Planning Division at KDDI Corporation, Yutaka Yusada (Yusuda 2003) mentioned that the
handset market trend will be from a growth in quantity to a growth in quality. He outlined three trends in handset evolution, which included:

- Remote control for applications such as a TV or remote monitoring of places
- Utilising local information such as enabling car and human navigation and
- Management of personnel products and vehicles, and
- Substituting for a wallet or a commuting pass thus containing personal and attribute identification.

Multiple media ideas have heavily broaden the ideas of mobile gaming and the diverse possibilities to play with mobile phone in connection with other media. Currently BREW in US and South Korea, Java and SMS in China and Europe and I-mode in Japan are defining the content development. Having an oligopoly position, Asian operators won’t open the markets for other players. In Europe this situation is handled with firm regulation to enable free competition in the telecom markets. Also, the diversity of platforms is currently a problem for smaller companies as well as high prices of data transmission due to operator policies. The concept of using WLAN for public hotspots is a central area of interest around the world. Across Europe a number of operators have started deploying cells in airports, hotels and train stations, and a range of consolidators enabling roaming, such as iPass, have emerged. Most observers conclude that WLANs and cellular phones are complementary services since they provide different data rates and different ranges (3GSM 2003). Regulatory wishes and concerns are closely connected to technological issues included the future usage of location information (customer privacy), and that the regulation should result more services to customers, minimise side effects and maximise service potential (Ylianttila 2003).

**Course regulations**

There are four general bases for consumer market segmentation that can be applied also in mobile entertainment: demographics, geographic location, psychographic segmentation, and behaviour in regard to the product or service. The ME market is developing differently in various countries and currently the global ME and mobile culture is still vague. Mobile entertainment is strongly targeted towards youth because young adults (20-30 year olds) have been considered as ‘players’ (all-round user of mobile devices) but the segmentation is not yet clear due to the unestablished usage culture and fragmented user groups. The relevance of senior segment have been noticed especially in Asian countries where there are content specially targeted at seniors as for example housewives.

Another important factor regarding mass-market adoption of ME is the role of the large technology, media and entertainment companies like Microsoft, Warner,
Disney and Nokia (N-Gage). Even though the first step taken by Nokia N-Gage team might fail, the effort Nokia gives to European ME industry is significant and thus it advances the market as a whole, both in the level of technological and also in the concept/content development. It is foreseeable that the US might catch up quite fast considering Europe’s rather short lead of one year. Although European penetration levels are considerably higher and therefore likely to include a larger number of low spending consumer segments, US consumers, with an expenditure on electronic media and entertainment beyond the $100 billion mark, might soon have generated a more developed ME market. The problem of US is its fragmented and slow market which otherwise is very powerful and dominant on many levels of content creation. Youth are supposed to be the heavy users of mobile entertainment at the first phase in USA as well. As for content, ringtones and logos have been a smash hit globally, games are still more a niche success and currently still mostly local. The leaders of the trends are rather general trends of ICT: ease-of-use and familiarity. Timing is essential and in the future will be differentiating factor.

Van Dusseldorp (Smith 2003) study state besides SMS, multiple media (cross media) solutions are a big hit in Europe. The most popular forms to be:

- Voting (Big Brother, Pop Idol)
- Game/quizzes (Millionaire, The Weakest Link)
- Games
- Chat (teletext, chat, dating)
- Messaging (iTV)

**Global brands, local trends**

Currently the market of mobile entertainment is going global but the content trends and technologies are pronouncedly local. Chinese mobile game manufacturer Enorbus stated: ‘We have found local cultural trends to be far more popular than the others, especially with it comes to branded content. Games and content based around the latest Hollywood film rarely holds the same value to our users as Asian based pop icons’ (Colby 2003). The division between global markets and local trends is relevant in the broad context. The broader culture of electronic games will enable the comparison with mobile entertainment. Electronic games have developed since 1950’s but more effective since 1970’s in the range of popular culture, classical board and card games, playability and technological development. Currently the game trends between e.g. Japan and the US are relevantly different outside manga-type of expressions. Anyhow, the players and content developers act globally. For example in Europe there has been modification to certain mainstream games due to local regulations and tastes. Also in ME industry, it is good to view the markets on global scale but understand unitary as well as distinct design styles of usage locally.
The culture of mobile games or mobile entertainment has not totally formed yet. Instead it is a collection of different embodiments from entertainment culture, console games and telecommunications. The cultures will develop by broader user penetration of mobile devices, developing common networks and production technologies as we as more fixed content forms. Mobile devices have been very effective in formulating new types of youth user cultures and through that, on the content level, boy and girl cultures have also a strong effect on the forms of mobile content. The youth have been the leading user segment in employment of mobile content and innovative new usage for mobile devices. Fears of technology, open-mindedness and experimentation have stigmatized the growth of youth and strongly affect the current use of technology (Coogan & Kangas 2001). In North Europe also younger children are getting involved with mobile entertainment more than mobile communications. The most popular way to use a mobile phone is playing games (girls 70%, boys 73%). Calling (girls 62%, boys 55%) is the second on the list (Suoranta 2002).

**Pioneer users**

The young have been often used as a synonym for an innovative user (Chesbrough 2003). Innovation has been scarcely defined as doing something in a new way. The actuators are technology push, market pull as well as social pull and users needs. Europe has in many ways been a forerunner in global evolution of mobile technology. User base of digital content is different in Asia when compared with Europe and the USA. There are several reasons for this. One reason is the previously mentioned cultural difference. Manga books cover nearly half of yearly book sales in Japan and are very popular in South Korea as well. Anime style has a strong effect on other forms of popular entertainment as well. The other reason is the style of Asian people and the type of childish behaviour. Even though in Asia the heavy users are the same than in Europe, mobile entertainment has also been targeted from 30-40 year old men and wealthy housewives in South Korea (Woo 2003), to middle age and senior citizens in Japan (Sambe 2003, Kobayashi 2003). Again cultural issues both at the level of local cultures, user cultures and gender/age should be heavily taken in consideration.

Also essential to point out that the young are not one large user segment but highly fragmented by age and gender. The communication trends are somewhat similar between boys and girls, only girls are more active in communicational use of the phone. Girls make longer and differently structured calls, while boys claim to use the phone sensibly, just when they need to use it. They do not chitchat the same way as girls do (Pedersen 2002, Kasesniemi 2003). Mobile content use is significantly different from the communication use because the content types and usage patterns are more culturally determined. Logos and ringtones have been fun for both genders, but games or other forms of entertainment with a history in other media already have dramatically different acceptance (Sambe 2003, Suzuki 2003, Tanikawa 2003).
Brands and marketing

It is presumed that the multi-user communities of the Internet will in some way expand to mobile phones. The same trends have also been brought up by large consumer electronics and IT companies like Microsoft and Sony. Microsoft believes in interlinking X-Box to MSN community services and Messenger as well as to some mobile device like wristops. Sony is significant content development company, currently developing PlayStation console, PlayStation Portable (PSP), consumer electronics like portable music devices and televisions. Sony consortium empowered by Sony Ericsson’s communications knowledge is a strong player in the future markets of multiple mobile media (Aikawa 2003).

Japan and South Korea in itself are already interesting markets. Currently the highest interest towards China is in the form of potential user base. Chinese mobile entertainment companies (e.g. Linktone and Magisoft) have also heavily supported this view. The wide user base enables testing of new niche contents and products but also makes it possible to easily reach million of users within one area (Shujun 2003). China is full of promise for enormous success when compared to Europe is prodigious possibility. But again cultural differences will have an important role in the mobile entertainment business. Currently cultural differences will play an important role in the global market of mobile entertainment. Local content, narrative and illustrative styles have immense effect on the content business.

Roleplaying games based on Asian history, cute anime characters (kawaii) as well as love- or train-simulations are issues that are not common in western countries nor are they always understood. Brands are currently leading the markets but it is also possible to create new brands. What is interesting to notice is that social interaction with other people seems to be more important than branded content. Especially dating services were popular all over the world and also multiplayer games gained over million players in China and South Korea. Entertainment in general is important whether in a form of a chat, dating service or utility games. Entertaining communication and information delivery is increasingly important due to ‘data overload’. Information is available around the user through different media channels or the information is ambient. From ME perspective there might be a way to fetch relevant data and interesting information for personal and business use. Entertainment will be used as a style or form to deliver data to casual gamers or users in general (compare to utility games).

Cultural sphere of influences

Globally the field of audiovisual culture has expanded and the borders inside the industry have been broken. Popular music, movies, comics or computer games as such do not have separate, clearly marked areas anymore. This has affected the recycling and fusion of themes, brands and ideas. Pokemon phenomenon is one good example of the development. Pokemon is not only trading cards or games;
It’s a broad culture of its own. There are certain similarities between different continents on the way the cultures form and how they affect other cultural forms. Globally brands are essential but in developing markets like China, where there are still a lot of piracy, the brands are not similarly important (Zhang 2003). Also a distinction needs to be made between relevant and irrelevant branded content. The average Hollywood movies does not hold much sway over Chinese users, while comic books from South Korea may generate more intense response. Brands from China or brands that are available in China, are important, but not essential, useful but not necessity (Colby 2003). The questions for future mobile devices will be: 1) How to personalise, 2) to entertain, and 3) to communicate? Content trends shall partly follow the general trends of electronic game and popular culture with Love simulations, ‘Photostudios’ and classical arcade games in mobile.

Drivers for content are music, games and city information (Tercek 2003, Raiskinen 2003). Currently popular games include arcade games, boards games, card games, and gambling. In Korea three-dimensional content is currently not an important issue as the first 3D-accelerated phone that has just been introduced by South Korean Telecom (SKT). Instead in Japan Macromedia Flash, 3D and video enabled phones are already in production.
The evolution of entertainment content has been technology driven worldwide. First generation of mobile entertainment has been SMS text message based, and the second generation is downloadable content. The third generation is expected to take more advantage of the mobility of the users, devices and usage contexts. By the development towards 3G content a parallel and influential development streams: pervasive computing, multiple media, tangible bits, location-, ground- and context-awareness and social local user innovations will enrich but also share the industry of mobile entertainment.

**Local user innovations**

Several ICT and mobile technology future forecasts have stated that the future of ICT is ‘right information at right time, in right place/context, on right devices, in right hands’ (Levin 2003, Park 2003, Södergård 2003). Any content should be accessed anytime using any ICT terminal available. The activity of the young, breakthrough of mobile phones and evolution of wireless internet in Japan (technology push, market pull) has been the main driving forces in the ICT-sector and will advance local user-driven innovations (social pull and user needs) in the near future. From the wider perspective the culture of mobile entertainment (in a broad sense including economical, social and political issues) will shape the subcultures of European, US and Asian electronic entertainment and will change the computer hobby from the programmers, hackers, chatters and gamers to a wide range of other embodiments. As the youth have been the heavy users of electronic games and innovators of mobile media, and because they are also under
the magnifying glass of the marketing people and trend seekers, it is justified to look at the early signals of mobile youth cultures from that perspective.

Multiple (cross-) media is a general form of the development of future networks and mobile services. People and involved on a regular and occasional basis with several different media at any given time. In the future, it is believed that people will act actively in a media environment that can be studied by multiple media approach. With multiple media we mean the way the same content is accessed through many kinds of static and mobile terminals including computers, television sets, PDAs, cellular phones, MP3 players, electronic books, traditional print and other devices. The force carrying local user innovations is the fact that information is already in the possession of and generated by the users. Local information is more personal and comes from in-house use. Context sensitiveness and local area communication are the keys in youth communication. Local innovations needs were created along with utility games, because the choice between mobile and the other devices is based on the following criteria: urgency of the matter, cost, privacy, convenience, the internal relationship of the communicators or the current state of this relationship, or the need for group messaging (Coogan & Kangas 2001).

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

Utility games deal with and mix the primary need that the media industry satisfies:

- Information, including education (usually rational needs)
- Entertainment (usually emotional needs)
- Advertising (rational and/or emotional needs).
Conclusions

Currently there are extremely interesting local mobile technology and culture evolutions going on around the world. From Europe’s perspective, Europe should unite and consider itself as a combination of countries and cultures. Also European companies should not despise US innovations like BREW. The industry of mobile content, lead by mobile entertainment is still developing in the different parts of the world. A type of mobile entertainment culture has been formed only in Japan. Technological standards and shared visions are for the good of everyone. European players should support that ambition. Europe should also create some kind of shared ways to promote European mobile and content industry. From Europe’s perspective, South Korea is very interesting country due to the efficient governmental support systems to mobile content development (Game Infinity). Korean Game Promotion Institute - Game Infinity – has made public its ambition to be the world leader in games and mobile content in 2007. Probably Korean Game Infinity would not be a suitable form in Europe but in the area of technology and culture, there are several pan-European efforts underway. European actors should find better ways to co-operate or join forces in order to compete in the field of global mobile entertainment market. Also, Europe should not look down on the USA or China because of their current state of technological development, as they seem to be coming strong and the real struggle between the dominance of global ME markets will take place after 3G systems and devices have become general.

Mobile industry actors should a) understand the values of mobility in content production more strongly and b) widen the current user base drastically to be able to support the growth of the industry. When the industry of mobile entertainment will become more global, or the broadcasted information is too general, users expect personalised content and emotional data transfer and information delivery via their mobile phones (Raiskinen 2003, Sommerer 2003). The evolution of 4G-networks model is one alternative, the other example can be found in Japan. Mobile Internet is the local market, while wired Internet is global. When mobile phones are connected to computers, the division between the local and global market will seemingly disappear, but the division should always be clear in the matter of security. The user control level depends on the usage situation, whether the user is handling personal content (stored in the phone), or global content (on the Internet).

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**Interviews**

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David Levin, Symbian (USA) Greg Costikyan, (USA)

Hiromitsu Aikawa, Sony Ericsson (Japan)

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Mobile-Entertainment: User-centred Perspectives

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Part 2

End Users and Consumption
Understanding Consumers’ Understanding of Mobile Entertainment\textsuperscript{1}

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Abstract:
This paper looks at the consumer perception to developments around mobile entertainment. After providing a brief overview of the current state of the mobile and mobile entertainment markets this paper details focus group research undertaken in the UK, Sweden, Finland and France involving actual, potential and non-users of mobile entertainment. It highlights six recurrent themes emerging from the research: ‘Clarity’, ‘Compactness and Coolness’, ‘Complexity’, ‘Convergence’ – the four Cs - and ‘Access and Affordability’, ‘Age and Context Appropriateness’ – the two A’s . Moving away from the digital optimism of commercial market analysts the authors argue that there is utility in understanding consumer perceptions of the use of current and future technologies and micro-level behaviour in order to inform planning and foresight at a macro level. Implicit throughout the paper is a belief that a particular focus of users’ understandings and practice had significant value in supporting development and implementation of mobile entertainment.

Keywords:
mobile phones, mobile gaming, mobile entertainment, 3G, consumer research, users

Introduction

The mobile phone is now firmly embedded in consumers’ everyday lives throughout Europe and in many states has become a near omnipresent technological artefact with ownership outstripping that of landline phones. During this process of diffusion and assimilation the under-thirty market has demonstrated regular and heavy use of SMS and mobile phone calls and are currently being seen (along with premium rate business users) as the potential economic saviours of European mobile telecommunications faced with unusual economic circumstances:

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In April 2000 the UK government happily received £22.5 billion from the auctioning of third generation (3G) spectrum licenses for the next generation of mobile phones. Similar auctions shortly afterwards in France and Germany netted the respective governments £12 billion and £32 billion. Despite Finland and Luxemburg allocating licences for free, about £220 per person throughout Europe was spent on the battle to control slices of the mobile phone airwaves.

The problem is that this feeding frenzy has to be paid for. In September 2002 in Germany Mobilcom came desperately close to bankruptcy and in March 2003, Graham Howe, the deputy chief executive of Orange, said that he did not expect 3G services to become a mass-market proposition for another 3 years. As such, throughout Europe mobile operators are searching for new ways to catalyse sales of new handsets, increase the amount consumers spend on profitable data services and, at least partially, recoup these considerable sums of money spent on 3G licenses. ‘Mobile entertainment’ (ME) - which includes not only gaming but also gambling, adult services, music and location based services - is recognised as the most promising fillip for the industry.

There is perhaps some rationale behind such optimism: In the United Kingdom alone 1.65 billion chargeable person-to-person text messages were sent in January 2003 across the four UK GSM networks (‘SMS text messaging hits all time high in the UK’, Mobile Data Association, 2003). SMS signals a success story for the industry, supporting as it does peer-to-peer communication but also mobile information and entertainment services such as news, sports, weather, horoscopes and downloadable ring-tones and icons. Anyone who has spent time watching television in Europe throughout the last few years can hardly have missed the way in which programmes such as Big Bother, Pop Idol, I’m a Celebrity, Get Me Out of Here, etc have involved viewers and generated income through SMS voting.

However, it is a long leap from SMS to assuming that mobile entertainment more broadly understood will become a successful market across Europe. While much commercial research has, unsurprisingly, been enthusiastically optimistic about diffusion of technologies and use of ME services some analyses make sombre reading for the industry. The Wireless World Forum (W2F) argues that it is unlikely that MMS will match its hype and become as widely accepted as SMS. Despite upgraded capability of colour, audio and graphics, W2F maintains that a migration of users from SMS to MMS is improbable (‘Multi-Media Messaging 2002: The Big Picture’, W2F, 2002). W2F’s results are based upon statistical data and interviews with wireless industry executives which prompts the question, ‘what do consumers themselves think about the adoption of mobile entertainment?’

Such information is useful because it facilitates the informed development of new devices and services to meet consumer needs as well as highlighting areas of consumer knowledge and expectations which will need addressing by providers. As such the analysis contained within this paper aims to provide a useful
exposition and understanding of the practices and discourses which users bring when engaging with Mobile Entertainment. To do this the paper draws upon a series of focus groups with a diverse range of consumers from Britain, Scandinavia and France which we undertaken during 2003.

‘Does this count as entertainment, what I’m doing now?’

A primary difficulty we face when researching mobile entertainment is that of definition. As the above quote from a focus group with young French consumers demonstrates, it is not always clear to consumers exactly what ‘mobile entertainment’ is. The problem of producing common understandings of what mobile entertainment has been previously highlighted by the Mobile Entertainment Forum (MEF) when stating that ‘[t]wo different industries make up the mobile entertainment industry: entertainment and telecommunications. Mobile entertainment is created as the convergence of both industries. Each of these worlds speaks a different language, and holds different assumptions about the nature of its work’ (‘Terminology of Mobile Entertainment: An Introduction’, MEF, August 2003). If industry specialists have difficulty in agreeing the parameters of mobile entertainment what do current mobile consumers make of it?

Recent research demonstrates that many consumers are unclear about the mobile entertainment and related wireless technology options available to them. For example, a Packard Bell-sponsored survey of nearly a 1000 British home PC users found that 70% of respondents did not know what Wi-Fi was (‘Knowledge of Wi-Fi Hotspots’ MORI, April 2003).

Elsewhere (Moore & Rutter, 2003) we have defined mobile entertainment as ‘any leisure activity undertaken via a personal technology which is, or has the potential to be, networked and facilitates transfer of data (including voice, sound and images) over geographic distance either on the move or at a variety of discrete locations.’ While perfectly workable, in certain ways we might regard our definition as overly technology-centred: The social aspects of mobile entertainment are hidden within the phrase ‘any leisure activity’. However, it is vital to see ME as an activity embedded within user routines, ‘inconspicuous consumption’ (Shove & Warde, 2002) and the technology of everyday life in order to gain an understanding of the domestication of technologies. A lead here can be taken from the way Schroeder (2002) looks at the role that cars, television, and telephones have played in increasing ‘the diversity of leisure and sociable activities in industrialised countries’ (2002:2). He warns of a common misperception with regards print, communication and transport technologies:

It is not primarily that new print media provides users with the (instrumental) means of access to a wide world of knowledge, or that cars and other forms of transport provide the means to get places more quickly. Instead, reading and driving become leisure activities in themselves’ (2002:5).
We believe that this is true of mobile communication technologies. The focus of this study is mobile entertainment, namely using entertainment services such as mobile games, as a source of entertainment (that the industry hope will prove profitable). It is worth remembering that for many consumers the mobile communication device represents a leisure activity *in itself*. This is borne out by the popularity of SMS, of downloading ring-tones and of the e-mail/chat functions of the mobile Internet (Sidel and Mayhew 2003). For an industry concerned with developing and marketing new innovative mobile entertainment services, it may be difficult to consider the communicative functions of the mobile device as themselves a leisure activity amongst consumers. However, participants in our focus groups often emphasised the importance, above all else, of mobile devices as communicative devices. The use of mobiles has become a leisure activity to rival others in contemporary social life.

The paper below is divided into six main sections each of which addresses a key theme that emerged from focus group research. Below the themes ‘Access and Affordability’, ‘Age and Context Appropriateness’ (the two As) and ‘Clarity’, ‘Compactness and Coolness’, ‘Complexity’, ‘Convergence’ (the four Cs) are looked at in more detail, whilst we highlight their significance for the current and near future success of the mobile entertainment industry in Europe.

**Theme 1: Access and Affordability**

This theme predominately relates to European consumers’ *willingness to pay* for mobile entertainment products and services. If European consumers are to take up mobile entertainment with enthusiasm then it has to be not only financially viable for the industry players to develop and run, but also financially viable for the consumers to access. The focus groups we ran with younger consumers for example demonstrate that whilst some potential young consumers may find the technologies and services on offer extremely ‘cool’ they often viewed themselves unable to afford them - at least in the near future. Within the focus groups the range of responses varied from being unwilling to pay for services at all, to being willing if they thought it would add to their enjoyment of leisure activities, and if the service was not too different from what they already use and already pay for in other contexts. Here the participants discuss downloading mobile video clips,

(1) Swedish Group 2

Emma: ‘I buy movies so I would be prepared to pay for it’
Steffan: ‘I think I’m prepared to do that. I’m prepared to pay a set fee, but I don’t want to pay for every single movie download’

Here we see that previous experience of paying for an entertainment service through different technological medium (video, DVD, Internet downloads) acts as a comparative precedent for these consumers. Some participants stated that they were highly unlikely to pay for mobile entertainment services, highlighting either their financial situation or their general attitude to finances as the key reason,
(2) Swedish Group 1  
Yvonne: ‘I’m so cheap, you have to pay for most things. Bah! Who needs it? If it costs money, forget it’

Other participants expressed the concern that whilst network and service providers may currently offer mobile entertainment ‘freebies’, charges would eventually be levied and thus it was not worth getting used to having the service,

(3) Swedish Group 1  
Brittas: ‘But then they are bound to charge for it later, that’s what’s bad about it’

One of the difficulties with being willing to pay for ME services was that some consumers argued that any money spent of ME would diminish their ability to pay for mobile communication services (i.e. talk and SMS). Members of the focus groups described having to weigh up the consequences of playing a mobile game in terms of their spend on voice calls at another point in time. Whilst consumers may express a willingness to pay for mobile entertainment services in the ‘abstract’ sense, in practical terms, that is in an everyday context they constantly make choices about the importance of spending on one service against another.

This point belies the fact that statements of willingness, or unwillingness, to pay may not always be a clear indicator of behaviours and attitudes. Willingness to pay needs to be put in the wider context of consumers’ general perspectives on mobile entertainment, and also be linked to other dynamics such as whether the consumer thinks that the service ‘fits in’ or is appropriate to his or her life. Some focus group participants for example noted that whilst young people may use mobile entertainment services, they did not really regard them as ‘appropriate’ for their stage of life,

So access goes beyond the willingness to pay and affordability for certain entertainment services. Within the European context, our research also relates to who can (and cannot) access services provided through mobile devices, services that may be of particular benefit to certain groups in society. Older consumers for example, a social grouping often neglected within the industry and consultancy literature, demonstrates their interest in some mobile entertainment services, whilst highlighting that certain physical difficulties (such as screen and button size) prevented them from enjoying interaction with these technologies,

(4) UK Group 4  
Fred: ‘I can’t see that. I mean I can see the buttons but I can’t see what it does’

(5) UK Group 4  
Jackie: ‘I just can’t see them. I wouldn’t be able to use that’
(6) UK Group 4
Sally: ‘I can’t see the symbols. Can you see the symbols?’
Florence: ‘I’m really struggling. I can see that’s red’
Sally: ‘Is that red? Oh this is awful isn’t it?’
Florence: ‘You can keep this one’

The indication here is that even if older users are interested in mobile entertainment services they are effectively designed of the market. It is not that the older users were unfamiliar with digital technologies - all the respondents had, and used, mobile phones, although primarily for emergency use. Indeed a number of the older consumers spoke about their familiarity with digital cameras and their use of the Internet with a notable level of familiarity:

(7) UK Group 4
Jackie: ‘Oh it’s like a digital camera isn’t it? We’re getting handy with it. That’s quite easy I can figure that one out now’

(8) UK Group 4
Gladys: ‘Can’t you download it [the picture]?’
Florence: ‘Yes you could send it to your own e-mail’
Gladys: ‘Can’t you take out your SIM card and connect it up to your computer?’
Florence: ‘Well that one you can do that but with those two you can’t’

Even if many older users indicate low usage patterns, this does not have to be taken as a given in terms of possible future-uptake of mobile entertainment services amongst this age group. The main difficulty is that older participants felt that the services on offer were aimed at younger users (such as mobile games) and subsequently had little relevance to their own needs and interests. In terms of improving access to mobile entertainment services for older segments of the population we suggest that device designers need to consider the needs of different user populations, and that content providers need to think about what entertainment services would be of interest to older users. We suggest that in terms of the establishment of mobile leisure interest groups and communities the mobile entertainment industry would do well to explore the needs and interests of a range potential users.

Theme 2: Age and Context Appropriateness

Rather than concentrating on access in financial terms, or the specific requirements of older users in terms of access, this section focuses upon access in cultural and moral terms. Who, for example, do research participants think should and should not have access to certain services? What for example, were their concerns about under-age access to certain services such as mobile gambling and pornography? In terms of mobile gambling, the main concern was over people who were already cast as ‘vulnerable’ to gambling compulsion or
‘addiction’. Here we see a classic debate running between the idea of protecting people and the idea of letting people make their own choice as to what they spend their money on,

(9) Swedish Group 2
Daniel: ‘I don’t think it will increase the number of gambling addicts’
Mats: ‘I do think so’
Daniel: ‘What’s the difference? They still have to pay the same amount’
Fredrik: ‘Those that are addicted to gambling don’t think like that’
Stefan: ‘It’s the same thing with those Internet casinos that are available. I think the service itself would work just fine, the person who offers it would probably earn a lot of money on it because I think people would use it a lot’

Access to adult services was of great concern to focus group participants. For the most part respondents expressed the belief that such services would ‘inevitably’ become available on mobiles and would undoubtedly be profitable for the mobile entertainment industry. Respondents voiced the view that if a demand for a service exists it will become available. Comparisons were made between the possibility of mobile adult services and the current situation regarding pornography on the Internet.

(10) Swedish Group 2
Nivva: ‘The porn industry is ugly and I think this would work in the industry’s interest. Porn is very popular so I think you can earn a lot of money on it. Porn WAP sites. Look at what you can download today. You can download a lot of stuff. I don’t think you will download a whole porn movie on your phone. I hope that no-one watches porn movies on the bus’

Context appropriateness also relates to some of the main and recurring concerns that consumers voiced about the social acceptability and mobile ‘etiquette’ when using mobile entertainment services in certain public contexts. Our data suggests that there are a number of social rules with regards appropriate usage. Rules that are likely to adapt to the availability of new mobile entertainment services:

(11) Swedish Group 2
Nivva: ‘Games are always boring when you are sitting next to a person that plays games and you hear all those noises. I just hate that’

(12) Swedish Group 2
Nivva: ‘I hope that no-one watches porn movies on the bus’
Exploring context appropriateness allows the exploration of where and when consumers thought they would use mobile entertainment services. The notion of ‘killing time’ with these services came to the fore in the focus groups,

(13) Swedish Group 2
Steffan: ‘When you are travelling you can listen to music but not necessarily download it…when you need to kill time’

(14) Swedish Group 1
Yvonne: ‘When the subway’s late’

(15) UK Group 5
Silvia: ‘In waiting situations’

In addition, respondents spoke of other situations where mobile entertainment services become a solution to a perceived problem, or where they could be used to heighten the enjoyment of a leisure activity in which they are already engaged.

(16) Swedish Group 2
Nivva: ‘I’ve been in situations where MMS would have been a good solution e.g. in a shop…am I going to buy this pair of shoes or not. It’s a little bit of a luxurious problem though’

(17) Swedish Group 2
Nivva: ‘When you’re abroad. Instead of sending e-mails to your friends or scan pictures you can just send MMS…’

(18) UK Group 2
John: ‘Like when you’re out clubbing and you could send pictures to someone who couldn’t make it’

The mobility of the device is seen as useful for game play or listening to music when killing time or escaping boredom at work. However respondents note that ‘serious’ game-playing or music listening may be better undertaken on a home computer or stereo system. This point relates to the ways in which mobile entertainment services need to be context appropriate in that they should be able to harness the benefits that mobility brings (otherwise, as participants argued, why not access services via fixed line Internet connection or play music on a stereo?)

The use of mobile entertainment services is not always linked to being in the public domain. Despite the popular perception of the mobile as something we use when on the move, Sidel and Mayhew’s work found that the highest usage of the ‘MobileNet’ in Japan was at home and work/school rather than when commuting,

2 MobileNet is used as contraction of ‘Mobile Internet’.
which was actually the least likely place for usage (2003:5). Their findings indicated that campaigns targeting MobileNet consumers should go beyond location and time considerations and instead focus upon the social, emotional and motivational contexts of users. Sidel and Mayhew convincingly argued that knowing how a consumer views her mobile may be more valuable to content developers and mobile Internet marketing campaigners than when or where she uses it.

**Theme 3: Clarity**

Our third theme proved to one of the main concerns of the consumers we consulted and relates to the clarity of mobile entertainment billing systems. These concerns were not directly about amount charged for services but about not being able to decipher what and when they were being charged and whether they would be billed for a crashed connection to or download from the ‘Mobile Internet’.

(19) Swedish Group 2  
Fredrik: ‘I disconnect. No I did not. I’m not disconnected’

(20) Swedish Group 1  
Bjarne: ‘‘MMS’ it says here ‘You have received an MMS, go to Telia to view it’…It says I have to surf to some website to view that message’

This second quotation exemplifies the confusion that consumers can experience about what they will and will not be charged for when using mobile entertainment services and who bares the cost of communication. If a consumer is unsure whether of not she remains connected, whether or not she is being charged will also be unclear. From focus group discussions it was apparent that some consumers felt a lack of control when using a 3G-enabled device, being uncertain whether a payment (say for a mobile game download) had taken place. This indicates that consumers need very clear feedback with regards to payment for mobile entertainment services to reduce such uncertainty that may interfere with their willingness to adopt.

Research on consumer perceptions of mobile payment systems is relevant here. Dahlberg, Mallat and Oorni (2003) for example argue that the issue of user trust needs to be explored in order to fully understand the ways in which (new) technology systems are accepted (or rejected). Following a series of focus groups with consumers they established that issues of security, trust and billing clarity were important factors with regards to mobile payment solutions. Unauthorised use, transaction errors, lack of transaction records and documentation, vagueness of the transaction, privacy issues and mobile device/network reliability were all

3 See Rutter (2001) for further discussion of trust in electronic transactions.
cited by their participants as major risks associated with such payment systems. If mobile entertainment is to become a widely used consumer good/service in Europe then industry players need to be fully aware of the concerns of consumers about the **clarity** and **security** of payment systems for such services.

As a theme, clarity also relates to the transparency of the services that are on offer, the ease of being able to differentiate between network operators and their respective services,

(21) Swedish Group 2
Steffan: ‘I think they charge you for one day and then charge you for every piece of information you download’

(22) UK Group 5
Ellie: ‘I want to be able to send stuff and use stuff not depending on which operator or phone I have. I hope that the involved companies will put effort in trying to make more compatible solutions’

Consumers want to be able to seamlessly send picture messages to friends and family members who happen to have different phones or who are on a different networks to themselves and they want to be told exactly what, when and how they will be charged for these services. Issues of clarity thus extend to the consumer’s concern with not having to worry about cross-network transactions and complicated billing systems. Clarity of billing systems also relates to phone package personalisation. The consumers we spoke to were keen to see a variety of mobile entertainment service bundles on offer so that they could choose the one they perceived best suited their needs.

(23) Swedish Group 1
Sussie: ‘It ought to be possible to buy those services as extras, games, if that’s the main purpose, it ought to be a package, ‘additional services’. *Those of us who don’t want it can forget it*’ (emphasis added)

(24) Swedish Group 2
Emma: ‘You can call and buy a new ring tone so I think they should have a special service that you call and receive those services that you are interested in’

**Theme 4: Compactness and Coolness**

This theme explores everything to do with the physical (mobile) device itself, from interacting with it using a stylus to consumer concerns about adapting content to suit the screen size of new mobile communication devices. The compactness of a device was sometimes deemed a benefit (i.e. small enough to carry around discretely) but at other times viewed as a disadvantage (i.e. too small to be able to see images properly). This section explores these design tensions.
Theme four also deals with the ways in which consumers produced ideas of how mobile entertainment is, and could be, ‘cool’. Research conducted with young people notes that something being cool carries importance to younger consumers (Mobile Youth 2002, 2003). What is judged to be ‘cool’ now may not be deemed as such tomorrow. It is vital for those within the mobile entertainment industry to keep abreast of the ever-changing landscape of youth cultures. Our exploration of ‘coolness’ includes a discussion of the ways in which consumers weigh up aesthetics and functionality/practicality. For example, many of the young people in our research considered photo-messaging applications to be cool but then went on to detail the difficulties they thought it does and/or could have.

In each focus group conducted we used three mobile devices to start the group discussions about mobile entertainment. We asked the respondents to perform a number of tasks on these devices, from taking a photo with the camera function to finding an entertainment news site. Many of the participants discussed the ‘look’ of the phones and aired their views about the importance of phone aesthetics. Whilst mobile content providers are understandably concerned with the quality and relevance of their entertainment services, we found that how ‘compact’ a phone is considered to be was deemed an important factor by the focus group participants in terms of how much they liked the device itself. Size was viewed as important, as was certain design quirks such as ‘flip-top’ phones.

(25) Swedish Group 2
Steffan: ‘There are thousands of people who don’t care about WAP services, they just want a good-looking small phone’

(26) French Group 1
Antony: ‘Oh this is great’
Anne-Claire: ‘Wow this is wicked’
Antony: ‘Look at this display’
Davide: ‘Yeah that’s pretty cool’
Etienne: ‘Oh this is amazing’
Antony: ‘The display? The look’
Anne-Claire: ‘I prefer the flip-top phones like that and there are loads of functions you see’

(27) UK Group 2
David: ‘I don’t like the Orange SPV. I don’t like the bit on the end.’ [The camera attachment]
John: ‘The screen’s alright’
David: ‘It’s too big’
Carl: ‘Yeah this one’s thinner’
David: ‘Yeah the camera on them is built onto the phone whereas that one you connect it onto. It looks a lot better if it’s built in’
However in terms of aesthetics, whilst (small) size was equated with ‘newness’ and desirability, the mobiles were often criticised for being too small and too compact, especially in terms of screen and key size,

(28) Finnish Group 1  
Ville: ‘The screen should be bigger if you wanted to…’  
Laura: ‘…go check your e-mail’

(29) Finnish Group 2  
Leena: ‘It’s pretty hard to type messages with these keys’

(30) Swedish Group 2  
Daniel: ‘Music is ok, but a movie? On this screen?’

**Coolness** is an ephemeral concept and we certainly do not set out here to pin it down. Yet it is worth noting that consumers, perhaps more so in the younger age groups, perceive ‘coolness’ of a mobile entertainment device, application and service as an absolute must when purchasing mobile-related products. The ring-tone, screen logo and facia market amongst teenagers is perhaps the clearest example of the importance of ‘coolness’, or in more sociological terms (sub)cultural capital (Thornton 1995), to the mobile market. The research consultancy Mobile Youth maintains that young people will spend a combined €13.4 billion on SMS, MMS, ring-tones and mobile java gaming during 2003, suggesting that this will rise to 20.1 billion Euros in 2006, an increase of 50% (Mobile Youth Report 2003). What is and is not deemed ‘cool’ very much determines what young people are prepared to spend their money on.

**Theme 5: Complexity**

Nieminen-Sundell and Vaananen-Vainio-Mattila (2003) note how designers of mobile user-interfaces (MUI) may either enable or discourage expressions in technology-mediated communication. Taking SMS as an example, whereby users are ‘limited’ to 160 characters, a whole culture has developed around this design-led imposition, with new kinds of short hand being used to express commonly used terms such as CU L8R (‘See you later’). Indeed there are numerous Internet sites and books on the ‘art’ of text messaging (see www.txt2nite.com for examples). Consumers of mobile entertainment devices are subject to similar enablers and barriers when using MMS, taking photos with camera phones, playing mobile games, conducting downloads and so on.

In the context of the focus groups, consumers discussed what they perceived to be the limitations or enablers of mobile entertainment technologies and services. Developers who spend their time surrounded by these technologies may be surprised to learn about the difficulties that some participants experienced when attempting to access services for example.

(31) French Group 1
Etienne: ‘This is bloody terrible. It really isn’t fun. Bloody hell I can’t work out how to get the sound working. *It looks ok but it really is annoying me*’ (emphasis added)

(32) French Group 1
Davide: ‘I think this one’s buggered because you can see the video but you can’t hear the sound’

Perhaps one of the biggest problems consumers encountered when using the devices we gave them in the focus groups was negotiating the menus. All the participants had mobile phones and so were familiar with mobile phone menus in general. As is clear from this selection of quotations, however, many participants found the menus and software related to mobile entertainment far from intuitive.

(33) Swedish Group 1
Bjarne: ‘Lets have a look…here’s Aftonbladet [a gossip magazine]…not under ‘entertainment’ anyhow, not where I ended up. Should they be under ‘Entertainment’? ‘New download’…what do they mean ‘download’?’

(34) French Group 1
Antony: ‘So what did you do?’
Anne-Claire: ‘You hold it up and press that. You can save them too’
Antony: ‘Oh ok’
Anne-Claire: ‘Oh bloody hell. Now I’m still in the phone book. The menu…oh right you press that one in the middle. Oh right you come back to that’

(35) UK Group 3
‘You have to go through so many menus to get to the games. At the main screen, at the top, it’s got different pictures yeah, but it doesn’t actually tell you what each of them are. You can get the obvious ones like messaging and calendar but the other ones…’

These consumers’ frustrations link to research conducted under the Technology Acceptance Model or TAM (Heilman and White 2003). TAM states that users’ acceptance of a (new) technology system will depend largely on their perceptions of it regarding *usefulness* and *ease of use*. In terms of ease of use, research has demonstrated that users’ perception of ‘fun’ is closely linked to how easy to use they find the system (Kwon and Chidambaram 2000) i.e. the harder they perceive a system is to use, the less ‘fun’ it will be to use. Within our focus groups those participants who struggled to use the mobile entertainment devices, or became frustrated with their limitations, particularly in terms of the speed of connection, soon expressed their reservations about how fun such devices and services would be.
Theme 6: Convergence

Mobile devices in Europe are currently thought of first and foremost as a communication tool. However new layers of meaning are constantly being built up around mobile devices as new applications and services are added. For example, before the advent of SMS, mobile phones were viewed as a means to contact others via voice, but text messages have changed that. With entertainment services now being incorporated into mobiles, it seems likely that what we think of as ‘a mobile’ will change once again. This is already occurring with the advent of camera phones. However, the consumers we spoke to seemed reluctant to embrace the mobile phone as something more than a voice and text platform although it is possible that this perspective may change as we become more familiar with mobile entertainment and 3G services.

(36) Swedish Group 2
Emma: ‘I don’t need extras. I use SMS and the phone only as a communication tool. The most important thing is that it works well. I am very satisfied with it’

(37) UK Group 5
Frank: ‘I think the mobile phone should be used mainly for making voice calls’

(38) UK Group 3
‘At the end of the day it’s a phone, not a camera’

Here we see how consumers are concerned about ‘extras’ such as mobile music interfering with the mobile’s perceived primary use, that is a tool with which to keep in touch with others. However, this reluctance to embrace the ‘extras’ that new mobile entertainment services can offer may, for certain services, may not prove entirely durable. This is because a number of mobile entertainment services, in particular MMS, can be thought of, and perhaps should be marketed as, enhancing the perceived primary communicative function of the mobile. Accessing e-mail whilst on the move is another appropriate example here.

(39) Finnish Group 1
Ville: ‘It [accessing e-mail] is pretty handy all right but a bit slow’
Susanna: ‘Isn’t it pretty handy?’
Rivta: ‘Yes it is very handy’
Leena: ‘No it’s not handy’
Pauliina: ‘Just because everything is shown as text only’
Laura: ‘It’s boring, it always looks the same’
Pauliina: ‘Yes but it is, but then again you get to read your e-mail through it’

(40) Finnish Group 1
Moderator: ‘If you had a gadget like this one, what would you use it for?’
Susanna: ‘Photography, phone calls, and also for reading my e-mails…yeah maybe not web pages otherwise, but it would be ok to check your e-mail through that’

Consumers are willing to consider those services they perceive will enhance their ability to communicate and stay in contact with others. Recent research on the use of mobiles by young people that enjoy clubbing is another example of the ways in which mobile entertainment services could be used to enhance the communicative functions of phones. Research participants expressed their reliance on mobiles to maintain contact with new friends made while clubbing, and to keep in contact with friends that were unable to come out on any particular occasion. The camera function of new mobile devices, and the ability to send pictures between old friends and new acquaintances in MMS formats, was deemed fun and useful by the majority of participants in this study (Moore 2003). Mobile entertainment services may be used to enhance rather than detract from the communicative functions of mobiles, thus casting convergence in a different light.

Finally from our focus group data it can be surmised that some consumers remain reluctant to see certain new mobile entertainment applications and services as ‘the real thing’. This involves consumers making (usually negative) comparisons between mobile entertainment applications and services and other currently available:

(41) Swedish Group 1
Emma: ‘Me personally would not spend much money on it, I would spend the money on a real camera instead’ (emphasis added)

(42) Swedish Group 2
Nivva: ‘Then you say to yourself: ‘I would like to see this movie tonight’ then you download it to your mobile and when your back home you just transfer it into your computer and watch the movie. Otherwise you’ll need to download the movie when you arrive home and it takes ages’
Staffan: ‘The thing is it doesn’t take time to download a movie nowadays so you can just as well download the movie direct to your computer. It will not be fast to download it to your mobile phone’

This perspective is at the crux of the issue of convergence and it remains to be seen how the European mobile industry will tackle the issue. Mobile communication devices will be viewed as a viable alternative to currently available technologies such as digital cameras, or they may become wholly convergent devices that replace uni-functional digital technologies such as MP3 players or portable game consoles. What is clear from our research is that for the
convergent model to work, consumers must perceive that convergent devices add values to services available to compensate for additional cost or quality of content.

References


Consumer Perceptions Towards WAP Games¹

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Abstract:
The proliferation of mobile phones, along with consistently improving network connectivity and device sophistication has contributed for the development of mobile entertainment. This service has the potential mass market appeal to rapidly spur the level of adoption of m-commerce. Mobile entertainment is composed of a variety of services such as ringing tones, games, gambling and so on. However, games are predicted to replace ringing tones as the main driver of mobile entertainment. This paper aims to contribute to the development of a better understanding of consumer perceptions towards WAP games. A series of four focus groups, each consisting of six participants, were conducted in Wellington, New Zealand to gain in-depth qualitative insight of perceptions towards WAP games. Focus groups were organised according to demographic homogeneity and consisted of three distinct stages in order to optimise understanding by uncovering a variety of perspectives. The qualities of an excellent WAP game converged into the following variables: user friendliness, media richness, interactivity, price, rewards, responsiveness, functionality, multiplayer and personalisation. WAP games were perceived as lacking sophistication, but at the same time, were also seen as possessing several beneficial qualities. Furthermore, even before advances mobile technologies, take place, by uncovering customer perceptions towards WAP games, areas were identified that could improve current offerings. These areas included the introduction of functionality to allow storage of personal gaming details such as statistics or preferences.

Keywords:
Mobile entertainment, mobile games, WAP games, customer perceptions

Introduction

Mobile phones have become one of the fastest adopted technologies of all time (Chen, 2000; de Hann, 2000). They are creating an enormous opportunity by introducing the benefits of mobility to e-commerce (Barnes and Huff, 2003; Clarke, 2001). Commonly referred to as m-commerce, the extension of e-commerce through wireless Internet-enabled devices allows the delivery of services beyond a traditional fixed line connection (Barnes, 2003a; Bergeron, 2001; Sadeh, 2002). As a result, m-commerce reaches a larger market size than e-commerce and is capable of being delivered not only at anytime, but also

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anywhere. According to a study by Telecom Trends International (2003), global revenues from m-commerce are destined to grow from $6.8 billion in 2003 to over $554 billion in 2008.

The proliferation of mobile phones, along with consistently improving network connectivity and device sophistication has contributed for the development of mobile entertainment, a service that has the potential mass market appeal to rapidly spur the adoption of m-commerce. The ARC Group (2001) forecasts the market for mobile entertainment will reach 1.6 billion global users by 2006, creating extraordinary opportunities to leverage m-commerce revenues.

Mobile entertainment is composed of a variety of services such as ringing tones, games, gambling and so on. Nowadays ringing tones and wallpapers are the dominant applications responsible for the majority of revenue in mobile entertainment. However, games are predicted to replace ringing tones as the main driver of mobile entertainment. The growth of mobile games can already be seen in some markets such as Japan and Korea. Without doubt mobile games have proven to be a killer mobile commerce application (Datacomm Research, 2002; Datamonitor, 2002).

Even though mobile games are a recent phenomenon there are a variety available in most developed markets (Vodafone, 2004). The nature of these games is heavily dependent on the boundaries created by device, network, and application. Most of the games currently available can be categorised within three mainstreams: messaging, downloadable, and online. In the future, the vision is for mobile games to be colour interfaced, real-time multiplayer and location sensitive (Choong, 2003). These are qualities that present to some degree amongst all three game types, but perhaps most prevalent in online games. The most common type of online games are WAP based. WAP games have the ability to provide synchronous multiplayer gaming to a global audience, to be played using location based services and to be customized to user preferences and profile. However, because WAP games are reliant upon online connectivity, they are susceptible to the limitations of current mobile networks and are as a result typically of a start-stop nature, not to dissimilar to turn based games.

It has been proven over and over that while a games brand may initially be able to attract consumers, it will not guarantee the success of the game. In the long run people embrace games that deliver them value (Kangas, 2003). Furthermore, games delivered over the mobile network operate in a different paradigm to those of the traditional wired Internet, as dictated by differences in infrastructure and user behaviour. Therefore, it is interesting to observe that a good part of the problem with the initial wave of unsuccessful WAP games was due to a lack of understanding of consumer needs and expectations and how these can be met over the mobile medium. Consequently, just as with any other mobile service, it is fundamental to have appreciation of corresponding consumer perceptions in order to achieve successful deployment of these types of games.
This paper aims to contribute to the development of a better understanding of consumer perceptions towards WAP games. In order to achieve this goal, four focus groups, each consisting of six participants, were conducted. The next section provides a background to mobile games. This is then followed by discussion regarding the research methodology. Subsequent to this, an examination and analysis of data gathered is provided. Finally, a conclusion is provided featuring a summary, limitations and areas of future research.

Background on mobile games

The potential market for mobile gaming is phenomenal. Worldwide, there are already over 1 billion mobile subscribers, a large proportion of whom maintain mobile phones capable of gaming and this figure is set to grow (eMarketer, 2003). These devices restrict mobile games to small displays and limited controls. Nevertheless, they also possess advantages over other digital gaming media, most notably, mobile phones are multifunctional as opposed to a specialist devices such as a radio, thus, consumers habitually posses them wherever they go, they’re ubiquitous and they are networked. By working around limitations and utilising advantages, mobile games are able to deliver a revolutionary gaming experience.

For the purposes of this paper, mobile games are defined as games played on mobile phones that are either embedded or require at some stage the use of wireless connectivity, excluding any games that are reliant upon cartridges.

Beyond simply allowing gaming at anytime and anywhere, mobile games can be massively multiplayer and can exploit information gathered such as players’ location and proximity to one another to create a new concept in mobile entertainment (Datacomm, 2002). The use of location based services has created an ability to play virtual games in a real world context. An article featured in BusinessWeek online discussing an increasingly popular game known as BotFighters epitomizes this phenomenon (Kharif, 2001).

BotFighters allows players to create a robot that is housed in their mobile phone, by choosing the robot’s armour, shield, and eyes, which they then set upon other robots by sending text ‘attack messages’ to the central game server. These messages are then relayed to their victims in the form of beeps. The game has become so pervasive that players are known to drive for hours in order to defeat opponents (Kharif, 2001). An involved player, who plays on average 30 minutes a day, will pay somewhere between US$5 to US$10 per month in addition to regular mobile phone charges.

An important component of combat games, such as BotFighters, is that they consist of provisions which prevent players interacting within a proximity close enough to reveal real identities. BotFighters (It’s Alive, 2004) is just one illustration of the pioneering location based games starting to appear around the world.
One other notable example that helps comprehend the current diversity of location dependent gaming is TreasureMachine (Unwiredfactory, 2004). Developed by Unwiredfactory, TreasureMachine releases clues to guide players to a predefined location. Whenever a player believes they physically stand on the right spot, they ‘dig’ for the treasure using their mobile phone. The first player to ‘dig’ for the treasure at the predefined location wins. Players are charged a small fee for each clue they receive and digging attempt (Unwiredfactory, 2001).

BotFighters, released in November 2001, and TreasureMachine, not long after, are the world’s earliest location based games (It’s Alive, 2000; Unwiredfactory, 2001). Partly due to their release being at time when WAP capable handsets were not widespread these games have been made available over both SMS and WAP platforms to increase circulation. Nowadays, it is more typical for mobile games to be clearly characterised as SMS or WAP based. Both platforms offer distinctive capabilities.

SMS together with MMS applications form a gaming category that can be classified as messaging mobile games. The means of interaction amongst these games is analogous to other data communications. To initiate game play an SMS or MMS message is sent to a game server. The player then receives a reply message consisting of instructions. From this point onwards, messages are sent back and forth consisting of commands from the player as well as status and directions from the game server until the game is concluded. Games that are particularly well suited for this medium include trivia, combat and strategy. Messaging games can be played either as single or multiplayer are able to feature location sensitive game play.

On the other hand, WAP games are always played through a sustained connection to the mobile Internet. Thus, along with constraints created by device, the limitations in mobile networks restrict the dynamics and interactivity of WAP games. However, WAP is designed to accommodate these limitations by bridging the gap between wired and wireless environments. Originally, termed WAP 1.0 and written in the WML programming language, the latest version, WAP 2.0, has now progressed to employ the more advanced xHTML and adopt more recent Internet standards. WAP 2.0 attempts to optimise the usage of higher bandwidths, packet-based connections and improved device capability, while at the same time providing backward compatibility to pre-existing WAP content (WAP Forum, 2002). The most significant advancement for games based on this platform is that WAP 2.0 recognizes the capabilities of users’ devices, such as screen size and colour in order to maximize performance potential and bring increased consumer satisfaction. Furthermore, WAP games are easily customisable to user preferences and profile. Genres suited for this medium include role player, casino and trivia games. These games are typically of a start-stop nature, not too dissimilar to turn based games.
In addition to WAP, the Japanese mobile service i-mode also provides a form of online games. I-mode originally differentiated itself from WAP 1.0 by being based on cHTML, a subset of HTML. However, the release of WAP 2.0 has signalled the unification of cHTML and WML. Unique to i-mode, is that it has been able to provide a form of online gaming not previously seen with older versions of WAP. One i-mode service links mobile phones to video arcade games. This i-mode service compliments the video games by allowing a number of functions to be played over handsets. For instance, as shown in Figure 1, the arcade game Virtual Fighter 4 allows players to check their fighting match history, national rankings, customise their characters, search for arcades with Virtual Fighter 4 and communicate with other players nationwide (NTT DoCoMo, 2001).

![Figure 1: The connection between i-mode and video games (NTT DoCoMo, 2003)](image)

The forecasted growth amongst each of the various mobile game formats displays a great deal of disparity. As depicted in Figure 2, messaging and WAP games lie heavily out of favour, perhaps even fading away towards the year 2008. While, downloadable games are destined to offer the greatest potential for growth.

Downloadable games, which are made possible by way of technologies such as Java, BREW and Symbian are downloaded into devices and can be played repeatedly without the need for any further network interactivity. Embedded mobile phone games are essentially also included in this category. Currently, due to mobile network limitations and the high sophistication of downloadable games, synchronous multiplayer capability is restricted to short ranged embedded technologies such as Bluetooth, while asynchronous multiplayer functions such as the uploading of high scores is facilitated by mobile networks. Already there exists a comprehensive range of branded downloadable games, including The Lord of the Rings, Tiger Woods PGA Tour and Pacman. downloadable games are arcade styled and sufficiently advanced to contribute to the ubiquitous network of gaming. In Japan, consumers are able to play portions of Sony Playstation console games over java enabled i-mode mobile phones (NTT DoCoMo, 2001). I-mode phones plug into a Playstation console permitting games to be later played on the go.
Regarding the three categories of mobile games, it is important to understand the peculiarities of their user demographics. Table 1 summarises the findings of Anderson (2002) regarding customer segmentation. A consistent feature amongst the segments prescribed by the author is the young age of mobile game players. However, when considering other demographics of gender, gaming background, reason for playing, type of game preferred, success factor, proportion of a population and speed of uptake, a clearer description of mobile gaming consumer segments unfolds.
Mobile-Entertainment: User-centred Perspectives

Table 1: Mobile gaming consumer segmentation (Anderson, 2002)

<table>
<thead>
<tr>
<th></th>
<th>Mobile casual gamers</th>
<th>Mobile hardcore gamers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>From mobile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>casual gaming</td>
</tr>
<tr>
<td>Demography</td>
<td>Young, both sexes</td>
<td>Young, both sexes</td>
</tr>
<tr>
<td></td>
<td>and all ages</td>
<td></td>
</tr>
<tr>
<td>Console gaming</td>
<td>Some</td>
<td>Most</td>
</tr>
<tr>
<td>background</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason for mobile</td>
<td>Time-killing</td>
<td>Hobby</td>
</tr>
<tr>
<td>gaming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of game</td>
<td>Simple</td>
<td>Simple &amp; complex</td>
</tr>
<tr>
<td>Success factor</td>
<td>Game play</td>
<td>Game play and graphics</td>
</tr>
<tr>
<td>Mobile gaming</td>
<td>Majority</td>
<td>Minority</td>
</tr>
<tr>
<td>user population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uptake</td>
<td>Now</td>
<td>Gradual</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With the realm of mobile games explored, the following sections present the methodology used in this research and the respective consumer perceptions towards WAP games.

Methodology

The use of qualitative methods of research can be found in many disciplines. Within the domain of Information Systems, qualitative research has become increasingly used in the past decade (Myers, 1997). Focus groups are especially valuable when there is a need to obtain qualitative data filled with vivid and rich descriptions. Focus groups generate data through bilateral communication between the moderator and participants. From listening to people share and compare their different perspectives a wealth of in-depth insight can be uncovered regarding opinions and attitudes (Morgan and Stinson, 1997). Figure 3 illustrates the research design undertaken.
Participant selection

A total of four focus groups, each consisting of six participants, were conducted during June and July 2003 in Wellington, New Zealand. In line with recommend procedure, participants were selected and grouped according to their previous experience with the Internet, mobile phones, computer games, and WAP in order to gain insight into consumer perceptions of WAP games from a variety of perspectives (Morgan and Stinson, 1997). Although, participants amongst all four groups were high Internet users, groups were unique with respect to participants’ level of usage of the other three technologies. With reference to Table 2, the focus groups were assembled as follows: WAP users (group A); computer game and mobile phone users (group B); mobile phone users (group C); and Internet only users (group D). Based on demographic statistics all participants were aged between 21 and 35 (Datamonitor, 2001; Chang, 2003, Lipp 2002).

<table>
<thead>
<tr>
<th>Group</th>
<th>Internet</th>
<th>Mobile phone</th>
<th>Computer Games</th>
<th>WAP Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 2: Focus group experience levels
Focus groups

At the start of each focus group, participants were presented with a mobile phone and worksheet (refer to Appendix 1). The worksheet included the purpose of the focus group, instructions on how to operate the participant’s respective mobile phone and the proceedings of the focus group. Each participant used a unique model of mobile phone. To increase the level of consumer perceptions uncovered, a variety of activities were conducted in each focus group. Focus groups ran for between 90 – 120 minutes and consisted of three stages: 1) Playing WAP games 2) Focus group discussion and 3) Quality workshop.

Playing WAP games

Participants were provided with approximately 45 minutes to play and build familiarity with three designated games. To gain understanding of consumer perceptions with respect to a range of WAP games, each focus group was designated a unique set of three games consisting of one game from each of the following genres: multiplayer; role player; and classic. This interaction was recorded onto digital videocassette. A total of 12 games were played, represented by a unique set of three games for each of the four focus groups. Table 4 details the specific games played by each focus group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Multiplayer</th>
<th>Role player</th>
<th>Classic</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Boy Racer</td>
<td>Ecowarrior</td>
<td>Rock, paper, scissors</td>
</tr>
<tr>
<td>B</td>
<td>Shark Hunter</td>
<td>Swingers</td>
<td>Tic Tac Toe</td>
</tr>
<tr>
<td>C</td>
<td>Trivia: Trivia Racer</td>
<td>Wipe Out</td>
<td>Hangman</td>
</tr>
<tr>
<td>D</td>
<td>Trivia: Woodbine</td>
<td>Gone Fish’n</td>
<td>Slots</td>
</tr>
</tbody>
</table>

Table 3: Games played by focus groups

Focus group discussion

Once participants had played the three designated games they were asked open-ended questions requiring them to draw upon their experience. A conscious effort was made to ensure questions were clearly formulated, neutral, appropriately sequenced and easily understood. Focus groups were recorded on cassette tape. Several indicative questions used at each focus group are provided in Appendix 1.

Quality workshop

For the final stage of the focus group, a quality workshop was run to uncover perceived qualities of an excellent WAP game. Bossert (1991) recommends a three-stage process for such workshops. Participants were first provided with post-it notes and asked to answer the following question: ‘What are the qualities of an excellent WAP game?’ Participants were instructed to work in silence, write one quality per post-it note and encouraged to also write a brief explanation and rationale for the proposed quality.
Once all participants felt they had exhausted their ideas, participants were then sorted into two groups of three to combine their post-it notes into affinity groups. This stage was undertaken by initially working in silence. Participants initially performed this task in silence, moving post-it notes around and creating headings as felt appropriate. Finally, participants worked as one group to develop one combined affinity group of demanded qualities.

**Data Analysis**

Results presented in this section represent derivatives of the data collected during all three stages of the four focus groups. Observations concerning the qualities of an excellent WAP game were found to converge into the following variables: user friendliness, media richness, interactivity, price, rewards, responsiveness, functionality, multiplayer and personalisation. Data exposed from stage one, user behaviour, and stage two, focus group discussion, are organized with respect to these variables. Inherent within these results, areas were identified that could improve current WAP game offerings.

**User friendliness**

The user friendliness quality consisted of the highest number of identified observations. Firstly, participants felt it was difficult to input keys. However, this may have been due to participant’s lack of experience with the mobile phone they were using. With the vast number of models of mobile phones it is likely participants were using phones with which they lacked familiarity. Secondly, the need to scroll down through text was seen as annoying. One participant suggested that audio could be used, especially in storytelling games to remove the need to repetitively scroll. Thirdly, an important need was recognised for WAP games to have instructions as participants were often confused and needed a longer than anticipated length of time to understand game play. A possible explanation for this could be due to an observation that participants had extremely misguided preconceptions of the nature of WAP games. This could be attributed to a number of reasons: preconceived notions of mobile gaming derived from playing embedded games that have a much higher level of interactivity; an association of Internet based technologies consisting of colour graphics and moving pictures; and connotations derived from the titles given to WAP games. Another explanation could be that the design of a game meant it was difficult to learn to play. For example, if the text displayed in a WAP game was not conducive to explaining to a player the need to scroll down, the lack of a scroll bar in WAP meant the user was left perplexed. Comments provided indicated that in a real world scenario, participants would have given up playing after experiencing initial difficulty.

**Media richness**

The lack of colour, sound and animation caused one participant to comment how WAP games were reminiscent of early handheld games played twenty years ago. This was a feeling that typified the expressions uncovered relating to media
richness. Some participants indicated that until the media richness develops to a sufficient level, they will avoid WAP games.

**Price**
Relative to the entertainment value gained, participants considered WAP games overpriced. WAP games are charged at US$0.04 per screen, which aggregates to approximately US$6 for every 30 minutes of game play. The high price was suggested as a factor that would make participants reluctant to play WAP games, especially since embedded games are a free alternative.

**Rewards**
A very strong consensus across all focus groups emerged regarding rewards. Participants believed there was a lack of some form of reward structure. They saw rewards as a way of acknowledging skill and enthusiasm. They also believed that by providing rewards an incentive would be created to play by increasing entertainment value in the form of indirect gambling and recompensing the steep price paid. It was also expressed that rewards do not necessarily have to be financially based.

**Responsiveness**
Participants invariably provided adverse comments concerning the mobile network. The network was found to be slow and unreliable. ‘Network not responding’ anecdotally appeared to be the most common WAP page sited. Participants felt that in alternative circumstances, they would have been inclined to give up playing due to the delays. A fast connection speed was desired to facilitate less frustrating and more interesting game play.

**Interactivity**
Participants were disappointed at the lack of control they had in determining the outcome of some WAP games. Participants felt that they would tend to stay away from games that were determined by luck as opposed to skill. Games that absorbed the user by providing an interesting storyline or requiring thought before taking action were perceived favourably. In contrast, games that lacked any degree of complexity got boring very quick. The length of time participants were willing to play WAP games was dependent on the game’s level of complexity.

**Functionality**
Games were seen as lacking a range of functions. Participants had anticipated the ability to record high scores, develop a personal gaming history, and to progress on to higher levels once a game had been mastered. The absence of functions of this nature restricted the level of value participants could derive from playing WAP games.
Multiplayer
Games that required participants to compete against others were found to have the potential to make the focus group atmosphere exciting and lively. The ability to play other people was seen as a quality that favourably differentiated WAP games to previous mobile gaming experiences. Games that were multiplayer and at the same time absorbed the user provided the most enjoyment.

Personalisation
Participants appreciated how certain games were customised by featuring the names of nearby localities. Conversely, adverse reactions were greeted to games that were considered gender bias and incompatible to personal morals.

Overall, participants respond to WAP games with mixed reactions. Although, WAP games were perceived as lacking sophistication, they were also seen as possessing several beneficial qualities. When combining these qualities with enhancements to design and the introduction of increasingly sophisticated technologies WAP games were generally regarded as a promising medium of gaming. In addition to lacking sophistication, price was also seen as a significant deterrent. Table 4 presents a summary of the positive and negative perception across the different focus groups in relation to each game genre examined.
<table>
<thead>
<tr>
<th>Game genre</th>
<th>Group</th>
<th>Positive perceptions</th>
<th>Negative perceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplayer</td>
<td>A</td>
<td>Enjoyed for the competitive nature created by being able to play against other people. Game exercised memory skills.</td>
<td>Lack of ability to store personal gaming history as well as other personal gaming details. Network speed affected ability to compete. Over inflated expectations due to connotations of the game’s name.</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Ability to play against other people</td>
<td>Although there are a variety of options that may be chosen, game is entirely up to chance. After gaining familiarity with game, participants left mistaken as to how game initiated.</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Ability to play against other people. Requirement to think when playing.</td>
<td>Participants were not always aware they were competing against another person. Difficult to decipher which player is which.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Ability to play against other people. Requirement to think when playing.</td>
<td>Slow network speed caused input to be received by the game overdue. The game disallowed answers if too much time has passed. Difficult to decipher which player is which.</td>
</tr>
<tr>
<td>Role player</td>
<td>A</td>
<td>Engaging storyline. Storyline indirectly provide instructions by describing possible allowable player actions.</td>
<td>The need to continually read text was not enjoyed. Need to continually scroll down through text was annoying. So many instructions to remember note taking was required.</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>–</td>
<td>Only one action can be taken when playing.</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Game customised by naming nearby localities. Players rewarded by seeing a picture.</td>
<td>Requires only one button to be pressed intermittently to successfully complete. Confuses participants by featuring animation, yet requiring one button to be pressed. Pictures appeared that offended participants.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Provided humour.</td>
<td>Does not require the player to produce any thought.</td>
</tr>
<tr>
<td>Classic</td>
<td>A</td>
<td>–</td>
<td>Gets boring quickly. Lacks reward, even when lucky enough to win.</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>–</td>
<td>Complex words used. Poorly adapted for restricted screen size.</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>–</td>
<td>Network failure prevented testing.</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>–</td>
<td>Failed to attract interest.</td>
</tr>
</tbody>
</table>

Table 4: Positive and negative perceptions in relation to game genres
Conclusion

The advancement of mobile devices, networks, and applications and the ability to provide an innovative form of gaming previously unattainable is suggestive of the increasingly pervasive role mobile games will play. However, even before these advances take place, by uncovering customer perceptions towards WAP games, by way of focus groups, areas were identified that could improve current offerings. These areas included the introduction of functionality to allow storage of personal gaming details such as statistics or preferences, offering rewards to compensate high costs, recognise skill and add excitement, as well as the important role of a game title to aid the instruction of a game and guide expectations. A further key finding of the paper was the significant entertainment value gained by consumers when playing multiplayer WAP games that engage the player to think before taking action.

There were a number of limitations identified in the focus groups. The mobile phones used in this research all featured monochrome screens. In addition to this, participants played WAP games within a restricted length of time and area of space, causing participants to have an unrepresentative exposure of the speed and reliability of the mobile network and preventing perceptions that would arise from a more longitudinal based study, such as community qualities, from being uncovered. It also disabled the ability to examine location sensitive games. Furthermore, participants were asked to play games that may have belonged to a gaming genre they find adverse, creating artificial experiment type conditions. Accordingly, in order to develop a better understanding of consumer perceptions towards WAP games, further research must be undertaken in areas such as HCI, mobile networks and user contexts. Undoubtedly, this is an area with great potential in which a deep understanding of its domain will be a key factor for a successful consumer adoption.

References


Appendix: Mobile Games Focus Group Worksheet

The focus group is being conducted with the aim to increase the current understanding of consumer perceptions towards mobile games. Your participation is appreciated.

Kyocera 2235

- Home screen
- Ok key
- Send/Talk key
- Navigator key: up, down, left, right
- Clear key
- End/Power key
- Keypad
Part 1: Usability Test, estimated time: 45 minutes

You are waiting for a friend when you receive a message that they are running late and will be arriving in 45 minutes. So you decide to play some WAP games.

Step Instructions

1  **Turn on mobile phone:** Press  (phone may take several seconds to load)

2  **Start web browser:** From the home screen, press  to select menu. From the menu screen press  left to scroll to **Web Browser**. Press  to select this option.

3  **Using the Xtra Mobile Service site map below, navigate your way to play the following three games:**

   **Boy Racer** – a multiplayer game where you race against other players who are online.

   **Ecowarrior** – a role player game where you complete spy type missions.

   **Rock, Paper, Scissors** – the classic game is now playable on your mobile phone.

   To navigate web browser: while in the web browser, use  to scroll and  to select. To go to the home page use  to scroll to **home** and  to select. To go back to the previous screen press  . To close the web browser press  .
Xtra Mobile Service site map

1 My Favourites
2 Xtra Email
3 Messaging
4 All Blacks
5 Search
6 Games
   - 1 Ecowarrior
   - 2 Shark Hunter
   - 3 Cosmic Games
   - 4 Swingers
   - 5 Ski Bunny
   - 6 Wipeout
   - 7 Gone Fishin’
   - 8 Boy Racer
   - 9 Air Games
   - WAPZig
      - 1 Tic Tac Toe
      - 2 Hang Man
      - 3 Dice Games
      - 4 Card Games
      - 5 Slots
      - 6 Crystal Ball
      - 7 Rock, Paper, Scissor
      - 8 Quote Server
      - 9 Draw Straws
      - Lottery# Generator
      - Word Builder
      - CrossWord Solver

Kalador
7 News & Info
8 What’s Hot
9 Entertainment

Part 2: Focus group discussion, estimated time 30 minutes

Consider these indicative questions:

What problems did you have?

What did you find easy?
What did you like?

What did you not like?

Would you play the games again? If yes, why? If not, why?

*******BREAK 15 MINUTES ********

**Part 3: Quality workshop, estimated time 30 minutes**

On the post-it notes provided, please answer the following question based on your opinion: what are the qualities of an excellent WAP game?

- Please use one post-it note per quality
- Please put your initials on each post-it note

**Post session**

Please indicate whether you are willing to be contacted in a follow up email should further clarification be required by providing your email address.
Mobile Entertainment Users: Headline results from an online survey

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Abstract:
This paper offers a preliminary analysis of a web-based questionnaire on mobile culture and entertainment. Respondents were found to value the advice of those in their informal social and knowledge networks when choosing mobile operators and ME products and services. Respondents demonstrated their reluctance to switch operators, in spite of indications of dissatisfaction with their current providers. Despite high usage levels of fixed-line Internet for entertainment purposes respondents were less than enthusiastic about mobile entertainment. Gaming, taking and sending pictures, watching video clips and listening to music on mobiles were all met with a lack of enthusiasm, with the majority of our sample emphasising the importance of the more ‘traditional’ communicative functions of mobiles. Evidence of conflicting views on content pricing and handset usability demonstrates the embryonic nature of the ME market. Consumer expectations are still in the process of being formed. In terms of consumer concerns, our results suggest that health worries and the protection of minors from ‘inappropriate material’ were minimal amongst this particular set of respondents. ‘Junk text’ was highlighted as the major source of concern. Respondents appeared reluctant to buy into the convergence trope of ‘one device for all’ although modernist notions of continuous technological progress were evident in user expectations. Given the ‘early adopter’ and ‘high-level user’ status of the majority of our respondents, their views on the future direction of mobile entertainment services are highly relevant here. Further work is needed to reach a greater understanding of the relationship between user and technology, between consumer and mobile entertainment product, as this embryonic market gradually matures.

Keywords:
mobile entertainment, users, consumer expectations, service adoption, regulation

¹ This paper is based upon work funded by the European Commission as part of contract number IST-2001-38846 and knowledge generated through that funding remains property of the European Communities. The views and opinions expressed in this paper are those of the authors and do not necessarily reflect those of the European Commission. The authors would like to thank the European Commission for permission to present this work and use project data.
Introduction

This paper presents headline figures from a web-based survey conducted by the authors as part of a European research project. It stands as a first thumbnail description of the results and an attempt to get preliminary observations from the data into the research community rather than a definitive analysis of the data. The focus and description presented in this paper is meant to complement a period of focus group research undertaken prior to the development and launch of the questionnaire. Key themes identified in the qualitative research are presented in Moore & Rutter (this volume).

The web-based questionnaire was made available online in English, Greek, Spanish and Italian during early 2004. Respondents were recruited through press releases, posting to newsgroups, consumer websites and direct mailing to individuals who has expressed an interest in the project’s research. A respondent incentive of a prize draw for a PDA was offered. The analysis below makes use of the first 600 responses to the questionnaire.

This paper looks at the basic demographic constitution of users who responded, their use of fixed line and mobile services, and their option of new technology. It then explores the knowledge resources that user drawn upon when making ME purchase decisions or changing service providers. Next the paper looks at users willingness to use and pay for future and emerging services before exploring consumers concerns over possible health and social issues associated with mobile phones and ME services.

The sample

Responses came from 35 countries with the majority being made up from the UK (45%) and USA (26%). There was a notable lack of representation of Scandinavian countries (Finland 1.6%, Sweden 1.4%, Norway 0.8%, Denmark 0.5%). This is especially surprising here given the level of mobile device ownership in these countries, and that the mGain project has four partners in Finland, two in Sweden and one in Norway.
The gender divide between respondents was approximately 2/3 male and 1/3 female with 72% being below 40 years of age.\(^2\)

As such, the sample is skewed from population averages but is representative of early adopters and high-level users. Not surprisingly, only 4% of respondents did not own a mobile phone but 10% owned and used more than one mobile phone on a regular basis. Only 26% of respondents disagreed with the statement that ‘I like to have a mobile phone that is as up-to-date as possible.’ Further, 60% of these users are subscribed to the monthly subscription schemes with their mobile service providers or enjoy the fact that someone else pays the bill, whereas less than ¼ use the less lucrative (for service providers) pay-as-you-go schemes.

\(^2\) In line with the host institutions’ ethical guidelines, prior to taking the survey respondents had to affirm that they were over 16 years of age.
These consumers demonstrated a high level of technology ownership and use: 67% had Internet access both at home and at work, with 57% spending three or more hours a week using the Internet for leisure and entertainment purposes. There is a high ownership of personal technologies such as games consoles (PlayStation 23%, Xbox 15%, Gamecube 12%, GBA 11%), mp3 players (23%) and PDAs (18%). The level of subscription to digital cable, aerial and satellite TV services was 43%.

Entertainment uses of the fixed-line internet were encouragingly high with more than 80% of respondents using their connection for leisure shopping, finding local entertainment information (e.g. cinema times) and finding other hobby related information. The low level of adoption of adult services in this sample may be an artefact of user response, especially given that over 70% of users ‘download pictures.’

However there is a notably low adoption of commercial content services. Use of pay gaming services (such as or pay-per-play websites and digital TV gaming) all had adoption rates of 2% or less. This apparent reluctance to adopt pay services and the existence of free (if, in the case of some well known P2P services, illegal) alternative options, presents a significant challenge to ME content providers – especially if encouraging migration from fixed-line services or adoption of complimentary services.

User responses support the belief that successful ME services will draw on the unique attributes of mobile technologies rather than competing with other, more
established, cheaper, and content rich alternatives. When asked which services they had accessed using a mobile device, there was a clear indication that the services with higher adoption rates are those which exploit timeliness of data delivery (e.g. instant messaging, emails, news updates) or the mobile context of service use (e.g. location-based information).

This is supported by the number of respondents who were attracted to mobile convenience services such as pre-booking and payment for events and queue avoidance.

Figure 4: Use of online services using mobile devices

Figure 5: It would be helpful if I could pay for goods/services such as cinema tickets using my mobile phone
Capturing users

Despite the trend towards adoption of technologies amongst this user group only 2% own a third generation phone (45% of users are from the UK which has had a commercially 3G network since March 2003) although 36% were considering upgrading during the next 12 month. However, despite the hopes voiced by Hutchison 3 that the launch of their service would draw users from the incumbent UK service providers (Vodafone, Orange, T-mobile, & O2), it appears that - like users of other services such as banking, utility supplier or land line telephony - users demonstrate inertia in moving between mobile service providers. Of the users questioned, 60% had been with their current (main) operator for more than 12 months with 1/5 of them remaining for more than 48 months. This is despite ⅓ of them making a complaint, mostly directly to their service provider, about their service. Almost ½ of those remaining unsatisfied with the response or receiving no response at all.

The lack of restlessness in this group of leading consumers makes the issue of capturing and retaining new accounts extremely important for service providers seeking to maximise this part of the market. Previous work has demonstrated national differences in consumers’ purchase of mobile phone services dependant on handset or call price (Massini, 2004), and indeed cost of calls and handset were identified as key variable influencing purchase. However, the most important factor influencing operator choice was socially orientated – namely subscribing to the same network as friends or family. This may indicate the utility in service providers developing further multi-user subscription services or offering incentives such as reduced call costs to nominated, same network numbers.

3 Apathy is not the only factor behind users’ reticence in changing mobile service provider. Number portability still can be laborious for users and taking a new number raises issues about remaining in contact. The battery life of 3G phone (sometimes less than 24 hours in practice) also caused user end reluctance, as was failure to see video calls as a killer communication application. Such consumer perspectives are dealt with in Moore & Rutter (this volume).
When asked which sources of information they placed most importance on when making decisions to buy handsets, users highlighted informal knowledge networks and resources such as friends, colleagues, family members and consumer produced websites.

However, there was a proportion of consumers who did place importance on information that reflected more clearly the interests of the service provider or retailer. The fact that websites of the operator and manufacturer, along with in store promotional information and advice offered by shop assistants were seen as important suggests an opportunity to significantly influence purchase decisions of users at the point of sale. This is especially the case given that approximately 70% of respondent bought the phone they use for themselves and a further 10% or we given it by a member of their family. This suggests that this market is heavily reliant on end user decisions, needs and discourses.

Other reasons given included that users worked for the operator, that the phone came as part of a job, in order to avoid using a previous service provider, to get a particular handset (e.g. O2’s Xda II) or ‘reliability as former monopolist.’
Opinions on Future Markets

The value of the market segments represented in the survey sample is not only in the view it gives of their past and current practices, but also their value as early adopters for new services and their position as lead adopters. As such these users’ opinions on future end user services has special importance.

The notion of ‘Mobile Entertainment’ as a hook for content, service and hardware adoption has been the focus of significant amount of industry and academic interest, though there remains a general consumer indifference to it. Taking games as a key element of the mobile entertainment market, the survey asked about the level of interest consumers had in using their mobile phones for this. Asking users to say whether they thought that the games available for mobile phones were a fun way of passing the time revealed no strong enthusiasm.

![Figure 8: I think the games you can get for mobiles are a fun way of passing the time](image)

There was a similar lukewarm reception from users when asked if they agreed that ‘I’m not really bothered about playing games on my mobile phone.’

![Figure 9: I’m not really bothered about playing games on my mobile phone](image)

In the UK at least, significant marketing attention has been paid bringing the ability of 3G networks to the delivery of video content, such as football highlights and video calls, to mobile users. But once again user enthusiasm for these services is far from strong.
Such opinions will become more important when users make decisions not just about whether to play games using their mobile device, but to search them out, download new ones and pay for the content and service. Even though the respondents were used to absorbing a premium for being early adopters, divergent responses to a question concerning pricing for MMS suggested that current pricing points for new ME services and content were not attractively positioned. When users were about this pricing point again in a less abstract context, highlighting the social network rather than the technology, this had a notable effect on consumer opinion. The amount of people who found the €0.5 price point acceptable dropped from 36% to 9%.\(^4\)

This reluctance to pay for available services also applied to alternative methods of revenue generation by content and service providers. When asked whether they would prefer to get cheaper content in return for receiving advertisements on their mobile phone, 73% disagreed or strongly disagreed and 49% suggested they did not want to receive any advertisements via their mobiles.

Moving from service use to handset preferences, users’ demands for mobile devices are typically contradictory and serve to further clarify the formative nature of both the mobile entertainment industries and their foundational technologies. This immaturity is evident in two different forms: the technology that is the basis of the industry and the formation of consumer expectations.

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\(^4\) Given the importance placed on social networks in other parts of this survey, this result is counter intuitive and seems to demand further exploration at a later point.
Figure 11: Attitudes towards payment for MMS

There was a general belief that a certain amount of learning time when upgrading technology was unavoidable, with only 17% of respondents disagreeing with the statement that ‘I think you have to take time to learn how to use a new mobile.’ Only the same percentage claimed never to have been frustrated when they were unable to find what they wanted on their mobile phone. That consumer views on the development of personal mobile technologies are still evolving is evident in the respondents’ ability to simultaneously hold contradictory views.5

Figure 12: I like mobiles that are small and compact

5 The ability for people to hold contradictory opinions is, of course, not limited to opinions on mobile phones. See for example, Philo (1990) for discussion of they way audience members in the UK negotiated a variety of views concerning the 1984/5 miners’ strike and its news coverage.
Encouragingly, there is a strong belief that mobile entertainment is an industry whose technological development and consumer adoption within the market is inevitable. There was evidence to support the belief that users have adopted a modernist view of this technology-based industry and because of this assumed technologies development would be linear and constant move toward perfection. Only 5% of respondents did not think that in the near future mobile phones would have more memory space and a better battery life. Similarly, only 11% did not believe that in the near future mobile phone connections would get faster and not crash. 69% were so optimistic that they agreed with the statement, ‘In the near future one device will do anything you want it to whilst you are on the move,’ while only 17% did not believe that in the near future mobile phones will be linked to all our home entertainment devices.

This is a promising finding for providers, but it is vital that these positive expectations are capitalised on in a strategically managed fashion so that over-optimistic consumers’ expectations are not encouraged, or there is (as with WAP) a notable difference between what is promised to users and their real world experiences of services.

Despite this, but in line with the focus group data presented elsewhere in the volume (Moore & Rutter), there appears to be a general reluctance of consumers to adopt the rhetoric of convergence. 74% disagreed with the statement that ‘There is no need to have any other mobile device than a mobile phone’, with a further 28% being undecided on the issue. Indeed, despite the high level of adoption of personal technologies by the respondents, there was little to suggest that users saw these as forming part of a portfolio of complementary technologies. Little need was apparent for devices such as mp3 players, personal DVD players, and portable game consoles to interface with mobile phones. Given the average level of technological adoption by the sample, that less that ⅓ of the respondents agreed that ‘Mobile phones are best used with other mobile technologies such as an MP3 player or a PDA’ is not entirely encouraging. Indeed, only 9% of users believed that the primary use of a mobile phone was anything but contacting people you already knew.
Consumer Concerns

Elsewhere the authors have systematically explored policy and regulatory aspects of the European mobile entertainment industry (Bryce, 2003) and argued that reliance on research and industry experts as a proxy for consumers is problematic (Moore & Rutter, 2003). It is notable that when respondents to the questionnaire were asked about the health, security and appropriate content issues relating to their mobile devices, their responses were fairly blasé. Despite media and regulatory interest in the possible effects of mobile radio frequencies and microwave radiation\(^6\), 62% would not entertain the suggestion that use of a mobile phone might have negative health consequences.

![Figure 14: Using your mobile may be bad for your health](chart)

There is of course debate about what level of consumer concern should be considered significant, but discussion of this is beyond the scope of this paper. However, the pattern of significant consumer confidence is notable and remains apparent when respondents were asked about other areas of potential regulation. When asked about whether they were concerned that minors might gain access to, or be exposed to, inappropriate material there was a significant spike with 38% strongly disagreeing with the statement.

Although concerns about the safety of credit card or identity details were less starkly defined, there was still a suggestion that the heavy Internet users represented in our sample had become accustomed to using secure services for fixed-line transactions, and had become relatively comfortable with the belief that the data they send to servers was safe and secure.

However, users did have reservations over the amount of spam and targeted adverts they might receive on their mobile devices. Of the respondents, 59% were worried about the level of unsolicited messages they might get, reinforcing the reticence of consumers to accept advertisements being pushed to their mobile phones discussed above.
Figure 17: I may receive unsolicited marketing and communications on my mobile via SMS and MMS

Whether this acceptance of possible risks associated with the development of mobile entertainment remains as described above is uncertain. It seems as though users are applying current experience of Internet services to ME. While this may smooth users’ adoption of comparable mobile services, there is a risk that a single, high profile event may have a significantly negative effect on consumer trust.

References


The Effects of Constant Touch on Consumer Behaviour: The Case of Iranian Mobile Users

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Abstract:
The main objective of this paper is to argue how the mobile phones have transformed the Iranian lifestyle and how the arrival of mobiles has been a catalyst for revolting behaviour, and has launched a new consumer behaviour and has changed our relationships. The paper explains how the people’s behaviour has developed a whole new social code in Iran. It is argued that the social value of being able to make a phone call at any time will also be extremely large. The paper discusses the contradiction of individualist behaviour and using mobile phones more publicly, that is to say, it used to be that you had to make an effort to over hear other people’s conversations. The paper investigates several questions relating to changing lifestyles such as whether men spend more time on the phone than women in Iran after the arrival of Mobile phones, whether mobile phones are just the preserve of a certain age group, whether class and wealth play a major part in mobile phone ownership, and whether the expansion of the mobile culture will be influenced with the removal of phone boxes. The paper points out that the Mobile expands the space for individualism by asserting itself against old hierarchies: people allow having more than a private mobile phone; nobody controls all forms of long-distance communication, and the phone is not the property of state organizations. In the age of mobile phones, it is the individuals, and not the society that play the major role.

Keywords:
consumer behaviour, mobile subscribers, social code, life style, individualist space, time-space distanciation

Mobile phone sociological perspective

The main aim of this paper is to give a sociological analysis on the expansion of mobile phone in the Iranian society. Mobile phones have been absent from sociological analysis. They have not received much attention from sociology and the media sciences in order investigate their impact on various fields of social life. Thus, we have no integrated theory concerning the specific functions and consequences of mobile phone communication. This lack of intellectual enthusiasm and scientific research which is less than research efforts on the World Wide Web has recently been addressed by making a web site for online mobile phone sociological research. (Geser, 2003). As Geser correctly mentioned late modern theorists such as Manual Castells, and Anthony Giddens on their theoretical perspective only give the Internet and the marriage of PC and Telecommunication the status of a mega-innovation that really counts, while mobile communication facilities are almost totally neglected. Such views ignore
the basic facts that in comparison with PC have and Net technologies, mobile phones are used nowadays by broader strata of the population all over the world, and that for many users, they have stronger impacts on social life, life style and consumer behaviour. In an Irish study where young respondents were asked what kind of technological device they would prefer when stranded on an isolated island, 52% voted for the mobile phone and only 18% for the TV. (Hession 2001 cited in Geser 2003). This is not the case in the Iranian society and I think it is neither in the western world. Nevertheless, it should be considered that people are making a space for mobile phone in social life for entertainment and leisure. They spend much larger sums of money on monthly phone bills than on Internet provider or land phone services. Thus, undoubtedly fundamental transformation in individuals’ perception of self and the world by the inexpensive mass-produced mobile communications need more scholarly attention. (Townsend 2000).

**Iranian mobile users**

This year the number of mobile subscribers around the world is likely to reach 1.4 billion, and for the first time greater than the number of land lines. We have been using the phone more and more since the advent of the mobile. In 1994 The Iranian Telecommunication Ministry launched the first mobile phone a decade after Ernie Wise made Britain’s first cell phone call. Now, less than a decade, in 20th January 2004 (30 Dey 1382), 3,416,868 people in Iran have a mobile and many try to have one by pre-purchasing its license and becoming a subscriber. (Iran Ministry of Telecommunication, 2004) We have been using the phone more and more since the advent of the mobile. Comparing to Britain that two decades after Ernie Wise most people have a mobile and every sixth person in the world owns one, it seems these figures are not comparable, as in 2000, the percentage of the UK population owning mobiles passed the 50% mark for the first time. However, if we look at the case carefully, it can be argued that the number of mobile users in Iran shows a revolution in terms of changing patterns of behaviour and relationships.
One of the essential mechanisms for social typology is ‘time-space distanciation’. This is a concept, which captures the ability of people in a society to control allocative and authoritative resources in time and space for use in power relations. Expanding allocative time-space distanciation involves (among other things) the development of the forces of production; expanding authoritative time-space distanciation involves developing the means of surveillance. Increases in such distanciation are human achievements: they increase the capacities of certain agents to act. Where there is unequal distribution of access, then in general those with the greatest access to the resources in question will have an interest in preventing a decline in time-space distanciation with respect to those resources. In non-capitalist countries, those who hold political power have an interest in a reduction in time-space distanciation with respect to allocative resources, i.e. reducing the realm of private ownership while increasing the planning capacities of the state, nationalisation, under-controlling economic institutions, expansion of state-centred control over authoritative resources, to erode the allocative resources capacities to increase time-space distanciation. In contrast, at the beginning of a
period of economic growth, the bourgeoisie tend to force the state to expand its control over the economy. This reductionism allows the bourgeoisie an increase in their capacities. Capitalists use their power, rooted in the inequalities of access to allocative resource, to prevent declines in allocative time-space distanciation by trying to reduce authoritative time-space distanciation. Essentially, the impulse towards expansion of time-space distanciation comes from different forms of conflict and competition in different societies. In class societies (capitalism) this is impelled primarily by conflicts over allocative resources in the form of economic competition between capitalist firms; in class-divided societies it is rooted in conflicts over authoritative resource forms of military and territorial competition. The leading edge of time-space distanciation thus varies, depending upon which kind of resource is the ‘basis of power’ in the society, and, accordingly, which dimension of distanciation will be most implicated in social conflicts. (Giddens, 1981, p 50, Giddens, 1979, p 94).

The coming of the mobile enabled the reduction of ‘time-space distanciation’ substantially, and then the ability of certain people to control resources. The age of mobile phone has made an end to unequal distribution of access to resources. It increases the realm of private ownership while decreasing the planning capacities of the state. Phone less communities which could be classified as class divided society according to Giddens, (1981), particularly rural ones, enable to bypass their sclerotic, poorly maintained, exclusive, low-technology, and landline-based systems. If this trend continues, the number of mobile phone subscribers will exceed the number of fixed phones. It is a compression of time-space in the society. It can be argues that it is the emergence of characteristic of late modernity that new technology assist the class-divided society to have short cut to a knowledge society. The Iranian Ministry of Telecommunication has planned to begin a pay-as-you-go mobile system. (Iran Ministry of Telecommunication, 2004) It might bring mobiles within reach of hundreds of millions of people who would never, for financial or bureaucratic reasons, have got a fixed-line phone. Thus, it is obvious that the mobile phones would transform much extensively Iranian life style in future. It has already launched a new consumer behaviour which has changed our relationships. The mobile expands the space for individualism by asserting itself against old hierarchies: people allow having more than a private mobile phone; nobody controls all forms of long-distance communication, and the phone is not the property of state organizations. The arrival of mobiles was a catalyst for revolting behaviour. ‘It was the individual, not society that spoke loudly: ‘I’m on the traffic jam’... the short history of mobile phones in Iranian is intimately tied to social transformations and competition. In the age of mobile phones, it is the individual, not society that speaks loudly.
The Conspicuous mobile users

The number of mobile users per population is not the same as the developed world. But, as I have mentioned everybody in the public scene and private gathering can easily realize the domination of the mobile. Using the phrase ‘conspicuous consumption’ from Thorstein Veblen in *Theory of the Leisure Class* (1975 [1899]), the reason why mobile users are conspicuous consumers is because they ostentatiously display using mobile phones in an attempt to achieve social status. Thus, although the number of mobile users in the streets of Tehran is less than London or Tokyo, as about every 20 person in Iran owns a mobile phone, it often seems that there are more mobile users in Tehran than the developed cities. The reason is that the users demonstrate their mobile and conversation in the public place more ostentatiously than cities of developed world. In addition, people avoid using old models of mobile phones, as old mobiles are often compared to bricks. Instead, using small pocket phones with more options are more common, while in comparison with the land line we cannot see people that use old model, as it looks ‘patina’, a characteristics of pre-fashion societies. (Corrigan, 1997, p 7-9)

The amazing phenomenon is that the mobile users have developed a whole new social code. The new generation, for example, can take calls in the middle of a crowded restaurant. It is no longer conceived as a potential nuisance. Contrary to this, it is as if people enjoy listening to each others conversations in the middle of a crowd. It indicates that the social value of being able to make a phone call at any time and any where is extremely large. You can see easily in the streets of Tehran, in the bus stop, everyday that many people talk loudly into a mobile phone pressed to their ear. Without consciously eavesdropping, you can hear what they say: about friends and family’s birthday or anything else. They sometimes speak with a particular volume and pitch: far more loudly than if they speak to someone next to them, not quite as loud as if they address a public meeting. They have none of the self-consciousness people usually feel when they are by themselves among strangers, because they are not by themselves.

It used to be that you had to make an effort to overhear other people’s conversations. Sometimes bad telephone lines allow us to listen to other conversations. We thought we had discovered other peoples’ lives. We had to turn our head to look into their lighted living rooms, glance into their strange lives. Now some of us have to make an effort not to. The Iranian customer’s behaviour seems stranger in terms of inviting others into their personal worlds. The aspects of personal characters of mobile users would be open to others, that is to say their accent, thoughts about living, what to do in leisure time, etc. every minute of mobile use becomes active. For example, busy people who don’t have time for rows or mutual restatements of love before they leave for work now have them on the bus instead. The mobile has become the supermarket checkout queue of private life, where everyone gets to clock everyone else’s trolley, to see who is on
no-fat yoghurt and who’s on family-size oven chips. Interviews with mobile users found that they call their relatives more than before.

It is common in Iran that women put the phones in their bag or purse when they go to a ceremony and tell somebody to call them just to show they have a mobile. It is just lying to ourselves that we are waiting just in case somebody calls, when we know nobody will. (For example, I once witnessed a young man on his mobile phone talking to a friend on a car when all of a sudden, as he was talking, his phone started to ring continuously and the shade of his face turned to bright red he realized the game was up.)

We have observed the scenes when people stand in old-fashioned silence, then suddenly you see they jump and scramble in their pocket, as if a ferret inside their trousers has bitten them. But you can just hear the haul out the mobile, or a text message on their mobile, and then they laugh because a joke has been sent.

The function of the mobile is widely accepted ranging from avoiding the obscure uncertainty of waiting for someone to canceling a meeting with a short notice. It seems that the fluctuation of our life in those pre-mobile days vanished. But it brings us a new fear. For instance, people on a plane sometimes worry about the consequences of a passenger not switching their mobile phone off.

As Jon Agar, in his book Constant Touch: A Global History of the Mobile Phone, argues, the effects of mobile phones was not spread around the world like a virus because of technology. Rather they arrived when society was ready for them: a time of individualism asserting itself against old hierarchies - paternalism in the developing world, communism in the former Soviet bloc, and the emerging of globalization and removing from discourse the argument of skepticism to globalization.

**Texting, language and social code**

The impact of changing context in text messages is also worth mentioning. Texting of mobile phone has become particularly popular with individuals and in cultures which tend to be reserved with other people. For instance, in 2001 BBC world service reported that senior Islamic figures in Singapore have ruled that Muslim men cannot divorce their wives by sending text messages over their mobile phones. The decision ends weeks of debate over the issue after a court in Dubai ruled that a mobile-phone text message was acceptable as a written declaration of divorce. Muslim men are allowed to divorce their wives simply by saying the word ‘talaq’ (divorce) - I divorce you - three times. However, it is not clear that despite of the acceptance of function of new technology by traditional institution would lead to an essential change in the text, that is to say, the secularization of ethic and Islamic jurisprudence. High ranking clergies (ualam) are not opposed on the usage of new technology. However, unlike the technology
of 1960s and 1970s which affected the life style with a lag, the advent of mobiles has had immediate impact on personal behaviour and life.

Nevertheless, they are youngsters who value texting as a means to communicate without having to voice feelings and thoughts. The demands of brevity can also encourage text messages and emailers to be candid, frank, informal, and even cheeky. (Plant 2000, p 56). However, it can be said that Iranian adult mobile users send frank text messages without the risk of embarrassment. As a consequence, SMS is highly functional for widening the social sphere by an ever-changing multitude of very peripheral relationships, mostly based on single accidental contacts, which may be a potential resource pool that can be tapped in the future. In some cases, it may also substitute closer relationships by providing an ever accessible reservoir of superficial contacts which demand very little psychological effort and involvement. (Geser, 2003)

Recently in Iran, text messages (SMS) begin to give service to mobile users. People use this service in different ways. In the first week of January 2004 (Dey 19 to Dey 25) mobile users sent more than 10 million texts. (Iran Ministry of telecommunication, 2004) But we should be concerned with the way the service affects the language. It is soon we investigate it in Iran but it seems a sort of hidden language is appearing. What texting is really doing to the language? None of the dictionaries I have looked at has caught up with the verb ‘to text’ as in Persian we use the English version but there is none in English either. Texting is a tightly circumscribed short message service (SMS) range-bound to 160 characters, including spaces. Abbreviation is the essence of texting.

**Iranian Mobile Users behaviour within September and November 2003**

<table>
<thead>
<tr>
<th>Numbers of conversations</th>
<th>785,615,586</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of conversations (minute)</td>
<td>1,077,150,561</td>
</tr>
<tr>
<td>Average time of a conversation (minute)</td>
<td>1.37</td>
</tr>
<tr>
<td>Number of mobile to mobile conversation</td>
<td>531,971,665</td>
</tr>
<tr>
<td>Number of mobile to land phone</td>
<td>166,179,023</td>
</tr>
<tr>
<td>Number of mobile to international land phone</td>
<td>4,294,072</td>
</tr>
<tr>
<td>Number of text messages</td>
<td>83,177,826</td>
</tr>
<tr>
<td>Text messages per users</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: Iran Ministry of Telecommunication

Sociologically, texting consolidates sub-communities. Each subgroup will have its own identifying styles and codes. Over here, the vanguard texting subgroup is the young and minimally educated. Texting irresistibly attract to youth people. They embraced text mails characterized by group-specific linguistic habits and codes. The extreme shortness makes it legitimate to use quote conventionalized forms of writing: so that even shy people (or people from cultures which prohibit very subjective expressions) feel free to communicate because they do not have to expose themselves in a highly personalized way.

They use differently from the use of adults. Making a hidden language is a demarcation from adult world by young people. (Rautiainen 2000). Text-based
message (SMS) is another escape route of mobile realm. By doing this, the users leave it to receivers whether and when to respond, and especially giving them time to design their response carefully, so that it mirrors their authentic and longer-term attitudes, rather than the impact of unpredictable momentaneous factors. (Geser, 2003). As he denotes, ‘text messages (SMS) are far less intrusive than phone calls, because recipients are given the freedom as to whether (and when) they want to respond. Consequently, there is a very low threshold for sending such messages, like merely trying out whether recipients take notice of them, answer them or even ‘escalate’ the relationship by calling back orally. ‘A noncommittal question such as ‘How are you doing?’ or ‘Did you think that the music was good on Saturday?’ marks the contact; gives sign of interest and also tests the other’s sincerity. The informants indicated that it is important to ask a question during this initiation phase since it is a display of interest and identification. The next turn in the cycle is some form of access display that is either an opening for further interaction or a closing of the potential.’ (Ling/Yttri 1999).

More than that: it is very certain that the SMS will be received by the individual to which is sent, without somebody else taking notice. This privacy contrasts with cell phone calls, which can drop into completely unpredictable environments where unwelcome third parties may be present. Likewise, it contrasts with all other forms of writing (e.g. letters), which can easily be intercepted by intermediaries (Ling/Yttri 1999).

Sharing the costs of message exchanges by the two senders is another attractive feature of text-message. Thus, SMS allows for an equilibrated ‘economic exchange’ which is highly preferred by partners not (yet) involved in an informal social relationship. By contrast, phone calls produce more ‘social exchanges’ which are typical for already established relationships where exchange disequilibria are intentionally produced for reinforcing mutual interdependence (Blau 1964, 88ff.).

As a consequence, SMS is highly functional for widening the social sphere by an ever-changing multitude of very peripheral relationships, mostly based on single accidental contacts, which may be a potential resource pool that can be tapped in the future. In some cases, it may also substitute closer relationships by providing an ever accessible reservoir of superficial contacts which demand very little psychological effort and involvement.
Mobile, uncertainty and trust

We spend a lot of time with our mobiles. In a sense, they become our confidants. They know the names and numbers of our closest friends and associates. They know the numbers last dialed. They carry secrets, and like all confidants, they can betray secrets. The advent of the mobile makes room for a whole new set of suspicions. Why did (s) he switch her/his phone off? Checking your mobile display constantly while talking to somebody is the modern equivalent of looking over somebody’s shoulder at a party while talking to them, making it obvious that you are hoping to see somebody more interesting. Nevertheless, research shows that having a mobile makes them feel safe from anything that can happen such as a car break down, alone on a dark road in the night, if you need an emergency services, etc.

Mobile, lifestyle and future

The arrival of the mobile phone has transformed Iranian lifestyles so much that men now spend more time on the phone than women. However, we have no accurate data from the Ministry of Telecommunication, so our observations show this. Mobile phones are still the preserve of the youths but older generations in their forties and fifties now try to have a mobile phone. It seems that men are actually spending more time on the phone. The explanation might lie in the fact that men love to play with techno toys while women may be more conscious of the bills they are running up. Class and wealth seems do not play a major part in mobile phone ownership. I have seen an unskilled worker use a mobile. Interviews indicate that your phone became more important than your trainers.

What the Finnish academic Timo Kopomaa called the ‘culture of interruption’ created by the mobile is resented far more by older generations. Older age brackets are more likely to be censorious about ‘inappropriate’ phone use than teenagers. To the traditionalist, the mobile fosters rude behaviour: it has eroded the art of making an arrangement and sticking to it; and breaking off a conversation to answer a ringing phone is the modern equivalent of looking over people’s shoulders at cocktail parties. However, even among the apparently uncouth, mobile-obsessed young, there is an unspoken etiquette. Researchers have found that customers are far less likely to put their phone on the table in an establishment with tablecloths. Ubiquitous as it may be, but the mobile divides generations; parents just don’t understand. What more proof could you need to know that this is not a gadget, but a fashion accessory?

The era of the telephone kiosk is drawing to a close. It is small sign of social breakdown that indicate a failed public space. The curious thing about predicting trends in mobile phones is that, in an important sense, the future is already here but we have not yet come to terms with it. This is not surprising. No other consumer product in history has changed so rapidly or gained popularity as fast as the mobile phone. Ten years ago when the phone was an expensive, luggable
brick, flaunted by flamboyant car owners, no one predicted the explosive growth that took annual sales.

Mobiles, unlike any other device, have been gobbling up other products so fast that we haven’t been able to adjust our lifestyles to them. Take the wristwatch. You don’t need it any more: the screen of your mobile – which is with you 24 hours a day - will tell you the time, warn you of meetings and wake you up in the morning. But people still wear watches because they can’t shed something that has been, in Marshall McLuhan’s words, an extension of themselves.

You can now buy mobiles that include a radio, an MP3 (digital music) player, a diary, a calendar, a camera, an embryonic video camera, a calculator, a note pad, a word processor, a spreadsheet, a modem, a voice recorder, a web browser, an emailer, a text messaging device, a games arcade, a thermometer, a contacts book and a barcode reader, not to mention satellite tracking devices that can calculate where you are to within a few metres. That amounts to 20 different products you could have bought separately but which are now packaged together in one device. The mobile is the first interactive device that people carry with them everywhere. Your phone knows who you are and where you are. Technology, including miniaturisation, is still progressing at an awesome pace. But the shape of the phone in the future will depend not on technology but on what consumers want.

We are now in the midst of the second generation (2G) phase and this Christmas we will be bombarded with ‘smart’ multimedia phones that can take and transmit photos and polyphonic ring tones. Coming shortly is 3G technology enabling you to see the person you are speaking to live on the screen or watch Premier League goals soon after they are scored. (The three Gs stand for girls, gaming and gambling, according to wags in the industry who know how hi-tech is usually led by base consumer demand.)

It is a small step to turn your phone into a television or a video camera (2G phones can already take video clips). No one wants to buy a radio, a camera or a miniature TV if it means carrying an extra bit of equipment around all the time. But if they come as built-in extras on a lightweight phone, that is different. Radio will enjoy a second renaissance (the first was the in-car radio) as a result of the mobile phone.

Mobiles are getting better at linking with the internet after the disaster of the first generation WAP (wireless application protocol) phones. Soon you will be able to access most web addresses or web cameras in the world (you can already look at webcams on your phone to check out traffic jams). You will be able to check your children’s nursery through a secure web camera while you are at work to see if they are all right, take in a live lecture at a remote university, answer the door or switch off the lights at home from anywhere in the world - as long as the device has a unique web address.
Finally, there are many unanswered questions about mobile phones: 1) Why everything became silver a few years ago - not just mobile phones but also cars, hi-fi systems, TVs and laptop computers. It is an under explained event in cultural history. 2) Does the customer have choice of a mobile phone that makes the fashion and design of new mobile phones? Is it really the conspiracy of the capitalist system and producers to persuade people to change their phone or it is the right of consumer elite that force you to do so. 3) What can ‘international mobile phone culture’ mean?

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Part 3

Location-based Games
On The Streets With Blast Theory and the MRL

On the Streets with Blast Theory and the MRL1: ‘Can You See Me Now?’ and ‘Uncle Roy – All Around You’

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Abstract:
This article describes the player experience from two location based mixed reality mobile games developed jointly by the UK artists group Blast Theory and the Mixed Reality Laboratory (MRL) at the University of Nottingham. Implementation is described, together with a brief discussion of the performance and usability of the various technologies employed. ‘Can You See Me Now?’ (CYSMN) was the overall winner of the 2003 Prix Ars Electronic Golden Nica for Interactive Art. It was first performed in Sheffield in December 2001 and has been rerun at several later events. ‘Uncle Roy – All Around You’ premiered in the summer of 2003 at the Institute of Contemporary Art (ICA) in London. In a five-star rated review, London’s Metro newspaper described the experience as ‘one of the most exhilarating theatrical experiences you’ll encounter’, adding ‘so you leave feeling contemplative, thrilled, and ever so slightly paranoid. What more could you ask from theatre?’

Keywords:
Pervasive, Game, Wireless, Location-based services, Context-aware services

Introduction

The term Pervasive Computing is used to describe a conceptual state in computer science, where computing power is ubiquitous. Communication and information processing capabilities would be everywhere, available to everyone, and always switched on, impinging on numerous aspects of our everyday lives. We can already see examples of this type of technology at work, from cell phones and wireless Internet devices, to the microchips that are embedded under the skin of pets for identification. There can be no doubt that our lives are increasingly being affected by this pervasive technology.

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Pervasive Gaming seeks to make use of the capabilities and possibilities afforded by this new technology to bring the gaming experience outside of its traditional box and into the ‘real world’. Precurred by films like ‘The Game’ where the boundaries between the game world and the everyday world are redefined, science fiction has become reality as projects such as Electronic Arts ‘Majestic’ (Bonsor, 2002), ‘Botfighters’ (It’s Alive, 2000) and the ‘Nokia Game’ (Nokia, 2003) allow the game to bring itself to the player.

On the bow-wave of this new gaming genera are the U.K. based interactive arts group Blast Theory and the Mixed Reality Laboratory (MRL) at the University of Nottingham. The collaboration has produced several pieces that have been shown to critical acclaim. This article describes two of the ‘games’ from the user’s perspective and provides additional insights from the designers and creators.

Can You See Me Now?

First staged in Sheffield in 2001 this work has, so far, been reproduced on two other occasions (in Rotterdam and Oldenburg both in 2003) and was awarded the 2003 Prix Ars Electronic Golden Nica for Interactive Art. Experientially speaking, ‘Can You See Me Know’ (CYSMN) is a pervasive round of tag, in which online players must evade the street runners who are trying to capture them. Players log into the game via the Internet using a regular web browser. They see the game world as a planar map view (or in later versions a 3D computer graphic representation) showing a small part of the host city, with an icon (or avatar) marking the players current position within the world. After starting at a randomised location, the player moves around the city using the keyboard whilst trying to avoid the runners. The runners are members of the Blast Theory team who are actually present in the physical city. They carry with them a collection of devices so they are able ‘see’ the online players position and communicate with them and the other runners. They are also equipped with a global positioning device so that a runner’s location is automatically and immediately known by the game server.
Fig. 1: A runner’s iPAQ/GPS/WaveLAN equipment and walkie-talkie.

**Communication**

Players could communicate with each other and the runners via a text chat mechanism, and they were able to listen to the runners’ communications via a streaming audio feed from their walkie-talkies. Notably, feedback from players after the experience has finished revealed that this verbal communication was one of the most compelling parts of the whole experience with the audio stream provided very direct window onto the gaming world.

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2 ‘Can You See Me Now?’ figures adapted from Flintham, 2003, and used with permission.
Fig.2: The Online players interface (Web Based).

Fig 3: The runner’s interface (iPAQ)

The game interfaces both attempted to show an accurate representation of the actual city and the position of all players and runners together with the text messages. Building boundaries were enforced for the online players so that they could not cheat by passing though a wall and into a building where the runners would not be able to follow. However, by listening to the runner’s radio traffic, several online players did deduce how to cause the runners difficulties. They then developed various tactics to avoid capture, such as requiring the runners to cross-busy roads, or by choosing routes that would require the runners to repeatedly go up and down hills to exhaust them.
Discussion: Bringing the Game to the Player

Although CYSMN was pervasive in as much as the game itself was played in the real world and made use of pervasive computing technologies, the players themselves remained behind their desks, sat at their computers. One reason for this was concerns over the stability of the technology. Wireless LANs have limited range (an 8 meter tower was required for CYSMN) and are prone to signal loss, and, over time, GPS systems have proven to vary wildly in their usable accuracy. So, it was felt that it would be better to keep this technology in the hand of the performers, rather than the players, until it proved to be more reliable (Benford 2003).

The next iteration of the team’s work solved many of these technical issues (Flintham, 2003). Taking a back-to-basics approach to location tracking created a new experience. This was part pervasive game, part performance art, but wholly immersive. Each player was equipped with mobile technology and was required to explore London’s parks and streets in the search of the illusive ‘Uncle Roy’.

Uncle Roy

‘Uncle Roy – All Around You’ premiered in the summer of 2003 at the Institute of Contemporary Art (ICA) in London. In a five-star rated review, London’s Metro newspaper described the experience as ‘one of the most exhilarating theatrical experiences you’ll encounter’ adding ‘so you leave feeling contemplative, thrilled, and ever so slightly paranoid. What more could you ask from theatre?’

Players experienced the game in one of two different modalities. Online players accessed the game gratis, using a web browser and could explore a three-dimensional representation of the game area (approximately a 1 mile radius around the ICA in London) by moving their avatar using a keyboard. Street players took part in the game in London where they were charged a fee (£6) for the session. The session lasted a maximum of one hour. Where the gaming paradigm in CYSMN was one of conflict, with the online players fleeing from the street player, Uncle Roy sought to evoke an atmosphere of co-operation in which...
the online player assumed responsibility for the street players and assisted them in their tasks. The two play modes, ‘Street Play’ and ‘Online’ created very different play experiences and each will now be described.

**Street Play**

As the game beings, players were stripped of their real world identity (pockets emptied, driving licenses stored, etc.), personal details were recorded and a digital photo taken. In return the player was provided with a networked handheld computer (Personal Data Assistant – PDA) with GPRS (General Pack Radio Service) networking, and given a brief tutorial on its use. This device is to be their sole conduit for communication during their quest. Possessions were removed for two reasons. First, it was designed to increase the player’s sense of isolation from their familiar everyday world, and so make them more reliant on the PDA (and subsequently the online players for help). Second, more practically, it guaranteed the return of the PDA since it was required for belongings to be reclaimed. The PDA display showed a planar map of the surrounding area that could be scrolled and zoomed to provide finer details. Players were also shown how they could communicate their position to online players by positioning a ‘me’ icon and the map and clicking the ‘I AM HERE’ button. This back-to-basics, ‘self-report’ of position does not have the same problems inherent with the technology in CYSMN. By placing the onus of positional feedback on the player through interaction with the PDA, the two were bound even closer in their relationship.

Street players could also send online players brief audio messages (up to 7 seconds) by speaking into the device. Online players could send short text messages in reply.

![Fig 5. The street player’s PDA display, left image shows the map ‘zoomed out’, and the right image shows the display ‘zoomed in’.

After the introduction, players were led to the entrance of the ICA and directed to enter St James Park where upon an elaborate ‘Easter egg hunt’ began. Various text messages clues were sent to the players PDA (by ‘Uncle Roy’) with each
being specific to the player’s current location (or at least where the player was declaring themselves to be). For example, the first clue upon entering the park could have been ‘...Find the bench in the park...[and] Click I AM HERE when you are there’. Upon reaching the bench, further clues were given that would lead the player on a path through the park and London’s back streets, until Uncle Roy’s office was finally found. Some clues guided the player back onto the correct path if they strayed too far away ‘You have come the wrong way. Head towards Pall Mall.’ Others were more spurious, ‘Look for a woman with black hair, she will show where to go’, and were designed to distort the perception the player had between actors and genuine non-game characters, who just happened to be in the locale.

Upon reaching the office, the player was asked to press a door-buzzer and they were let in. At this point, the PDA disconnected from the network (so that the player could no longer communicate with the online players) and displayed a sequence of pre-canned instructions for the player to follow whilst inside the office. On the table was a postcard addressed to Uncle Roy and they were asked to fill this in by answering the question ‘when can you begin to trust a stranger?’ When done, they were told to leave the office and wait in a nearby phone box for further instructions. There, they were phoned by an actor and given instructions to leave the phone box and wait on a nearby street corner where they were picked up by a limousine. During a ride through London an actor asked them a standard script of questions about the nature of trust. This concluded when they were told that another player in the game was being asked the same questions, and asked if they would like to enter into a yearlong contract with this person, to help them if called upon to do so. If they agreed, their contact details were taken and they signed the contract.

The game ended with the player being dropped off by the limousine outside the ICA where they put the postcard into a pillar-box and returned their PDA to retrieve their belongings.

**Online Play**

Due to bandwidth limitations, it was necessary to limit the number of online players who were simultaneously playing the game. When then game was full, a cuing system operated from the introductory games web page on a ‘one-in, one-out’ basis. After reading the instructions, the online player’s game began as their avatar was placed at a random location within a three dimensional model of the game world. The player moved the avatar using their keyboard and text messages could be sent to both other online players and to specific street players. The information recorded about each street player was made available to the online player. This consisted of the players name, gender, and a description together with a photograph that was taken when they received their PDA. The street players currently declared location (defined to be the location of the ‘me’ icon, on the PDA map) was represented as a pulsating orb labelled with their name. When a
street player explicitly declared their position (by selecting the ‘I AM HERE’ button) a bell tolled in the game and a burst of rays shot from the orb.

Online players had access to additional information, which the street players did not have, via the computer graphic model. ‘Photo-points’ existed where images of important locations in the game, such as Uncle Roy’s office door, could be seen. Since there was no time limit that a single online player could remain logged for they could also accumulate experience about the game (e.g. location of the office) and so could further help many street players.

Upon successfully helping a street player to the office, online players could elect to view the street player in the office via a live web cam. They were then prompted to fill in a web-based form with the same questions about trust that the street player was about to be asked in the limousine. This includes the possibility to make the same commitment to help a stranger, and if they agreed they enter their contact details.

**Discussion: Trust**

In many respects street players had already displayed a high level of trust in the organisers of the event before venturing, ‘alone’, into a city park, often late a night, without any of their belongings. They further put their trust in the technology that they were given, believing that it would safely guide them. Finally, street players had to trust that the online players were guiding them in the correct direction, rather than deliberately hindering them (which they were free to do if they so desired).

After the end of the game’s run at the ICA each street player, who had agreed to help a stranger, was randomly paired up with an online player who had made the same commitment, and his or her contact details were exchanged. With hindsight it would perhaps have been better to pair them up with an online player who had personally helped them. In that way, the trust gained during the game and shared experience would have been further extended into the non-game world.

A major theme of ‘Uncle Roy All Around You’ was trust. Trust in people, trust in technology, but essentially trust that the natural inclination of human beings is to help each other. Indeed it is pleasing to note that although free to help or hinder the street players as they so chose, the vast majority of online players took their responsibility for their real world partners seriously, and made every effort to ensure their success in finding the office.

**Game v’s Non-Game**

The blurring of the distinction between what was ‘game’ and what was ‘non-game’ was an essential part of the experience for players of both modalities. Although, to the casual viewer the online play might look like a typical detached
solo gaming experience, only when the mapping from game world to real world is understood does the game world become alive with people and associated social responsibilities, i.e. events in the 3D world directly impact upon street players experience, and similarly, the actions of a street player directly affect the 3D game world. This gives the online player a sense of remote power, and hence responsibility for the successful progress of the street player. For them it is about a disconcertingly distorted view of the city that causes them to question their relationship to it, the online players and even passers-by. This invites them to cross the usual boundaries of behaviour such as getting into a stranger’s car, or an unknown office.

**Conclusion**

Location-based games such as CYSMN and ‘Uncle Roy’ are by definition bound to a specific place. Whilst this is a strength, since it allows the real world to be an integral part of the game, it is also a weakness since in hinders large-scale (disparate geographic) roll out because the content must be tailored for each target site.

CYSMN was played by a relatively small number of online players (a maximum of twenty at a time), and Uncle Roy experienced by a total of 272 street players and 200 online players. Although all events were fully booked, player fees alone far from covered the cost of staging the events. It is difficult to scale the experience without employing more people and so neither design as they stand form commercially viable propositions. Extending pervasive gaming into the larger market is one of the biggest challenges that are faced in this area.

Encouragingly, player feedback in the form of questionnaires indicated that players do find this form of entertainment both novel and engaging. Here one street player from Uncle Roy writes about their experience: ‘My initial feelings were of slight paranoia because you knew you were probably being watched and certainly monitored … … I couldn’t help but look around me to see who else might be in on it. There was only a limited amount of guidance, just enough to increase apprehension and maximise the impact of the experience … … I thoroughly enjoyed the experience. It is unlike anything I have done before.’

**References**


‘Gangs of Bremen’: The First Prototype of a Mobile Game

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Abstract:
In a student project at the University of Applied Sciences in Bremen we are developing a game named ‘Gangs of Bremen’ with a virtual part of the game in a 3D environment and a mobile part of the game, where the gamers are forced to discover and conquer their real life surroundings. We chose our hometown Bremen with its many places to discover as the playground for our game. It is our goal to merge different popular game aspects with the new ideas of mobile games to one concept in which the real and the virtual parts of the game are inseparably combined. Due to the complexity of the environment we decided to create a prototype situated in a smaller and more familiar surrounding, the ZIMT2. In this prototype we want to simulate the core mechanisms of our game concept.

This concept consists of three main parts: First, quests, which have to be solved; second, real-world parts in which the gamers take their mobile devices and start moving; third, battles where the virtual characters can attack each other or the real gamers seen in the virtual game as ghosts. For all these elements a good team play will be required.

The engine concept anticipates not only graphics, physics, network and other data but supports communication with mobile devices as well as displaying their graphical user interface and of course wireless positioning services for locating the mobile devices in specific surroundings.

Keywords:
mobile game, simulation, team-play, hybrid, 3D engine, positioning

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**Complexity**

In this paper we introduce ‘Gangs of ZIMT’ the first prototype of the project ‘Gangs of Bremen’, in which we show the concept structure through a film, which partly consists of virtual simulations and partly of real life film sequences.

‘Gangs of Bremen’ is a student project at the University of Applied Sciences in Bremen, Germany. We are developing a game in which it is our goal to create a fusion between a virtual game world and real parts in the gamer’s real life surroundings. The gamers are able to stay in the different worlds and have to show a good teamwork combining the team-mates in them. The positions of the gamers in the real world are gripped by different positioning technologies with the help of their mobile devices to make the fusion of the dimensions visible and noticeable in the game. We decided to create the ‘Gangs of ZIMT’ to get a clear view on our complex concept. For this reason this prototype is situated in one single building, the ZIMT instead of the hole city of Bremen to scale down the complexity. In this surrounding we are familiar with, we play through different scenarios.

**Concept**

Regarding the concept we started with taking a look at different popular virtual game concepts and focused on comparing them with several new mobile game concepts to find aspects that can be connected. In our concept we now have merged some aspects of which we think they are good approaches for a cooperation through the different dimensions of the game. One important part of the concept is teamwork.

In the virtual part of the game a gamer is able to select an individual character with some increasable abilities (as known from different role playing games). This character moves in a 3D world - like you can find it in many of today’s ego perspective games - and starts with his team-mates to battle against one or more other teams. There will be no AI, the gamers will only play with or against other human gamers. Within the game the gangs have to solve different quests for which they have to move in the virtual world as well as in the real world with their mobile devices. One fundamental aspect of the fusion of the two dimensions is the collaboration between the gamers in the real world and their virtual team-mates.

Around the conceptual ideas we put a storyline to make the integration and the switching between the dimensions comprehensible. In the plot the virtual world is the same building as it is in our real world but we are several years in the future. The future is mostly destroyed by an evil artificial intelligence generated in our university. It is called the G1 and it has overpowered many people and forced them to fight against each other. The future population is unsatisfied with its life. Therefore some begin trying to change their past. Several groups with different
opinions about how this is practicable start this hard quest. Each of the teams has a team energy called totem to boost their individual power. To find G1 and to get different information the teams have to go on time trips. If they do so, they get into the mobile part of the game where they can move and find what they need until they have to go back into their own timeline. Throughout the game more and more teams will fail and will start to sabotage the other teams, because they will be overpowered by G1.

![Diagram of game periods](image)

**Figure 1: The game periods along a semester.**

We planed the game in periods over a complete semester (Figure 1), to give all students of the univeristy the possibility to participate in the game. In the first period the students create their characters and start in their home bases. They have to contribute an attribute to the team totem, which has its place in the home base of the regarding team, by solving a gamer specific quest to denote their participation in the game. The second period consists of small sequences. One sequence is a closed strand with a specific length of time, for example one week, in which complex quests have to be solved. The faster the teams can solve quests, the more points they receive. If a sequence ends and a team has not completed a quest, it receives no points. The quests for this sequences force some teams not to succeed. On the FINAL DAY the best team of period 2 will fight against G1. The other teams will become the defenders of G1 because they are still supposed to participate in the game.

**Prototype**

The prototype starts with a game screen, in which we show the character creation process at the beginning of a game. Gamers can either create a new character or select an existing one to play with. When this is done the game starts. In our case the game is simulated by a 3D animation with some real life film sequences to show the gamer while playing the game.
The fusion between the virtual and the real world is meant to be visualized, for this reason we show the main elements where we can find it in. These merged aspects are collaboration, orientation and fight management.

First, the collaboration enabled by the game engine will allow the gamers to communicate beyond the borderline of the virtual game. All gamers can send messages to all other gamers and receive messages from them. (Figure 2). This communication is essential for solving quests in both parts, virtual and real, to make a good cooperation between the team-mates possible.

Second, there are different parts where the orientation is important. In the virtual game part you see everything through the game engine, even the real characters are visible through a lucent avatar at the position they are located in the real world (Figure 3). With the help of the minimap the gamer is able to orientate himself in the virtual surroundings and has dots representing gamers on the map to show enemies and team-mates, virtual and real of course. This minimap is generated for the gamers in the real part of the game, too (Figure 4).
Figure 3: Lucent avatar in the virtual part of the game.

Figure 4: Minimap of the ground floor of the building on a PDA
The last element of the fusion between the virtual and the real world is the fight management. The virtual gamers can attack each other. The virtual gamer can also attack the lucent avatar of the real gamer. The real gamer is not able to actively defend himself, but he gets a message on his mobile device and can dash away or hide in rooms the virtual characters cannot enter. This makes it harder to move in the real world because the support of the other gamers in the virtual part is necessary and forces the teams to find a good strategy in the game.

The prototype shows in different scenes how these three elements of the concept cooperate to generate an ensemble where everything belongs together.

**Technicalities**

Finding or locating a certain position of an object by signal strength is not a new concept. The Global Positioning System (GPS) and other positioning systems usually have at least 3 reference points that allow the system to find one exact location of the specified object. The intersection of these reference points usually returns 2 possible locations of the object if the height of the object is taken into account, whereas GPS, for example, only considers one of them.

Three different techniques came to our attention that would basically fulfill our requirements. For choosing any other system than GPS, GPRS or the fairly new wireless LAN positioning, further hardware equipment would be necessary. We need a system that lets us use the given infrastructure while being accurate enough to simulate an interaction between a real world position and a virtual 3D-environment. For ‘Gangs of ZIMT’ and its specified surrounding we chose the wireless LAN positioning system, because it allows us to test the engine and the game concept in a familiar environment.

In the conducted research, we encountered two major techniques that promised to be accurate enough to be used inside a building. The first one requires metering the entire building allowing the walls and floors to be taken into consideration. Most of the commercial products use this technique as well. The second technique does not depend on knowing the exact environment; instead it needs many Wireless LAN clients to pinpoint accurate locations. The more clients can be taken into account the more precise the system will become. Since the prototype is based on just a few clients as well as very broad placement of the associated access points, the first technique seems to be the more compatible one.

Nevertheless, the prototype is still supposed to allow gamers to use the entire building to play the game. Therefore the problem of finding more than one position of one object while altering the height of the object still arises. To redeem this aspect we place bluetooth equipment at specific points in the building. Whenever a gamer enters a different floor, therefore alters his height, the bluetooth equipment build into his mobile device will notice him passing by the specific counter device and immediately change his level of height.
Another intensive part of the project is constituted by the development of the game engine. To ensure high compatibility and adaptability the engine design must include smart module interfaces that allow any new module to be integrated very quickly and without any hassle of adjusting the module itself. Usual standard design patterns like factory or singleton are integrated into the module design. The modules that have been considered up until now are shown in figure 5.

Figure 5: UML diagram of the basic modules and the core.

**Perspectives**

As noted earlier the prototype, ‘Gangs of ZIMT’, is one step towards developing a game that will be situated in the city of Bremen. To be as portable and adaptable as possible the entire concept must meet high standards. Nonetheless some of the encountered difficulties might not even occur in a different surrounding. For example, the height of the object is irrelevant in environments like Bremen city. Further, GPS, being the better choice for such a broad environment, does not need to calculate any positional coordinates that lead to ambiguous decisions. On the other hand GPRS systems create a bigger target group because a lot of people could use their own equipment to play the game.

Detailed conceptual differences have to be seen. The long term playing which is one essential part of the game right now might not be quite suitable for different surroundings as well. The ability to play ‘Gangs of ZIMT’ just for a little time will enhance short term playing. So mobility and simplification would ensure educational and thrilling purpose of the game.

Future applications might include playful education of interested tourist or local residents. The second might be interested in long term playing and the real/virtual world aspect whereas tourists just nearly rely on mobile capabilities of the game. Conceivable waypoints might include some virtual aspects for tourists. Another
target group may be schools, which compete in some way against each other already. The whole game concept could excite large groups of students. For any of those purposes the environment must still be compatible to the engine.

Technical future prospects could include digital TV for higher bandwidth and deliberate streaming media. Notice though, that it might be necessary to have a separate positioning system. We cannot estimate by now whether it is possible to locate an object by its digital terrestrial receiver or not. UMTS might be an option as well but still does not offer the possible bandwidth of wireless LAN.

References


On the development of a mobile play mechanic

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Abstract:
Mobility as a genuine game feature is changing everything: the playground, the position and the role of each element in the game, the activity and the experience of the gamer. Starting and reference point for the theoretical considerations in this article is the development process of the mobile game ‘Gangs of Bremen’ conducted by several students and a teacher at the ‘Hochschule Bremen’, university of applied sciences in Bremen, Germany since March 2003. We present and evaluate the concept of the first phase. We then examine the theoretical and practical issues included. Dealing with the questions ‘what is a mobile game’ and ‘what language do we need to talk about mobile games’ we discuss interactive storytelling and the game-design-pattern-language. Finally we proceed to a reduced and condensed version of the concept, a mobile play mechanic, which enables mobile gaming in the near future, instantiates the gamer as producer and allows the move of the territory to the city of Bremen.

Keywords:
Mobile gaming, gamer as producer, playground, interactive storytelling, play mechanic, pattern

Introduction

‘Gangs of Bremen’ is a mobile game we started to develop at the Centre of Computer Science and Media Technologies at the ‘Hochschule Bremen’, university of applied sciences, in Bremen, Germany. The mobile communication- and multimedia technologies enable the players to experience complex situations of learning and playing locally anchored, and interacting with their own physical and virtual environment. The project-group ‘Gangs of Bremen’ is using these technologies to combine virtual and real game sequences in one seamless integrated game. In this paper we are concerned with conceptual and development issues of mobile gaming. Starting and reference point for our theoretical considerations is the development process of the mobile game ‘Gangs of Bremen’. In March 2003 some students and the authors got together with the idea to start a

¹ Funding of two positions for Ph.D. candidates within the project ‘Gangs of Bremen’ has been provided by the Senat of Bremen within the ‘Hochschul- und Wissenschaftsprogramm Phase II’ (HWPII, University and Science program Phase II) from January 2004 until December 2006.
project on mobile game development, which allows students and teachers to work in one project consistently over time and across the frontiers of different academic subjects. Now one year later, we finished the first project phase. The lesson learned in general, mobility as a genuine game feature is changing everything: the playground, the position and the role of each element in the game, the activity and the experience of the gamer. We need a deeper understanding of mobile games. The complex project demands division of labour and parallel processing - we only can handle that under our conditions with much more clarity. The theoretical issues at the core of our considerations are ‘what is a mobile game?’ and ‘what kind of language do we need to talk about mobile games?’ and after all ‘what does this mean in the case of the ‘Gangs of Bremen’. We have to understand, to grasp and refine the logic of our mobile game. What we are heading for is the play-mechanic that means the core of the story and the functioning of this core as a mobile human-computer-interaction-unit. We are in the situation of making a mobile play mechanic and it is that, what we want to talk about within three steps: First we present goals and results of the first developmental phase of ‘Gangs of Bremen’, second we will deal with the theoretical issues of mobile gaming, relevant in our current state; third we present the core of our game-idea and the necessary next step of the development.

‘Gangs of Bremen’ – first phase of the development

The project ‘Gangs of Bremen’ started in March 2003. About fifteen students and one teacher worked about three month together to invent the concept and the design of an engine. In the following six months six of the former students, the teacher and an assistant worked together to create the plot, a prototype and the module-design of the game-engine.

Goals

In March 2003 we declared the development of a mobile situated game as our goal. Mobility of the gamer we thought to be a feature of the game. And we wanted to attain this goal by means of the concept of a situated virtual world and the according method of situating. We thought about a virtual world of the game, which is not separated from the real world of the gamer as it is in the traditional computer game, but which is by different relations locally anchored within the real world of the gamer. The anchors of the virtual world within the real world we wanted to discover by the method of situating. In 1987 Lucy Suchman presented a concept of human actions, according to that actions are not primarily the execution of an idea, a pre-given plan or template, but enfold within the unique situation of a singular human being acting, a situation which neither we nor this

2 The collaborating students are till now Hans Hamm, student-project-manager, Katja Fahrenholz, Claudia Glomb, Jochen Hahn, Andreas Jonderko and Dietmar Pichler.
human being can predict exactly in the forerun. Suchman initiated a paradigm shift in the way of looking at human actions, instead of looking in a rationalistic way she made a plea to pay more attention for the emergence of actions within the situation of the actor. If you transfer this idea to the concept of virtual worlds in computer-games and think of situated virtual worlds, which are related to the real world of the gamer, than you have a novel method to develop the game-idea and to discover the game potential within the connection of virtual and real world. The mobile game to be is the ‘Gangs-of-Bremen’, located in Bremen, Germany, basing on the energy and dynamics between youth groups on the streets in Bremen. The ‘Gangs of Bremen’ addresses youth-groups, which exist by institution as for example students or which get together as individuals spontaneously by neighborhood. The playground we thought to be a combination of the real territory of Bremen and a 3D photorealistic replication in the virtual space, enriched by several dimensions, which go beyond the realistic part and underline for example emotional aspects of the gamers activities or historical aspects of the territory. As the first step we designed a prototype ‘Gangs of the ZIMT’ we thought to be appropriate especially because of the manageable endeavor to create the graphical world and the less complex real world of the ZIMT

Results

Now one year later, we finished the first project phase within two steps a summer-part-project, three months, and a winter-part-project, six month. The results of the student work are a) a mobile game concept, b) a plot, c) a simulation of game-mechanisms, d) the module-design of the game engine and d) the accordant work packages. In the fall my colleagues associated themselves to the project. In the winter they took the role as review-experts on the fields scripting, engine, networks. In the next phase we will re-organize division of labor within in the project and define part-projects. In this paper I present and discuss the game-concept.

The mobile game concept

The game-play is as follows: The objective of the game is to conquer the symbol of power. The symbol is protected by security mechanisms that define the quests for the players. The gamers are organized in gangs. The members of each gang collaborate in mastering a quest. The gangs compete with each other in obtaining the symbol of power. The playground is a combination of a real world and a virtual world. The real world location of the prototype is the ZIMT, the ‘Zentrum für Informatik und Medientechnologien’ or in English, the ‘Centre of Computer Science and media technologies’, a huge building, with five floors. The architecture of the building as a whole is like a quarter of an arc of a circle. On each floor there is a long hall running through the building, from where you can

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reach all other rooms: Halls for lectures, rooms for exercises and student projects, rooms for conferences, laboratories and offices, a cafeteria, a kitchen and a student lounge. The virtual world is a 3D-replication of the real world. The virtual ZIMT basically has the same architecture of the real existing ZIMT but has some modifications in the extension and the equipment of the rooms.

Before I further outline the concept, I start with the plot the students developed for the prototype. The story around the ‘Gangs of ZIMT’ is told as follows: Sometime in our time coworkers of the ZIMT have developed a powerful computer named G1. G1 was a self-teaching computer that gained more and more intelligence the longer it existed. Nobody ever doubted to lose control over G1, but by the time G1 developed a virus that did not only infect other computer systems but was able to attach itself to viruses that strike human beings. It spread all over the world, people started nuclear wars with the effect that the polar caps melted away and the earth was flooded. By the time the power of G1 weakened and people came back to their senses. A group of students who had survived the war remembered a time machine that as well had been developed in the ZIMT and started to make plans to destroy G1 in the past. The military influence of G1 had still not faded and instead of working together the students were divided into several groups who competed to destroy G1. The objective of the ‘Gang-of-ZIMT’ is – according to the plot – to destroy G1, the symbol of power at the ZIMT. This of course cannot easily be done, because G1 is protected by security mechanisms. To deactivate these mechanisms riddles and quests have to be solved for which a cooperation of players in both worlds is necessary.

The gamers are organized in gangs. Each gang is a group of several students, each group is related to one study course at the ZIMT. At the ZIMT there are three basic study programmes: Media Computer Sciences, Technical Computer Sciences and a Women’s Degree Programme ‘Computer Science’. To be able to act more efficient through the game players are equipped with different trainable competencies like strength, endurance and intelligence. Successfully solving a quest enables the player to strengthen his competencies and indirectly the competence of his team.

The time-sequence of the game is defined by the mastering of quests to obtain the ‘symbol of power’: first: the gamers choose their role and define and train their competencies by solving quests. Doing so they build up the power of their gang at the same time. The growing power of each gang is embodied by the gang-totem and by the degree of influence on the ZIMT-territory; second: the gangs compete with other by solving quests one group against the other groups; they gain influence on the whole territory by conquering the symbol of power of the ZIMT, which incorporates the power of all gangs involved in the game. There are two strategies of conquest, the direct way to conquer the symbol of power and the indirect way to conquer the totems of the other gangs. According to the story, the playground is not only a combination of different spaces, but also of different ‘time-zones’. The past is the time before G1 had taken over the reign (but existed
already) and is represented by the real ZIMT. The future is the time after the war and is a virtual replication of the ZIMT. The present is the active game-play, where past and future come together. Gamers will experience different worlds located in different rooms and communicate via the computer they are playing at. The devices are PC and handhelds. The gamers in the real world are supported by an iPac (a mobile handheld), which allows receiving and sending quests and their solutions, communication with other team-members and an overview of their companions and other hostile players. The gamers in the virtual world use a desktop computer. Wireless LAN and Bluetooth realize the network. The game-mechanisms are based on the combination of the real and the virtual world: collaboration, orientation and battle. Collaboration between gang members is required to master quests. There is a division of labour between the members of the gangs. As an individual you can move, but you can act only within one world. You can switch between the worlds. You can go from the real to the virtual world and vice versa. But you cannot act within both worlds at the same time. To master a quest you have to collaborate with other members of your gang, who act in the other world and communicate with you. One part of the gang is sitting in front of a personal computer and moving within the virtual world. The other part of the gang is moving within the real world by means of a PDA. Orientation about what is going on in the other world is a necessary condition for collaboration and fight and is made possible by visualization. You are acting within one world, but you are informed about the position of the members of your gang and the other gangs in the other world. The members in the 3D virtual world see the movement of the gang members and of the enemies in the real world by the movement of lucent avatars. The gang-members in the real world see the movement of their gang-members and their enemies in the virtual world by the movement of dots on the 2D-map of the ZIMT. Fight with members of the other gangs is mediated by the virtual world. You can attack a gamer in the real world by attacking the avatar of the gamer in the virtual world. If you succeed the gamer in the real world gets the signal that he has to take a time out. The gamer in the real world only can evade or dash away. Counter attacks have to be conducted by those members of the own gang, who are moving within the virtual world.

Evaluation

We got the big picture of what we are heading for. We got a sense of the complexity of the venture. Looking at the concept with simultaneous consideration of the conditions of development, maintenance and gaming we discovered issues we will have to deal with, if we want to go further into mobile gaming by the development of the Gangs of Bremen. The concept of the mobile game we have worked out till now, is in this version far too heavy, far too massive, to serve as a guiding orientation for the development process within our research context or within any other context of development.

There are several difficulties we have to cope with. First of all, there is the problem of further prototyping. Second, the local territory is decisive for mobile-game-design. Third, there is the problem of funding the research and development
process. Forth, there is a predictive huge amount of costs of maintenance nobody can pay. We have to deal with these problems, if we want to succeed in developing this mobile game. (1) *Prototyping* is a condition of development to succeed on unknown fields. But our concept of mobile gaming in the current stage is too heavy and too massive for prototyping. There are too many assumptions we have to make over a much too long time, if we want this mobile game concept to be the orientation of our further development process. By prototyping you are able to take into account unforeseeable aspects of the game-play. You can specify or even redesign the concept during the development process. In our case we need the gamers experience, the gamers activity to understand, refine and develop our mobile game. *Mobile gaming* has literally to be a continuous assumption of the development process. But to spell our concept out and realize the game-idea actively as a game during the development process, we need a finished game engine. The development of our engine needs at least eighteen months, if not more. (2) The *territory* and the *actors* are decisive for the mobile-game-design. The idea to develop a prototype within the ZIMT was good for getting the big picture done. But for further development, we have to take into account the game potential, emerging by mobile gaming within the territory and together with the gamers. We have to relocate the concept within the territory of the city Bremen and in a certain way we have to play with the local actors we want to address in Bremen and to integrate the gamer as producer. The mobile game concept depends on the specific playground and on the gamers. Even on the technical level the territory is decisive for the further development of the game. Positioning techniques within one building are very different to the positioning techniques within the city of Bremen. In the former case we have to work with W-LAN, field-strength and Bluetooth, in the latter we will work with GPS, W-LAN and UMTS. (3) The *funding* in relation to the costs- and time-consuming development becomes apparent to be difficult. Funding of game development depends on promising interim results, but the engine-production needs that much time, that interim results, which are based on the engine, cannot presented in the early stage of the development, when we need funding. (4) The same accounts for the costs of *maintenance*. The game concept till now requires a quest-production-machinery as a condition of maintenance. Nobody can guarantee the payment of those costs. The methodologically next step we have to do: exclude all elements, which are not necessary within the elementary mobile game concept and develop a concept, which allows to deal with those issues above.

**Theoretical issues of mobile gaming**

Asking for the language we need to talk about mobile gaming first candidates are interactive storytelling and the ‘game–design-pattern-language’. *Interactive storytelling* has a strong tradition leading back to the roots of our culture. Interactive storytelling is the situation, where we sit around the fireplace, or its modern successor, the TV. Within this approach you get an idea of creating an own *singular* world and the idea of both who interact in development of the game and in gaming, the storyteller, game designer, and the audience, the gamer who
has to be spellbound and abducted into the story-world and is as such an acting part of game design. In the transition from designing to gaming the gamer himself becomes a storyteller. In the first glance the interactive storytelling approach is focusing the uniqueness of the situation and the process of storytelling. The creation of the special atmosphere, the emergence of the specific game experience by the interaction and resonance between teller and audience is the goal of interactive storytelling, the development of the singular game solution, which is most appropriate for these special circumstances. Game design in this tradition is called an art. Game designers are artists and artists in the traditional view differ from industrial workers by the singularity of the production act. One game-designer and promoter of interactive storytelling is for example Chris Crawford, who joined Atari in 1979 and designed games such as Eastern Front - 1941, a game that became a bestseller. Managing the games research group at Atari he wrote ‘The Art of Computer Game Design’ (1982, http://www.vancouver.wsu.edu/fac/peabody/game-book/Coverpage.html). After the Atari crash in 1984 he worked as a freelancer and created the game ‘Balance of Power’, having been sold about 250,000 times. In the nineties he started to work on the ‘Erasmatron’ story-engine 4 (www.erasmatazz.com), a technology for interactive storytelling and a development environment that permits non-technical artists to control the technology. The engine includes for example a model of human memory that allows gossip, a model of microeconomics that allows haggling, a model of human personality that offers a range of possibilities of acting and reacting as well as options of traits, moods and social relationships (see above). Crawford’s efforts show that despite to the traditional view the ‘art’ of computer game design accounts for a generalized structure and the according technology. By means of an interaction theory, which integrates psychological, social and micro-economical models underlying the artificial intelligence of the engine this technology allows for interactive storytelling of the gamer and the emergence of unique game experiences. Referring to mobile game design interactive storytelling completely incorporates the gamer as producer and consumer. But thinking about mobile gaming the basic idea of interactive storytelling is not fitting as well. The meeting at the fire comes before and after hunting. Interactive storytelling is the activity before and after the movement of the gamer respectively as in our concept parallel to the movement of the gamer.

While the interactive storytelling approach offers a view on gaming and on the human-computer-interaction, which has consequences for the development of ideas, concepts and games, the other candidate the ‘game-design-pattern-language’ offers a view on patterns, on design solutions working within particular circumstances. Game design is not only the work of one singular designer. Over the past decades game production has become an industry like film production. A growing knowledge body of game design has evolved from without the

4 The name derives from Desiderius Erasmus (1466-1536), author of ‘The Praise of Folly’ (1509).
development of computer games, the study of classical games, of psychological
game theories and of mathematical game theory. Game design as a discipline and
as a profession requires a means to communicate, plan, organize and document
the work. The challenge lies in developing those means and techniques for
communicating the engineering or craft knowledge that experienced designers
have accumulated. This kind of knowledge is not an abstract knowledge, which is
entirely separated from its origin and formalized. This kind of knowledge is based
on experiences. The separation of this knowledge from the context might destroy
the knowledge. The experience of the designer has to be preserved and can be
preserved in a pattern and in its relation to other patterns. A similar challenge as in
game design today emerged within architectural design in the sixties.
Architectural design also has been practiced as an art. To manage the design of
complex large buildings architects applied formal methods to conceptualize and
organize their work. They failed at least in regard to the quality. The result had
been buildings, which didn’t fulfil the needs of the people who lived and worked
in those buildings and didn’t adapt to the local social and physical environments.
The architect Christopher Alexander and colleagues (Alexander 1979, Alexander
et al 1977) compared those modern buildings with the ‘living’ buildings created in
other societies at other times. The latter ones ‘embodied ‘the quality without a
name’, a recognisable but indefinable quality which floats in the semantic space
bordered by terms such as ‘alive’, ‘whole’, ‘comfortable’, ‘free’, ‘exact’, ‘egoless’
and ‘eternal’. Patterns are conceptual tools for helping people design buildings
which might themselves have that quality.’ (Pemberton 2000) Analogue efforts
are made today within game design especially by the game design patterns project
(Björk, Lundgren and Holopainen), a collaboration between Nokia Research
Centre and the PLAY studio at the Interactive Institute in Stockholm, Sweden
(http://www.gamedesignpatterns.org), but also by others (e.g. Kreimeier 2002). A
dangerous misunderstanding of the game-design-patterns-language is the use of
patterns as building blocks in all phases of the development of a game you only
have to put together like Lego. In the first phase of developing the concept for
example, you won’t succeed, if you connect patterns. You first need a game-idea.
Of course you also need an idea for connecting Lego blocks. You might get your
idea by going over patterns but this is not the same as putting them together. You
also might get your idea under the shower or at breakfast. And before you can
work with patterns as building blocks you have to make your idea explicit. The
idea has to function as an elementary game, as a play mechanic and finally as a
scheme of development, which allows to plan and organize further work. This
process of getting an idea and getting it started is embedded in the specific context
of the designer. There are contextual premises of your work given by external
requires, qualifications, personal ambitions, group dynamics, organization,
funding, which strongly influence your way of thinking and shaping the game. In
this first phase you have to focus on a clear expression of your idea. The going
over patterns is like reading of books or studying games only one condition to
work as a designer. There will be a time you have to completely abandon patterns
to get your design done. What we need is a language, which allows the designer to
express, to organize, to reflect on the own design activity. We need a language, by
which we talk about the *use* of patterns, the creating and applying, that is the *designer's activity*.

![Figure 1: Game Design Activity](image_url)

Patterns are necessary elements for game development, but not the whole language we need. The Swedish game design patterns project group is aware of that danger. They are not only collecting, analyzing and redefining game design patterns, but also looking for the *use* of game design patterns during the different phases of development - the development of the concept, problem-solving and analysis and comparison of games - and this is in our view decisive. ‘We describe three different use areas for design patterns for games: allowing different games and game genres to be *compared* to each other through analysis and comparisons of games in terms of components and interaction; the *development* of game concepts from an idea to a draft through the selection of patterns and recursively selecting subpatterns based on their feasibility for the particular design context; *problem-solving* during development by finding related patterns and adapting previous design choices to the current problem.’ (http://www.gamedesignpatterns.org/). And especially for the situation of development they specify ‘Having a collection of patterns is in essence having a listing of concepts that other game designers have found useful for designing games. Having these concepts at one’s fingertips provides a game designer with a knowledge base that can be used to find the core of a new game design or tweaks that make a game different. One begins by selecting a few patterns based on the core game concept (and external requirements). These patterns are analyzed in the specific context for the designers’ (http://www.gamedesignpatterns.org/). Game-design-patterns are useful as a language only within a deep understanding of the game-designer’s activity. A concept of the game design activity has to encompass, the designer, the conditions, means and media of the design process, the relation to gamers and to gaming as well as the relation to others as there are partners, customers, directors, the dimensions and phases of the work process and so on. A very elementary figure of the design activity outlines essential instances of design: the designer, the conditions, means and media of his work, including the game-design-patterns, the objective of his work, the gamer as the imaginary and or real partner, he has to refer to (Figure 1). Asking now for mobile gaming in the next step one has to start with asking for gaming. But if you try that, you are overwhelmed by the different approaches. There might be as much definitions of play as there are researchers, who studied playing.
Playing

There are theories, that emerged in the second half of the 19th century and explained play with reference to functions playing has within biological, evolutionary or social processes (e.g. Spencer 1855, Hall 1906, Groos 1901, 1922) or defined it on the contrary as a ‘just for fun’ or an ‘as-if’ activity (Lazarus 1883). In the 20th century theories emerged, that tried to integrate different aspects of gaming within one theory, some started from the phenomena of gaming (e.g. Scheuerl 1994, Chateau 1946, Buytendijk 1933), some focused on the interaction between individuals and their surroundings and on the interplay between form and content of cognitive actions (e.g. Piaget 1968/1972, Mead 1934), some understood play as an essential element of culture (Huizinga 1938). Only very roughly you might group the theories into two basic traditions, the biological-functional tradition and the anthropological-cultural tradition. The former ones are going back to the Enlightenment, the latter ones to the romantic and the classic period. In the latter tradition we see for example Fröbel (1782-1852). According to him a play is both a means of expressing oneself and a means of understanding the world (Fröbel 1838). There is also the aesthetic concept of playing from Schiller, akin to media theories of today: play makes the human being complete, play enables the human to enfold the own double nature by creating a ‘living form’ (Schiller 1795, 333). The play is here an instrument of creating and acquiring (aesthetic) orientations, which characterize the special way of one’s living (see also Sachs-Hombach 1995). This difference between the theories of playing resembles that difference Snow has made between the two worlds of science, the world of nature and the world of culture. In the following approach we use and combine both traditions.

In our view playing is a slight moment of each human activity, which may enfold within a burst of energy, transcend the pre-given limitations and become an ‘living form’ of its own or may stay inconspicuous and die with the activity. Play is akin to the moment of creating and using results of cognition and action, and akin to the pleasure of consumption. Play is that moment, which emerges by the interaction of the double characters of each activity, the form and the content, the rational and the emotional, the instrumental and the social dimension of human activity. This definition is easily to integrate into the preceding figure 1. The designer might be instantiated as a gamer, who relates to other gamers.

Mobile Gaming

While the gamer within computer-games is separated from the surrounding, the mobile gamer is in a certain way re-integrated into the surrounding. The gamer is playing and as such still different from those, which don’t play, but within mobile gaming the player moves within the same world and behaves within the same world as the non-player. But is it this, what makes the difference between computer-gaming and mobile gaming? Our hosts proposed a typology of games,
which allow us to describe differences. The model they use has 13 dimensions, grouped under the headings of Space, Time, Player-structure, Control, and Rules. The crucial difference of mobile gaming they describe is the physical space. Mobile games ‘take place in physical space, and this is what makes them unique compared to other computer games.’ (Aarseth, 2003). This difference has more implications. The territory is decisive. In the context of ‘Gangs of ZIMT’ we have a mainly closed playground in the homogenous building with defined borders (walls). Gamers playing in the real world can expect that when leaving the building they will lose contact to their team mates in the virtual world. When playing in an open environment like the city of Bremen there are no natural borders, which separate the playground from the rest of the world. The playground in the ZIMT is clean and manageable compared to the playground city of Bremen, where outer factors are merged with game conditions and might influence the game. Further dimensions change. For instance the mobility of the gamer at the ZIMT is well defined, moving by feet or by elevator. Bremen offers a greater variety – the gamer might move by foot, bike, car, tram and so on. This in turn has consequences for the time-management in the game. Finally the relationship of privacy and public, the gamer within Bremen is far more exposed to the curiosity of strangers. The nature of the game activity is changing. Within computer-games the physical activity is reduced to sitting in front of the computer. The main activity is the movement of the gamer in the virtual world. The nature of the movement of the gamer is above all imaginary. Contrary to the computer gamer the mobile gamer moves physically. The gamer is running, chasing, escaping, is hiding and not only his avatar. He is sweating, becoming breathless and jumping full of joy in the case of success. The imaginary activity is bound to the physical movement and supported by the physical environment. According to the psychological concept of activity above. The physical level of activity is more elementary than the imaginary one. Game design should be aware of the different activity levels and the possibilities to address them and their relationship by concepts (see also Bruns, http://www.artec.uni-bremen.de/people/W_Bruns/). The physical activity changes also the relationship of the gamer to the computer. The computer becomes integrated into the activity and the surrounding of the user as Mark Weiser has envisioned with the concepts ubiquitous computing and calm technology (http://www.ubiq.com/hypertext/weiser/UbiHome.html). Mark Weiser has outlined the fundamental change of the design: ‘For thirty years most interface design, and most computer design, has been headed down the path of the ‘dramatic’ machine. Its highest ideal is to make a computer so exciting, so wonderful, so interesting, that we never want to be without it. A less-travelled path I call the ‘invisible’; its highest ideal is to make a computer so imbedded, so fitting, so natural, that we use it without even thinking about it. (I have also called this notion ‘Ubiquitous Computing’, and have placed its origins in post-modernism.) I believe that in the next twenty years the second path will come to dominate. But this will not be easy; very little of our current systems infrastructure will survive.’ Within mobile gaming the devices has to support the
physical activity. The methodologically next step we wanted to do: to exclude all elements, which are not necessary within the elementary mobile game concept and develop a concept, which has to be immediately realizable, instantiates the gamer as producer and consumer and shifts the territory from the ZIMT to Bremen.

‘Gangs of Bremen’ – concept for the next phase

The elementary play-mechanic

The game-play is now as follows: The objective of the game is to conquer the symbol of power, the Key of Bremen. The gamers are organized in gangs. They carve out their territories, defend them and attack the territories of the other. The power of one gang is anchored in the own territory. The Key of Bremen is conquered by that singular gang, which captured the most landmarks within a pre-given time. The gamers are organized in gangs. Each gangs is a group of several students, each group is related to one of four ‘down-town’ high schools in Bremen. Between the four in reality there is a non-violent conflict about whose school is to be the best and most difficult one. This conflict can easily be ‘patronized’ for the game. The playground is a combination of the real world and a 2D-map of the real world. The physical space is the city of Bremen, where all schools are placed around. The gang’s territory is marked out by the gamer themselves setting landmarks around their school. Around each of the landmark a circular territorial area is defined. The whole gang-territory is the sum of those landmark-areas. The virtual space is a 2D-map of Bremen. On the map the different gang-bases (schools) are marked as well as the territories by the landmarks that belong to the school of the gamer. The time-sequence of the game is as follows: first, the gang marks out the territory by setting landmarks; second, the gangs compete in defending the own territory and attacking the other territories; third, that gang succeeds in the conquest of the Key of Bremen, that has succeeded in the conquest of the most landmarks within a certain time. The durance of each round will be defined accordant to the experiences. The devices are handhelds. Gamers will be supported by PDAs during their hunt for hostile territories. The PDAs are equipped with a GPS and a GPRS module. The GPS module determines the position of the gamer and the GPRS module ensures the connection and communication with the central game server. The game server knows (with an inaccuracy of max. 5 minutes – this is the time interval in which the position of a player is updated to the game server) the GPS coordinates of each gamer and provides the gamer with this information after certain time intervals. The game server knows the territorial owners of the landmarks as well as other facts relevant for the game. In order to minimize the standing charges during the game, lots of information is stored on the players’ PDAs and not on the game server. Alternatively to playing the game with PDA support, a version should be planned which is playable on mobile phones with GPRS and GPS (or other positioning
Mobile Play Mechanic

technique) support. The game-mechanisms are based on the combination of the real and the virtual world. While in the former concept the combination of both worlds is based upon the division of labour between members of the gang, assigned either to the virtual or to the real world, in the current concept the virtual world mediates the game-activities in the real world. The mechanisms are collaboration, orientation, conquering hostile territory and attacking enemies. Collaboration between gang members is required to master the marking out of territories. The marking out of the territory of the gang - has to be done by the gang-members by moving to certain places, take a photo of that place, note the coordinates (longitude and latitude) and give the message to the server. For each landmark, a photo and the corresponding GPS coordinates of the landmark are stored. When taking photos, certain guidelines must be observed, for instance objects must have a minimum height of 1m and have to be photographed from a distance of at least 3m. There should also be restrictions about what kind of items is allowed (and not allowed) for the photos. Allowed items could be houses, fences (as long as they are unique enough to be identified), streets and so on. Items are not allowed are that which cannot be publicly accessed as well as items that are available only temporarily (such as parking cars). These restrictions avoid that photographed objects cannot be identified by the other gangs at all. Orientation: to have an overview the gamer has a 2D map on their PDAs, which shows an extract of the city quarters in which the game is played. On the map the different bases (schools) are marked as well as the territory and the landmarks that belong to the gang of the gamer. Territories of the other gangs are not visible (this would be a too big help for others when conquering hostile territory), but each gamer gets to know how many landmarks there are left of the other territories. In defined intervals (5 minutes for example) the positions of all (friendly and hostile) gamers will be updated in the map. Conquering hostile territory: To attack hostile territory gamers have to identify a landmark by the photo and go to the place they think they have discovered. When the player has arrived at the place he acknowledges this on his PDA. The PDA checks the position of the player with the position saved with the photo and in case of correspondence the area around the checkpoints now belongs to the gang of the attacking gamer. Attacking enemies: There is not only the possibility of attacking hostile territory but also attacking opponent gamers. This can be done on neutral or the territory of the attacker. There is no possibility of attacking a gamer on his territory. A successful attack disables the losing player as long as he has not been back to his base to reactivate himself. To attack a player one has to get near to an opponent. The PDA will show that there is an opponent in range. Gamer as producer: During the first phase for the game all participating gangs have to define their territory with photos of the places the landmarks are set. This creates a large amount of landmarks all over the city. In a later phase of the game it could be considered that not only schools can compete with each other but the game could played by tourists or other interested groups who do not have the time to define a territory
for themselves in a first phase of the game. They will be assigned a territory, which consists of ‘old’ landmarks, which have been defined in earlier games.

Conclusion

The reduction and condensation of the concept to an elementary play-mechanic now enables a game that is immediately realizable, instantiates the gamer as producer and consumer and allows the move from the ZIMT to the city of Bremen. The game is immediately realizable within the next phase of development. It has become an easy concept in so far the virtual world is reduced to a 2D map. The concept is realizable on the elementary level and can be enhanced by higher levels, growing more complex relations between virtual and real world. The elementary mechanic therefore enables accordant sequences of the development. The step of simplification of the concept has been done carefully. We have hold and combined all those elements of the elementary level, which allow for a smooth transition from the elementary to higher levels of mobile gaming in further phases. This elementary concept is as such mainly independent of the city it is played in. In this version it is adaptable to other cities. Prerequisite is the existence of an infrastructure that is suitable for the game. The situating of the game will be realized by the gamers themselves (as well as by the designers within further development). The gamer acts as a producer in the following phase in that the gamer participates in developing the content by taking photos. The move to the territory of the city Bremen can be done.
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The Design History of a Geolocalized Mobile Game: From the Engineering of Displacements to the Engineering Of Encounters

A case study of the development of a mobile game based on the geolocation of terminals

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Work in progress

Introduction

Social intercourse must be seen as equipped by information and communication technologies. ICTs mediate these myriad of interaction which makes up patterns of association and forms of solidarity. Understanding the place ICTs occupy in the ecology of interpersonal transactions is a step towards a deeper understanding of the ways by which we ‘make society’.

Within the repertoire of force, the use of a communication device translates into a particular format, that of the volume and variety of messages exchanged. This effervescence in social exchange is taken to testify to a kind of internal energy internal to social structure, a potential energy for interactions that ICTs are supposedly able to capture, materialise, liberate or stimulate. The multiplication of mediated interactions in return lends substance to the notion that there is a particular virtue proper to any communication devices, which will get people to mingle, chat, write to one another and exchange viewpoints by their means.

This particular approach which relate the definition and use of mediating devices with respect to the actual exchanges they support, stands out from other social science description of artefacts and action, usually dealing with different kind of technologies, in which the object may translate and reify an injunction (Latour, 1993), incorporate memory data into the environment (Norman, 1988), materialise an algorithm which guides its appropriation (Norman, 2003) or triggers routines, or be described as an actor endowed with ethnomethodological skills for a flexible, temporally ordered, conversation-like type of use (Suchman, 1987). We are favourable to the idea that technology is like a text, whose interpretation is emergent and depends on the particular organization of the situations in which it is used (Grint and Woolgar, 1997). It therefore does not have force by itself, but it
may be apprehended as such in situations organized in a way that makes technology as interpretable as something endowed with a particular pattern of force and efficiency.

Studies of information and communication technologies (ICT) and their effects on society are often described along these lines. Interpersonal communication technologies are considered as enabling generic possibilities for meeting, making contact, mingling, interacting and exchanging\(^1\). Their use is perceived even more intensely as the expression of pure sociality in that it is partly detached from economic issues. Once the flat-rate access to a generic service has been paid, each interaction is often free of charge thereafter. The proliferation of mediatised communication is thereby more easily perceived as the reflection of a force that lies within the technical mechanism. The debate of the effects of ICTs therefore closely crosses the discussions over the force of social links and the vitality of solidarity. ICTs are assessed according to the manner in which electronic exchanges appear to support virtual communities (Rheingold, 2000) and specific forms of network sociability (Wittel, 2001), or to preserve social capital, understood in this case as the sum of the resources that an individual can mobilise through his interpersonal contacts (Lin, ).

This representation framework defines a particular paradigm for the conception of information and communication technology. The notion of design paradigm may be considered as an extension of the notion of scientific paradigm that Thomas Kuhn proposed within the framework of the history of science (Kuhn, ). A design paradigm typically weaves together the definition and classification of a given technology, criteria and methods to assess what constitutes proper tests and how to interpret their results, and a cognitive frame mapping the relevance of the rules, routines, algorithms, functions, modules and affordances that may be incorporated in the design of a device. Trials, tests, experiments simultaneously shape the type of efficiency that is relevant to describe the technology, and provide a way to measure that efficiency.

In the specific case of information and communication technology, trials and tests will very often consist in analysing the proliferation of the traces left by the exchanges and interactions. In the corresponding design paradigm, the technology is grasped through its capacity to sustain such an effervescence in interpersonal communication and leverage it by the means of proper ‘communication affordances’ (Hutchby, 2000). Inasmuch as a characteristic, and perhaps constitutive property of network digital technology is to produce electronic traces with each use, the assumption may be put forward that innovators and designers have increasing recourse in this domain to these

\(^1\) This is a recurrent feature in analyses of computer-mediated communication dealing with electronic mail, forums, chats, etc.

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The Design History of a Geolocalized Game

objective traces and, as a result, will configure more their observations of the uses of the devices they design as force-based trials. Music fans who construct Internet sites dedicated to their passion assess the design of their sites from the commentaries expressed in the dialogue they set up with a few Internauts (value-based trial) but, above all, from the number of visitors, generally silent, who access the site (a force-based trial), audience figures being generally provided by their hosting service (Licoppe and Beaudouin, 2001). Since the use of ICTs leave objective traces in digital networks and because these are easily accessible to innovators, trace-based trials of ICTs will have increasing predominance in the design process. By focussing efforts on the interpretation of usage feedback as a measurement of the efficiency of devices, (where usage is framed as the volume and intensity of the device-mediated exchanges), the pervasiveness of trace-based trials in the trajectories of innovation also leads to a strengthening of a particular dynamic representation of the social, where social intercourse is by principle laden with positive value, and society appears as a gigantic reservoir of potential interaction.

We will explore this assumption with a case study, based on the development of a game relying on the geolocation technique used in mobile terminals. By means of tests and user feedback, essentially constructed as tests of the force of the mechanisms, designers initially oriented towards the concept of a multi-player role playing game for mobile phones, targeted towards a specific audience, will shift their design strategy. They will gradually grasp the potential represented by the possibility of users ‘seeing’ their mutual positions on mobile screens in order to enter into contact with one another. Their design work will focus on the engineering of encounters, through an innovative geolocated service which is now oriented towards any mobile phone user (and not only gamers) – a generic device that anyone could use in principle. The design trajectory moves away from the development of a highly scripted, distinctive game towards the development of a generic information and communication technology.

Since the services they design are based on location tracking, they are also particularly interesting by themselves, from a sociological standpoint. Geolocation embeds issues of space and place directly into the engineering of mediated encounters. Up to now, electronic encounters were a characteristic feature of Internet world, i.e. in situations where actors use a connected personal computer. The development of mobile technology actually introduces original possibilities of exploiting cell phone tracking (in wireless network or through satellite positioning) to engineer disembodied meetings ‘on screens’. Since mobile phones almost always accompany their owners as they move about, a geographic position (that of their ‘geolocated’ terminal) can be associated with personal electronic identities. The mobile phone screen may become a map of the cityscape, and icons or avatars represent the location of the players that move in it. To quote one of the developers, ‘The great thing about this game in my opinion is that the human body is the interface […] We are the means of locomotion of the avatar
and this is something really new for me’. The development of services based on
terminal geolocation therefore contributes ‘to the development of a
communication hybrid’ inasmuch as ‘physical and cyberspace come together’
(Castells, 2001). It can therefore be expected that encounters equipped by
mobiles geolocated in urban space will provide for original forms of social
intercourse.

This work is based on a case study analysing the conception process of such a
game, and the various events, trials and shifts in paradigm that led to the
reshaping of the initial design. We conducted several waves of interviews
between 2001 and 2003 with the actors associated to the startup firm in Paris
where such a development was occurring. On two occasions, one of us (R.G.),
which had software development process expertise, engaged into participative
observations for several weeks, by taking part in some parts of the design process.

The game and its context

Jindeo is a game that takes part of its inspiration from massive multi-player online
role playing games (MMORPG). In Jindeo, the players are supposed to set up
teams that are to accumulate resources to construct ever more powerful artificial
intelligences (IA), by means of quests and interaction with other players. The
major originality of Jindeo² is to try to move MMORPGs from the connected
computer screen universe to that of mobile phones. Not only because players may
log on to Jindeo either from a computer connected to the Internet or via a mobile
terminal (phone or PDA) but also because the gameplay is based on the new
possibilities offered by mobile terminal location tracking. The position of the
player in the game space map representation is closely related to the position
occupied by his body in geographic space via the geolocation of his terminal in
the mobile network. The common distinction in online games between a game
space that is ‘simulated’ electronically onscreen and in which the player projects
himself through avatars, and a ‘real’ space where the embodied player moves
around, becomes blurred with Jindeo. The purpose of this game is in fact to
construct a game universe that maps the space of ordinary embodied experience:
‘The originality of the game stems from the use of mobile phones to immerse the
player in the most perfect virtual universe: reality’³.

² All names here are fictitious
³ Jindeo, Bible V0.3, p.10.
Jindeo then adopts certain characteristics of ‘lifesize’ roleplays – where players are gathered to interact in conventional places (town, hotel, forest, etc.)⁴. Jindeo moves away from this, however, as regards the scale of the game universe. Here it is not a question of people meeting in a closed place that they take over for the duration of a weekend, but of making the entire town a game universe. Players are expected to be engrossed enough by the evocative powers of the cityscape, as translated in the gameplay⁵, to meet in places where they would not have any reason to go and to move when and where they would not have moved without the game. In addition, the designers of the game claim that the game’s major feature is that it can be played simultaneously by players using computers connected to the Internet network and by players using mobile terminals. This requirement has played a significant role in their choosing to base their gameplay on the progress of teams rather than individual players (the latter being the standard convention in most MMORPG). It was in their opinion the only way of ensuring effective forms of gaming co-operation between players using PCs and players using mobiles⁶.

For the designers of Jindeo, the most evocative city is undoubtedly Tokyo, revisited by the aesthetics of the film ‘Blade Runner’ which they often refer to⁷. According to the ‘bible’, the basic game description document prepared by them, the idea for the game initially came to Michel R., already a MMORPG fan, when he was staying in Tokyo in early 2000, and still envisaging taking a job in the finance sector. He used his relations in Japanese banks to try the relevance of the Jindeo concept, first gathering opinions and then developing a business plan. A few months later, by mid-2001, these preliminary business discussions were useful for him to obtain funding to develop his mobile game concept from the Mobilfone mobile phone operator incubator, InnovaCell. The latter also provided the small Jindeo structure with premises in the Paris Sentier district. This was the time when the New Economy craze was starting to fade, though the district was still being promoted by media coverage as being the Paris ‘Silicon Alley’.

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⁴ ‘These multiplayer online games are, to some extent, inheriting several features of role plays on paper. Jindeo is in a way close to ‘lifesize’ role plays, I think.’ (Gilles, developer)

⁵ Ibid., p.2.

⁶ One of the key references of the designers here was the first Matrix movie: they visualized players in front of their PCs being able to have a near-panoptical view of game situations (due to the power of the software and graphic interfaces on PCs) which would guide mobile players whose terminals have much less functionalities.

⁷ The authors of Blade Runner were themselves avowedly basing their futuristic urban décor on today’s Shinjuku district in Tokyo.
The incubator imposed very strict constraints on the composition of the team, refusing them to hire people on full employment contracts, and only authorising them temporary hiring and various forms of outsourcing. During most of the Sentier period, between 2000 and 2001, the chief technical officer (CTO) had a permanent contract, but with an outside employment agency, run by a personal contact of Michel. The designer worked on a day to day basis. The developers alternated between direct short time contracts and indirect short time outsourcing. This flexibility of employment systems caused the team to alternate between the passionate, focussed commitment of young professionals in creating from scratch a permanent and fully blown firm, and the more flexible and revisable type of commitment usually associated with ‘project-based’ tasks. In the project mode, people will focus very intensely on the current task for as long as it lasts (or for as long as their contract lasts): they operate in a bounded horizon in which switching their commitment to other projects in a near future is always a strong possibility. ‘To join a team, a company, I really have to believe in the project. As a result, as soon as I believe in it and think it is really good and want to see it progress, I want to put effort into it, get on board and paint it in my own colours, if you like’ (Philippe, developer). The shared passion for games and the motivation of participants for the project are evident and this brings a particular distinction to their professional comitment. ‘In a game, the motivation is different from working in a bank for major accounts, for example.’ (Antonio, developer). Nevertheless, the exclusiveness of their attachment to the Jindeo project might be called into question at any time.

The nebulous organisation that designs Jindeo revolves around ten people on the average. The designers that invented the original concept, and now in charge of the evolutions in the scenario and game rules are Michel, who is the entrepreneurial soul of the whole thing, and Paul, who got his share of fame when he developed in the eighties a well-known ‘space opera’-like roleplay game, before it was swamped by products derived from the worldwide fad for the Space Wars trilogy and its various derivative outputs in the game sector. On the technical front, the central characters are Pascal, the cto, who heads the team of developers and Philippe, a later arrival, who was to take on growing responsibility at design level. There is a duality between the designers who acts as the guardians of the founding spirit of the game, on one hand, and the ‘technicians’ on the other, who constantly draw attention to the recalcitrance of the software systems to yield to the designers’ impractical ideas (according to them). This duality shapes the organisation of the office space. Besides a conference room reserved for meetings, everybody works in a single room, arranged in open space fashion, and divided into two groups of four desks set up in a petal shape. The creative designers are on one side and the developers on the other (Fig.1).
The difference between the two main modes of expression of the different actors, bursting, inspired, expansive creativity in the case of the designers, and stubborn, mute realism in that of the developers, is also obvious in the very different ways in which they set up dialogues within each groups. Discussions between the designers looks very much like oral jousting, each coming up with a new idea about the gameplay to resolve a previous objection. As the CTO mischievously puts it, ‘fortunately, the storms and thunder of the creative designers have not contaminated the developers!’ Quite the opposite, just next to them, the developers often absorb themselves into their screens. ‘I find that if you are programming, you tend to become enclosed in a logical process, to be fairly obsessed by what you’re doing and to dedicate your entire capacity and brain to it.'
As a result, it is hard to switch from one thing to another, so you create a wall around yourself to some extent. When you are programming, you try to lock in, particularly when you are listening to music which, in fact, helps you to focus. It’s a total involvement thing’ (Philippe). They also develop original methods of communicating with one another, annotating the bits of code they exchange in a coordinated software development workflow. Though in the same room, they rarely speak to one another. They exchange written comments through this silent and invisible electronic channel. ‘For example, with Pascal, there are moments when we exchange information without using words. In fact, we use a system of source codes centralised on a server, a thing called CVS; for example I update my source code, so, if you like I upload new bits of code that he needs to implement something and, roughly speaking, I give information in the code, which means that, by taking my code, he just needs to read the info to know what he has to do – so, we can, in fact, progress without actually talking’. (Philippe, developer)

However the roles and postures of the various actors were to evolve considerably with the various trials encountered in the course of the design process.

**A short story of the development of Jindeo (2001-2003) and its trials**

The contract with the mobile incubator covered 10 months’ development, ending in July 2002. During this period, Mobilfone allowed an experimental access to its cell-based location tracking server, to which requests could be performed through the WAP (Wireless Application Protocol) protocol. At the start of the contract, in the Autumn of 2001, Michel R. was invited by InnovaCell to show his project in Japan, within the framework of a meeting of the WIVA (Wireless Venture Association). He took advantage of the opportunity to meet firms close to the Japanese operator, KDDI, which had announced it wanted to quickly launch services founded upon the location tracking of mobile terminals based on GPS (Global Positioning System). This location technique is much more accurate than those based on mobile phone network cell geometry. In the context of a Japanese

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GPS-assisted geolocation does not actually use the GSM network as such, but satellite-based localisation. Implementation of this technique requires the integration into each mobile phone of a GPS chip in addition to the classic SIM card. Because of the wavelengths used, a user cannot be located within a building or in a very dense urban area. This technology was available in Japan, and KDDI commercialised it. However, each localisation request with this system cost 5 yen and took around ten seconds to be completed.

It is very different to the various geolocation techniques based on the GSM cell grid. Cell identification (or Cell ID), for example, is the simplest of all location tracking techniques. When the user is in a zone covered by the network, a single
market well ahead as regards mobile phones with screens and Java graphic interfaces (much more user-friendly than the WAP interfaces available at the time in Europe), the Japanese also wanted services that would be accessible through such interfaces.

On this occasion, Michel met with the people from Tomen Telecom, a KDDI subcontractor, which was looking for opportunities to supply KDDI with new, innovative services. They set up a meeting with KDDI management who confirmed the launch of GPS and indicated their wish to develop game content based on the geolocation principle. KDDI showed a marked interest in Jindeo. After a few meetings, Tomen Telecom agreed to sign a partnership to manage the relationship with KDDI and take charge of the development of the Java interfaces for Jindeo, in exchange for an exclusive right to license the service in Japan and a share in future revenue. The meeting with KDDI constituted a significant trial of Jindeo, imposing new constraints and leading to two major evolutions of the initial concept. On one hand, KDDI required that the service provided by Jindeo should be accessible with national coverage, as all the mobile data services they commercialised. Leibsoft, who greatly needed a partnership with a major telecoms operator to boost its credibility, had to comply. This meant a radical evolution of the gameplay, for it had been designed with a focus on a particular situation, that of mobile players playing around in the centre of dense towns. On the other hand, the designers had also set up a demo in Japan to convince KDDI. This last minute effort was also an opportunity for them to gain a direct experience of the difficulties posed by the delay in server response. They were expecting it, but the demo, by forcing them to put themselves in the user’s shoes and get a feel of a realistic game situation within their current architecture, made them realise how requests that took more than a minute adversely affected the game experience.

The partnership with Tomen Telecom nevertheless gave the designers a welcome break. For instance, it allowed them to hire Philippe, the designer, on a full contract. But the financial pressure kept on growing during the summer of 2002. The development contract with InnovaCell, with which relations had become strained, was supposed to come to an end. Leibsoft had sufficiently spread its investments to be able to maintain cash flow for several months yet but the need to find other forms of financing was more and more pressing. Under these accumulating clouds, Leibsoft approached a major video game publisher, Ubisoft, in September 2002. In October, a presentation of the Jindeo project lasting several
hours was arranged on Ubisoft’s premises. This evaluation with demos was carefully prepared by the designers who attached great importance to that trial of their concept and architecture. Ubisoft is a major publisher, very well known in the sector. Moreover, the firm had just won a contract with Sony for administration of the Everquest MMORPG game in Europe, acquiring still more prestige in French video game circles. For their show at Ubisoft, the Jindeo designers were to meet with Ubisoft’s marketing and game design specialists, including the new Everquest Europe Project Manager. According to the designers, it went as a complete disaster, following after previous negative comments from Wanadoo and Goa. Though very cordial, the Ubisoft experts called into question the concept of a gameplay that was based on the progress of teams rather than individual players. They strongly doubted its capacity to sufficiently motivate individual players, both to get into the game, stay in the game, and pay for it.

A very difficult period then ensued, because almost every element of the game had to be redefined. With each new suggestion, the designers, Michel and Paul, had to face stronger opposition from the software developers, arguing that because of the current technical constraints this would lead to increasing development time and costs. Two distinct possibilities emerged from these fierce debates. On one hand, trying to save the initial project, the development of a massive, multiplayer mobile Internet game. On the other hand, moving on towards a pragmatic scenario, the fast development of a very simplified, geolocated Internet mobile game for KDDI, focussing on individual players, relying on the few existing working software modules. The latter solution also meant running counter to most of the principles that the initial project enticed. From his posture as designer/entrepreneur, and never completely renouncing the initial ambition of Jindeo, Michel was to draw closer to this last solution and to Philippe, the designer with whom he had done considerable work on the demos for Japan the previous spring. Money greatly mattered for it became very short; in late 2002-early 2003 Michel started to use expedients to keep his cash position afloat.

In this tense situation, the Leibsoft people eventually agreed to develop an extremely simplified version of the game in four months (three months’ development and one month ‘beta-testing’). It was called Nido. Nido involved collecting virtual objects to be picked up with your mobile when you pass close to them. This reorientation made Paul’s position ever more precarious and his departure in February 2003 finally ratified these drastic changes. The development of Nido got only one month behind schedule. The game was launched in Japan in early April, with limited visibility and almost no advertising. It was a moderate but reasonable success: 700 visitors to the site the first week, 50 subscribers and then stabilisation at an average of around 200 players.
We are now going to backtrack in order to analyse the initial version of Jindeo and then the various trials that took place during the design trajectory that led to redefinitions of the game and shifts in the design paradigm.

**The move towards the engineering of encounters**

**The Priss adventure (extract from the Jindeo bible, v0.3)**

To understand how Jindeo’s designers imagined game situations, it is interesting to go back to the fictitious narrative with which their large game presentation document started. Here goes a significant extract, ‘Friday, 5.27 pm Rue du Caire, Priss undoes her bike to return home. What a pain these antitheft devices are, they ought to make electronic protection devices available. The day had once again gone by quickly but she was really looking forward towards the end of this temp work. Going home on her bike did her good since she avoided the harsh, closed-in atmosphere of the underground. She put her large Sony earphones on her ears and prepared to ride across Paris all the way to the 13th district. She plugged her player into her mobile phone. Better to answer straight away than be swamped with ten messages … She wondered if she should log on. After all, she might get lucky enough to receive a new module. In addition, she would only have to cross districts mostly controlled by the ‘United Labs’, and biking: no
chance of being targeted. The game had turned out well recently for her, and nothing obvious seemed on the verge of happening. Well, the latest modules she has heard about looked like a lot of fun.

A few minutes after crossing the Seine, it started to beep repeatedly. And it wasn’t a phone call! Damn, she hesitates. She has forgotten... Ron’s SMS this morning telling them that something strange was up with manipulations at the Source last night. The hassle of work had put it out of her mind. She slows down and stops to look at her mobile terminal on the corner of Rue des Ecoles. She glances at the contextual mapping module which indicates over twenty-five players from the same team roaming in her current cell area! She had set the alarm to twenty and it had been a long time since it had last gone off. She hesitates a moment and then attaches her bike because it’s better to be unencumbered for proximity action.

She tinkers a bit with the screen to see which of her co-team members are hanging around. She had been so happy to get accepted in this team, because they were reactive rather than aggressive, keen to thwart the moves of much more belligerent teams. The ‘I.A.Bastas’ were frankly the worst. Blast, no ‘AFs’ (‘Artificial Futures’, her team). The music kept pulsating in her ears. She decides to review the situation more thoroughly and to find a suitable, more private corner to avoid being caught stupidly now she has got into a sensitive area. She looks carefully around her checking for any suspicious movements and moves away from Boulevard Saint Germain until she finds an open building. Twenty ‘T+s’ (‘Turing positives’) remaining now in her current cell, the others must have moved to another cell. Twelve ‘U-Labs’ and five cops (‘IABasta police’). No ‘Mtraders’, though they own that particular area. The ‘T+s’ have a more technology oriented, combat zone tactics did not usually interest them much. Who knows what they’re playing at. The only nearby exchange zone was dedicated to the trade of protection modules. Priss decides to load three defence modules and two spy mechanisms: this is the maximum she can pack in any case. Vibrating, a new message from Ron: the ‘T+s’ are apparently in the middle of a geoglyph and the ‘U Labs’, as aggressive as ever, are trying to pirate them as they go by to steal and load their modules.’

The Priss narrative\(^9\) weaves together most of the elements that makes up Jindeo into a tightly integrated game situation description, focussed on complex game-mediated encounters and coordinations in a public urban space. In its core, we have a player whose displacements in town are continually alternating split

\(^9\) This is a reference to the film Blade Runner, where Priss is the name of a pretty, dangerous replicant.
between two roles and two participation formats, that of the ordinary embodied passer-by (Priss, who is returning home by her normal route, crossing quarters populated with city-dwellers to whom she is politely inattentive) and that of the equipped player (Priss who moves through ‘cells’ belonging to identified teams, populated by both city-dwellers and players that she has to differentiate between). This participation format switching is different from what may occur in ‘MUDs’ (Multi User Dungeons), where actors connected for hours and hours on their computer switch their attention and commitment continuously between professional activities and game activities by moving between active windows on their PC screen. Priss’ urban space experience is different. It hybridizes action performed within the game frame and the urban context: there are no separate windows to switch between, they make up a single mediated reality she moves in and she lives in, even if her gaze may alternate between the street and the mobile phone screen.

Switching the attention between the mobile phone screen and the cityscape involves very distinct engagements into the situation. The player’s perspective
alternates between a subjective, embodied view of the town and an intangible, almost omniscient perspective. On the screen, he can see himself located on a stylised cartographic representation, which includes nearby members of other teams, material and virtual resources to be retrieved or exchanged in this sector, and fictitious obstacles to be circumvented. This permanent fluctuation of her attention between the mobile terminal and the urban scene allows Priss to differentiate between passer-bys and players, between ordinary mobile phone users and players (themselves differentiated according to the teams they belong to), and adjust her actions accordingly. This particularly equipped situation is somehow reminiscent of that of an aircraft passenger who can alternately see the landscape passing beneath him and follow the progress of the plane on the maps displayed on the small television screens that surround him. But, in a plane, everything is done to ensure that the passenger with divided attention remains passive. On the other hand, in the game, the switches of perspective and attention of the actor engaged urban activities are designed and exploited to empower the player to develop coordinated actions, meaningful from both perspectives.

For this purpose, the designers introduce numerous features into the design of the game, the use of which requires refined discrimination and co-ordination between the two perspectives. ‘The wall’ is one of them. It is an obstacle that only appears on the screens and has no referent in ‘real life’. When the ‘real’ position of a player corresponds to the co-ordinates of the wall in the ‘virtual’ game map, and if the wall has been activated by a hostile nearby player, he gets ‘frozen’ on the map, until he has made a ‘real life’ displacement in the street, which is equivalent to a ‘circumventing’ of the wall on the screen. If a player thus has to walk publicly around an imperceptible and fictitious object only visible on the screen, he still has encountered it in some sense, and it has acquired a form of presence in the space of ordinary experience. From this example, we can see the extent of the hybridisation of the embodied experience of the player and its meaning with respect to the game. Designers judiciously call situations of this kind ‘game-related proximity engagements’.

In this particular interpretation of their game, the engagement of the player in the game and the pleasure he derives from it are reflected by the movements the player makes in relation to the game. The force of the game is determined by the scale, the difficulty or the number of such moves in actual space, that can retrospectively be read as ‘induced’ by the game. The farther those displacements, the more they seem to vindicate the game design in the eyes of its architects: ‘We can envision gameplays in which a team is attempting to link Marseille and Paris by conquering squares in between; just think of the guy that gets on a train and stop at all stations to do so, or another which does the same thing from his car with his GPS, just for the sake of building up a chain belonging to his team between Paris and Marseille! Just think about it, it’s amazing! It’s absolutely crazy’ (Michel, designer). The design is then oriented towards stimulating many types of movements in the city, co-ordinated with the gameplay. Either by
inventing rules in the game scenario or by designing innovative interface affordances that would making such finely adjusted movements more compelling. For instance the ‘wall’, which combines both these design rationales. The wall consists in an obstacle that is only visible onscreen. When the ‘real’ position of a player corresponds to the co-ordinates of the wall onscreen (i.e. in the ‘virtual’ gaming plane), the player gets stuck to the wall: if the wall has been activated by a member of a rival team, the position of the player is frozen onscreen independently of the way he may walk around. Unless he makes a very special displacement in the city, which is equivalent to ‘circumventing’ the wall onscreen, in which case he gets unstuck, and his onscreen position aligned with his ‘real’ location. If a player thus has to circumvent an imperceptible object with his body, this ‘fictitious’ obstacle becomes somehow ‘perceptible’ by other players in the vicinity, thereby acquiring a form of presence in the ordinary space. This example shows how far the design pushes the hybridisation of the player’s embodied and onscreen experiences of movement. Designers have rather aptly labelled situations of this kind ‘playful proximity engagements’.

The possibility of devising a wide variety of playful proximity engagements cannot be separated from the sharpness with which the ‘ordinary’ urban experience and the onscreen game context may be adjusted and fine-tuned. The designers will realize that this depends less on the precision available with location tracking systems, than on time delays resulting from their technological architecture, which eventually determine the update rates for the mobile screens.

The problem of screen update rates: the lowering of design expectations and the move towards a discrete gameplay

Geolocalisation was at the core of the Jindeo concept. So much so than when the initial idea germinated at the end of 1999, at a time where mobile location tracking technology was not commercially available, Michel was still looking for alternate solutions, such as sensors scattered in the environment, and which would recognise barcodes placed on mobile terminals. The initial partnership with InnovaCell gave the designers access to geolocation technology based on GSM cells, but the precision of this system was limited by the size of the GSM wireless network cells, i.e. a few hundred metres in cities. Thus, as soon as the collaboration with KDDI made available the much more precise form geolocation based on GPS, the enthusiasm was immediate. ‘It’s a dream come true, we can do Quake with that!’ For such precision seemed to open the door to a wide variety of playful proximity engagements, such as ‘physically’ taking shelter behind a ‘real’ building to avoid being directly in the ‘virtual’ line of sight of another player: ‘When you achieve a precision of 3 or 5 metres, you can imagine a whole lot of functionalities, in particular one that would check the actual line of sight of players so that two players would only be able to interact when they are in sight of one another and not when there is a building between them. Interaction principles could be much more fun. With a precision of 5 metres [...] you no longer move
onscreen by 500-metre jumps, you really move continuously’ (Pascal, technical director). In the mind of the designers a high level of precision in mobile geolocation still appeared as the key issue in rendering possible continuous gameplay and fine-tuned coordination of motions in the city and of onscreen action.

But the real setback lay elsewhere, in the time delays that went with each server request: ’It took me a very long time and I’m not sure I’ve properly understood time and taken time lag problems [linked to the various request execution times] into account in the design, the time taken to send a request and receive a response, etc., and server overload problems. All this is still not very clear. I’ve kept the reflexes of video games where reaction occurs to a hundredth of a second’ (Paul, designer). But this is not so in their mobile network architecture, where server responses may require more than a minute each time. Time issues will become particularly salient during the demos in Japan in March 2002. Michel and Philippe will the make the direct experience of that latency and the problems it might pose to actual users.

These problems are essentially interactional by nature. They provide a particular case of a more general problem, that of the continuous updating of the different relevant contexts on which a given coordination might depend to preserve their consistency and coherence as the action unfold\(^\text{10}\). In the case of Jindeo, the two relevant contexts whose consistency is at stake are that of the embodied experience of the player in the city, and that of the onscreen mapping of the game play, updated with each request to the server.

The precision that can be reached through location tracking plays a role in the degree of consistency that may be achieved between both contexts. If that precision is not less than a few hundred metres, the player’s location on the onscreen map is meaningless inside a circle with that radius. He could be literally anywhere in that circle, and the position of any game feature (player or resource) in the same vicinity cannot be distinguished from his own position. All positions are merged at that scale. This impossibility of providing precise enough information on the mutual positions of players or of players and resources preclude many types of coordinated movements, if not all.

\(^\text{10}\) A fairly similar problem occurs in paper role plays, for example, where players must constantly verbalize and report ongoing game moves so that all the assembled players can share an updated and detailed enough representation of the unfolding and evolving game play. This is necessary for their own subsequent moves to be relevant. Action then relies on the proliferation of speech, in the form of verbalized descriptions of what is going on (Shulga, 2003).
Time delays in server response compound this problem. Updates of onscreen data only occur each time a request is made to the server from the mobile phone. Updates are therefore discontinuous, and the intervals between successive updates cannot be less than typical server time responses. With typical server response time taking more than a minute, a given player may have walked or ridden around for at least one minute without his position having being updated on the screen. Even with a very precise location tracking system (such as GPS), the delays in server updates lead to irredeemable inconsistencies between the urban context and the onscreen context. That it was the case with Jindeo became obvious during the demos in Japan. Although the developers made a considerable effort in mid-2002 to optimise delay times and to rework their network architecture, the problem remains unsolved to this day.

![Image of a mobile device showing a radar interface with locations listed.]

**Fig 4A: Listing of the resources in the radar interface (wap version).** Here, no objects are listed, only the players are present in the perimeter but objects are displayed in exactly the same manner:

- deconX – 200m S
Fig 4B: In the Java interface, the fact that virtual objects and players are in the same plane is graphically perceptible. Each resource and person present within the game perimeter is represented by an icon of an equal dimension.

When the Japanese experiments made them aware of these various problems, the designers had to revise thoroughly their gameplay, moving from a continuous model (where all playful proximity engagements are conceivable) to a discrete model (where almost none are). In the discrete model, as soon as a player enters a gaming cell, all the players and resources of this cell become accessible for game action, irrespective of their actual position in the cell, that is even if they are actually several hundred metres away from the player, or concealed from his view by numerous urban structures. This discrete version of the game therefore almost totally renounces implementing playful proximity engagements, the very notion becoming detrimental to the game experience. How can the game play suggest a displacement to a player, in order to conform to some game requirement or strategy, if the onscreen map that determines the moves in the game that such a displacement allows is not updated fast enough to take it into account?:'I moved two kilometres north west to learn that my target was in Rue du Sentier, that is the place I had just left! This is intolerable for a player.' (Paul, designer).

This drift towards a discrete gameplay considerably hampered the game’s potential to induce urban displacements. It therefore weakened the initial design paradigm. The meeting with Ubisoft in the autumn of 2003 would provide it another blow. Marketing people at Ubisoft would call into question the very viability of Jindeo as a multiplayer network roleplay game. They would do so through a very different type of assessment of the game, which we will describe now.

The first criticism of the Jindeo concept: collective versus individual game plays
Jindeo developers were quite critical of the individualistic nature of MMORPGs. Online players focus on increasing the skills, resources and score points of their own character or avatar. Such games are devised so that the player has to undergo a long individual learning process during the first levels of the game, a ‘tutorial’. The length of such a tutorial also has the commercial function of developing the player’s loyalty to the game due to the investments he has made to progress through its first levels. Higher game levels usually foster some amount of cooperation, mostly in two different ways. In the game play itself, with a scenario and rules that link progression in the advanced levels to the trade of resources and skills, and even sometimes require explicit collaboration of different characters and players with complementary resources. Some form of cooperation also occurs besides the game world itself, in the galaxy of media dedicated to the game, whether official or amateur Internet sites. Forums and chats there are venues for intense interpersonal game sociability where people swap info (tips and solution tricks), download software to change or personalize the game (‘add-on’), meet and organize with other players sharing the same values or the same ethos (‘guilds’). But such games promote as a whole an individualistic and egoistic figure of a player, focussed in the development of his character.

Jindeo was therefore also designed to stand out from MMORPGs in that respect. Its developers definitely wanted it to be something different: ‘it is really different from other games inasmuch as there are no xp points [experience points]; it is much more community-oriented than current games, where everyone is more or less in it for himself. It is really team and community driven’. What is special about Jindeo is that the ‘player does not progress in Jindeo, only the team progresses’. The player does not accumulate, ‘every victory or defeat is necessarily temporary and quickly no longer has any meaning because it is diluted over time. Just as in real life’, and ‘the one who wins the stake enjoys himself as much as the one who loses’. Only the team progresses, through the number of players that affiliate with it, through the number of cells that have been claimed in its name and that the team controls (game cells represent a ‘real space’ segment of town) and amount of software resources accumulated by its members, and which are used to increase the power of the collectively owned team artificial intelligence (AI), which it is the aim of each team to make as powerful as possible. In addition, each team bears its own distinctive spirit, ethos, and set of values, that new players are expected to take on board and subsequently enrich.

The particular stance of the Jindeo designers stems from a judgement of value: they are seeking to counter what they perceive as a wrong individualistic streak in

\[11\] See the example of the game Diablo2 in (Largier, 2003).
\[12\] Jindeo Bible V0.3, p.7.
\[13\] Ibid., p.6.
multi-player games. But the choice of giving preference to team progression rather than individual player progression in the game plays has other roots, besides criticizing the pervasive individualism of MMORPGs. It also provides an elegant solution to the problem of attracting and interesting newbies to the game. In online games, the newcomer only access the game universe one step at a time according to his accumulated skills and experience points. The purely virtual, immersive game universe can be split up in several distinct sub-universes only accessible once the player has reached a certain stage, and performed all the relevant quests at lower levels. Here the game universe is largely ‘real’, for it is the city itself. It is therefore unique and difficult to split up in distinct sub-spaces with differential access. Players will be able to move in all of it, because they are part of it, and it makes up their whole environment. You might restrict access to virtual resources, or the possibility of performing certain actions or encountering certain players onscreen. That would however reduce drastically the interest of the game itself which lies in the multiplication of possible coordination between onscreen actions and ‘real space’ actions. So to maximize the attractiveness, all players, including newcomers, should be allowed as much encounters and actions as possible. If progress only occurs at team level, the issue is nicely settled. Any player that gets close to a useful resource, may capture it for the team and help the team to increase its power. Participation is made to depend more on location than on skill and experience.

Another compelling reason for giving preference to teams over individual players is link to an innovative requirement the designers are very proud of, that is the possibility of playing the Jindeo game either from a PC or from a mobile terminal. Some players are therefore allowed to log on from PCs, with access to sophisticated screen functions, while mobile players will play from their cell phones, with downgraded interface functionalities and gaming capacity. The designers’ idea is to exploit that situation and try to get mobile and PC players to cooperate, for instance with the latter guiding the former (the designers have in mind here some of the situations in the Matrix movie trilogy), even though their capacities are very different: co-operation between PC and mobile players will be

14 ‘In all games, there is a real temptation to boost your character, often to the detriment of the team, and there is always someone who does this, though here, everything is designed to counter that tendency. A player must play for his team. He may his team but all he can do then is join another team. He gets more experienced a player, more familiar with the rules, gets to know other players, but it is still his team that makes progress […] The reflex consisting in trying to build your own character and observable in almost all massively multiplayer games or paper roleplay games is usually a hindrance… I thought it a good idea to try to curb this tendency’ (Gilles, developer)
advocated as something which lies in the best interests of the team to which they belong.

The marketing people at Ubisoft were to criticise most severely this emphasis on team progression. They did not believe that such an incentive was enough to motivate players and make them loyal to the Jindeo universe. Based on their own experience of online games, they considered that if newbies were to have access to full player capacities in a single game universe, without going through a long and tedious individual tutorial, players would not become lastingly attached to the game. They would enter it, exit it, get back to it on a simple whim, unlike MMORPG universes where the tens of hours spent to learn the ropes, and get through the first levels were quite instrumental in building players loyalty.

This meeting with Ubisoft marketing executives was a landmark in the design process. What was at stake was the very definition and categorisation of Jindeo, and more generally of similar games based on the geolocation principle, where the game world is not virtual, but some kind of augmented real space. The choice the Jindeo designers made that gave preference to teams other individual players was precisely motivated by the problems raised by this latter particularity. Ubisoft criticism therefore amounted to saying that Jindeo was a new type of game that could not be assimilated to MMORPGs, at least as long as it operated on that basis. We can’t tell right now whether it is an inevitable consequence of the introduction of mobiles and location functions into the gameplay, or if a completely renovated gameplay, centred on individual progression might answer the objections raised by Ubisoft’s experts. That encounter with Ubisoft dealt Jindeo designers a severe blow at a time where they too pressed to try to answer Ubisoft’s criticisms and invent new rules and new scenarios that might do the job. Because they were at that point quite short of cash, they absolutely had to get something out fast, using only the working bits and pieces, software and architecture that already worked. This *bricolage* was to be the Nido game, developed for KDDI and commercialized in late spring, 2003.

**From Jindeo to Nido: a radical and final shift in the game concept**

After the meeting with Ubisoft, the design space contracted to the existing and working modules, which were the Radar module, the collection module and the communication module. The Radar module tracked and mapped the location of the players and the resources present in a given cell cell, while the collection module enabled the player to collect available resources in the cell. The communication module allowed text messaging between players. Based on these three modules only, the simplest and possibly the only thing to do was to design a collection game, slightly inspired from successful image card collection games for children ("Panini"). The principle of this new game, Nido, was therefore to complete collections of virtual objects picked up with the mobile phones by clicking on the icon such objects when they appeared to be close enough of the
player in the onscreen electronic map. Some were collections of everyday objects, such as precious stones or fruit, and others did not have any real world equivalents, such as moments of time. To collect those, one had to pick them at the right location and at the right time (you could only pick morning in the morning, etc.). The Nido onscreen map also featured the other players present in the cell. Finally, players could communicate with one another when their icons were apparent and active onscreen, via the text messaging module.

The transition from a complex role playing game towards a simple collection game was not easy on the designers. Developing the new game involved renouncing, and most of its founding principles and values. Nido is an individual game\textsuperscript{15}, based on accumulation, based on a schematic scenario. The designer which carried the spirit of Jindeo during that period, and had tried to find a way to get it to evolve satisfyingly eventually had to leave the firm at the beginning of 2003. The move to Nido seemed both radical and final. The designers did not even believe they might be able to get Nido to look more like Jindeo by enriching it with yet undeveloped modules and functions. There seemed to be an unbridgeable gap between an individualistic accumulation game such as Nido and an altruistic team-based game such as Jindeo. And part of the excitement seemed to have faded. In the first tests, its designers (immersed as they were in the massively multiplayer online game culture) found Nido rather boring.

They were all the more surprised to observe the level of involvement of some Japanese players. The behaviour of the first Nido users in Japan and its observation constituted the next trial in the design trajectory. The innovators did not have enough money to conduct interviews with users. They could only rely on the electronic traces that user behaviour left in their databases to assess the type of involvement users had into the game. These traces could be either details of object collection for each user (number of objects, place and time of collection, etc.) or the text messages that users sent along through the game server as they moved into Tokyo and played Nido. With the observation of user behaviour thus organized, the innovators could mostly link intensity of use to the proliferation of electronic traces, either those left by data collection or text messaging. Their reasoning, framed by the particular constraints of the experimental setting, was mostly structured by the interpretation that the more numerous those traces, the more intense player involvement, and the stronger the force of the game. Three

\textsuperscript{15} Still wishing to avoid developing an overly individualistic game, the designers tried to introduce incentives for the trade of objects between players (through ‘trade’ modules). This was also a standard strategy in the advanced levels of MMORPGs as we saw above, and it still involved a complete renouncement to any notion of team progression.
The Design History of a Geolocalized Game

force principles pertaining to Nido were actually uncovered in this test, leading to one dominant design paradigm and two minor ones.

The two minor paradigms were associated with particular ways of becoming ‘excessively’ engrossed in the mobile-based collection of virtual objects. Some Japanese players thus developed a taste for pure accumulation, completing the same collection ten or fifteen times. Some of these seemed to enjoy the game so much that they found ways of ‘cheating’, even though the game play was so rudimentary\(^{16}\). Though Nido appeared so unsophisticated and unexciting a game, some Japanese users were thrilled enough to invest a considerable amount of effort into the accumulation of virtual Nido objects. This particular type of involvement opened up an ‘accumulation paradigm’ for the design process. To encourage such user behaviour, the designers tried to devise increasingly sophisticated objects to collect, that might stimulate even more such players’ fetishist compulsion to collect virtual objects with their mobile phones. A complete collection of a particular set of virtual objects might, be rewarded with a free downloadable ringtone, or compose in jigsaw puzzle fashion one of those starlet pictures the Japanese so much delight in\(^{17}\), to be used as a mobile screen saver. For such type of collection though, the intellectual property of the final objects would belong to actors other than Leibsoft. To enforce that particular design paradigm, the innovators were already actively looking for possible new partners.

Some other players use the Nido collection game effect as a pretext for wandering around Tokyo. This provides another path for ‘displacement paradigm’, which we showed to be central with the Jindeo concept. But here it did not mean any longer trying to enable subtle coordinated moves between screen and city, but just spreading enough the objects to be collected to allow many pleasant ‘hunting-gathering’ trips throughout the Tokyo area.

But the last and most decisive type of user behaviour involved text messaging, particularly mobile text messages originating from the very possibility given by Nido of players ‘meeting’ on the screen of their mobile phones.

\(^{16}\) One Japanese lady player, interested in the collection of ‘moments of time’ completed her collection in the following way. She collected several moments of time icons one morning, and when back at home, she found a way to put them back on her virtual onscreen environment. Then she waited at home for the proper time to pick them up, thus subverting the principle of the game (which required her to move to definite places at given times to complete her collection).

\(^{17}\) There is a whole paper media industry dealing with this craze about starlet pictures, with fully dedicated tabloids.
Mutual positioning and the engineering of encounters.

One of the key features of the Jindeo concept, which made such mobile geolocalised games so different from online games was the possibility that players would meet face to face: ‘I feel like saying, it’s not like a game any more! To my knowledge, there is no (video) game that brings players directly into contact’ (Antonio, developer). But such ‘meetings’ may occur in two distinct contexts, in real space (physical co-presence in the sense of being able to get mutual sight of one another) and on mobile screens (with the icons of both players being represented in the same cell map). In a sense the involvement in the management of co-present gatherings may win over the involvement into the game itself: ‘If there’s going to be direct contact, there will be this ambiguity: knowing that you are playing a video game while interacting face to face with the players. In Everquest, for example, you actually encounter an avatar on screen, you know that there is someone behind it whom you will have to interact with; you’ll write to him, ‘come on, let’s form a team and smash up monsters’. Here, you will meet a real person face to face, and the game will be completely forgotten. The game is embedded in the mobile phone and it is the phone that gives the game its substance and its materiality. In face to face encounters you might be able to forget it and you might also be ridiculous if you keep on looking at your mobile in front of the other person. (Antonio, developer). The idea that Jindeo might lead to original configurations for interactions is present from the start in the orientation of the design perspective.

This issue will come to the fore with Nido, and the possibilities that the game offers to observe user behaviour. Encounters between players could only be observed through the trace they left in the text messages exchanged by the Nido players, when those chose to mention and comment on such encounters in their exchanges. With that particular way to make user behaviour visible, the Nido designers are put in a position to analyze each mediated encounter that is mentioned in text message as a particular expression of the force of their system. The force of the Nido technology is simultaneously constructed and measured as its capacity to stimulate encounters, both in volume and variety. The more messages mentioning such encounters, the more encounters, and the stronger the Nido game in that respect. Framing user feedback as a trial of the force of the system thus defined, supposes a background representation of the powers and virtues of association. We recover here the idea of society as a reservoir for encounters, with a bonus for interpersonal exchanges, the vitality of which can be liberated if one puts proper communication affordances in the environment of actors. The observed enthusiasm of Japanese players in using Nido to generate and ratify various forms of mediated encounters is interpreted as an indication of how successful it is under that particular paradigm. The innovators read Nido as a tool to engineer encounters, and a large part of their design strategy gets aligned with that particular definition of the strength of their game.
A particular type of mediated face engagement stands out with the first Japanese users, where two Nido players get to ‘see’ one another on the screens of their mobiles (without necessarily being co-present in the sense of a direct visual contact) and ratify this mutual perception on screen as a proper encounter by commenting on it by text messaging. It is interesting to break down these players in two groups, thirty or so KDDI employees that were given the system to interest KDDI in it, and about 200 ‘normal’ subscribers to the game.

The particularity of the KDDI was that they all worked in the same building. Therefore the concentration of connected players in these cells was rather high, and these users had many opportunities to ‘meet’ several other players on their mobile screen, even if they worked at different floors. They seemed to take so much pleasure in such mediated encounters that the number of relevant text messages explodes, highly exceeding the expectations of the designers. The emotion and pleasure they felt in these mediated encounters accounted to a large extent for the good reputation enjoyed by Nido in the Japanese firm. Such behaviour confirmed the initial idea of the designers that the attractiveness of such games would depend very much on the local density of connected players. However, the way interest in mediated encounters and subsequent exchanges superseded interest in the game play itself came as a surprise.

The 200 hundred ‘normal’ subscribers were in a very different situation. They were randomly scattered in the whole Tokyo-Yokohama conurbation and beyond. Therefore they had very few opportunities for mobile phone mediated encounters, and they also communicated by text message much less than the KDDI group. This observation went a long way to confirm that there was a direct relationship between the number of game-related text messages and the number of game-mediated encounters. Mediated encounters could therefore be considered as a powerful lever to stimulate text-messaging practices.

The fact that users were scattered over a large area did not preclude two mediated encounters to take place, at least (others might have occurred without being mentioned in text messages). The first of these took place in the underground. In her train, a woman who used to play Nido but was not logged on at the time saw a man engrossed in his mobile phone, playing at Nido (or so she believed). She did not address him in any way, but got out of the train at her usual station. As soon as she was on the platform, she logged on to the game with her mobile phone. She checked that she could indeed see the icon of this active player on her screen. Then only she sent him a text message, thus ratifying the co-present encounter by this lateral and indirect communication. In the second mediated encounter, two connected players came across one another at night, in an otherwise deserted business district, while both were connected to the game. Their icons were mutually visible on their screens as they walked past each other. Since they were almost alone in the street, they both could not ignore that the other one was that connected player that had appeared on their mobile phone screen map. But they
just walked past without acknowledging the fact, either openly or electronically. Later, one of them recounted this particular encounter to another player by text messaging.

These two mediated encounters are very peculiar instances of those encounters in public space that Goffman has studied in detail (Goffman, 1963). From the perspective of a bystander in the street, it might have looked like two unacquainted persons walking past, and granting each other some form of civil inattention. But, unseen from this hypothetical bystander, those two persons were meeting both as urban passer-bys (to which the regime of civil inattention is relevant) and as Nido players. Their attention was prone to oscillate between the subjective and embodied viewpoint of the passer-by and the disincarnate, exterior perspective of the representation of the gaming plane on the mobile screen. Within that latter representation of the encounter, the mobile screens allowed them to recognize one another cognitively. In these two particular instances, they chose not to make that simultaneous cognitive recognition mutual by failing to ratify it through direct social recognition. In the first one however, social recognition occurred by the means of text messaging (a communication back channel), which turned the spurious co-presence into an encounter, in a way that could not be detected by a bystander. In the second case, social recognition was not proposed, but the SMS mention of that particular crossing to another party, meant that one of the participants at least interpreted that fleeting social gathering as a situation involving two ‘acquainted’ persons. There is a sense in which one could say that the fact these Japanese users were equipped with Nido, and logged on to it, turned the chance meeting of two strangers in public spaces (which would normally be treated in the regime of civil inattention) into fully blown encounters between ‘acquainted’ persons, with social recognition being accounted for and visible only in text messages. At least it was the interpretation of the designers, and we see that it makes even stronger the alleged correlation between the proliferation of text messages and the power of the game to subvert and transfigure urban social gatherings.

All these observations of user behaviour were discussed at length by the design team. They led towards a new reorientation of the design trajectory in the summer

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18 To Goffman, cognitive recognition involves either placing another individual with respect to some singular information that characterizes him only, or with respect to ‘some general social category, but in a context where any member of the category can play a crucial role’ in the situation (as here the fact they are both logged on Nido players). (Goffman, 1963)

19 Social recognition to Goffman is ‘the process of openly welcoming or at last accepting the initiation of an engagement, as when a greeting or a smile is returned’ (Goffman, 1963).
of 2003. The innovation effort now aligned with the optimisation of a technology that was mostly seen as an instantaneous, geolocated mobile messaging, rather than a game. The criteria for successful design became the ability of the interface functionalities to stimulate and regulate such ‘encounters’ mediated by mobile location tracking to enrich the corresponding experience. This meant for example making easier the sending of text messages, or creating ‘buddy lists’ that would allow friends and personal relationships to recognize one another on screen: ‘there are not enough places in the application where I’m tempted to send a message, or where I have the possibility to do it, and we missed a bunch of functions in our initial versions of the design such as displaying the nearest players connected. Now we are creating a list of favourites, a basic Messenger thing … being able to see easily if my favourites are connected and close or not’ (Michel, designer). A key feature to promote encounters was to ensure at least another player would be visible on the screen map. The innovators therefore added an additional feature, in which the icon of the nearest connected player in the buddy list appears together with his distance to the player, even if they are not in the same cell. This was thought, probably rightly so, to be a way to afford mediated encounters in contexts were there were too few players for there having a great chance of finding two connected ones in the same cell at a given time. The design trajectory had therefore largely reoriented towards the conception and implementation of interface features that would promote and ‘afford’ mediated meetings in general. This is the crux of the ‘engineering encounters’ design paradigm.

With that paradigm and the particular representation of the force of the technology it entails, a new set of issues appeared, dealing with the responsibility of the designers with respect to the morality of the encounters their technology mediated. This problem became more salient as the design rationale got focussed on building an architecture facilitating generic encounters and socialisation between any equipped user. Deviant encounters became possible, and likely. Indeed, one at least had already taken place. An adult Nido player had got into contact with a twelve-year old girl playing on her mobile phone. She revealed her age in the subsequent messages and he kept on flirting with her on a remote basis, at the same time following her movements in Tokyo from this PC. This is quite unacceptable in Japan, where adolescent prostitution through the Internet is a matter of heated public debate. The designers realised that they had to take responsibilities for some of the risks involved in Nido-mediated mutual location-aware interactions, and particularly ill-intentioned forms of ‘tracking’ or tailing. Characteristically, the designers were looking towards the conception of interfaces adapted to do the job. For example, they were and still are exploring the

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20 The screen maps available to Nido users playing through their PC and the internet server are much more extended than those available on mobile phone screen, which only figure the current cell.
possibility of providing users facilities for making up different lists, each involving different rights to mutual access and visibility, such as a list of onscreen mutually visible friends (‘buddy list’) and a black list that forbade such mutual visibility. This was only a start.

**Conclusion**

Operating under ever more stringent economic constraints, the innovators had to switch from Jindeo, a team-based massively multiplayer mobile game towards Nido, an individualistic collection game that was still founded on the localisation of mobile terminals. This was a dramatic reorientation of the design process, where the engineering of displacements was largely replaced by the engineering of encounters. Because user feedback was accessible only as electronic traces left by the actions of the players, the game technology was mostly interpreted by the designers according to its capacity and strength to elicit such traces (and particular text messages). When those traces were relevant to some form of mutual and mediated recognition between players, usually dumped into the generic idea of encounters, they reinforced the representation of the game as a generic communication technology, the force of which lay in its perceived ability to exploit the interaction tonus of the social fabric to engineer mediated encounters. This comes close to Mauss’ seminal description of gift-giving as a total social phenomenon, with encounters replacing gift-giving situations, and the mediation of ICTs the mediation of the given thing. Such an interpretation was not prominent at the start but it became more salient as the design process went on, reaching its climax with the ‘engineering of encounters’ design paradigm, in which the innovative mobile technology became very generic, like some kind of localized instant messaging system.

We think this is an instance of a more general phenomenon. Because ICTs are based on digital technologies, the uses of ICTs leave electronic traces, and probably more and more of them. There is some kind of economic gain in using these traces to understand the effects of the technology and adjust the design process. But this has two important effects. First, because such traces are objective and often may be aggregated in a quantitative manner, they lay the ground to an assessment of the technology with respect to its force in stimulating opportunities for users to leave such traces through their mediated practices. Second, these traces usually have specific formats which pay little justice to most of the contextual details: in a characteristically circular fashion, they construct and shape the alleged ‘effect’ of the technology, of which they are supposed to be an independent measure. In the case of Nido, the very notion of mediated ‘encounters’ cannot be separated from the assumed correlation between the number of text messages in Nido and the number of such ‘encounters’. The ‘engineering of encounters’ paradigm acts both as a scheme of interpretation of ICTs and as a horizon for the design process. Our case study showed how this
paradigm could get more and more entrenched, because of the propensity of the use of ICTs to leave digital traces easily accessible with digital tools.

This also has consequences for the social sciences, and the relationship between social sciences and the IT world. For example, when they were operating within the displacement paradigm, the designers thought of themselves as urban geographers and city planners, trying to incorporate the relevant abstract knowledge into the conception of their game: ‘We’re in the urban game, aren’t we. We are almost urban planners. The problem is that we know nothing about it! If we knew more about pendular mobility, etc. it would have been really helpful’. (Michel, designer). In the encounter paradigm, they move in the interaction game. They are relying on their lay understanding of the workings of interactions to fine-tune their system with respect to the possibility of their system to engineer what the system itself shapes as meaningful ‘encounters’. They increasingly incorporate into their devices, and therefore into the environment of the actors, the various rules, obligations and safeguards, ritual constraints and ceremonial practices that govern social interactions and their intelligibility. Interactions and encounters then appear as distributed practices. Equipped Nido players might experience proximity-based onscreen cognitive recognition without visual access, and their mobile devices embedded features geared towards supporting or regulating the possibilities for them to move on to mediated social recognition, without necessarily engaging into co-present visual or verbal interaction.

The very notion of encounters and social order in public spaces is at stake. With respect to the issue of strangers crossing in large cities, the concept of civil inattention proposed by Goffman was founded on a principle of equivalence, in which every passer-by was the absolute equivalent of any other21 (Quéré et al., 1992). That very equivalence is called into question with location-based services such as Nido, for even if the Nido-connected passer-bys are not acquainted by name, some screen-based cognitive recognition relying on mutual placing of the other both as a Nido player and as the connected player they both can see in the street and onscreen is always a possibility. Is there still any such thing as socially insensitive civil inattention in a world where each actor is embedded in a personal environment saturated with Nido-like devices? The public space and the social order in such a world might be very different from the ones we inherited from modernity.

21 Goffman himself emphasized that point, remarking that civil inattention was ‘a courtesy that tends to treat those present merely as participants in the gathering and not in terms of other social characteristics’ (Goffman, 1963, p.86)
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Part 4

Innovative Services
Stay in Contact – ‘Landlordz’ Strategy Online Gaming for Mobile Platforms

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Abstract:
Mobile devices like mobile phones or PDAs offer a large set of entertainment applications, mainly adapted versions of existing PC-games. These games have in common that they provide entertainment for only a few minutes of leisure time. In these cases mobility surplus value comes by ‘anywhere and anytime’ paradigm, but mobility is no gameplay feature at all. Landlordz is a multiuser online game with its typical strategic development features. The crucial point is to keep an eye on the game progress and to interact occasionally with your own units. Landlordz has an active messaging mechanism that informs the player via email, text message or SMS – depending on the device he or she is logged in. Respectively, different gaming platforms are offered to the user for fast reaction. Communication is based on XML which makes the development of new client systems or gameplay features quiet easy to perform.

Keywords:
strategy game, multiple mobile platform, message service

Introduction
Currently, mobile phone users can find more than 180 (mostly Java-based) games for their devices, with an average increase of 10 to 20 games per month. These games mainly cover the genres of sports, actions and puzzles. All these games have in common that they provide entertainment for only a few minutes of leisure time (anywhere and anytime, that’s what mobility is used for), but no additional surplus value is drawn from the mobility feature.

In this paper, we present the concepts and architecture of the online multiuser strategy game ‘Landlordz’. In the current prototype, the use of mobile devices is essential for the players success in the game.

The general game objectives are similar to those you can find in many of the games from this genre: the set is a medieval like fantasy world (like ‘Dark Age of Camelot’ etc.), several competing realms are struggling to get dominance over other realms, each controlled by a single player. Players can operate with different units, defensive buildings and resource extraction. All actions, that is movement, assault, resource extraction, building construction etc. are performed in ticks, the
general time measurement unit in this game. The player typically reviews the status of his/her units, conducts orders and logs off again. The main purpose is not watching the units creeping over the ground in 5 minute ticks.

Nevertheless, it is important for the player to stay in contact with the game proceeding on the game server. He or she has to be informed about the outcome of battles, react as soon as possible on competitor actions and compete with several unforeseen events, build into the game plot.

The paper is structured as follows: in the second section we give a short insight into the gameplay of the game. The main characters and features are introduced. The third section describes the different client platforms with there different level of detail provided. Some layout decisions are discussed with respect to the used hardware platform and the playing context of the user. The forth section focuses on the technical communication aspects, the extendable XML-structure and the architecture of the server. In the fifth section the active communication technique of the game is explained. The different levels of detail in the messages and the access to the game is are presented. The paper ends up with a summary and some new location based gameplay elements that will extend the game in further releases.

**Overview of the gameplay in Landlordz**

Ultima Online, Asheron’s Call (Microsoft), Everquest (Sony) etc. sets up the genre of massive multiuser online games (MMOG). Landlordz is a typical strategy online game, with hostile realms fighting each other. Thus the objective of the game is given by a simple sentence ‘There can only be one Landlord...’

Basically the game will start in multiplayer-modus. The aim of every player is, to conquer all other countries and to defend his own homeland against the other fellow players.

First, every player, who will become the real Landlord, has to choose a race. Every race has its own quality. This quality is born on the idea, that different landscapes bring different geographical advantages to a thereborn race. For example, nations which are living in the mountains (called ‘The Trenkerer’) have the ability to look further than others can. A nation living in caverns (called ‘The Olmenauer’) are blind, because they live with the absence of daylight, but have the special ability to move very fast at night. These special qualities define the properties that affect moving, attack, defence, and their fighting radii.

If a race is chosen, the Landlord will come up with basic equipment for starting the game. Equipment means a particular amount of warriors, gold and buildings. Their starting bases are their homelands from where they will start their campaign. Warriors exist on three different types: cavalry, artillery and infantry, every with
Stay in Contact

different qualities in strength, speed and fighting radii. These units of warriors have to move through the countries to fight against the other fellow players. Additional to this, buildings must be built, gold be increased and warriors developed. Two or more players could forge alliances to have more power in fighting. Communication is done via special game functions.

Especially during the voyage through the lands, the realtime modus is an important feature. A transfer of the troops could last nearly a few hours in realtime. And this is a point, where the mobile character of the game comes into play. If the player starts a session on his/her PC at home and he has to leave, he keeps in contact with the game via his handset or PDA.

All players have real human adversaries. This is indeed more exciting than playing against the computer.

The game ends, if one of the players has conquered all countries. He becomes the one and only ‘LandLord’.

Game contact from anywhere at anytime

Here is, where mobility becomes important. According to the players communication profile, he/she can be actively informed by the system via email, messages on the message board of the internet game portal or even an SMS to his/her mobile phone.

To enable a fast reaction ‘anywhere and anytime’ as proposed in (Palm, 2003), we provide three different client frontend systems for different game situations:

- PC client based on Flash
- PDA client based in a downsized Flash application
- Mobile Phone client based in J2ME with rudimentary graphical output

As (Amaro, 2003) stated, J2ME is the future technology for mobile phone gaming. But for PC and PDA, we use a Flash-Front end for better graphical effects.

Each of these client systems provides a different level of detailed presentation of game data. e.g. the mobile phone provides an easy to use a zooming function of the map: pushing the keys 1 to 9 zoom into the corresponding square of the map as shown in fig. 3.3.

The Mobile Client offers the user the access to all data which is important for playing the game. As shown in fig. 1– 3, different game information is available belonging to troops, buildings or fellow players. Furthermore the user has the
possibility to accomplish basic game actions with the Mobile Client. In addition belong: to provide, move or split own troops, attack hostile troops and buildings and build own buildings. Likewise the user can receive SMS Messages, which refers to important events in the game process or were sent by another player in the game. A chat function like in the PC Client is not intended for the mobile Client.

Because of a better performance and due to the reduced graphic possibilities of the Mobile environment, the navigation, the interaction and the entire layout are mainly limited to lists and plaintext elements. The view of the game world map makes a difference at this point. A general map is available for the user, on which the individual territories are represented in different colours. These colours are assigned to certain players. So the user can get an overview of his own and hostile countries at first sight. With the help of a scale at the edge of the map, the user can determine where his/her and the enemy troops and buildings are situated.
Figure 2: PDA client based in a downsized Flash application

Figure 3: Mobile Phone client based in J2ME with rudimentary graphical output
Because the coordinate system of this scale on the general map is very low detailed, the user has the possibility to zoom into the map by using the keypad keys 1-9. During this procedure the appropriate grid square of the map is increased and the scale is refined accordingly. This can be repeated till a certain detail stage is reached (see fig. 3.3). If the user reaches a scale sufficiently detailed for him, he can determine to which coordinates he would like to move to his troops. In each detail stage of the map view, the user has the possibility to move his own troop by input coordinates or to attack an enemy troop in his view radius. These actions can be released at the map context menu.

Graphics play an important role in understanding the game mechanisms and makes the player feel comfortable with the game. This is especially true for games with limited display resources like mobile games. The navigation and framing elements have been coloured in gold. Thereby the framing element doesn’t divert the user from the game they have same colour group. Especially according to playing the game with the Mobile, the landscape design uses more duracolours. Even with the small display of the Mobile and eventual reflections of the sun on it, this design should make it possible for the user to play the game without restrictions and to recognize all important things. If the game design would be created in dark colours, it may be hard to recognize something. For this reason the landscape is not as detailed as on the other devices are. Thereby the user can see e.g. the buildings or the enemies, these element are coloured in red (a colour, not used for anything else in this game).
Figure 4: Mobile menu structure
The internal communication technique for game data

Another problem the game system has to cope with is to reduce the transferred data to a minimum to make communication with low bandwidth and slow processors easier. A special connection module on the server keeps track of each logged in client. Only the information essential for this dedicated client is transferred. Security is achieved by transferring a unique session id (quite usual). In order to reduce the volume to a minimum it is possible to compress the transferred data via zip format if the client is compatible with it. If the client provides public-key-encryption, it could send the data encrypted by receiving a key from the server. Scalability is very important in multiuser game environments. We cope with this issue with a load balancing mechanism, hidden from the client. The server sends requests from the client to one of many server ports which are not used at the moment.

The communication is based on XML with a quite simple structure. It is quite easy to add new functionalities into the game. Adding a new game object (e.g. a dragon object) would not influence other operations in the init file like creating and positioning a building. Of course there have to be proper parsing snippets on client & server side to handle these improvements.

The backend is split into 2 modules. The ConnectivityEngine handles the requests of the clients and the server balancing. Furthermore it takes care of the running game threads and the handling of database information.

All functionality which belongs to current game processes (i.e. game parameters, tick execution, game rules, handling game data also) are covered by the GameEngine. Within this part the real game will be managed (see fig. 2).
For security reasons the handling of the clients are realized via a session id. After logging in to the PHP portal the user gets a unique SID (Session ID) which grants access to game functions. When joining a game this SID will be submitted to the client (Flash, Java) and passed on to the backend. The connectivity engine creates another special SID and send this back to the frontend. Henceforth this ID is used for the further communication with the backend. This provides a very high level of security.

Another highly important topic in mobile applications like a mobile multiuser game is to handle with high latency and unstable connections (Nokia, 2003). If the connection is lost during game play, the client system automatically reconnects to the server with the old SID. In our approach the SID keeps valid up to a threshold time period. Within this period, the server accepts the SID and restarts the old session without further interaction of the client.

With increasing number of games (game threads) it makes no sense to host all these games on one connectivity server. For that reason it is possible to initiate a master server that administrates several connectivity servers. Therefore it is necessary for the master server to know, which game is connected to which connectivity server so that it is able to pass on the request correctly.

The last alternative is the use of RMI or CORBA which provides the functionality to roll out special calculations on other servers. E.g. it is possible to integrate a server that will process the fights only.
While not connected to the system, the player should get informed about important events that happen. The Active Message System takes control about this, managing the delivery of the game-based information to the player using different interfaces.

First is the Portal, showing a list of recent notifications when the user logs onto the system. Sending an e-mail is an additional alternative. The third option uses the Short Message Service (SMS). The user is immediately informed via his mobile phone.

To decide which interface to use, repeating events are categorized into priority levels (figure 5-1), ranked by their importance. Events requiring time-dependent reactions (like ‘Opponent approaches!’) have a higher priority than events that do not require an immediate reaction (like ‘The game is over.’).

Every user has an individual profile that informs him related to the priority of the event. This allows the user to configure the amount of notifications and the way they reach him by editing his profile at the web portal.
**Current Status and further research**

Currently we operate a running prototype. Beta testing has started in Jan, 04. Future developments will focus on the connection of the real- and virtual world. Depending on the players location in the real world, he/she will get an extra bonus for special abilities of the Landlord. e.g. governing from his home base (i.e. his Home-PC) will make economy more effective, while visiting his troops in a province (i.e. by mobile device) will enhance their combat morale. The idea is to match the provinces in the virtual game with real, predefined places that can only be reached with a mobile device, e.g. Train-Station, shopping mall etc... Thus, mobility will become a real game play feature, but with limited technical overhead and costs. SMS is still a feature of contacting the player, not a command carrier, like in SMS games on the market (e.g. Undercover (Ydreams, 2004), W-Domination (Novosoft, 2003)).

**References**


Mobile-Entertainment: User-centred Perspectives


Mobile Phones and Football Fans: Technology, Services and Markets

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Abstract:
Advances in both handset and network technology have provided new opportunities for the presentation of sports information. This paper provides a state-of-the-art review of current services and technologies. We first review general sources of information for the football fan, and then current services available on mobile phones. These include football-specific services such as goal-alerts and downloadable highlights, and general services such as photo-messaging and internet access. Nearly all mobile services are for the ‘near-live’ bracket, i.e. during or immediately after the game. At present there are no continuous live services, nor are there services designed to retrieve archive football information. We describe research activities seeking to provide a new type of real time content for the football (soccer) fan, and to understand what facilities are most valuable.

Keywords:
football, soccer, sports, animation, spectator

Introduction

This paper presents research into current and future mobile information services available to football fans. Receiving information is a key activity for the football fan: it includes watching matches, listening to commentaries and results, and accessing facts and figures via various electronic devices, including mobile phones. We first review general sources of information for the football fan, and then current services available on mobile phones. These include football-specific services such as goal-alerts and downloadable highlights, and general services such as photo-messaging and internet access.

The market for football ‘infotainment’ services over mobile handsets is decomposed into the key scenarios that have distinguishing characteristics for the types of service demanded. Critical factors include the location of the user, the availability of alternative information services, and the price and availability of bandwidth.

Advances in network and handset technology provide more opportunities for novel services. Existing and imminently available technology are explored to consider what additional services and applications are possible. One such novel service is explored in depth, and the results of focus group trials are reported. We conclude with a summary of the findings.
Before looking at mobile entertainment for the football fan, we first enumerate, in Table 1, services through which an individual can receive information about a game of football.

<table>
<thead>
<tr>
<th>Service #</th>
<th>A person (without a mobile phone) can get information about football by:</th>
<th>Short Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attending a football match in person and watching it live.</td>
<td>Attend-Match</td>
</tr>
<tr>
<td>2</td>
<td>Watching a match live on television (possibly enhanced with digital interactive features)</td>
<td>TV-Live</td>
</tr>
<tr>
<td>3</td>
<td>Watching extended highlights on the television, usually on the same evening as the match</td>
<td>TV-Highlights</td>
</tr>
<tr>
<td>4</td>
<td>Watching brief highlights (goals) featured on television news sports round-ups</td>
<td>TV-News</td>
</tr>
<tr>
<td>5</td>
<td>Watching live television round-up programs (but without live footage)</td>
<td>TV-Round-up</td>
</tr>
<tr>
<td>6</td>
<td>Using text-based television services (‘teletext’ in the U.K.) to give information on the score, scorers, team news and brief match report</td>
<td>TV-Text</td>
</tr>
<tr>
<td>7</td>
<td>Listening to a live match on the radio (possibly via internet broadcast)</td>
<td>Radio-Live</td>
</tr>
<tr>
<td>8</td>
<td>Listening to a live radio roundup programs</td>
<td>Radio-Roundup</td>
</tr>
<tr>
<td>9</td>
<td>Using web-portals (such as BBC or UEFA) for minute-by-minute updates and latest scores across many matches</td>
<td>Internet-MbM</td>
</tr>
<tr>
<td>10</td>
<td>Using web-portals to read post-match reports, and see pictures and movies of significant events.</td>
<td>Internet-Reports</td>
</tr>
<tr>
<td>11</td>
<td>Reading match reports in the newspaper the following day.</td>
<td>Paper-Reports</td>
</tr>
<tr>
<td>12</td>
<td>Reading articles in football magazines.</td>
<td>Mag-Articles</td>
</tr>
<tr>
<td>13</td>
<td>Receiving information (e.g., word-of-mouth, email, photos) from someone they know who has seen / heard / read-about a match or other football-related news.</td>
<td>Peer-2-Peer</td>
</tr>
</tbody>
</table>

Table 1: List of services through which people can get information about football. The short name is used in Fig 1.
Below, these services are compared in five different ways: latency, bandwidth, availability, cost and interactivity. These characteristics are then used to analyse the mobile services for receiving football information, enumerated in Table 2.

Firstly, we note the time between the event and the users’ receipt of the information about it – or latency. Services 1, 2 and 7 are live, services 4, 5, 6, 8 and 9 are bursts of communication received before the end of the match (interpreted here as ‘near live’), and the rest are used after the match – soon after (3, 10) or days later (11 and 12).

Second, these services have significantly differing bandwidths. Even though a detailed estimate is beyond the scope of this paper, from a user’s perspective, the amount of information contained in e.g. 160 characters of text is a couple of orders of magnitude less than the visual information available over television. A rough ranking of these services in this respect places a ticket to the match as provider of the greatest bandwidth (though nearly all of it is about just one match), then live and highlight television, followed by radio, internet reports, and newspapers. Then follow TV and Radio news, and finally, we estimate TV ‘teletext’ service to have the smallest bandwidth of all the services in Table 1.

A third comparative measure is the availability of these services in different locations. A live attendance naturally restricts the spectator to only one possible location (the strictly limited supply of stadium seats); other services are more flexible. Television-based services have a spectrum of availability, from free-to-air stations through digital and satellite channels, to pay-per-view arrangements, most commonly viewed in public houses or the like. Mobile televisions are not widely used. Excluding cellular networks, the internet services are restricted to the home, workplace and public wi-fi hotspots, leaving radio and newspapers as the most ‘mobile’ of the listed services.

A fourth point is the cost and method of charging to the spectator. There are three main categories: free (with and without advertising), charged per match, and charged per season. Live game attendance is mainly bought per season, less so by the game. Television straddles all categories, with free-to-air broadcasts funded by the license payers and advertisers, then pay-per-game and subscription services. Web services are free except for some subscription services, e.g. the UEFA service offering video clips shortly after each ‘Champions League’ match. Extensive advertising is typical on both club and media websites.

Finally, it is interesting to characterise the degree of interactivity in the services listed. Phone-ins and discussion forums are popular components of radio broadcasts and web services. Other services have less capacity, or use for, this ‘back-channel’.
Current mobile services

The services currently available for a mobile phone user, wanting information about football matches (or background news) are listed in Table 2.

<table>
<thead>
<tr>
<th>Service #</th>
<th>A person can get information about football, with a mobile phone, by:</th>
<th>Tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Subscribing to commercial SMS updates for one or more teams</td>
<td>Mobile-SMS</td>
</tr>
<tr>
<td>15</td>
<td>Subscribing to MMS updates for a particular team</td>
<td>Mobile-MMS</td>
</tr>
<tr>
<td>16</td>
<td>Receiving video clips of goals and post-match highlights (via 3G)</td>
<td>Mobile-Highlights</td>
</tr>
<tr>
<td>17</td>
<td>Receive SMS messages (and emails and pictures, on 2.5/3G devices) from fellow (or rival!) fans</td>
<td>Mobile-p2p</td>
</tr>
<tr>
<td>18</td>
<td>Use WAP or (mobile-compliant) HTTP to browse sports websites</td>
<td>Mobile-Internet</td>
</tr>
</tbody>
</table>

Table 2: List of mobile technology services people can use to get football information.

SMS (Short Message Service) Alerts (Service 14) send to the user the score (and scorers) typically at half-time, full-time, and after a goal or missed penalty. Present versions of the MMS (Service 15 – Multimedia Service) for football send (in addition to the SMS text) 3 small images of the goal, or selected moments in the match. The 3G service sends 10-12 second video clip per goal, plus a 60 second highlight package at the end of the match. Service 17 (Mobile Peer-to-peer) applies to user-generated content sent to other users. In general, this content can be voice, voice-mail, Short Text Messages, or pictures and video send from the ground. Finally, standard internet services may be accessed with mobile technology, e.g. WAP or mobile-compliant HTTP web-sites allow access to sports web portals.

The five properties used to characterise non-mobile services can be applied to the five mobile services listed in Table 2. The following observations can be made. Firstly, all the mobile services have a ‘near-live’ latency: they do not provide a continuous stream of information, but bursts of information as soon as possible after the events. This varies from SMS messages (usually sent about a minute after a goal, and received a minute or more after that) to the 60 second video highlights package, received about 25 minutes after the final whistle. Secondly, the bandwidth of the mobile services is, understandably, more constrained than the previous set of services. Again, this varies from a couple of words (SMS) to 60 seconds of video (3G highlights). All mobile services cost – either by a subscription to the service providers (e.g. SMS vendors) or the de facto cost associated with GPRS connection. The availability of mobile services is dependent on the cellular network coverage (widespread for SMS, MMS and WAP-based services, less so at present for 3G Video-based services); the ownership of handsets, and also the social acceptance of their use in a given environment. Finally, the only mobile service to be interactive is peer-to-peer use, as none of the newsflash-style services have any scope for interactivity.
In Figure 1, all the services enumerated in Tables 1 and 2 are plotted out on a graph, showing their approximate relation to one another in respect of latency (how live is the information?) and bandwidth (how much information is there?). The mobile phone is mainly used for Near-Live newsflash type services. It also used in conjunction with conventional services, e.g. SMS comments to radio services, and live audio feeds, or post-match photos, sent to friends by people attending the match.

**Figure 1:** Two characteristics of both mobile and non-mobile services are their bandwidth and latency (delay): these are (roughly) plotted out for all services. Current mobile services are mostly near-live ‘newsflash’ services; of these, only Highlight service is high bandwidth.

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**New Technology**

There are several key factors that determine the range, richness and performance of services available for the user. These factors are, typically, the resolution and colour depth of the handset display; its processor performance and memory capacity; and the reliability, speed and cost of its connection with the outside world. In this section, we consider the impact of these factors on the football entertainment services described above.

It is widely acknowledged that the emergence of zero-marginal-cost domestic fixed-line internet connections precipitated a landmark change in user-perspectives about internet use. Users were more comfortable browsing the web without being conscious of the cost per minute. Another important change for internet user perspectives is the advent of faster (broadband) connections. This allowed users to experience the richer content associated with higher bandwidth data, e.g. music, video, and animation.

These factors are also present for the mobile network. The two types of cellular network supporting data connections are the 2.5 and 3G networks (GPRS and
UMTS respectively). On both networks, subscription packages are available offering a limited number of Megabytes per month. From the users’ perspective, a key development will be less expensive, un-metered data connections. It is difficult to estimate whether and when this development will occur for cellular networks. However, there may be alternatives. The 802.x Bluetooth and 802.11x Wi-fi standards operate in the unlicensed 2.4 GHz spectrum, and have ranges of between 5 and 250 metres depending on the landscape and other signals present. These may be useful for the mobile user in a number of contexts. For example, two users in the same vicinity can use Bluetooth to share photos via a wireless peer-to-peer connection. Alternatively, many users in the same vicinity can use Wi-fi to access to the internet, via a wireless access point. To date, Wi-fi is not available on the same handset as GSM or UMTS cellular network transceivers; however, the advent of such devices is imminent. Further ahead, other signals may be available to future handsets, e.g. DAB digital radio or digital television broadcasts, if the necessary receiver hardware can be reduced to a portable size.

**New Services**

In this section we consider what new services could be offered to users, firstly with current mobile technology, and secondly with new technology. To structure the discussion, the different scenarios in which the phone could be used to receive information about football are considered in turn. Three scenarios are considered: on the move, at home, and at the stadium.

For the user on the move, their level of attention is the critical factor to determine the appropriate service. For example, audio is appropriate for a car-driver, and visual information is appropriate for a train passenger. Technically, this scenario is the most challenging, as the handset will need to change between base stations and possibly between network types (e.g. 3G and UMTS). The overall service must adapt gracefully to the bandwidth available at the different locations.

For the user at home, the mobile handset may still be the most appropriate medium for learning about football. This may be because of local constraints – the television or radio being used by others, or inappropriate to use at the desired time. Alternatively, the mobile device may be the best source of information available to the user. Goal updates are available on TV, radio and internet, but mobile-highlights include video clips of goals, so this represents premium information unavailable elsewhere at the time. Taking this further, we can posit audio commentary or even live video coverage being available exclusively via mobile handsets. In theory all league matches could be available, rather than the occasional game broadcast on television (usually a maximum of two games across all TV stations are concurrently broadcast). Technically, the same service could be made available over fixed-line broadband internet connections, which would certainly be a more efficient way to communicate the data. Two reasons for limiting the service to mobile networks and handsets are as follows. First, the reduced transmission and display available for the mobile user is less attractive
than TV as a substitute for attendance of the live game (attendance which the governing bodies are keen to preserve). Display on handsets may be considered less of a threat to stadium attendance than display over a broadband connection to a desktop monitor. Second, it may transpire that Digital Rights Management and billing is easier on cellular networks and handsets, than on the internet at large, and arbitrary desktop computers, where the service provider has less control over the storage and copy of the content. Finally, the service provider may estimate that the potential returns are greater for mobile content, where there is a convention of paying for content, than for internet content, where conventionally content is free.

The user at the stadium will obviously be focusing on the match without needing their mobile device. However, there are many peripheral uses of mobile devices at such occasions, not least aiding the typical rendez-vous behaviour before and after the game. For learning about football, we can distinguish between the game being attended, and other concurrent games. For the attended game, information could be made available before, during and after the match, e.g. virtual programmes, referee decisions and match highlights respectively. If this information is exclusively available at the stadium, it could be transmitted via selected base stations only, or (in future) using the wi-fi standard (if take-up of wi-fi compliant phones is sufficient – at present only PDAs have wi-fi tranceivers.) For learning about other concurrent games (a traditional component of the half-time entertainment is P.A. announcements of half-time scores for other matches), from the users’ perspective it should be no different to the services generally available for handsets about those games, e.g. mobile-compliant web-pages containing latest scores, minute-by-minute break-down of information.

One interesting issue is the economic consequences of mobile technology for the football clubs that comprise the leagues. Certainly, mobile services have constituted an additional revenue stream, and the leagues have negotiated collectively to sell the rights to e.g. video clips of goals to a single brand. From the perspective of the general sports fan with an interest in many football clubs, a single brand for all information appears reasonable. However, from the perspective of the supporter of a specific club, it makes more sense for the mobile service to be integrated into the service at the stadium, the programme notes, the internet commentary etc. Those practical considerations that mitigated in favour of collective negotiating with the broadcasters, may no longer be present for the new media.

To conclude this section: we see the major developments in mobile services for sports information as, firstly, the transmission of continuous live information about a match to a mobile handset (Television/radio substitute); secondly, the introduction of local services for people at stadiums that augment existing information services, and finally, more sophisticated peer to peer software and communities that enable mobile users to participate in groups regardless of location.
In the next section, an animation media is described that could be introduced to transmit continuous live information on mobile devices as an alternative or supplement to live audio or video streams. We then present analyses of the media, both in the literature and from our own study groups, before presenting our conclusions.

**Use of animation for match viewing**

A novel form of presenting the state and progress of the match is as a figurative animation as shown by the inset of Figure 3. The animation contains the positions of the players and the ball.

![Figure 2: The animation service aims to inform the mobile user about the positions of ball and players](image)
These positions are automatically estimated using fixed digital cameras positioned around the stadium. The video stream from each camera is processed to find the moving objects observed in its field of view, as indicated in Figure 4 (left). These moving objects are classified into the different players (and referees and ball) on the pitch, and their position on the pitch is estimated. All the information from all the cameras is integrated together, and a final estimate is output as shown in Figure 4 (right). The idea of using video data input to computers to automatically estimate players’ positions was proposed by (Intille, 1995) for American Football, and research has since been undertaken to apply Computer Vision methods to Association Football (Seo, 1997, Bebie, 1998).

There are some limitations to this method of automatically extracting player positions. Principally, the method can only distinguish which team each player is on (or whether they are the referee or linesman). In addition, when players are tightly packed together, their estimated positions will be less accurate. Alternative proposed methods for automatically estimating player positions include RFID chips (Radio Frequency Identification) detected by corner-flag sensors.

In any case, this data can be transmitted in real time over a small bandwidth connection, which presents opportunities for sports viewing over mobile devices. The required bandwidth depends somewhat on the available compression and desired accuracy, but is of the order of 10 kb/s – well inside a GPRS bandwidth limit. In addition, the complexity of the output video stream is far less than the
natural imagery, which is difficult to decompress in real time on mobile phone processors.

In the next Section, we discuss research in the literature on this topic. Then, we describe the results of our user trials with prototypes of this service. Finally we conclude with a summary of our findings.

### Other Research into Football Animation on Mobile Phones

Greger and Eriksson have conducted the *Football Animations for Mobile Phones* study (Greger, 2002). They assert that animations are a cost and bandwidth efficient way to transmit data to an end-user on the mobile network. They designed and executed an experiment to contrast different animations and video codings in terms of their cognitive and emotional effectiveness for watching a football game on the mobile phone. According to the authors, the results suggested that different renderings of the same model produced a significant difference in the users’ understanding and enjoyment of a game. The conclusion is that more advanced renderings might be able to give an individually optimised blend between emotional and cognitive effectiveness. The renderings in Fig. 4 show two ways of showing to the user the positions of the players on the pitch.

![Figure 4: two possible views of the animation, 2d plan view (left) and 3D perspective (right)](image)

First is a 2D ‘plan-view’; second there is a 3D ‘perspective’ view. In the study, 3D perspective animations (similar view to a TV broadcast) achieved higher overall ratings than the 2D plan view animation. Viewers who preferred the 3D perspective view had a higher Sports Spectator Index Score. Viewers who preferred 2D scored higher on football pre-test (rules, tactics and trivia). 8/15 thought that the 3D view was better than reading a newspaper the day after. Most participants were uninterested in the animation service on their mobile phone if that was all they would get. They would be willing to use the service if additional information was made available such as notifications about goals and penalties, results from other games and team information. Those that preferred video to animation had lower football knowledge and thought that animations were best for understanding the game. The analysis also showed that most participants were rather unimpressed with getting football clips presented in this way in their mobile
phones. The average overall impressions were below neutral and on average even one Swedish Krona was too much to pay for the clips. The ranking and the desirability analysis also showed that there was a minority that valued the service far above average.

This study, then, suggested than animations are not sufficient in themselves to be regarded as compelling content by the mobile sports viewer. However, this study did not assess the animation as component of a multimedia package. Some of the comments suggest that the animation may actually be very valuable by making an audio-commentary more understandable, providing a strongly tactical view of the play, and to a limited extent substituting for video when video is not available.

**User Trials of Sports Viewing Application**

Five trial users were selected for participation in a trial of the animation service. Sample data was created and a simple sports viewing application was designed that allowed the users to switch between two recorded matches. The aim of this trial, then, was to characterise the contribution of live animation to the fan’s viewing experience of live football, if any, and as an addition to existing text and audio commentaries. A simple single-group design was used for the trial. The methods for assessing these usability issues are described below.

During the free use session, users were handed the PDA with the application and some simple instructions on its use. The user’s task was to explore and freely use the prototype system until he or she had explored all features and felt fully familiar with them. This meant that in practise the trial user would look at each of the trial sequences, stopping and starting them to compare between them. They would also turn on and off the different channels of multimedia, to compare the effect of different combinations of audio, text and animation. (It was felt that it would be highly artificial to impose a rigid set of detailed selection and viewing tasks – real viewing tasks are driven by a user’s interest in the content, which is difficult to specify a priori as a set of Task Instructions for the user to follow.)

The hypotheses about the kind of contribution to overall user experience that would be made by alternative media were generally confirmed by the test results. It was not expected, however, that the combination of media presented would be perceived as such an incomplete package of services. Although users appreciate the value of animation, it is unclear whether users will adopt the package of services tested here, without many, if not all, of the following additional services: an archive of match highlights; an alert customisation service (any event in any match); statistical information from this and other matches; a view selection service (any zoom, point of view of any object/area of pitch); access from desktop PC as well as mobile device. There was a consensus among the users that audio commentary was an invaluable component to the animation service, although some could foresee occasions in which a muted service would be very useful. The most critical quality of the animation was in the perceived accuracy of the
positions of players and ball. Since the user feels a slight dislocation from the impressions of the game received via video, it is important that the animation model he or she is presented with gives the impression of reliability.

Conclusions

An analysis of conventional and mobile services for football information demonstrated that nearly all mobile services are for the ‘near-live’ bracket, i.e. during or immediately after the game. At present there are no continuous live services, nor are there services designed to retrieve archive football information (more than a week old). This is explained by the mode of use of mobiles, typically used for short bursts of communication, as the user is constrained by cost, user interface, circumstance, and available alternatives. As technology changes these constraints will lessen; already premium content such as premiership goals is exclusively available on phones. As bandwidth affordability of data improve, more services can offer the user a continuous information services such as match-by-match commentary and web services for goal and team information. There is scope for mobile technology inside the stadium as well as outside: if handsets can receive unlicensed connections such as 802.11x standard, then the handset has the potential to become the standard interface between football club and supporter. Outside the stadium, we show how bandwidth constraints encourage new forms of media, such as animation of the game, and describe a system for presenting this information to the mobile user. User trials of this animation suggested that, while not sufficient by itself to replace convention football information services, it may form an invaluable component of an integrated mobile sports viewing package.

References


Designing an Auditory W-LAN based Game

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Abstract:
This paper is based on a thesis written by the five students above from the department Design, Communication and Media at the IT University of Copenhagen. The aim of this paper is to examine the potential of sound to create new user experiences and alternative modes of interaction. We build our analysis upon the design process of an auditory location-based game we have designed and the different theories in the fields of aesthetics and interaction design our game is affected by. Our main focus is how to create an immersive game universe through the use of sound only. We explore this by using sound as the only parameter in the game. We have constructed a multi-player game that mainly uses sound for interface and creation of atmosphere and suspense. Also, the player is physically present instead of being represented by an avatar. The game is called Dark Circus and is built upon a mobile setup and a multiple speaker system. Dark Circus is intended for playing wherever these are made available. The sound system is based on adaptive audio, designed for a generic context – that is the sounds can be exchanged according to the context for the particular game. Firstly, the paper will address the design of the game, basic technological requirements for implementation and the gameplay. Secondly we will discuss more general aspects of sound and premises for sounds design and how sound effects the user experience.

Keywords:
Location-based gaming, sound design, game design, auditory interfaces, soundscape composition, adaptive sound

Introduction

As the focus in modern computing seems to switch from traditional interfaces towards new ways of comprehending the concept of computers, it seems natural to evoke different approaches to the design of games and interfaces. This switch has been underway from the early nineties when Mark Weiser published his article on the computer for the twenty-first century and introduced the term ubiquitous computing. While virtual reality brings the user into a universe within the computer, ubiquitous – or pervasive – computing brings the computer into the everyday life of the user, in a way that ‘allows the computers themselves to vanish into the background’ (Weiser, 1991, p. 94).
This approach has influenced such different areas as intelligent clothing, coffee machines and surveillance systems and has had a great impact in our approach to the use of technology in general. This paper addresses the design of an auditory location-based game, though the game should be considered as a context for design rather than a goal in itself. The main objective is how to create a complete experience of a universe only by the means of sound, and the game should therefore be looked upon as an experiment more than a product meant for the mass market.

We have created a concept whose predecessor is not as much traditional video games as it is a version of traditional games, embedded in a universe of its own. Whereas a player of a traditional video game is represented as an avatar, a player in our game is physically present. Dark Circus can be related to other location-based games and projects, which for example include Sonic City, made by researchers from Interactive Institute in Gothenburg (Gaye & Jacobs 2003), and Pirates!, made by researchers from Play! Institute in Gothenburg, Sweden (Björk, Falk et al, 2001). Sonic City is like Dark Circus a sound- and location-based experience, but while our project has a gameplay; Sonic City is an audio walk and has an acoustic ecological approach to soundscape. Pirates! is in the other hand a location-based game, but while a major part of Pirates! takes place on the screen of the PDA, we wanted to go further in order to make the computer interface transparent, and thereby make the presence of the player more immediate.

In that sense Dark Circus relates to traditional computer games, location based concepts, play and different forms where sound is included – installations, films, soundscape compositions, etc. Also different theorists from fields of HCI, interaction design, art history and sound art have influenced us in our process. However, the focus in this paper will be on the use of sound and movement as the main elements of the interaction.

### The game

**Introduction**

Dark Circus has resemblance with *Capture the flag* where two teams compete with each other, trying to capture each others flag. Our game is augmented in the way that a system ‘watches’ everything that is happening in the game. This finds expression in the use of an adaptive sound system where the system and the player mutually influence each other. Thus, the player’s movements provide input for the auditory output, and the output influences the player the way the soundtrack in a movie can influence the spectator.

**Initial setting**

The game we have developed takes place in a room like a sports hall or an empty warehouse. The room should be as dark as possible, by which we mean pitch black. A speaker is placed in each corner of the game area.
Each player wears a PDA fitted on the player with a belt. The PDA itself is camouflaged in a small container, allowing the players only to activate the touch screen. The room is provided with W-LAN that keeps track of where the players are according to where the PDA’s are located. The user has an earphone in one ear only. There are two additional PDA’s that represent the flags of each team, those are hidden in two separate briefcases.
The game universe

There are two categories of sound in Dark Circus: Individual sound and global sound. The individual sounds are played through the earphone and are primarily informative such as event sounds related to the individual; are there any flags or players nearby? The global sounds are played through the speakers and create the atmosphere of the game and represent the status in general.

The game universe is abstract. There are no specific stories, periods or historical events attached to the game. The choice of having an abstract game universe is a result of our initial goal, which was to explore the potentials of using sound in interaction design rather than how you tell a story with sound.

Rules

The game consists of the following basic rules:

1. There are two teams, A and B, playing against each other.
2. Each team consists of a minimum of 4 players.
3. The game area is divided in two equals, each belonging to each team.
4. Each team has a flag, which can be moved around.
5. When a player enters the opponent’s half or carries a flag, she becomes an outlaw and is in a position to become frozen.
6. A player can freeze an opponent, if the opponent is an outlaw, by activating the touch screen on the PDA. The opponent has to stop immediately when being touched, so the home player gets a chance to register the action in the system.
7. A player can be de-frozen if a team member comes to rescue her. This is done by de-activating the touch screen on the PDA.
8. A team wins if it brings both flags together on their own half or if all players of the opponent team are frozen.

The rules listed here are by no means final for the game. We have considered many variations that could be taken in with some minimum changes. These are features like additional barriers and dangers, and a no-man’s-land in the centre of the room where all players would be outlaws. The game is also well suited for level design. Various levels could include the assignment of different skills, roles and settings. That would provide increasing challenge and thereby optimize the premises for a greater flow experience.
Technology

The game is based upon the principle that the system continuously registers where each player and both the flags are located, as it keeps track of the PDA’s in the room.

The system registers if a player is close to another player, how close the teams are to complete their missions, how many players are frozen etc. By ‘watching’ these facts it develops the adaptive soundtrack and sends information out to the PDA’s. Those pieces of information set off the global and the individual sounds.

![Figure 3: The input and output of the system in general: The system tracks the players’ movements and sends out sound](image)

For positioning we use a positioning server from Ekahau that has been set up at the IT University of Copenhagen. Although this positioning server is generally accurate, it has a standard precision of 2 meters when tracking the players and uses up to 2 seconds to calculate the position of each PDA. This delay of system updating is not a problem in our game because of the fact that the darkness forces the players move slowly anyway.

After considering different interactive sound system technologies and development kits we chose DirectMusic from Microsoft to build our adaptive soundtrack. It is a versatile tool that is a part of DirectX®, which is made specifically for game development on the Windows platform. We also chose this program because it gave us the opportunity of synchronizing shifts in layering, tempo and harmonics.

The ideal game will have more speakers and possibly stricter requirements on the textures of the walls and floors in the room so that optimal audio positioning and surrounding can be achieved. Also, a complete control of the sonic environment, e.g. reflecting surfaces, external sound sources would be ideal.

Design and preliminary testing

On an early state of developing the game, we tested the gameplay and potential user experiences in different ways. One of the tests took place in a basement where we tried to locate each other and each other’s flag while being blindfolded. One person was still able to see and simulated the system; giving auditory cues
about the flags and the opponent’s location. Also, we had placed a boom box playing ambient music to ascribe to the atmosphere.

Another test we made was taking a walk through town while being blindfolded and only guided by sounds from a person next to us and the auditory environments. Also we played computer games for blind people, such as Pacman Talks (PCS Games, 2002), Shades of Doom (GMA Games, 2001) and Terraformers (Pin Interactive, 2003).1

From these different tests, and an interview with the developer and designer of sound-based games Dan Gärdenfors, we got an idea of what might work and what maybe would not work in an auditory interface/universe. We also got even more convinced that a purely auditory universe can create immense emotional experience comparable to those experienced when watching films and playing traditional video games.

**The intended user experience**

Playing Dark Circus can, like in other multiplayer team based games, evoke different strategies and degrees of teamwork. An example of a simple strategy in a game of Dark Circus with two teams of each four players could be: Two players stay at home and protect the flag. Meanwhile one player goes after the opponent’s flag. The last player might protect the player that is going after the flag. Each player can therefore have several sub-missions like guarding her area in order to freeze outlaws or rescuing a team member by de-freezing her.

As shown in the example, the game can develop in multiple ways, which the global sound should reflect. A very adaptive score would react on every action in the game, for example location-based events, player-state, non-playing characters and objects, and would be able to transition seamlessly on every trigger at any given point of time. Compared to soundtrack in films and dynamic sound and music in computer-games, this is a tricky challenge in our game. In films, the sound and music normally relates to what is happening in the film and that is the same to all spectators. In our game the sound has to make sense for everybody in the room at the same time even though they are experiencing different game situations. Therefore, we can not accentuate one event without consider the effect for the other players.

The global sound consists of three musical states, or levels of intensity, based on global events and individual circumstances, but will practically always exist mixed. The three states are as follows: A *death world* reflecting the number of frozen players, a state of suspense reflecting the threat scenario, and state of

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1 Here we make a distinction from the term *video game* due to the irrelevance of a video display in games for blind.
Sound-based interaction

As mentioned in the introduction, the idea of entirely sound-based games is far from new. But until recently, games using sound as the primarily interface have in most cases been designed for users with a visual disability, or games which are comparable to ‘sound installations’, such as Sonic City. By this we simply mean that sound-installations in most cases aim at giving the user an aesthetic experience rather than a good gaming experience.

Apart from games that remind of art installations, many of the sound-based games seem to be modified versions of already known games. For instance, one of the games Dan Gärdenfors’ has made is actually an auditory version of a classical arcade-style ‘shoot ‘em up’, where the player can move left and right and shoot at monsters, basically like we know it from the classic Spaces Invaders (Taito 1979). From the perspective of gameplay, such games bring forward none or little new, though they might still be entertaining concepts. But as an alternative way of mediating a gaming experience and as game interface they bring forward some interesting perspectives in relation to the creation of completely new auditory games. Studying these games tells us that even with a very simple interface it is possible to create a game world that works. With simple functions and a little practise a person should be able to orientate herself in a purely auditory space.

When experiencing mediated universes and spaces, such as movies on a screen or music on home stereo equipment, it is to a great extent an experience of watching or hearing something from the outside as a spectator. By using a real or emulated 3D environment – in our case a large room with multiple speakers – it is possible to submerge the user in a surrounding auditory virtual space; the game reality.

With the design of a purely auditory interface we try to make excessive use of a part of the human bandwidth, which we normally tend to make less use of – our hearing ability. Unless if we are listening for something specific, our hearing is basically used as a more or less subconscious surveillance system monitoring the surrounding environment. This especially applies to areas we cannot see but still need information from, such as traffic and baby alarms (Wickens, 1998).

It might be hard for first time users of our game to interact and orient themselves in a purely auditory environment without any tutoring. However, studies by Brewster indicate that with simple training users quickly learn how to understand non-speech sounds in unfamiliar environments (Brewster 1998).

It raises a need for an introductory level to be able to successfully introduce the auditory mode of orientation and interaction to the novice, still keeping the number of different sounds at a minimum. At the introductory level our interface is very basic, with only a few auditory elements. Then subsequently more auditory
information is gradually introduced; starting with basic information about presence and distance to other players, then gradually introducing other elements in the auditory universe, e.g. bots, changing textures of the surroundings and an increasing complexity of the adaptive soundtrack. This approach will help unexperienced users orientate themselves in a purely auditory universe.

**Input through movement**

As mentioned earlier, the player interacts with the system by moving around the game area. This means, for instance, that if the player receives auditory information of the approximate location of the flag, by hearing the distant sound of the flag, she will most likely start searching the area to find it. She will have to figure out which direction to move in, in order to get closer to the flag. The closer she gets to the flag, the louder it gets. The same thing will happen if the player gets information of an opponent nearby. Depending on whether she is in her own half of the game area or in the area of the opponents, she can either try to avoid or catch the opponent.

Except from the occasionally activation of the PDA to freeze or de-freeze co-players, moving around the game area is the only input from user to system. In other words, the actions taken by the player resembles the moving of bricks in a board game, but instead of having the player to move bricks, she moves herself around on the ‘game board’. This is a major element of the invisibility of the interface, as the user will not experience the movements as an interaction with or through a computer interface, but rather as a reaction to the environment surrounding her. Thereby we hope to create a more immersive game-experience. This is not a new concept, but since we have placed the player in a dark room which exclude the outside world from the gameplay, the reality in the game is the reality the player experiences and the only thing the player can respond to.

As mentioned above, the player reacts to the game universe, which is formed according to the movements of the players. By doing so an adaptive soundscape is created. As the system is able to tell the difference between teams, status of players and the flags position and from these parameters can change the soundscape, we have created an intelligent soundscape that could not be made by the use of traditional game artefacts such as bells and balls. One could imagine our game played without the system, e.g. people running around with bells on their legs and a tape-recorder in a suitcase playing music to indicate the flags position. In doing so, the rules of the game could be more or less the same, but the experience of the game would be different. By making an adaptive soundscape, we hope to achieve a higher degree of an immersive gameplay, where it is possible to constitute different virtual universes in a physical room. Furthermore, the computer mediated game universe makes it possible to introduce virtual objects, both static and dynamic, such as transformer stations and flying birds, as known from traditional video games and films.
Sound design

According to several music scholars, like Philip Tagg and Richard Middleton, music will always be interpreted in a cultural context but also as gestured and affective patterns where a lot of sound will be perceived universal because it relates to basic corporal movement and behaviour. That means that music is partly something acquired and self-referential, partly something that affects you directly in body and mind (Middleton, 1990 and Tagg, 2002). In our design we have considered how traditional conventions known from music and films influence the spectator by parameters like timbre, loudness and tempo.

As mentioned, we work with two categories of sounds; global and individual. Furthermore, we have divided the sounds into the types of musical and event sounds. The musical sound can be ambient and constitute the game world, but it will also always relate to the game state (death world, suspense and action state). These sounds are all supposed to have a function in the game, so they are at the same time both referential and un-referential.

The individual sounds heard through the earphone inform the player of nearby co-players and flags. We have concentrated mainly on timbre, to find sounds that coheres with the situation it relates to – warm and pleasant sounds to symbolise your team members and the flags, itchy high-pitched sounds for your opponents, and noise when you reach the limits of the game area. Secondly we have worked with pulse and tempo to symbolize the degree of danger. A quick pulse will tell you that you are in danger, whereas a very slow pulse tells you that you are in a frozen state.

For the global sound in the speakers, we also work with timbre and pulse/tempo, but as the sound is composed, it is also important to consider musical processes and parameters such as rhythm, harmonics and the relationship between figure and ground. For example, having undeterminable rhythm and shrilling sounds in contrast with sounds in slow motion and an underlying drone will create an eerie and weird atmosphere and a feeling of an indefinable enlarged space will be created. In that way, unlike most film and game scores, we avoid the question of leit-motifs and melodic themes, but instead try to make sound-textures with specific gestured qualities.

Conclusion

By this project we want to bring focus on the qualities of sound and ways of using sound to create new user experiences and alternative modes of interaction. The reason why we wanted to create a game universe, based upon sound only, was that we found, that the quality of sound is not yet extendedly explored when creating immersive game universes. Most of the games on the market today are based upon graphics. By removing this element, and making a game in a pitch black room, we created a chance to explore the effect of sound thoroughly. We are aware that a
pitch dark room is far away from the reality most people know from their everyday-life. But by forcing people to move around in a totally dark room, we are able to examine sound in a pure form, isolated from its relationship with the visual and thereby investigate sound’s quality as a navigator and abilities to create a virtual universe. This is why we claim this to be more of an experiment, rather than necessarily a well functioning game in the traditional sense.

The atmosphere created in the game affects the way the user acts inside the game, and these actions again affect the output from the system. This relates to the adaptive musical composition, which can create a connection between the immediately sensed and the added soundtrack. Thus, our work has led us to the assumption that sound can be used to create an enhanced and more immersive interaction and user-centred experience in many aspects of the entertainment industry. Sound has a transient and manageable form, and is a well suited tool for modifying existing elements, such as the experience of the texture of a room. Also, the way we have used sound relates to the users reactions, and via our game we emphasize the relation and co-existence of emotions and reactions. Hence, the connection between the players emotional state and her reactions – and hereby the interaction with the system – is infinitely tied together.

References


C Space an adaptive, user led communication service exploiting the convergence of DVB-T and UMTS in portable devices

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Abstract:
C Space is a proposal for a new communication service using virtual / physical communication environments or 'spaces' accessed using a mobile terminal. The system would provide, through the interaction of avatars and people a service that promotes data exchange in the widest possible sense ranging from conventional digital files (documents, sound, video, animation) to conversation (voice and text). Other aspects of communication such as body language (virtual and physical) and group dynamics (the interaction of large numbers of avatars/people in one place – physical and/or virtual) are also facilitated. This communication takes place within environments that are highly modifiable by users and will scale with the development of new technology, higher bandwidths and better displays. One of the things that differentiates C Space from other network communities is its relationship between the virtual space and physical space, avatars can be located geographically as well as in virtual space. The real world can ‘break into’ the digital spaces, real landmarks can punctuate the virtual landscape, C Spaces can reflect the weather around a user.

C Space exploits the convergence of digital television (DVB-T) and data capable telecommunications (UMTS). DVB-T has very high bandwidth data transfer (including conventional high quality video) but to be effective has to send the same transmission to many people while UMTS has the advantage of offering point-to-point connections but has a lower data rate.

Keywords:
Communication, User-Centred, Adaptive, virtual/physical hybrid, UMTS, DVB-T

C Space in Context

The aim of this paper is to propose a communication structure that is flexible, adaptive and modifiable by the user. The specific nature of this communication will not be determined at the start of the project rather it is intended that it will evolve as the system is used. The structure and the descriptions here are a primer for the development of communication strategies developed by separate groups in ways relevant to them. This is a project rooted in technical possibilities and

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1 C Space was one of service scenarios developed for CISMUNDUS (Convergence of IP-based Services for Mobile Users and Networks in DVB-T and UMTS Systems) an EU project funded through the IST (Innovative Society Technology) initiative.
exploits the telecommunications and broadcast networks available at the present or certainly within the near future.

C Space will offer a physical/virtual space in which the user can express themselves, encouraging them to step into, to be pro-active in and to tailor the space offered conceptually, electronically and virtually. It should invite them to interface with others in a seductive manner, to pull them into this active communication space.

An important aspect of this proposal is a re-appraisal of the relationship between industry (whether couched in terms of designer, engineer or service provider) and the end user. The assertion here is that there are circumstances when its appropriate to create systems in such a way as to facilitate users modifying the systems in ways beyond the control of the systems originators, for designers to provide the catalyst for user activities without pre-determining them.

Deferring a detailed analysis of this position for another time, theoretically this approach is well supported within post-structural philosophy, especially in the works of Deleuze & Guattari (1996), Derrida (1997) and Lyotard (1992) and in the writings of groups such as the situationists. In design studies theoretical designers such as Eisenman, Tschumi and Libskind (Papadakis, 1989) support this position. This is also seen in writers looking more directly at technology by writers like William Mitchell (2003).

This theoretical respectability is reinforced in practice with the proliferation of SMS and more recently MMS communication systems where firstly users spontaneously subverted basic components (punctuation) or acronyms to modify communication systems in ways not controlled or predicted by network operators. This subversion is now being actively encouraged by companies such as Vodaphone in an effort to precipitate a user-led vernacular visual language for picture messaging.

The C Space proposal takes the creation of vernacular, non-verbal forms of communication as the inspiration for the construction of a new communication environment within a larger research project called CISMUNDUS, exploring the possibilities for mobile communication of the co-operation of advanced telecommunications and broadcast TV networks.

**CISMUNDUS**

Convergence of IP-based Services for Mobile Users and Networks in DVB-T and UMTS Systems

It is the convergence of telecommunications, Internet and broadcast technologies in a mobile device that is exploited by the CISMUNDUS project in which the C Space proposal resides. This is a substantial collaborative project between industry and academia with industrial partners; France Telecom R&D, Institut
The aim of the CISMUNDUS project is to show relevant hardware, network and broadcast technologies can work together synergistically in a portable device. This involved the generation of scenarios of potential use and the development testing and demonstration of these fully functional scenarios to the major European companies involved in the commercial application of these technologies.

The scenarios developed as part of the CISMUNDUS project are intended to be adopted, mutated and replicated by other agencies. C Space was published as part of a number of scenarios, but in this instance it was not prototyped in the working test bed, this was partly because it relied on an active constituency, a community using the devices being developed to be demonstrated effectively. There were also the practical considerations; practical demonstrations were geared towards trade shows such as IBC where scenarios have to be communicated very quickly.

The physical device is the size of a large paperback book and has a colour, touch-sensitive screen filling one of the large sides. The heart of this device will be two processing units, one standard low power consumption processor, the other is a Tri-Media chip that has been specifically developed by Philips to process sound, image and video in a very efficient manner. This will have the capability to show broadcast quality video whilst undertaking other computational tasks.

The device will be capable of accessing interactive television signals (DVB-T signals broadcast from terrestrial transmitters - as seen in the BBCs Freeview service). In addition to offering very high quality in terms of sound and vision, each DVB-T channel takes up a small fraction of the available broadcast spectrum required by analogue television. This allows many more digital channels than are available with analogue television. This system also has the ability to broadcast data (loosely the sort of information one might store on a CD ROM or online). This data can either take the place of the sound and image of the conventionally broadcast TV channel or the data can be broadcast ‘on the side’ of a channel, operating as a very high bandwidth sophisticated, teletext service.

The broadcast network (DVB-T) transmits the same information to many people, this could be a whole region, a city or in circumstances that are more exceptional a local transmitter could broadcast to a small area such as a stadium or airport, the smaller the number of people broadcast to the less cost effective the broadcast. This one-to-many network is complimented by a point-to-point telecommunications network, this is most efficient for sending information to a single user, this will use UMTS (Universal Mobile Telecommunications System) technology although much of the developmental work has to be completed on GPRS (General Packet Radio System) test beds to circumvent restrictions on UMTS for data transfer in some EU countries. Both protocols allow the transfer
of data to specific terminals and allow the user to send data from their device to others.

**C Space**

C Space is designed to exploit the technical possibilities of the framework developed by the CISMUNDUS project. The ‘C’ in C Space represents both community and communication and plays between these two meanings. Space here denotes both virtual and physical space; there is activity in both electronic and in physical space. It also indicates conceptual space; a space left in the process of creation for the user to exploit, without the occupation of this creative space the system cannot function.

The system described here exists within a practical context of multimedia design as well as the academic and theoretical contexts described above, this includes previous research concerning negotiated Iconic communication (Cruickshank & Hughes, Cruickshank & Barfield), it also owes a debt to text MUDs and MUSHs and latterly visual online spaces such as www.helpgame.org and virtual worlds. Within the telecommunications field FLIRT (Flexible Information and Recreation for mobile Users) a joint project between Philips Research and the Royal College of Art exploring the potential of WAP phones was influential (Raby 2000).

C Space differs from these; here it is the user that is in control of the deployment of a distributed flexible system and the patterns of use and operational structure of this system. The C Space system uses a series of virtual structures accessed through a mobile terminal. There are a number of projected configurations of how these spaces may function. The system provides, through the interaction of avatars and people an environment that promotes data exchange. This exchange occurs in the widest possible sense ranging from conventional digital files (documents, sound, video, animation) to conversation (voice and text) to less easy to define aspects of communication like body language (virtual and physical), group dynamics (the interaction of large numbers of avatars / people in one place). This takes place within a digital/physical hybrid environment designed to be scaleable with the development of new technology, higher bandwidths, better displays and so on.

**Populating C Space**

On their own, the spaces described here are simply empty vessels; populating these, spaces are a number of different elements (fig. 1).

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2 MUSH was originally conceived of a less geeky name for MUDs (Multi User Dungeon) the first of these types of environments, subsequently MUSH has been expanded into the acronym Multi-User Shared Hallucination.
The most important element within C Space is the avatars of the people using the system. These avatars can be illustrations / graphic images but also photographs, three-dimensional objects even a three dimensional animations. The user sees this avatar in the centre of their device window and moves through space by directing this, the avatar remains at the centre of the window with C Space moving in relation to this (fig. 2, overleaf)

Avatars can undertake a wide range of activities from talking (voice or text) to other avatars to picking up or dropping data and links. Avatars leave footprints as they move through the spaces that dissolve over time. This ‘bread-crumbing’ helps people to find each other in C space. Another element populating the areas will be data, this could be text, MP3 film clips or images, and the volume and accessibility of this information is dependent on the infrastructure and resources devoted to this aspect of the system.

Figure 1: Some of the components that could populate a C Space

Figure 2: Prototype C Space Interface
In addition to data existing in the space - available to everyone in the space there will also be links to other information and other spaces. The links to information could be to a web site or be a peer-to-peer file transfer these files could be placed within conventional web server or exist on CISMUNDUS terminals. Access to the links could be open, restricted by profile (for example age, by subscription or favourite band) or be limited to a specific person or persons, for example the avatars on screen at that moment.

There could also be links to other spaces (with the relevant gate-keepers). This could be a URL-type link but it would be more stimulating for there to be a window through which avatars and the people controlling them could see through into the other space and the activity within the local area on the other side.

![Figure 3: One example of potential spatial complexities of C Space](image)

This environment is not a single, one-size-fits-all monolithic entity that is hoping to please everyone, a multitude of ‘spaces’ that work in different ways (fig. 3), with different pre-conditions of use and with different relationships between the physical and virtual components of the space. Looking more closely at these, inter-relationships there are a number of predicted configurations.

**Stationary common geography**

This is a virtual space that maps to a discreet fixed physical location, to access the virtual space you must be inside a specified geographical area, this could be at its smallest a half kilometre square area up to many kilometres determined by UMTS cells. For example, one scenario below discusses the use of a space that covers the tracks and station of the mainline train station from London to Oxford; this could just as easily be a shopping centre or a village.

C Space offers the potential for reality to ‘show through’ into the digital space and the digital into the real world. Landmarks, physical features, contours and rivers
could punctuate the virtual map in addition to myths, archaeology and memories (fig. 4 explores this more fully). It is a space that people live or work in or a space that they travel through, this space is exploring the potential resonances between physical and virtual meeting, passing the environment of developing a physical/virtual community. The physical nature of this experience raises issues not normally associated with virtual communication. One is not in a diffused, anonymous environment in terms of ethics and social interaction, you would not want to talk to just anyone and would not occupy the often aggressive stance occupied by many people in a chat situation on-line.

![Figure 4: Some possible relationships between C Space and the physical worlds](image)

**Geographically remote**

This is a local geographically fixed space (virtually and physically) which people in other locations can tap into, the obvious application of this would be a person who wanted to keep in touch with their community when they moved away from their physical location. It could also be the case that someone wants to acquaint them with a new environment or just expand their area of communication. This link does not have to be between space and a single individual, a group could go on an exploration or space-linking could occur in the same way that towns are twinned.
Geographically mobile

This is a virtual area, a C Space that moves through physical space. A train, bus or even some other utility vehicle like a milk float could be the instrument for this movement. This space or structure is exploiting transition, it has people passing through the sphere of influence of the space and has the space passing through their sphere of influence, users experience of this space is transitory, both physical and virtual spaces are changing with the movement of the space. These mobile spaces can also be nested inside other virtual spaces as fig. 5 (overleaf) shows a situation in which a micro-broadcast is mobile within a c space, avatars can sign up to this content, jumping onto this broadcast, that may be for instance someone streaming a web cam view of a bus ride. The virtual movement of the broadcast reflects the movement of the real buss between different UMTS / GPRS calls, users jumping out of the stream return to different part of C Space as the bus continues its virtual / physical movement.

![Figure 4: Mobile micro-broadcast within C Spaces](image)

This space does not relate to a physical location, it operates in a similar way to conventional chat rooms and virtual online environments. There are some intriguing possibilities when such a system starts to interface with the other spaces and operations available in addition to this these distributed systems are popular and should be included in the possibilities offered; indeed the ideal would be if all possibilities were on offer.

The modes of operation outlined here are modifiable in a number of different ways. Generally, spaces can have different layers (in effect sub-spaces). These
can have restricted access, be moderated have different characteristics in terms of data capacity, response time, links to other places, topics of conversation and so on.

**Technology**

C Space broadcasts the data rich environment (and constantly updates it) to many people using DVB-T. Feedback and communication from the mobile terminal will be handled by UMTS, as the user moves their avatar UMTS will be used to tell the broadcaster (actually a multiplexer) to move the avatar, this updated C Space is then re-broadcast and the avatar moves.

There will be situations where the changes to C Space are very small or the constituency (the number of people in the space) will be too small to make it worth updating the whole space centrally, the amount of data that needs to be changed for each user could be very small. In this case, the system would automatically (and seamlessly) use the UMTS network to update the spaces. The automatic switching between broadcast and telecommunications systems to dynamically find the most efficient way to service the users is a major objective of the CISMUNDUS project as a whole.

**Commuter scenario**

Developed as part of the deliverables for the CISMUNDUS project this describes a fixed geographical network covering the length of the train line from London Paddington to Oxford.

Tony splits his working time between his home near Oxford and the publishing house he works for in Soho as he leaves his house he picks up his (CISMUNDUS) terminal. This handy book sized device stores all the information he needs to take to work with him, has also downloaded his daily newspaper, and a magazine to which he has subscribed.

At the train station he waits for the 7:42 to Paddington, as he mooches around the platform he switches on his terminal and watches the early morning news, after checking the local weather he decides to see if he can find out where his train is and have a chat to some people, he knows on it. Selecting the C Space option on his terminal, he selects Train from the range of Spaces available to him.

His avatar appears in the space, he sees that there are a few people around so he goes in search of his mates on the train. Following a foot trail he tracks down someone he does not know. He strikes up a conversation, ‘Silver Surfer’ is on a platform much further into London, she does not know what’s going on either but is glad to know that her train has just left Tony’s station.
Tony decides to drop a voice link accessible to the 6/7 people he regularly talks to on his train, this dropped he continues looking around, he soon comes across Spider, although they have never met Tony and Spider often talk in this space, he tells Tony that his train is on the way and has just left Iver. They decide while waiting to follow a link to a web site they have discovered, they explore the site for a while continuing their conversation as they play online crazy golf together.

Tony receives a voice call; someone has activated the voice link he left. Its Tracy, she tried to keep Tony a seat but the train is crowded, she also says that she has something for him, moving back to the voice link Tony left he sees Tracy’s avatar. Tracy hands him an MP3 file of the recital she performed in last night, I know you would have liked to have come so I thought you would like this. Tony does not like classical music but thanks her nevertheless.

As his train arrives, he sees there is a seat next to Sanjit, he recognizes Tony and activates his terminal, and for the rest of the journey an animated conversation ensues with a combination of C Space and physical space as Sanjit, Tony and Tracy swap information gossip and data.

This is the scenario published in the work-package document for the CISMUNDUS submission. Beyond this, the system can branch out in a multitude of different uses and applications. The following describes a personal slice through the unconstrained possibilities of the system. These further developments are not examples of best practice or an ideal rather these suggestions are to provoke your imagination.

**Business use**

With the basic details of the operation of the C Space system established, the second scenario develops and extends the proposed system. The scenario concerns a stockbroker working in London. It exploits the focused geographical distribution like-minded financial workers, with high disposable incomes, an easy engagement with technology with an accompanying digital friendly infrastructure. The early adoption of new communication technologies such as Blackberry (www.blackberry.net/) a business only mobile device for reading e mail in a precursor to domestically available GPRS service is evidence of the feasibility of this proposal.

The system is geographically located in the notional ‘square mile’ of London’s financial district and surrounding environs with a very high quality provision, accompanied by subsidiary provision along the major lines of communication although in terms of live DVB-T broadcast the underground presents an intractable problem. UMTS cell update at stations is a possible compromise position although C Space is not the only activity available with this terminal; this could be time to catch up on the journal downloaded to the terminal or play space-invaders.
C Space offers a graphic environment in which large amounts of data is deposited, distributed and retrieved. Spaces can be open to all, moderated or highly protected. Within the spaces, the normal open mode would allow people to mingle, chat, exchange information with many different people. There could also be the facility for less public or indeed highly confidential communication through the creation of a b(h)ubble space. In the creation of this the C space in which a number of people are occupying wraps around them to form a self sealing bubble of space completely isolated from the starting space so protecting (for a fee) the information (voice, text, file &) exchange within the bubble. The exit ‘unwrapping’ of the b(h)ubble does not have to take the people inside the bubble into their initial starting plane of C Space; it could open into another plane entirely (fig. 7).

Personal security of data is also an issue. As an avatar moves thorough C Space it is likely that some people will want to receive, information updated second-by-second information but not shared by all. This could include ‘texts’, the receiving of e-mails, stock prices or other time sensitive information. The developmental work in fig. 8 describes a range of strategies for the display of sensitive information in C Space.
Similarly, this developmental work describes the relationships between spaces and
the possibilities of moving between spaces and a range of different possible
applications of C Space. It seems appropriate to present these further ideas in an
open, discursive, ambiguous manner rather than a specific, deterministic
taxonomy of ‘good’ applications of this technology.

The space offers novel data services either for common consumption or within the
members of an institution or individually.

In conclusion, this paper describes a series of proposals that are more provocative
than definitive. Mirroring their aims if they were implemented the desire here is
not to provide a rigid model of this system but to allow the user to dictate the
forms of C Space applicable to them and to enable them to use such spaces in
ways that are not predicted of controlled by the system provider.
References


A Content Personalization Engine for Mobile Device Games

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Abstract:
In personal computer (PC) applications it is quite usual that applications provide the possibility to change their appearances (or skins as it’s commonly called). Even full operating systems (such as MS-Window, MacOS and Linux) offer different skins or, as they are more popularity known, themes. A skin usually defines the application appearance, including bitmaps, icons, organization, animation, menus, sounds, characters, etc. It also defines the way that the user will access the application basic functionalities. The ability to change the application appearance allows the user to personalize the application as needed. It is natural that users may want to personalize their environment so that it becomes more attractive and friendly to them, improving productivity or comfort. In the wireless world it is not different. Skins remain a quite interesting possibility, and also important, the skin could be downloaded via the network, what would add value to an application with this feature. Nowadays, people can download ring tones, screensavers, and wallpapers in order to personalize their devices, and these features are a huge success. But there is not much related to personalizing downloaded applications (as games) without having to download a full different version. Many end users would like to download their favorite characters to populate the game for instance. In this paper, the attendees will discuss the problems that need to be faced, as well as the solutions in our implementation of a client/server engine to load and provide themes and skins to wireless games. The games can be personalized by changing their characters, sounds, colors, texts, images, and so on.

Keywords: wireless applications, user interface, personalization, customization, content engine.

Introduction

In personal computer (PC) applications it is quite usual that applications provide the possibility to change their appearances (or skins as it’s commonly called), and most users make use of that functionality. There is now also much research supporting the view that personalisable interfaces and customization is important for acceptance, usability and comprehension (Knight and Munro, 2002).

Nowadays, mobile phones kind of represent part of a user identity, for example, it is common to see people who personalize their cell phones with a different ring tone, or with different colours and screen savers, or other features that reflect what they like. Unfortunately, for security reasons, it is not possible to personalize every mobile phone software as happen in the PC world. But it is possible to personalise a downloaded application such as J2ME (Java 2 Micro Edition) (Sun,
2003b) MIDlets or BREW (Qualcomm, 2003) Applets. For example, a Clock application could allow the user to personalise the application appearance, that is, the clock format, the colours, the time format or even if it’s analogue or digital.

Many of these downloaded applications have entertainment as goal. This is case with games, screensavers, media applications, etc. The mobile phone user forecast for 2001 (Western Europe & USA) was for 50 million data enabled mobile phones users and 8 million of them (16%) were entertainment applications users. In 2005 there are forecast for 240 million data-enabled mobile phone users, with 196 million of them (81%!) being mobile game players [though regular game users are likely to be a smaller percentage than this]. It is a huge growth in data enabled mobile phone penetration but an even more significant growth in the number of users who are predicted to be mobile game players. The mobile entertainment revenues in Europe in 2001 are forecast for 1.7 billion Euros growing to 15.4 billion Euros in 2005. In 2005 mobile games are forecast to be 52% of the 15.4 billion Euros – 8 billion (Miao, 2003 and IDSA, 2003). That is, entertainment applications have become a good business. Adding to these applications the personalisation feature will expand even more their market value.

Another argument in favour of customisation is, as pointed by (Dubuis, 1996), the importance of the ‘feel’ in user interfaces (UI) ‘look and feel’ and how widget placement and distinction can improve user interaction. Design issues for mobile device software have different requirements than their PC counterparts (Landay and Kaufmann, 1993), but we believe that as any other platform until now, personalisation will also be of great interest/necessity for the users, specially as device capacity grows.

One way used to provide such personalisation is by developing different versions of the same application, for example, the application designer could release two versions of the same media player application, each one with a different appearance. The user would access the web site and would download the version he likes the most. In spite of this being a simple solution, in the users perspective, it is not a good one because the whole application must be downloaded again, consuming more time and more money from the end user.

Other alternative way that can be used to personalise these applications is to make available only the personalisation content. The user could download the application and when necessary, download only the personalisation content to give a new skin to the application. A skin represents some aspects of an application such as bitmaps, labels, fonts type/size, window layout, sound, the way to access some functionalities, etc. PC applications such as media players and operating systems usually provide this feature.

As pointed by (Persson et al., 2001) when analysing mobile messaging systems, even simple text messages and crude animations combine well to produce surprisingly expressive results. That is, even simple elements, if left to the user
interaction can have a great result. And that can be improved with more user freedom to customise messages/applications and insert some sort of self representations.

From end users view point, the last approach presented (that has more elements of control over the application), is much more interesting also because the content that is downloaded would be smaller, thus saving time, money and memory space on the handset. Moreover, this idea can be extended to other features of the games as the release of new game levels or stages. For example, in a Rally game like the one described in (Karlsson et al., 2003), one could make available different stages of the same game as a ‘Swamp Track’ or ‘City Streets Track’. Since the core properties of the game stay the same, the game designer could publish new stages to the end users that when executing the application would need only download the new track data. And this feature could even be improved to allow users to submit their own tracks to a central server, creating a user community around the game.

This paper presents an alternative way to provide the personalization feature in mobile entertainment applications using the last presented approach. This work is based in a project by Informatics Centre (CIn) of the Pernambuco Federal University (UFPE) and the Recife Center for Advanced Studies and Systems (C.E.S.A.R), both conducting research related on mobile games to foment the wireless market.

This document will present the problems associated with the mobile entertainment applications personalisation followed for the framework developed to support such feature. Afterwards, the research results will be described and a conclusion presented.

**Problems associated with the personalization**

There are some problems associated with the personalization of mobile applications. Many of these problems are related to the restrictions found in wireless environments, such as: processing power, memory size, colour number, display size, alphanumeric keyboard, wireless network speed, and security. The technology used in the applications development also presents some restrictions that must be taken into consideration.

How to find out which functionalities or information should be personalisable by the user? What would be useful to personalise? In order to create and use rich custom appearances, designers are often forced to introduce an unnatural gap into the design process. For example, a designer creating a skin for a music player must separately specify the appearance of the elements in the music player skin and the mapping between these visual elements and the functionality provided by the music player (Fogarty *et al.*, 2002). This gap between appearance and
semantic meaning creates a number of problems and is even worse on mobile devices.

One of the first problems is in the analysis of what should be personalised on the application. So, it is necessary to know both features and restrictions of the target device where the application will run, as well as the technology used in the implementation. For example using J2ME MIDP (Mobile Information Device Profile), the downloaded content size should not be bigger than 15k bytes, because the read/write process in the RMS (Record Management System) - system used to store persistent data - in most current devices isn’t very fast; and also, big frequent writes can cause data corruption. The challenge is than to choose which features are more interesting to make customisable for end users taking into account the restrictions in the technology and in the mobile device.

Another critical problem is the definition of how to represent the content data that will be supported by the application. Today, a technology well known to represent hierarchical data structure exchange is the XML (eXtensible Markup Language) (W3C, 1998) format, but in mobile environments as mobile phones and similar devices, the use of this technology is still not a good choice because the XML parser requires too much memory and processing. It is necessary to find an alternative way to represent these data.

A way to provide personalization

To provide a easier way to personalise the application, a framework called Content Engine was proposed. This framework (Figure 1) represents an client-server application where the client side corresponds to end user application that can be downloaded from a website (or via the carrier network) and the server side corresponding to the application content that can be downloaded to personalize the application upon the user request.

The main function of the server side is to store and list all contents available for the personalisation of the application. For example, these contents can represent the colours and image set used in an application; and by accessing this list, the end user can decide what content will be used in the downloaded application.

The client side has the role of decoding the server data and doing the actual personalisation of the application according to it. In the next sections, each part this framework will be explained in more detail.
Development framework

At the beginning of the project, the first challenge was to design a data type that could be used to represent the content data, as for example, colours, images and sounds used to personalize the application. This data type should be able to represent a set of different data types as characters, integers, bytes, float, strings, images, sounds, and text in the target language used in the wireless application development.

For this, the Content structure was designed. This structure represents any data type as a byte, an image, or a string and could be classified as simple or complex content. When a Content is a simple Content, it must contain only the information of data type and its respective value. The data type can be a long, a byte, an integer, an image, a Boolean, a short, a string, a byte array or a character. The value field has the data value, for example, if the simple Content has a string data type its value could be the string ‘Mobile Entertainment’.

When the Content struct is classified as complex it means that this structure contains children structures. In this situation some additional information must be provided as how many children it contains. For example, to represent a skin in a media player application, Content is classified as complex and should have several simple Content fields with the information of images and colours used on the application including how may children it contains. Using the XML notation the Content structure can be explained as in Table 1.
```xml
<!-- Represents the data identifier -->
<ElementType name = 'ID' 
    content = 'eltOnly'
    dt:type = 'number'>
</ElementType>

<!-- Represents the data type -->
<ElementType name = 'Type'
    content = 'eltOnly'
    dt:type = 'string'>
</ElementType>

<ElementType name = 'Content'
    content = 'mixed'
    dt:type = 'number'>
    <element type = 'ContentField'
        minOccurs = '1'
        maxOccurs = '*'>
    </element>
</ElementType>

<ElementType name = 'ID'
    content = 'mixed'
    dt:type = 'number'>
    <element type = 'ContentField'
        minOccurs = '1'
        maxOccurs = '*'>
    </element>
</ElementType>
```
Table 1: Content structure in XML notation

In Table 1 a Content is composed of at least one Content structure. A Content structure has an identifier, an associated data type and has or has not a value. After the Content structure was designed, a set of classes was implemented to represent it in the server and client sides of the mobile application.

The client side

The framework client side is composed of a set of classes responsible for loading, adding and removing content on the mobile phone. Although, the main function of these classes is to decode the content data to the application according to the implementation language used, for example, if the application was implemented using the J2ME (Java 2 Micro Edition), theses classes must decode the content data in Java objects that will be used in the application. An important point to explain is that the data semantics is given for the application not for framework. For example, in a game content there could be a Content representing a game character with the information power, speed, image, life, etc. The application shall be responsible for interpreting this data.

In the current version, the framework client side was implemented using J2ME. In the J2ME world the skins are a quite interesting possibility since they allow the user to personalise its application, and most important, the skin would be downloaded via the network, what will add value to an application with this
feature since most carriers charge per bytes transferred or by time spent connected. Standard MIDP already defines a record management system (RMS), where the themes/skins can be stored in the handset; and a network API, to provide basic functionalities to download them.

A simplified classes diagram is shown in (Figure 2). In this diagram, there are the classes Content, ComplexContent and SimpleContent that represent a complex content or a simple content respectively. The class ContentEngine is responsible for decoding the content data and add them as application persistence data. In J2ME, this persistence is given using the RMS (Record Management System). The framework reads the content data, adds it to a record in the RMS and when requested by application decode that data in Java objects used by application. For each content at least one different RMS record is created.

Every application that provides the personalization feature must contain theses classes to decode the content data. Other properties added to client side were the capability to connect with the server side and verify the available contents to download.
As mentioned previously, the server’s main functionality is to make available the contents associated with a respective application that can be downloaded by the end user. These contents are searched from a database and formatted using the standard established in the `Content` struct. This data is transformed in a byte array and sent over the network to the user handset.

A communication protocol was also designed to provide the services of downloading a content, listing the available contents, doing the content preview and an API to upload a new content.
The server was implemented using J2EE (Java 2 Enterprise Edition) (Sun, 2003a) and its initial implementation had JBoss (JBoss, 2003) as application and web server. The current implementation is a simplified one not suitable for a production environment due to some restrictions in its implementation of user authentication and the relationship with the carriers billing systems.

Utilities tools
Thinking about the application graphical designers, a tool to facilitate the content creation was developed. With this tool the designer is able to design visually the content, adding each content field and filling its contents without typing any line of code. Called Content Editor, this tool generates binary files that represent the content to be used with the application. Although such a tool is of great help when creating a new content, when one needs to constantly update a Content content, the use of a visual and manual tool can prove to be a great hassle; thinking about this situation another tool was developed that converts a XML representation of a Content into binary content ready to be used by an application.

Results
The framework has been used in about 15 wireless applications where 13 of them are entertainment applications (such as electronic games). These applications were developed using J2ME and for different handsets from various manufactures. The aspect most used in personalizing the applications has been the use of skins. Generally, the skins contain information about the colours used on the main screens as well as all images of the application. In some games the contents also made it possible to customize the number of shots a player has, the player maximum speed, background, foreground, game objects, back-history and even the enemies. These aspects have added value to the games as they provide the end user with a choice for the his most wanted skin, and moreover provide new challenges to the game players when these aspects are related with the game levels themselves.

For example, in a game similar to the TicTacToe puzzle it is possible to choose the player and opponent by selecting available characters of the current theme, and also, select who starts the game, the background and the opponent level. The current theme is selected from a list of theme options. This list contains some default themes and other downloaded. The application includes an option to download new themes from the server.

Another example is a game similar to Atlantis, a classic of the Atari era, where the player had to shoot the passing planes trying to avoid the destruction of the lost city. A new game was developed with the same basic mechanism but with the plot happening in Stalingrado during the Second World War. This very game, using a content change could be transformed in a medieval fantasy game where the player needs to fight dragons in order to save its city (as seen in Figure 3).
Conclusions

As shown, the use of personalization in applications is getting more and more common and necessary, and it is a highly attractive feature to end users. Consider the growth in the number of cell phone users; these users are potential wireless application users, that will have a device capable of being connected via network 24 hours a day. These two factors together, can lead to a huge set of options that will improve carrier revenue due to network usage and improve user interest as highly configurable applications become available.

Because of this perspective regarding personalizable applications for wireless devices, this paper focused on a framework capable of implementing this ‘customization’ in a way interesting to both end users and carriers and also coping with the few resources available in the handsets (low memory and processing power, small screen, etc.).

The presented framework is generic enough to be used in the development of several kinds of applications, from digital games to calendars and schedulers. The framework is formed by a content Server, a Server Access API, a content translator, a client content engine and a hierarchical data representation scheme (either in XML or as binary data). The server is responsible for storing the themes/skins/contents and making them available via HTTP/TCP/IP. The access API, responsible for providing access to the Server allowing the request of a specific content. The translator, for encoding and decoding the content for transmission. The client engine is responsible for the interface between the server and the target application. These components coupled with the content structure can handle any kind of data supported by J2ME, thus allowing for a good level of complexity in composing customizable content for applications.

Several applications and games were developed for different wireless devices using the present work with little change. With the download of new contents/skins it was possible to improve user experience interacting with the applications allowing the user to feel more comfortable using them, to put something of the user into the application changing it into a unique piece of software or even enhancing the application functionality.
This work shows that it is possible to personalize different applications using different approaches, even in restricted environments such as cell phones that support J2ME getting very good results that are interesting for the users but also for device manufactures and for cellular network carriers.

The ongoing work now is to integrate the framework with billing systems and to change applications to make use of uploading content and not only downloading.

**References**


The Future of Ubiquitous Gaming

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Abstract:
This paper explores new scenarios ubiquitous gaming, illustrating research into new experience models and new forms of content for convergent media with particular focus on contexts of leisure and learning. These new scenarios anticipate how mobile phones as personal interfaces interconnected with other surrounding platforms (e.g. i-TV, PCs, PDAs, in-car-navigators, smart-house appliances, etc.) will contribute to create this communication ubiquity. The term Ubiquitous communication doesn’t refer here to the concept of the ‘disappearing computer’, but to a system of pervasive communication without spatial and temporal constraints (Ubiq-ui-ty: presence everywhere or in many places especially simultaneously).

From all the possible interfaces above-mentioned, it is i-TV due to its ‘domestic’ connotation, which seems to be the more appropriate and plausible ‘ally’ for mobile phones in an optic of ubiquitous gaming.

The paper shows how a relevant field of application for games in this scenario will be related to the creation and sharing by the users of new forms of content. More specifically, to the production and broadcast or narrowcast of multimedia content by the users. This is a fertile area for games that are strongly based on the creativity skills of the players and that pursue learning aims.

Keywords: iTV, Ubiquitous Gaming, UMTS, Handsets, Multi-access

Introduction

The European game industry soon understood as both mobile phones and interactive TV are fertile and promising new platforms for the development of games. Television has had a substantial impact in the way people socialise even beyond the domestic context (Williams, 1992). In recent times, becoming interactive, TV seems to increasingly replace traditional ‘passive’ TV platform through the increase of active participation by the viewers (Lamont, 1999). Interactive television can substantially influence people’s experience of television and their television-related social behaviour. Interactive television gives the newly active viewer the opportunity of extending their use of the television to activities apparently more familiar to the Internet (Steemers, 1998). These activities are a consequence of the enhancement of their communication possibilities enabled by the new media: users can browse information on topics of interest, personalise their viewing choices, play interactive games, carry out e-commerce related activities (shopping, banking, betting, etc.), and play an increasingly active role in broadcast programmes (even to the extent of interacting with other viewers).
However, iTV is a simple amalgamation between the Internet and traditional TV (Allen, 1998). On the contrary, it has its own dynamics and users expect different services and interactivity than from the Internet. As can be seen in Fig. 1, the usage contexts of both media are completely different. Furthermore some recent researches between European iTV users revealed that many of them didn’t have any familiarity with Web based navigation, especially in southern and east European countries (Cereijo, 2003).

![Figure 1: User interface categories](image)

The social and domestic aspects of iTV make it a closer media to the mobile phones than to the internet from the interactive point of view. And this assertion is especially relevant when considering entertainment applications as games (Cereijo, 2003).

**Where iTV and handhelds can intersect**

There are still some problems that need to be solved in order to improve the diffusion of iTV in Europe (Ergo/Gero, 2001). For example, the existing interface that entrusts all the navigation across a conventional remote control is far from expressing the interactive potentiality of the system (Steemers, 1998). The current remote control limits the interactive experience to only one member of the audience at a time (except in certain games where viewers can now make use of a gamepad).

In the other side, users are becoming more and more nomads spending less time at home and in the office. This implies an increasing need of performing our daily
tasks while on the move (Leed, 1991). This fact makes useful the need of a new sort of more accessible portable interface that allows the users to have access to the information for work, leisure or any other purpose, at any time and in any place. Furthermore, in order to optimize the usability of the interaction, this interface should be able to dialogue with other eventual more ‘practicable’ interfaces available (e. g. with the bigger screen). For example, in the specific case of games, a TV screen creates a more immersive scenario than a mobile phone display (Kneale, 1999), therefore, this hypothetic interface would enable users to navigate in the TV screen of public spaces. A good example of this is the WaterWar.TV: it is a multi-player action game played on television via mobile phones, where two teams compete via SMS to dominate the game area. It enables users to experience a widely featured, challenging and addictive game using simple everyday technology. This game for up to 30 players at a time is an excellent example of interactive television supported by SMS-technology with no display-technical constraints limiting the amount of SMS traffic. The game involves a clear business model, where as the TV-chat integrated into the concept strengthens the community aspect of the game.1

The mobile phone seems to accomplish successfully with all this requirements, becoming a successful substitute of the TV remote control. Thus this is a reasonable premise to suggest that iTV and mobile devices could make a good team in a ubiquitous gaming scenario (Cereijo, 2001).

The incoming third generation scenario, where UMTS technologies is making possible the merge of different media (Internet, Mobile Internet, iTV and smart-home). In this new environment it will be possible to choose the most appropriate interface according to the specific context or affective conditions of the user (mobile phone, iTV, PC, etc.) to interact with the information (Bergman, 2000), with the digital world (Castells, 1997). In this ubiquitous communication scenario, users will be able to exchange almost any kind of information with anyone else and with their preferred interface, in any place and at any time (Burkhardt, 2002).

It is clear how this enhanced interactive scenario will mean an overcoming of the customary barriers of domestic leisure towards more ubiquitous entertainment contexts. Communication capabilities can extend media consumption to a shared communal experience, or the device itself can act as a time and location independent media consumption terminal. However, do the actual capabilities of the devices and the usage patterns and expectations of consumers challenge the proposed ideas of active and always-willing broadcast consumption?2

1 www.waterwar.tv
The Future of Ubiquitous Gaming

**Context awareness: users as actors**

Mobile phones are suitable interfaces for contextualized applications, that is, services which are related to the specific context of the user. The term ‘context’ regards the following aspects: the time when the service/information is required (stands for date, actual time, sensorial time (day/night), perceived time - early/late -, occupational time - work/leisure - and so on), the location of the user (whether physical or electronic, refers to the exact position of the user), his/her identity (represents the user’s interests, preferences and knowledge) and the environment in which the interaction is taking place (correlates to the task or activity the user is carrying out, the presence of other users, things etc.). Therefore the delivering of content across handhelds can be correlated to the particular context of the user (Raby, 2000).

This extraordinary feature will provide customized information that can be defined as what the right information in the right place and in the right time (Stanton, 2001). This feature compensates the intrinsic limitations of this small device (screen size, data transmission and processing speed autonomy and memory) if compared to the existing interfaces: TV PDI and PC.

Context awareness applications place users in a new dimension: they are not merely consumers but they start to be considered as actors, who have live in a real context. Contextualized content linking the learning experience to where, when and how it takes place, captures higher levels of user’s attention (Cereijo, 2002). This fact has a high potentiality for games, especially if pursuing a learning scope.

**Ubiquitous production, editing and broad/narrowcasting of multimedia content: users as producers**

It is quite obvious how mobile devices are limited as broadcasting interfaces. As testing with users aged 18-25 in Milan have proven [fig. 2], their small size makes difficult for the user to follow a long video even with the newest multimedia mobile phones.
<table>
<thead>
<tr>
<th>Time (sec)</th>
<th>50</th>
<th>60</th>
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<td>% users</td>
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**Figure 2: lost of concentration for video watching in a 176x208 pixel screen**

However, recent technological developments in handsets have converted them into tools for creation, editing and diffusion of multimedia content. The last mobile phones are endowed with large screen (even more than 208x320 pixels), colour display, photo and video camera, and with functionalities as MMS, video call, image, sound and video editing software [fig. 3].

**Figure 3: multimedia phone**

As an intrinsic characteristic to these interfaces, all these operations can be done in any place, time and environment. This freedom of action for the user can be interpreted as a scenario of ubiquitous multimedia interaction. *Since the earliest days of cinema, artists and technologists have dreamt of a future in which everyone could create and share their vision of the world. With the evolution of ubiquitous mobile networks and the enhanced mobile handset as creative device,*
we are on the cusp of realizing improvisational media fabrics as an active expression in our daily lives.

At the same time, the new nomad generation will benefit from interactive TV systems not only playing an active role in interacting with TV programs. The most challenging aspect of iTV is found in the one-to-one connectivity that the media will enable. This attribute will allow users to become a sort of ‘home-made producers’ of multimedia content. They will be able to create and share their own contents (mainly in multimedia format) and share them with other users. The diffusion of fast wireless data networks raises interesting possibilities for the use of video. Media firms, with their countless hours of programming content, clearly sense opportunities for ‘Ubiquitous TV,’ and yet future demand for traditional mass-media content over personal wireless devices is far from predictable. Even with powerful user profiling and customized programming, there are reasons to believe that ‘personal video’ exchanged between friends, colleagues, and family will be a bigger driver of the technology than ‘TV’ content.

Handhelds will play a crucial role in scenarios of ubiquitous broad and narrowcasting, or better ‘ubiquitous interactive broad and narrowcasting’. Multimedia mobile-phones can be used to create and to receive reality TV programs. Moblogging is a new phenomenon where users can use their mobile phones to send their own multimedia content in form of MMS (e.g. regarding their travels, cooking recipes, etc.) to a broadcaster who will moderate and edit them into a certain program and then deliver it across iTV, mobile phones or Internet. Another feasible scenario is that the user itself can edit the content and narrowcast to specific users. In a third possible scenario users can store their multimedia files in shared repositories and interested users can upload the wanted files from time to time.

At the other end, receivers will be able to reply to the senders with a SMS, Email or messenger across the iTV, Internet of a mobile phone. It will be also possible for viewers to save or send a received video to other users.

In these new scenarios, users are not passive viewers but actors, or better, producers. According to them it is easy to imagine formats for games within the ambit of ‘reality TV’, where users will be able to produce the contents by themselves. Considering Gibson’s concept of cyberspace, as a real nonspace

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world, characterised by the ability for virtual presence of, and interaction between people through ‘icons, waypoints and artificial realities’. This conception of cyberspace is a peculiar urban space (Kneale, 1999), where real experiences and socio-economic conflicts take place (Gibson, 1984). In this new ubiquitous gaming scenario, users will design the elements of the cyberspace (Benedikt, 1991) where the game takes place, being designers and actors at the same time.

This passage from passive viewers to actors, and finally to authors (producers) characterises the iTV social revolution.

**New forms of content**

Digital content will undergo dramatic change in the next ten years. It will evolve from simple authoring, editing, displaying and proofing environments to ‘smart’ content that is interactive, clustered, predictive, contextual and proximity sensitive, and accessible on the move. *Using speech, surround sound and seamless real and synthetic images, it will enable a highly interactive and visual user experience. Today, the interactivity with systems like digital TV and radio or with mobile devices is more about handling files or streaming media, not going much beyond smart menus. In the future, based on digital cross-media platforms, interactivity should be more about the user-control of objects and sequences within the file or content stream*.5

In the next decade, we could envisage an interactive infrastructure where digital content flows from multiple sources, over different pipelines, is created and stored in many formats and data types, is processed, purposed and enriched for different contexts and different audiences and is displayable on a wide range of devices.

Each interface (PC, iTV, mobile phone, PDA, car navigator, etc.) has its own characteristics from both the interactive (screen size, resolution, etc.) and the technical viewpoints (memory, transfer info speed, processing capability, etc). HCI designers, thus, need to know the most suitable service formats and the distinctive interaction patterns for each interface (Weiss, 2002), towards optimising its usability. They are also compelled to preserve the unity of the service they design (e.g. in terms of recognisability by communicating one coherent identity) and, enhance the interoperability of all its features.

Therefore, to be able to express all the potentiality of the new interactive system in this prospected new scenario of ubiquitous communication, and, more specifically in the case of ubiquitous gaming, content will need to evolve towards new forms including virtual objects, multi-user environments and immersive, animated content. It will need to be smart, automated, multi-channel and multi-

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format content, flexible, affective (Picard, 2000), cost-effective and device-independent digital content, context dependent content.

**New research disciplines**

This research represents a multi-disciplinary and cross-disciplinary work. It involves subfields as psychology and sociology for the creation of multiple viewer scenarios, the study of the implications in issues as personalisation (Stroud, 2001), the analysis about users’ new behaviour and needs, gender behaviours, social inclusion and concerns about privacy and security, frustrations, etc.

Another crucial discipline is HCI Design, as it is required a study in the design of the new interfaces with attention to the interaction design aspects rose by device-independent content, with the scope of developing adequate design models (from conception through prototyping to development). This area also explores how immersive and multi-user environments, animated content, intelligent multi-modal interfaces, etc. can be applied in this research (Schneiderman, 1987). Furthermore, designing for multiple platforms involves other crucial HCI issues as the review of the usability and accessibility aspects for input-output devices. It will be crucial to explore the contribution that interactive arts can give to this area.

Education is also a fundamental area, as it is concerned to the exploration of new and relevant learning models, new rich contents and applications, device independent user generated content, smart interactive content, etc.

The technical aspects of the design of a multi-platform broadcasting of interactive multimedia (databases, artificial intelligence, networks, agents, multi-modality, semantic search engines, context awareness technologies, transport systems) require the contribution of Information, media and information Technology.

Special attention must be given to all the aspects related to the copyright, industrial property and other legal issues related to this new content in the hypothesised media.

Finally it is critical to study how the proposed system can be economically sustained.

**Conclusions**

Recent technological developments in handsets transform them into tools for creation, editing and diffusion of personalized and personal multimedia content on a ubiquitous network. It is not difficult to imagine how when these mobile devices intersect with i-TV will contribute to create a scenario of ubiquitous gaming. This new scenario requires change in production processes, creating adequate design to new technological as well as social contexts.
Some of the issues that need to be addressed are: what are the immediate and long term advantages for mobile users and TV viewers of ubiquitous gaming in the future? What are the core issues regarding usability and accessibility for input-output devices to ubiquitous gaming? How will other non-tech users will respond to a new gaming model based on the interaction through the mobile phone and the iTV? What are the interoperability issues that need to be addressed? How can interactive games gain from the application of context awareness to mobile services? What other paradigms exist beyond having contextualized access to information? Will customization become a must? Other related relevant topics may be considered: The right to copyright for everyday media producers. How will users create and share their own content? What does it mean to become a ‘producer’ in a convergent media society? Will research need to focus on interoperability, systems integration, context awareness and affective HCI? What are the challenges for game producers to this new scenario? Most SMS TV functions are for chat purposes only or peer-to-many communication, what new scenarios for SMS applications regarding iTV? What new mobile applications and technology could be developed regarding interaction with iTV? Will a mobile game users community be created? Will this community communicate and exchange content one-to-one? Would content be beyond SMS towards a more rich media? Time shift seems to be a more powerful driver in digital television than interactivity with the programme itself; will it also be important for ubiquitous media?

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‘Be a Freeporter!’: Enabling a Mobile News Publishing Community

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Abstract

The incredible spreading of mobile phones and recently even of camera phones throughout society is preparing a new kind of news publishing culture. It could enable everybody to be a reporter of events as they happen. Events can be recorded and commented on and finally published immediately to a large audience by the witnesses themselves. Such a grassroots news reporting network over everybody’s mobile phones has the potential to dramatically increase the quality and quantity of news-coverage, because:

* **Topicality:** it could make news accessible within a minimal delay in time,
* **Scale:** such a network could contain reports of global interest as well as reports relevant only within certain locations (e.g. a city) and even personal messages (e.g. holiday reports),
* **Objectivity:** it could provide several independent points of view of the same event and
* **Personalisation:** each consumer of these reports could receive a personal newscast, selected from a wide variety of opinions and topics to suit his/her personal interests and taste.

The recent development and the wide adoption of Weblogs confirm the users’ demand for this kind of news publishing and also show interesting paradigms for its technical realisation: social networking and local reputation.

Keywords:

mobile audio Weblog, social networks, local reputation system, peer-to-peer

Introduction

Chances, developments and perspectives for a new kind of journalism

Imagine journalism as a profession not limited to a group of well-trained journalists any more. Information monopolies of repressive regimes and the corporate media would be obsolete. Everyone who wants to publish his or her own newspaper article or radio broadcast goes out on the street and reports about everything interesting going on there. Does that sound too much like future? It should not because this is the way things have been developing in the last years. The Internet is one of the most promising platforms for such newcomers in journalism. Writing and reading in the Internet can be done at low expense, fast,
and from all over the world, encouraging a ‘mass amateurization of publishing’ (Shirky 2002).

An emerging technique of publication on the web is the so-called Weblog, or Blog for short (Tscherteu 2003). These are informal news reports, often only short notes, usually published on private websites. Weblogs have gained special attention recently as Warblogs (http://www.warblogs.cc) and as a form of protest under repressive regimes, e.g. in Iran (Schäfer 2003). Thus Weblogs serve as a network for free and decentralised information. They are said to be an important tool in order to build identity and form the freedom of thought (Tüshaus 2004). The activity in the Weblog scene is already quite high. The Blog tracker Weblogs.com (http://www.weblogs.com) was pinged 5638 times in the time from 4:59:03 PM to 5:59:03 PM on the 1/13/2004 (Weblogs.com news: high water marks). Each ping usually indicates a new entry in a Weblog. Another example for an important meeting point for self-made reporters in the Internet is Indymedia (http://www.indymedia.org). It is a network of volunteer, non-professional journalists who are seeking an independent way of publishing as a counterbalance to commercial press coverage, originating in the trade protests of the late 1990s (Beckerman 2003).

The Internet is already playing an important role as a source for news, a fact confirmed by surveys: ‘[...] from a structural point of view, [...] consuming online news has grown and will continue to do so. The Internet will definitely become a major news medium of the future.’ (Nguyen 2003). The New York Times says that about one fifth of the young adults in America think of and use the Internet as a top source for news, especially for the presidential campaign (Pew Research Center, 2004).

**Flash Mobs**

Possibilities of the Internet and modern mobile technology are not limited to news publishing. Publications are even used as preparations and starting points for activism. Thus they also bring up new kinds of social grouping. A peculiar form of this are Flash Mobs which are part of Rheingold’s theory of Smart Mobs (2002). This method of spontaneously gathering hundreds, thousands, or even more people in order to do some action together can be viewed primarily as fun. A prominent Flash Mob took place in the luxurious Hyatt Hotel in Manhattan in the summer of 2003 (Sixtus 2003). 250 people were activated by email, came to the hotel and stood up at the balustrade on the first floor. All of a sudden they started applauding and kept doing so for 15 seconds and then immediately left the hotel to spread out in all directions – just as unexpectedly as they had been gathering. People participate in Flash Mobs voluntarily for a collective motivation which makes them come together even if they have never met before and might not meet again afterwards.

Though Flash Mobs are usually harmless non-political actions, the potential of these crowds goes way beyond fun activities, as history has shown in the Filipino
capital (Rafael 2003). The Filipino people, it seems, have their own way of political problem-solving. Already twice a political leader in Manila were overthrown by big crowds forming large demonstrations. What is so special about the case of President Estrada’s downfall in 2001, though, is the way in which protests were organised – with mobile phones and SMS. Each user who received a message about the demonstrations quickly forwarded the information to others, thus acting like a broadcasting station. This made the messages spread easily and quickly. As shown, mobile devices can reach a big group of selected receivers which makes them an extremely powerful tool in social environments and social activities. ‘While telecommunication allows one to escape the crowd, it also opens up the possibility of finding oneself moving in concert with it […]’. In the first case, cell phone users define themselves against a mass of anonymous others. In the second, they become those others, assuming anonymity as a condition of possibility for sociality.’ (Rafael 2003).

**Wearable Computers**

Wearable computers are usually characterised as tiny computers which are worn like clothes and which are always running and ready for interaction with the user (Rhodes 1997). In 2001, Gartner Research estimated that by 2004 30 percent of the US population will carry or wear WIDs (wireless interactive devices) for six hours a day (Fenn, Linden 2001). The mass adoption of mobile phones which are equipped with more and more processing resources reinforce this estimation. The usage of mobile phones in 2002 was already 50 percent among the US population and 70 percent among the European population with the Finnish population being in the lead with approximately 80 percent (Vehovar 2003). Wearable cameras (Mann 1997) can be used to take pictures in situations when the presence of a hand-held camera could be dangerous to the operator. This is for example the case, when it comes to witnessing wrongdoing, especially the abuse of human rights (Mann & Guerra 2001). Mobile phones with embedded cameras already give a prediction for the use of truly hidden cameras: these devices are already prohibited in several US companies (Sydow 2003) and also in some countries with repressive regimes, e.g. in Saudi Arabia (Wearden 2002). A tiny commercial wearable camera – Camwear 100 – was announced by Deja View Inc. (http://www.mydejaview.com). It is a lipstick-sized camera which is worn unobtrusively on one’s eyeglasses or baseball cap. The pictures taken are processed by a small device worn on the hip. The camera is constantly monitoring but not saving until the user hits the record button. The camera then saves the last monitored 30 seconds — a good tool for the documentation of accidentally witnessed wrongdoing. The other side of such a pervasive possibility for making a report is, of cause, being subject of a report. People would place themselves under constant surveillance.

The technology paves the way for society’s demand for alternatives in news publishing. There are platforms to bring readers and writers together, there are mobile and wearable devices to support the reporters’ activities.
Scope and purpose of the Freeporter

The Freeporter is a concept to realize the described shift from the traditional model of centralised news dissemination to the emerging culture of everyday people becoming mobile reporters of events as they happen. The ongoing prototypical implementation of services and features is used to explore and evaluate the concept. It currently focuses on news items as spoken audio messages.

There are three components, which need to be in place to enable the envisioned community:

C1. *Cheap and easy-to-use reporting devices:* today, the mobile phone has already become commonplace for a large group of society. Mobile phones can easily be used to record an audio comment or to enter a short text message about an event and to transmit the report to a special service for publication. With the availability of cameras which are either integrated in mobile phones or attachable via Bluetooth, images also become available as a medium. UMTS and the corresponding devices even promise to record and to transmit live video streams.

The current implementation provides a voice gateway which can be used with most telephones simply by dialling a specific number. A voice control interface lets the user record a message and subsequently publish it.

C2. *Comfortable presentation of personal news broadcasts:* for an alternative news system to succeed, the consumption of the news items has got to be at least as comfortable as it is in traditional systems.

The consumption of traditional audio news broadcasts is as simple as turning on a radio receiver, tuning to one’s favourite station and waiting until the next hourly broadcast. Moreover, if one is listening to music from the radio anyway, no action is required at all to receive news. On the other hand, this tight interconnexion of music and news is a disadvantage, since it is not possible to select a different source of news, or even multiple sources, while keeping the same music.

The Freeporter overcomes the mentioned limitations and keeps the benefits by using the Internet instead of radio waves as the transmission medium. Through an extension of music playing programs, it can interrupt whatever music one is listening to in favour of a periodic newscast which may be composed of messages from different sources.

C3. *Mechanism for distribution as well as personalised selection of relevant news items:* while the World Wide Web can be used — and actually is used — straightforward for the publishing and distribution of news items, there are serious problems that remain unresolved, particularly with regard to the automatic generation of personalised newscasts. The required mechanism
has to assure a certain quality of the resulting newscasts. It should also have the ability to discover new topics of interest which the receiver never specified before. It should also facilitate the mixing of local news, which are only relevant to a small community, with news of global interest. Finally, the user needs a way of interacting with the system to influence the automatic selection process.

The Freeporter uses a social filtering and recommendation system which is described in detail in the following sections.

Besides these three building blocks, the whole system must be designed with an additional condition in mind: it is a matter of particular interest for the emergence of this community that the users can protect their own selfish interests against the interests of other users. This aspect is ambivalent:

*Spam:* the community needs tools to protect itself from a flood of spam messages as it happened to the email users. The problem is even more critical because the newscasts shall be generated and presented automatically.

*Censorship:* nobody will have the possibility to censor any reports in the system.

In other words: everybody will say whatever he/she wants to, as long as nobody is forced to listen. In a broader sense, this is an issue of social scalability. Internet communities need mechanisms to avoid or to resolve conflicts arising from a large set of users. It is not sufficient to address the problems arising from the connexion of a large set of machines. This problem was also encountered in the context of the submission and curation procedures for the human genome database (Letovsky 1995).

**Social networking with Weblogs**

News publishing systems have quite a long tradition on the Internet and its predecessors, with BBSes, Usenet and mailing lists being developed and deployed in the 70’s and 80’s. The 90’s brought the World Wide Web and gave birth to several communities dedicated to making their own news for the masses, e.g. Indymedia.

Recently, at the end of the 90’s, a new trend came up: Weblogs. What separates Blogs from the earlier web communities is that Blogs are usually authored by individuals and reflect their owners’ personal points of view. Compared to communities like Indymedia, personal Blogs foster a much richer spectrum of opinions. In a community, there are always a lot of compromises which restrict their members’ opinions to the common goal of the whole community. On the other hand, the disadvantage of the independence of individual authors is their disconnectedness. A community means strength since it can reinforce their members and bring them together for discussions. Weblogs do not form exclusive groups, but rather make the aspect of social networking explicit. So-called
Blogrolls are part of Weblogs and refer to other Weblogs which are interesting in the authors’ opinions.

The news items themselves are encoded in RSS (Beged-Dov et al. 2000). Version 1.0 of this format builds on the Semantic Web standard RDF (Beckett 2003) to make the separate items on a website available for standardised interchange. As a result, RSS enables the aggregation of news from different sites in so-called RSS reader programmes. An RSS reader regularly fetches the RSS feeds from a list of sites and usually displays them through a GUI which is similar to that of email programmes. The user can efficiently scan a large quantity of news with this technique. It is also common practice to republish items from other Weblogs in the own one. RSS and Blogrolls connect the individual Bloggers much tighter than the plain HTML links could. A new community called the Blogosphere emerged which connects all Bloggers, regardless of their opinions and backgrounds. The open spirit of the Blogosphere unites diverse authors without restricting them to the policies of closed groups.

The Freeporter builds on the promising development of the Blogosphere to achieve the proposed goals. The following section briefly reviews related approaches to information selection. It considers the problem from a social network perspective and gives a model for the functioning of the community. The next section explains the realisation of the Freeporter and compares it to the Blogosphere. The conclusion follows.

**Freeporter’s local reputation system**

**Information selection systems**

The design of the information selection component C3 can be seen from different sides, which can lead to totally different approaches for a solution. Further, combinations of different approaches can be created.

One important class of information selection systems are content-based filter systems. These systems analyse the contents of the given items to infer a classification. There is a multitude of approaches to the analysis of content data. Rule-based classification is described by Pollock (1988), Bayes networks are used in the Autonomy Inc. product (2002) and a linguistic analysis is used by Inxight Inc. (2003). All these methods work only with texts and not with audio data and are expensive in terms of computing resources. Moreover, content analysis is not well suited for the recommendation of items with other characteristics than specified beforehand.

Collaborative filtering systems or recommender systems (Resnick & Varian 1997) rely on the users to analyse and rate the contents of items: ‘Collaborative filtering simply means that people collaborate to help one another perform filtering by recording their reactions to documents they read.’ (Goldberg et al. 1992, p. 61). This makes recommender systems independent of the contents type and accounts
for the fact that the human user is better in making such a rating. Therefore, new problems are introduced: how to encourage people to participate in this joint venture and how to facilitate the connexion between them. With a growing user base, the opinions of the users might drift apart, rendering some ratings useless or even deceptive for others. This problem gets worse once people consciously enter false ratings or try to influence it to their own advantage. This is where the notion of trust becomes useful.

Reputation systems introduce trust into a large group of people by collecting, distributing, and aggregating feedback about the past behaviour of the users. ‘Though few of the producers or consumers of the ratings know each other, these systems help people decide whom to trust, encourage trustworthy behaviour, and deter participation by those who are unskilled or dishonest.’ (Resnick et al. 2000). Ebay (http://www.ebay.com) for example is using a system where the buyer and seller rate each other’s performance of the transaction (Resnick & Zeckhauser 2001). Reputation can be accumulated and is stored in Ebay’s central database.

There are problems in adapting this system to the domain of news filtering. The kind of reputation Ebay is building can be called global, as an individual’s reputation is the same for the whole community. While this works well for selling items, it cannot work well for the recommendation of news items because of local interest groups and different attitudes. What is needed for the proposed community is a local reputation system (LRS), in which one would have a different reputation, depending on who is asked for it.

To model local reputation, we should take a closer look at the group or community of our concern. The reviewed approaches treat a group as an unstructured set of individuals. Indeed it is not, and a better understanding of group structure can lead to better models for large communities.
A news network as a social network

The discipline of social network analysis has developed a model of group structure which is well suited for the explanation of the proposed community: the social network. ‘Just as a computer network is a set of machines connected by a set of cables, a social network is a set of people (or organizations or other social entities) connected by a set of social relationships, such as friendship, co-working or information exchange.’ (Garton, Haythornthwaite & Wellman 1997). This section applies the elements of social networks to a community of independent news publishers and consumers.

**Node:** the nodes in a social network usually represent individual actors. In regard to a news publishing community where every actor has the possibility to publish and consume news, the nodes should act as combined information sources and sinks. These nodes can be maintained by individual persons or organisations. A node may hold a set of news items.

**Tie:** a tie connects a pair of nodes by a maintained relationship. It can be weak or strong, depending on the frequency or intensity of activity of the tie, and is directed. Ties are durable edges in the network. In the news publishing domain, a tie represents the recurring transfer of news items between two nodes. Such a tie can be facilitated by means of a subscription to a news provider. A subscription is associated with the subscriber’s trust in the provider. Trust, in this case, is the belief that a source will provide interesting information in the future. This trust may also be weak or strong and is unidirectional.

**Network:** a network is a set of nodes and ties as shown in figure 1.

Node, tie, and network are the basic elements of this model. Other elements can be derived from the set which help to better understand the resulting structure:

**Group:** groups are a special kind of pattern in the network. They emerge as highly interconnected sets of nodes known as clusters which are densely-knit (most possible ties exist) and tightly-bounded (most relevant ties stay within the defined network) as shown in figure 2. Groups in the news network correspond to thematic clusters which focus on certain kinds of topics or share the same opinions.
Network of networks: groups do usually not exist in isolation. People are members of a number of social networks, each one possibly based on different types of relationships. The same is true for nodes in the news network: each may have subscriptions to various nodes which are not densely-knit. This places it in a number of groups and interconnects them, thus forming a network of networks.

Path: there are not only direct connections. Nodes are also connected indirectly by paths. Paths connect two nodes by a sequence of ties and intermediary nodes. The length of a path is the number of ties in the sequence. Paths are unidirectional and there may be several paths of the same or different lengths connecting two nodes. Since the whole network may be partitioned, a path may not exist between two given nodes. Paths are of special interest for the distribution of news items. An item may not only be transmitted from the original author’s node to its subscribers. It may also be passed on to third nodes. Since every node in this model is source and sink at the same time, a node may be used to republish or recommend an item. Through this mechanism, an item may quickly be distributed to the directly connected nodes in a first cycle. In a following cycle n, it can be passed on to nodes with a path length of n from the originating node. This effect can be used to create a gradient which results from the concatenation of the trust levels that are attached to each tie in the corresponding path (figure 3). Thus paths can be weighted by trust levels which are automatically derived. This leads us back to the concept of local reputation.

Local reputation: in this model, the reputation a node A has in relation to another node B corresponds to the aggregated trust levels of all paths leading from B to A. If there is no path from a node D to A, A has no reputation in relation to D. In figure 4, the reputation of A in relation to B is $R_{AB} = t_{BA} \odot (t_{BC} \circ t_{CA})$ and $R_{AD} = 0$ with $\odot$ and $\circ$ representing aggregation and concatenation respectively.

Dynamics in the news network

The Freeparkers’ news network is not static, but can change dynamically with the actions of the participants. As there is no authority in the network, anyone is allowed to participate and become a maintainer (or owner) of any number of nodes by creating them. A maintainer may also remove his/her maintained nodes from the network. To establish connections, a maintainer can create ties between an owned node and any other node. This is an explicit expression of trust in the other node as explained above. These ties are always directed from the own node to the other node and news items can only be transmitted in the opposite direction. When the maintainer of the other node also draws a tie in the opposite direction, news items can be transmitted in both directions. A maintainer can also affect the trust levels on ties he/she has established or remove such a tie.
The trust level of a tie shall represent the belief that interesting messages will be published on the source node. To take advantage of this arrangement, a value of interestingness is connected to each news item to reflect the interest the maintainer of a node has in an item it holds. When an item travels along a tie, its interestingness is concatenated with the trust of the tie. The resulting value represents the automatically calculated interest of the receiver and replaces the previous value. When a node receives an item through several paths, the different interest values are aggregated into a single value. The changing of a tie usually happens as a reaction to the contents of received news items. If the receiver is satisfied he/she is likely to increase the trust level on the corresponding tie, otherwise he/she may possibly decrease it or remove the tie completely. If a maintainer thinks that only individual news items do not measure up with the automatically calculated value, he/she may adjust it accordingly. The corresponding items might be marked as rated to make the action of the maintainer transparent to others.

The users establish ties, keep the trust values adjusted and rate individual items for their own selfish interests. Yet, their behaviours have far-reaching consequences for the whole community, because every change of a single trust value may affect the reputation of several nodes at the same time. The three required properties for reputation systems become manifest in this system: ‘entities are long-lived’, ‘feedback about current interactions is captured and distributed’ and ‘past feedback guides buyer decisions’ (Resnick et al. 2000).

**Features of the local reputation system**

The resulting local reputation system assures a certain quality through a social filtering and recommendation mechanism. It is related to the concept of social navigation (Dourish & Chalmers 1994) which enables the system to discover new topics of interest. The mixing of local as well as global news is possible because of the functioning of the distribution mechanism. News items will not spread widely without multiple manual ratings. This is probably the case for local news. News of global interest will probably find several recommenders who increase the interestingness and thus increase the spreading.

Unsolicited commercial electronic messaging (spam) and unsolicited electronic messaging in general is a serious threat to open messaging systems. In the worst case, one individual can force thousands or even more people to see or hear his/her message although the recipients do not have the slightest interest in it. The local reputation system of the Freeporter is resistant against this kind of misuse. Since its filtering mechanism is not dependent on the analysis of the contents of messages, it does not have the problem to define spam. Compared to email spam avoidance strategies, it has similar properties like a referral network (Cranor & LaMacchia 1998). A spammer may create new nodes, but because they are not trusted by anyone, they cannot be used to distribute spam. If a trusted node begins to distribute spam, the trustees will likely reduce the trust level or even remove
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the tie until the node gets isolated and can do no more harm. Spam clusters which trust themselves for the reason to gain reputation do not work either, because then the whole cluster will get isolated just like a single spam node. These clusters could increase their reputation on a global scale, but not on the local scales the Freeporter network uses.

**Realisation of the Freeporter**

This section summarises the characteristic components of the presented news network and describes the prototypical implementation as well as how it could be integrated into existing technologies for a fast adoption.

News items in the network have to be annotated with an *interest* value and a corresponding scale has to be established. The *immediate source* must also be attached to the item so that the node in charge can be identified. An extension to this feature would be that the *whole path* which a news item travelled gets recorded in the items. Additionally, items may be annotated with a *rated* value to indicate that the interest value was not determined automatically. Metadata for the description of the contents of an item is necessary for the automatic generation of newscasts. The *media type* together with details about the *extent* of the contents, e.g. the *duration* for audio messages. The connections to other nodes have to be extended with a user-defined *trust* value of a specific scale. Moreover, a protocol for the efficient and immediate transmission of news items between two nodes is necessary to support the spontaneity of mobile users.

**Prototypical implementation**

The prototypical implementation provides a single program called *matrixdbd* which is responsible for the storage and distribution of news items. A single instance can contain multiple nodes. Multiple instances of matrixdbd can also be connected over the Internet to form a peer-to-peer network of nodes. Nodes can be identified by a URI in the form *mpn:*<node name>+<server domainname>, e.g. mpn:tomsby+mpn.bloggermatrix.com. Matrixdbd maintains an XML file containing metadata of items as well as a list of trusted nodes for every node. Trust values range from 0.0 (no trust) to 1.0 (absolutely trustworthy). The metadata basically contains a unique identifier, a URI to the content file, details about the author and the characteristics of the proposed concept: an interest value between 0.0 (uninteresting) and 1.0 (very interesting), the path an item travelled as well as details about the media type together with the duration if applicable. An additional value indicates the order in which the items were received.

A custom XML protocol is used to access and modify the associated item storage. It uses XSLT as a flexible but inefficient query language. The protocol features a delayed query which is used to facilitate instant transmission of items: if a query result is empty, the queried matrixdbd keeps the connexion open until the query can be satisfied. In comparison to simple polling, this mechanism avoids the
typical delays while it keeps the advantage that the client is in control of the connexion. To calculate the interest value of incoming news, the multiplication is used as the concatenation operation: the previous interest value multiplied by the trust value of the connexion yields the new interest value of an item. If an item arrives through several paths with different interest values, the aggregation is facilitated with the maximum function. The usage of multiplication and maximum is suggested by Richardson, Agrawal & Domingos (2003) and is well suited for a practical implementation.

Several interface programmes take advantage of the network infrastructure by connecting to one’s own node. A telephone interface can be used to easily record an audio message with a mobile phone. The system uses line identification to determine the caller and can be controlled through voice commands. Subsequently, it inserts the message into the caller’s node for distribution. To realise the presentation of automatic newscasts as described in the introduction, a plugin for the audio players XMMS for Linux and Winamp for Windows was implemented. When a newscast becomes available, it fades out the currently playing music stream, inserts the individual parts of the newscast, and finally fades the music in again. A newscast usually consists of multiple audio messages, eventually from different authors, sorted by the interest value. There are two kinds of newscasts: instant and regular. Instant newscasts happen as soon as a message arrives. A threshold can be defined to determine the minimum interestingness for an interruption. Regular newscasts happen once or twice per hour with a specified maximal duration. If more items are available, only the most interesting messages will be played. A web interface (http://www.bloggermatrix.com) was also implemented to access a node. The list of trusted nodes can be modified and the telephone interface can be configured. It displays a chronological list of news items together with the corresponding interest values in two areas: friends and moderated. The friends area contains all items which were received over the trusted connexion. The moderated area contains own items and selected items from the friends area. An item can be put from the friends area to the moderated area with one click. This action is also interpreted as an explicit recommendation and the interest value is set to 0.9 at the same time which eventually causes the item to reach a broader audience.

**Extension of the Blogosphere**

To foster a fast adoption of the proposed concept, appropriate standards could be extended. RSS is well-suited for this purpose because of its popularity and extensibility. A module needs to be developed which implements the additional item values as discussed above. RSS aggregator programmes need extensions to attach trust values to the subscriptions, make the necessary calculations and

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1 The web interface was implemented in cooperation with glonz.com (http://www.glonz.com)
republish the items with modified interest values in the own Weblog. However, to facilitate instant distribution of news, a protocol similar to the one developed for the prototype has to be specified.

**Conclusion and future work**

The goals of this study were to determine the enabling factors of a mobile news publishing community. Contemporary mobile phones are good tools for occasional amateur reporters. Gateways for voice, SMS, MMS, and email can be implemented to transfer messages into an Internet-based news network. Custom Java programs may be used to make more sophisticated reports. The challenge of the project was the design of an appropriate distribution and recommendation mechanism for audio messages as well as other media. While reputation systems with global reputation are not sufficient, a local reputation system is proposed as a solution which incorporates elements of social networks. A prototypical implementation was accomplished and an integration into Weblog technology was suggested to foster a fast adoption. The bigger part of the necessary technology and infrastructure is already in place. Compared to other social networking systems, e.g. Referral Web (Kautz, Selman & Shah 1997), the goal is not to collect information about the social network of people, but rather to use it as a transfer medium.

Evaluations of different functions for the concatenation and aggregation of trust and interest values and of the impact of these functions on the distribution of news have still to be carried out. Furthermore, a concept for the semantic connexion of news items among each other could be developed. This would allow for a seamless integration of comments, translations, revisions and a general composition of items into the described system. The design of efficient search and routing functions for the network were not addressed in this paper. This would increase the amount of accessible information and enable new applications. Research related to small world networks might be a promising approach for this problems (Watts 2003). The system could also be used to manage messages which could be attached to geographic locations (Persson et al. 2002) or product identifiers, e.g. barcodes. The same advantages regarding information quality would arise in these scenarios. Another application scenario is the search for a helping hand. Since a help call reaches interested persons, there might even be a volunteer under them.

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Part 5
Posters
Conceiving an augmented reality, through the tone of mobile data, the proximity of its users and the poetics of environmental communication

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Abstract:
I propose to create a series of loose environments/artworks in which single and multiple users interact with mobile data. Attempts will be made to enhance the ‘real’ space by overlaying a virtual world that will be experienced in duality. A seamless portal to the physical room itself and the virtual objects that inhabit it. The user will be able to communicate their relationship to other users, while exploring their real/networked spatial status through the dynamic data relayed between the handheld and the mobile computer system. Extending the perceived spatial awareness the device reflects via the mobiles joystick and incoming data via short text message (SMS). Allowing the information to drive new structural meanings while invoking the rooms invisible architecture.

Keywords:
Ubiquitous computing, emotional space, real, virtual, augmented reality, mobile, geophysical. Proximity

Context

‘Spatial changes give a tone to a communication, accent it, and at times even counteract the written word. There are certain thoughts that are difficult to share unless one is within the proper conservational zone.’ Edward T. Hall

Proximity is the study of humankind’s perception and use of space. Violation of these spaces can affect communication relationships and vary greatly from culture to culture. Office space magnifies these complexities further. A simple shift of a desk into an open formation welcomes a new worker and establishes an architectural framework where multiple user’s can co-exist. A less enthusiastic neighbour may draw the space into a corner. Two desks and two walls can quickly declare an interest in dominating the space.

Process

At the entrance to the gallery space, visual clues will help define the inherent virtual spatial arrangement. Upon entering the space, sms (short text messages) messages will be relayed to the device to prompt the user to engage with the environment solely by joystick control. The space will remain devoid of any physical objects. Further audio/messages will be relayed as the user affirms their connection to the virtual space.
A computer based wireless network model delivered via a handheld mobile device prompts the user to reassess their spatial proximity to the gallery space, other users and the real time city dynamic (abandoned space).

To achieve this, I intend to develop a series of artwork that build upon each pieces outcome. These artworks will be constructed as an opportunity to explore user behaviour and to assess emerging narratives, behaviours and emotions in relation to the actual architectural space. The virtual space will be constructed using Macromedia Director software which will provide a virtual map of the ‘real’ space.

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MOBILE ENTERTAINMENT: USER-CENTRED PERSPECTIVES
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“What makes developments in Mobile Entertainment so fascinating is the way in which technological development is impacting on end users. Over the last twelve months we have seen 3G networks begin to roll out. Consumers are now enjoying colour screens, built in cameras, gaming and digital diary functionality and the ability to swap memory cards between mobile phone, PDA and digital camera. Consumers are integrating new-to-market devices and mobile services into their routine practices. They can now vote (either for parliament or Pop Idols) using their handset, roam across national boarders while remaining in contact, synchronise email and access data services which are location sensitive.”

This collection brings together papers presented at the conference Mobile Entertainment: User-centred Perspectives and provides a snapshot of current state-of-the-art research from various disciplines including computer science, sociology, economics, governance, psychology and design.

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