

Gaming Goes Mobile: Issues and Implications

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Abstract

A recent report by the telecommunications research firm Analysys predicts that mobile games will replace ringtones, logos and other personalisation services as one of the key drivers of the mobile market. Despite the rapid growth of the mobile gaming market, there appears to have been little critical analysis of this phenomenon. The paper aims to investigate the industrial and social implications of mobile gaming, by bringing together some of the current research on both mobile communications and computer games.

Beginning with a broad overview of the major stakeholders in the market, the paper examines how mobile gaming functions as a vehicle for convergence, bringing together previously disparate industries around a common form of content. It also examines the regulatory complexities that arise when gaming becomes mobile, and in particular how the rise of technologies like location-based services might impact on issues such as privacy.

Keywords: mobile games, privacy, convergence.

Introduction

Advances in technologies such as miniaturisation, liquid crystal display (LCD) screen design, and processor development means that mobile devices are now capable of running applications which would have been impossible just a few years ago. This is perhaps most apparent with respect to games, a category of software that has rapidly transcended the barriers between numerous technical platforms, from mobile phones to handheld computers. A recent report by the telecommunications and new media research firm Analysys predicts that games will replace ringtones, logos and other mobile phone personalisation services as one of the key drivers of the handset market (Businesswire 2002). Similarly, a report from the online retailer Handango indicates that games represent 24% of all software sales for handheld computers, surpassing the sales for all other software categories (Handango 2004).

However, while various industry groups are rushing to cash in on the expected mobile gaming boom, little attention is being paid to wider social implications of the phenomenon. Console and personal computer-based gaming has recently become the subject of sometimes intense debate in both academic and popular circles, mainly centering on the relationship between games and various forms of anti-social behavior (for examples, see Bensley & van Eenwyk 2001, Matthews 2001, Anderson 2003). These debates are likely to be transposed into the mobile environment, but this paper will argue that the very mobility of the technology in question will add an additional set of complications. Rather than providing a detailed examination of specific mobile gaming issues, this paper is designed to offer a broad overview of some of the key industrial, political and social themes this phenomenon raises. As such, the definition of mobile games used in this paper is necessarily broad, encompassing everything from traditional computer and console games that have been transposed to mobile platforms (phones, handheld computers, portable gaming devices) to simple text based games that use the Short Message Service (SMS) commonly available on mobile phones. Significantly, this definition excludes activities such as using a mobile telephone as a return channel for interactive television game shows and contests, as this type of application is limited in terms of its mobility due to the necessity of being able to access non-mobile hardware (in this case, a television). Thus, for the purposes of this paper, mobile games can be *defined as games that release the player from the traditional requirement to remain in a particular location to engage in gameplay.*

Key Industry Players 1: Hardware Manufacturers

The mobile games market currently centres around three main types of player, each with their own approach to the concept of mobile games. The first and perhaps most important group at present are the hardware manufacturers, currently dominated by mobile phone companies due to their sheer reach into the market. While games are available for a variety of mobile platforms, the near-ubiquity of mobile phones in many countries means that more people are likely to have access to mobile gaming on a phone than on any other device, even though owners of dedicated gaming devices (such as Gameboys) are likely to make more use of this facility. Games for mobile phones have traditionally been very simplistic visually and aurally as compared to their computer and console counterparts, due to limitations of screen real estate, processor power and speaker size. While simplicity does not automatically equate to a negative player experience, the current trend is for increasingly sophisticated graphics and audio across all gaming platforms, implying that players can potentially enjoy some games more with enhanced visual and aural presentation. In keeping with this trend, some mobile phone manufacturers have begun to produce more games-

focused devices in anticipation of an expected surge in the popularity of mobile games. In this respect, the release of Nokia's N-Gage platform constituted a turning point in the mobile games market in that it represented the first attempt by a traditional mobile phone manufacturer to produce a dedicated gaming device. Unlike the vast majority of mobile phones, the N-Gage features a large screen and dedicated gaming controls such as a directional pad, built into a body that is ergonomically designed to be held in two hands.

The N-Gage is also significant in that Nokia has attempted to overcome its novice status in the gaming market by licensing several high-profile titles from other platforms. The device launched with Tomb Raider, which was one of the most popular games in the history of the Playstation console, and more recently has added The Sims to its catalogue, a title which has dominated PC games sales for the last five years. Despite such moves, sales of the N-Gage have not lived up to expectations (Guttridge 2004), although the recent release of a new, redesigned version of the device could potentially result in better figures.

While not as focused in their approach to gaming, other phone manufacturers have recognised the potential of gaming as a way of selling hardware. Sony-Ericsson, for example, offers a fully functional gamepad which can be attached to several of its most popular units, while other companies such as Panasonic and Siemens offer handsets with navigation pads designed to double as game controllers. While most mobile handsets come with graphically simple games already installed in their operating systems, many of the more recent units also have the capacity to download games based on Java technology, at a cost of between AUD\$5 and AUD\$7 per game. While the commonality of the JAVA platform opens a space for independent game developers to create software for a number of devices, it is also restricting in that the Java environment currently employed in most mobile phone games only has a limited capacity for creating sophisticated game elements.

Mobile gaming hardware is also being produced by traditional console makers, with Nintendo in particular strongly supporting the mobile gaming market through its Gameboy range of handheld gaming devices. While Nintendo's home consoles have been steadily losing market share to Sony and Microsoft, the company's sales of handheld hardware and software have remained steady, with over 150 million Gameboy devices sold since its introduction in 1989 (Gossage 2003). However, this domination may change in the coming months as Sony rolls out its Playstation Portable (PSP) unit, a handheld version of the company's successful home console. To counter, Nintendo has rushed to release its latest handheld device, the DS, hoping to steal some of the thunder from the Sony product, but it will still likely encounter tough competition from a manufacturer with solid gaming credentials and a long list of prominent developers. Indicative of Sony's seriousness in entering the mobile gaming arena is its release strategy for the PSP, with analysts estimating that the company will forfeit approximately AUD\$60 per unit in a bid to gain a foothold in the market (Yoshida 2004).

Key Industry Players 2: Software Producers

Like all gaming platforms, the real key to market success is software, and software producers represent the second main player in the mobile gaming market. In the traditional gaming market, most companies generate most of their revenue through software sales and licensing, and while the mobile gaming market is still relatively small when compared to the booming PC and home console spheres, several major software developers are becoming involved. Indicative of this is the fact that companies such as Electronic Arts have begun licensing some of their more prominent titles for mobile platforms, with versions available for handheld computers, Nintendo Gameboys and some mobile phone handsets. However, while major software houses are entering into the mobile market, the field is still evolving

rapidly enough to provide a space for smaller and independent games developers. This is especially true of games developed for mobile phones, many of which do not require the long development time or the extensive teams of coders that characterise software created for PCs and home consoles. Whereas console and PC games often require complex physics modelling and level design, most of the current generation mobile phones do not have the technical capacity (in terms of screen resolution or processor power) to make such coding-intensive features a necessity.

Key Industry Players 3: Telecommunications Carriers

The third major player is the telecommunications carriers, who while not responsible for developing software themselves, are acting as distributors for gaming software developed by third parties. In the Australian context, all the main carriers offer gaming software as part of a broad suite of entertainment enhancements for their products. Carrier-distributed games generally fall into four categories, each with different modes of operation. Firstly, there are the Java-based games which generally resemble traditional arcade video games but in a much simplified form. Second, there are games based on Short Message Service (SMS), which take the form of text-based interactions between users and automated responses. Many of these games are based around a dating theme, and can often involve communication between users from different countries. The third category of games is based on Wireless Application Protocol (WAP), and use the simplified graphics of the WAP environment to create a variety of game genres, from action games such as Top Gun, to trivia games. As with SMS games, WAP based games allow players to interact with others both from Australia and internationally, with high scores often being displayed on the carrier's websites. Finally, there are fully-functional multiplayer games which use the carrier's own network as a way of connecting players in real time. This type of gaming is still relatively rare in Australia, with only the 3G carrier Three offering such content. However, as more carriers increase their bandwidth to 3G capacity, this is likely to be one of the fastest growing areas in mobile gaming.

Distribution Issues

In combination, the three types of players trace out a complex and rapidly evolving model in which production, distribution and consumption are tightly interconnected. This in itself represents a significant change in the way games are traditionally disseminated, in that the fluidity of the distribution model alters the power relations between the hardware and software producers. The traditional video game distribution model is based on the music industry, and involves a series of royalties and licensing fees which are added to the production and distribution costs for a product. In Australia, new games typically retail for \$AUD 100, but of that \$10-\$20 is paid as licensing fees to the hardware manufacturer (Steinmeyer 2001). This means that for every game produced the hardware manufacturer is assured some revenue, but for the developer it represents an added cost to be recouped before profitability can be attained. Developers of games for mobile phones also have to pay license fees, but in this case they tend to be to the owners of the particular software development tools such as JAVA and ExEn, and tend to be substantially lower than those required by hardware manufacturers (Amaro 2003). This opens up a space for developers who want to enter the game market, but are dissuaded by the costs associated with traditional platforms.

Method of distribution is another key issue concerning the mobile games industry, and in some cases represents a key point of difference between mobile and non-mobile game developers. Distribution essentially follows two broad models, with the first mirroring the

situation with console and personal computer based gaming with distribution through hardcopy sales. Software for stand-alone hardware such as the Nokia N-Gage and the Nintendo Gameboy is typically supplied in the form of a hard-coded memory card, which is physically inserted into the device. Once inserted, the information required to run the game is copied into the device's internal memory, meaning that the software can only run from the card and will terminate if the card is removed. Traditional console manufacturers have tended to favour creating their own proprietary card format, with Nintendo using a flash memory card while Sony has developed a Universal Media Disc for use in its upcoming Playstation Portable. Nokia has also opted for a memory card solution for its platform, but has chosen to go with the non-proprietary Multimedia Card (MMC) format for its software distribution. The choice of format has significant implications for both software developers and hardware manufacturers, and to some extent represents a point of tension between the two. Whereas proprietary formats allow hardware manufacturers to "lock" consumers into their particular platform, the diversity of formats poses a problem for developers wanting to distribute their games on a multi-platform basis, with the software having to be tweaked to conform to both the hardware specifications of the devices, and the specifics of the recording media as well.

The second model, favoured by developers of games for mobile computers and phones, bypasses traditional retail outlets in favour of online distribution. Whereas most PC and console games are still sold on hard media (CDs and DVDs), the small data size (typically under one megabyte) of games developed for mobile computers and phones makes them easily downloadable, even on relatively slow non-broadband connection. Developers of games for mobile computers frequently sell their product through their own websites or through electronic storehouses such as Palmgear.com (www.palmgear.com), reducing their distribution costs as well as eliminating costs such as packaging. Games developed for mobile phones take this one step further, with this content often being downloaded directly from mobile phone carriers. For the carriers, the result of this arrangement is that they have an additional feature they can offer to their customers, while the game developer potentially gains access to a large and established customer base. However, this advantage is to some extent mitigated by the fact that the developer is in a relatively weak position with respect to the carrier; games are not yet established as a key selling point for mobile phones and this means developers have little control over issues such as marketing and promotion.

Profit Generation Models

The greatest difference between mobile game development and traditional development models is in terms of profit generation. Console game developers generally rely on a share of hard product sales to generate their revenue, but the flexibility of the mobile environment offers a number of alternative models. While most of the games designed on the JAVA platform are still sold on a perpetual license basis, several carriers have begun experimenting with time-limited licenses. The advantage of this model is that players who become bored or frustrated with a game have only outlaid a percentage of a full license fee for the game, thus reducing their overall expenditure. However, those who wish to continue playing the game after the license has expired have to purchase a new license, thereby generating extra profits for both the carrier and the developer.

The growing dominance of packet-based GPRS and 3G telecommunications services have created a third revenue model, in which users are charged according to the amount of data traffic their gameplay generates (Nokia.com 2005). This model relies on the ability of GPRS devices to remain constantly connected to their parent network, and is most suited to multi-player games where interaction between players generates the majority of the data flow. In

Australia, all major carriers are now offering games utilising this revenue model, with prices generally in the order of 20-22 cents per kilobyte of data transmitted plus an additional session fee. While the games on most networks are generally fairly simplistic in terms of the amount of interactivity between players they can allow, higher capacity networks such as Three will permit a more immersive, and thus potentially more profitable experience with enhanced graphics and interactivity.

Classification Issues

The mode of distribution is especially important from a regulatory perspective, in that the mobile gaming phenomenon greatly complicates established regulatory regimes. Since the vast majority of games are delivered via download, most of the content available on mobile devices bypasses the body responsible for classifying computer games in Australia: the Office of Film and Literature Classification (OFLC). At present, it appears that the carriers themselves are acting in a self-regulatory role in that they are choosing the content that will be delivered via their networks. Indicative of this is the fact that none of the games currently offered by Australian operators carry any kind of classification notice, despite the fact that some involve gambling, while others are based on violent themes.

The way Australia classifies content adds yet another complication to this scenario. Under the current system the OFLC is responsible for the classification of all films, publications and computer games, with enforcement being carried out on a state-by-state basis according to the relevant legislation. While this system has proved to be effective for tangible commodities such as books and magazines, the more nebulous nature of some mobile content poses some problems. While the classification legislation is administered on a state-by-state basis, the phone networks used to download games are national, meaning that there may be some irregularity in the way a specific form of content is dealt with from state to state. Potentially compounding this problem is the recent call by the Western Australian Opposition Leader Colin Barnett to give the states independent censorship powers (Banks 2004), a move which could see downloadable content illegal in one state and legal in another. Such issues obviously raise serious concerns for regulators, who have to be mindful of community concerns surrounding digital content, but at the same time over-zealous regulation could potentially hinder the development of a mobile content industry in this country.

Content downloaded from the Internet poses an even greater problem for regulators, who have little jurisdiction over material that originates outside of Australia. Games produced by major software houses often carry classification information of their country of origin, but these generally bear little resemblance to the system used in Australia. More importantly, software produced by smaller independent developers seldom carries any classification information, and bodies such as the OFLC are effectively powerless to do anything about this.

On a more practical level, the actual labelling of content with classification advice is likely to represent a major problem in a mobile environment. Most gaming software is currently distributed in the form of CD or DVD ROMS, and is packaged in traditional DVD cases which provide ample space for the display of classification advice. However, games for devices such as the N-Gage and the Nintendo Gameboy are distributed in much smaller packages due to the small size of their actual storage media, and in some cases the physical dimensions of the packaging make it difficult to provide adequate consumer advice. This problem is greatly exacerbated in the fully mobile context, where games are downloaded directly from the Web or from a telecommunications carrier. Games downloaded from the

web typically carry the classification markings of their country of origin (if at all), and these may or may not be commensurate with the OFLC system. As noted above, games downloaded from carriers currently display no classification advice at all, and there is the additional issue of where such markings would be displayed. The obvious solution would be to provide classification advice at the point just prior to download, but if this were the case then the classification advice and marking would have to be scaled to fit the small size and comparative low resolution of the mobile phone screen, potentially rendering them unreadable.

Mobile Games and “Effects”

While mobile gaming presents many opportunities and challenges for both industry and regulators, it is the consumers who are likely to experience the most significant changes from traditional notions of gaming. Indeed, mobility means that games are more likely to be played at more times, and in more places, than has ever been the case before.

Recent years have seen a flurry of speculation about the potential of games to generate anti-social thoughts and behaviours among players, with writers such as Tamborini et al (2004), Zillman and Weaver (1999) and in particular, Anderson (1997, 2003) proposing a direct causal relationship between violent games and violent behaviour and/or attitudes. To date, very little of this attention has been directed toward mobile games, possibly because the visual simplicity of the content available means that notions of realism, upon which most claims of negative impact are based, are not able to be substantiated. Even titles with violent themes such as Splinter Cell have such low resolution graphics that arguments surrounding the impact of the content on players seem to have been nullified.

The lack of attention to the potential “effects” of mobile games is in itself interesting, and goes to the heart of many of the debates about media, and in particular game, violence. Much of the literature focusing on the perceived negative effect of games on players tends to emphasise the realism of game depictions, and implies that this realism is a key element in promoting anti-social responses. For example, in framing her study of the reactions of players to a martial arts game (Mortal Kombat), Ballard states that:

In terms of video games, there has been an increase in the violence and brutality of the games and increasingly realistic graphics and sound that yield blood-gushing, bone-crunching special effects. Newer games are often played from a “first person shooter” perspective; players kill video characters directly rather than via another character (Ballard 1999).

What is interesting here is that the “increasingly realistic graphics” that Ballard is referring to would be considered somewhat simplistic by most current players, such is the speed with which gaming software and hardware is advancing. More importantly in the context of the present discussion, the current generation of mobile games have already met and in some cases surpassed the visual sophistication of games such as Mortal Kombat, but we have yet to see similar accusations of effects levelled at them.

There are perhaps two possible reasons for this. The first is that when compared to their personal computer and console based counterparts, mobile games generally are less realistic, and that the popular press and the academic community have both chosen to focus on the more obvious target. If this is the case then the situation might well change in the near future, as rising mobile phone hardware specifications enable increasingly complex software to be run on these devices. More immediately, the new wave of dedicated mobile games devices such as the Playstation Portable already have hardware capable of delivering very

sophisticated content. For its release, the Playstation Portable has a selection of games including some such as MediEvil which were ports of violent Playstation games, as well as new titles such as the first-person shooter Coded Arms. The inclusion of such titles implies that the portable unit is not aimed just at younger players, and if this is the case it is possible that other popular and definitely adult games such as Grand Theft Auto and Manhunt will find their way to the mobile platform.

The second possible reason for the lack of concern over “realistic” mobile gaming content is also related to the speed of development in this area, and relates to the fact that many consumers and academics are still unaware of how quickly the field is evolving. While attention has been focussed intently on console and personal computer content, mobile gaming has gone almost unnoticed, despite the fact that many of the platforms upon which it runs have been heavily researched. Mobile phone researchers have tended to focus on the communications-centred aspects of their subject, while those studying mobile computers have tended to focus on productivity and business related activities, and in doing so tended to overlook the rising prominence of gaming on both platforms.

The Rise of Adult Content

There is little doubt that mobile content will soon attract more attention from both academia and the popular press, especially since there are signs that consumers are willing to pay for the always controversial category of “adult content” in a mobile form. Australia's first 3G operator, Three, began offering content from Playboy in early 2004, and as such became the first Australian carrier to offer audio-visual content targeted specifically at the adult market. Accord to Three's own website, the Playboy service allows users to:

Experience the captivating beauty of every Playmate of the Year since 1960, every Cybergirl of the Month since 2001 and Videogalleries featuring Playboy videoclips (Three 2004)

Similarly, many software developers have begun offering adult content for mobile computers (Manjoo 2001), ranging from adult orientated games and puzzles through to explicit XXX pornography, in both still and video formats. Although the early examples of this content were limited by the specifications of the hardware they were designed for, the recent advances in handheld technology means that the devices are now capable of showing full-motion videos at high screen resolutions.

The concept behind the distribution of such adult content to mobile devices is similar to that behind most internet pornography: the technology allows for users to access socially unacceptable content in private, and in most cases anonymously. However, the shift to mobile devices arguably extends this concept one step further, in that the devices on which the material is stored and consumed are genuinely personal technologies. Whereas more than one person can view the screen of a personal computer at once, the small screens and limited input methods of mobile phones and handheld computers mean that they are designed to be used by only one person at a time.

In one sense, this limitation actually benefits the community, in that it is less likely that members of the public would be accidentally subjected to unwanted content while it is being consumed. However, there still exists the risk that people, and minors in particular, might be exposed to this material should the device on which it is stored be lost. This is not such a concern in terms of mobile phones, since in most cases the content in question is likely to be accessible via a connection to the network usually requiring some form of identity verification (Three 2004). However, many handheld computers are used without any form of security

(Cox & Dubie 2003), a practice that is especially dangerous given that the devices now have the capacity to store several megabytes of potentially illicit content.

Mobile Gaming and Public/Private Spaces

Perhaps more importantly, the availability of adult-orientated games and other content on mobile devices works to complicate traditional notions of public and private spaces. Although some players received their early exposure to games in computer laboratories in the 1970s, until quite recently mainstream gaming has been a public phenomenon, most often experienced in game arcades and similar venues. Advances in computer technologies (and in particular miniaturisation) have meant that there has been a general shift to the home console and home computer, a trend which rapidly accelerated from the mid 1990s. The move from the public to the private sphere entails not just a shift in location but also arguably a shift in the mindset of players, who could behave in ways during gameplay which would not be acceptable in a public venue. The advent of mobile gaming represents an interesting convergence of these two modes, in that the private space of games can now be experienced in a public arena. For example, a player using a device like a Gameboy or Playstation Portable on a train can potentially have an experience similar to that encountered in the home, especially if they use headphones to block out competing noise. While it could be argued that this is similar to experiencing games in an arcade in that they are both public spaces, the key difference is that the arcade is a dedicated gaming space, whereas the train is not.

The way in which mobile gaming impacts upon the private/public dichotomy is perhaps most well illustrated by the concept of location-based gaming. While still relatively unknown in Australia, location-based gaming has been popular in Europe and some Asian countries for several years, with literally thousands of subscribers involved. As Sotamaa explains, location-based gaming has utilised a variety of technologies over the years, ranging from Global Positioning Satellites (GPS) through to Wide Area Networks (WANs), (Sotamaa 2002, 36), but it is the cell identification facilities provided by current mobile networks that provides the greatest potential for growth, due to the large installed user base. To play a game, subscribers of the mobile phone network send text messages to a dedicated number indicating that they want to begin a game, and identify the other subscriber they want to play against. The network automatically returns a text message with the general location of the opponent. In a combat game the players then move closer to each other and begin a battle, using virtual weapons which the players have selected prior to commencing the game.

Although players in these games tend to participate using pseudonyms, the fact that the game allows players to identify the location of an opponent clearly has implications for privacy. The game on which Sotamaa focuses is the European-based Botfighters (<http://www.botfighters.com>), which has become the largest mobile gaming platform of its kind in the world, accumulating over 5000 registered players within six months of its inception (Bennahum 2001). It has also proved to be very lucrative for the service providers, with every move in the game being performed via text messages sent to and from the carrier, each generating revenue for the service provider. However, for the game to work players have to be willing to have their location revealed to other players in the game. In addition to having the location of opponents described in text messages, the latest version of the game also has a web interface in which opponents locations are shown on a map on a carrier-hosted webpage, making it much easier to find and engage with other players.

Bennahum notes that the ability to locate opponents has already had some disturbing consequences. In 2001 a player operating under the pseudonym of Silver was holidaying in

Sweden and located all the local players in order to go on a virtual killing spree, eliminating five other players. The eliminated players subsequently joined together and chased Silver, physically beating him in retaliation for his actions (Bennahum 2001). Just as the game maps a virtual world over physical space in order to operate, the players in question twisted the dynamic in the opposite direction, perpetrating a physical response to a virtual set of actions.

While location-based gaming is yet to become established in Australia, it is likely that such services will soon arrive as carriers continue to search for new sources of revenue from existing customers, as well as ways to attract new users. What is perhaps disturbing about this is that it appears that regulators are far from ready to produce policies that will protect consumers in such an environment, especially in terms of privacy. In a discussion paper issued by the Australian Communications Authority in April of 2004, it is argued that Australian carriers are likely to introduce commercial services based on mobile location information in the near future, and that the impetus for such services will increase as the accuracy of the location-detection technology improves. In terms of how these services will be regulated, the paper states that:

The ACA may be able to facilitate and encourage the commercial introduction of location solutions and Location Based Services LBS by addressing any regulatory uncertainties that may otherwise impede or delay their introduction. Such issues may relate to the maintenance of end-user privacy in the provision of commercial LBS, the 'ownership' of customer location information when collected to provide commercial services or legal liabilities if, for instance, location information happened to be incorrect... The resolution of such concerns is principally a responsibility of the telecommunications industry itself (Australian Communications Authority 2004).

The emphasis on self-regulation demonstrated here is characteristic of trends in current Australian telecommunications policy, but this seems to be out of step with what is happening elsewhere. In the United States, for example, there has been a great deal of debate about the need to protect consumers rights when using location-based services (for example, see Dempsey and Mulligan 2005), with these protections embodied in the Location Privacy Protection Act 2001. While consumers are afforded some protection under the Telecommunication Act 1997, the Privacy Act 1988 and the Privacy Amendment (Private Sector) Act 2000, these policies were established to protect static information such as a person's phone number or address, not transient data such as their mobile location. As such, it is possible that the existing protection may contain loopholes that will only become apparent when breaches occur.

Conclusion

As the preceding example demonstrates, mobile gaming represents more than simply a transposition of a form of entertainment from one medium to another. At the very least, it clearly demonstrates how the convergence of different technologies poses challenges on many fronts, with policy makers in particular having to dramatically alter their approach as rapidly advancing technologies overtake established procedure. At the other end of the scale, the rise of mobile gaming has the potential to radically alter how people perceive leisure, making gaming available regardless of time and/or location. The longer term results of this remain to be seen, but as companies such as Sony, Nintendo and Nokia continue to focus their attention on this market, it is clear that mobile gaming will increasingly represent a significant part of the leisure industry.

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