



## Game development technologies in Europe

### 1. Introduction:

The computer game industry has developed and grown in size. Games sales have already outstripped cinema box office revenues some years ago. Massive multiplayer online solutions are breaking into what was once the TV market. At the same time the scope of games is expanding; more women and not only just young people are playing games. Games are a key sector as they are at the **crossroads** of three core issues: **Economic development** and **cultural diversity** of content and **technology** and its spin offs.

The games industry is a growing industry in a growing market and will remain in growth for the next years as its audience grows older as well. Games are probably the killer application of the new converging media fields. The public is often unaware just how strongly the games industry technology drives the development of the technologies and networks.

Computer games represent a significant cultural phenomenon. The implications of this development on the media culture are still hard to grasp and – above all – mainly unexplored. Games may well become as or even more important than the TV of today in the next 20 or 30 years because their impact on the individual is higher. At the moment media agencies and promotional firms shift budgets from passive media (TV, Cinema) to interactive media as they are understanding that the attention of the consumers is higher when he is interacting.

Therefore it will be important for Europe to have a positive attitude about games, so that they can be integrated properly into the regulation and support initiatives of the information society. But it is also important to assure the European approach of cultural diversity in a changing business scenario and to make sure that SMEs have their proper revenue in the value chain. While public television stations and film funding systems make sure that a certain diversity and quality is taken care of, none of such measures is still in place for this sector.

Questions for research and technology of content creation and specifically the technological challenges of game development play a key role in the positioning of the EU in the ICT sector within the years to come. However, most of the research is done in an uncoordinated manner in small SME's scattered all over Europe. Content is becoming more and more important for the development of technology, as market success is defined by content and technology likewise. Therefore, games are a good example for the requirement to redefine the relationship between content and technology in our era.

The EGDF, the European Game Developers Federation is in the process of building up structures within the developer community all over Europe. Via its member organisations (all non profit associations) the EGDF is today representing the majority of game developers from UK, France, Germany, Sweden, Austria, Netherlands, Belgium, Denmark, Luxemburg, Finland and the Czech republic.

The NEM initiative, as an industry lead platform to identify and evaluate technological tasks and research areas in the ICT field for the period of 2007 – 2013, is today already treating different context issues of game development. This paper is meant to be a contribution to the ongoing discussions in the NEM- process, and tries to respond to upcoming issues and reacts to the NEM strategic research agenda (SRA) as a principal paper.

This paper has been edited by Malte Behrmann, Geschäftsführer Politik of GAME Bundesverband e.V. ([www.game-bundesverband.de](http://www.game-bundesverband.de)) on behalf of the interests and in consent with and under review of the other Members of the European Game Developer Federation (EGDF) ([www.egdf.net](http://www.egdf.net)). It should serve as a working paper of a workshop, which will be held in Brussels on April 5<sup>th</sup>, 2006.

## 2. Economic situation

The leisure software market in total has grown in Europe constantly, about 20 % from 2000 to 2004 up to about 6 bn € (Screen Digest industry report 2005). At the same time game developers continue to consolidate; the number of companies making computer games is still falling, but costs of production have tripled. A large part of investments are also made in network games ventures.

The arrival of the next generation consoles marks the start of a new industry product cycle. This has again increased barriers to market participation for developers in terms of financial risk and skill resources required. One of the main effects of this is that it is even more difficult to recoup the development costs of a game on one platform alone (Most games are released on Playstation 2, Xbox, Xbox360 and PC at the same time nowadays, sometimes even including handhelds such as Playstation Portable or Nintendo DS). The concentration of game development on specific and limited territories has broken up a little: In connection with regional and national funding schemes games from Canada, the Nordic countries, but also from Central and Eastern Europe have gained importance.

Although the sector is successful, from a macro vision, the situation of European game developers of today is not satisfying. Games are following similar rules than other media: Network effects and economies of scale ease the way for 'monocultural' genre orientation and international stereotypes, just as in the movie industry. Here it might be even worse as market entry barriers are higher.

From a micro perspective, production costs are constantly rising and independent development becomes more difficult. Game development is a highly competitive business. One third of all game developers in the world go out of business every year.

Game developers are usually financed per project in an advance against future royalties which in reality comes close to a commissioned production from the TV sector. As a result developers are constantly confronted by a power asymmetry and have little chances to build up sufficient financial resources to grow. In addition they have to struggle constantly to build new game prototypes at their own risk after their last production is finished.

Risk reduction strategies lead to further integration in the traditional media industry using more and more IP's from outside or by licensing Game-IP's into other fields. Third party tools become more important as a result of professionalisation. Publishers make efforts to minimise risk by emphasising the studio track record and keeping development budgets as low as possible. Content funding systems, such as the film funding systems can help to reduce the risks as well.

But above all it is urgently necessary to reduce the power asymmetry concerning the relationship between game developers, game publishers and platform holders, which currently discriminates games from Europe. We need to take measures to make the development of games less dependent of the console hardware development, and less dependent of tools and middleware of non-European origin.

### 3. Game development as content creation

If anything is relevant to describe the new era, then it is the redefinition and flexibilisation of barriers between content and technology. Engines for real simulation games have differences to engines for ego shooters and content features. Technology features become more and more exchangeable. Creation of content is a subject for technology issues in the same way as technology issues are increasingly content issues. This is especially true for the development of games.

The vision is that tools and middleware for content creation are developed – ‘European’ open source, if possible – to ease the access for content creation to the various platforms and render the European content more independent from overseas proprietary soft- and hardware. It is further desirable that these projects are set up in a manner that they are interoperable among each other on an open source legal standard basis. They must be technologically attractive to be accepted by the developer community. This will be an important step for a continued sustainable future of the sector.

Multiavailability of content from multiple sources implies both higher diversity and standardisation. As transaction costs are going down, the value of the content itself becomes more and more central and content will have a higher impact on the whole value chain. Especially content – based SME’s use more and more open software standards to narrow the gap to the big players. In the market of content creation SME’s will continue to dominate the community as big groups usually are uneager to face the uncertainty of development risks and have problems to mobilise sufficient personal motivation of their staff.

Network effects and economies of scale can contribute to the fact that inferior technologies supersede by establishing a standard. It is possible, that those companies, who have already a dominant position, will be taking their dominant position to bring it to other markets. If the standardisation will be from outside Europe, the status quo will even deteriorate. The dominance of other world regions in this sector has to do with their part in bigger homogenous markets, closer relations to hardware manufacturers and other factors. It has little to do with skills, ability or know-how of European content producers, but with a given environment.

Public intervention can be useful in network economies to set a standard in a small time window. At the moment there is no more standard middle ware or tool chain on the market. The existing system Renderware by Criterion (UK) was bought in 2005 by the world leading game publisher EA (US) and basically removed from the free market immediately. This has led to many difficulties in the European Development community (the working platform of many SMEs ceased to exist), as the market share of Renderware was very large. Competitive products are priced even higher and do not originate from Europe. A larger European player may eventually emerge, but at the moment the race is open and an unsatisfactory situation for the industry exists. “European Open source” standards have the advantage that they can not be bought by a major player (which would render the work base for all the independent developer companies using this solution void, just as happened with Renderware). It would be a chance for European companies to come back in their own home market, and it would help balancing the fact that virtually nothing of the game hardware side is controlled by Europeans.

### 4. The gateway

Game terminals will become one if not the key terminal in the integrated world of networked electronic media. The integration of the sectors TV, internet and games will be first offered by the ‘next-next’ generation consoles. The latest generation currently being brought to the market, called ‘next-generation’ by the industry, is already supporting several of these features and can therefore serve as a good example of what is yet to come. Content will simply be primarily transmitted by consoles or game terminals. All the console manufacturers are currently preparing for this development as the game consoles have a much larger market penetration than any TV Set Top Box or Living-Room Media PC has ever had or ever will have. They will be the first and set standards concerning technological questions but also concerning formats and genres – e.g. standards in the way how the mass market will perceive and treat information.

It will not be the PC as the PC as such will not enter the living rooms. Game terminals are already in the living rooms. Game terminals are identified by the consumers as pleasure while the PC is more and more perceived as the central working equipment. It will not be the TV as the TV without controller has not possibility to have a proper return channel and the remote control is not a practical interface for interactive applications. Without a return channel literally all network based formats will not be able to work. Set top boxes might play a remarkable role in the development; however they will have little chance to catch up with the major players on the mass market. Mobile phones will be of growing importance, but their display is too small for the home entertainment market.

There is no European console.

This has economic consequences: Gaming terminals are produced overseas. Monopoly like systems lead to drawbacks for the continent and only very few enterprises, who have gained influence and reputation with the console manufacturer companies, can gain access to consoles early in the market cycles. Naturally the manufacturing companies have closer ties to the development and publishing enterprises in their own home markets.

This is also of political and cultural importance. The biggest and most underestimated effect of this development will be the impact on the content. The difference between game terminals and other platforms lies in the proprietary status of the consoles themselves. Major companies have invested significant budgets to establish a vertically integrated value chain. The content provided will have to please the platform owners to be visible. This not only has an impact on issues like cultural diversity, but also on freedom of expression, information etc..

This also has major technological implications for Europe. With the increasing importance of game terminals for networked electronic media, Europe is in danger to completely lose track to the key technologies of the future. The budgets for game development will rise significantly. Only very few of the European game developers (= content creators) will be able to compete and they will have a very small share in the consoles portfolio. The technological know-how will not spread significantly.

The reasonable European solution to these kind of problems are strategic research plans and consortiums, which are melting together their competences and resources. A thorough analysis might come to the conclusion that a European console is too risky and at the given speed of technical development may not likely be the best option. It is not sure that a fourth vertical console system is ready to be part of the market at all. It is quite unlikely that four systems will survive on the long run and the new system needs to have more and additional features without marketing experience. The tough competition forces the platform holders to pay a high price for their activities. End terminals are effectively sold far under their real production prices in order to win market shares for the platforms. A European console would face the problem of low market prices and reluctant acceptance as it is not the standard.

In return Europe might be forced to accept, that for a long time it will not be able to master the technology of end terminals in the networked media environment of the future in the households. Any strategic reflection should base on that and should have aim to become reasonably independent from hardware.

Substantial investments in middleware and tools would help to master the multiplatform problems from the content producer's point of view. As mentioned initially in this document, it is critical for game producers that their games can run on all the different platforms at the same time, which is one of the key aspects of middleware – making the hardware layer invisible for the game content, therefore allowing for effective multiplatform development. However, access problems are not only technical but also of legal nature. This means these activities have to be backed by a regulatory framework, which allows this also for game consoles – even when open software is used on the PC platform. Technologies used in or surrounding the console platforms are treated as proprietary trade secrets by the console manufacturers, and therefore they are not available to the public – making pure open source approaches difficult. This must be taken into account in order for any initiatives to be

meaningful and successful (a mix of open source and ‘restricted’ open source could be a feasible solution)

In general, the emphasis of the strategic software decisions must be in favour of ‘European’ open software and open source. Europe is not a leader in this industry, and as a result open software can help us to advance quicker, as the creative communities do not have to spend a large part of their development budgets on licences for middleware tools. The resentments among the large industry stake – holders towards open software is comprehensible to us and will be respected to a certain degree – but in some areas it must stand back as they are not taking European Developers forward quickly enough. In our opinion it is also important for the commission to realise that single project research support alone will not be sufficient to ensure acceptance by the European Developers. Any middleware projects must not just be operated from a snapshot research perspective, but must imperatively provide developers with long-term support and update perspectives as game technology (hardware + software) advances over time. A long-term perspective to this entire matter is very important.

The commission might set in place a system which assures interoperability of open software solutions aimed at the creative industries, which have been supported by the EU, a member state or a region within the EU. In the time until 2013 the public support for open software game development tools and middleware is likely to increase, but the interoperability is not secured due to different legislations. Research projects should be set up that will investigate where it makes or does not make sense to standardise, and then actually also establish and document software solutions to standardize these different activities.

The most important issue is the question of technological and legal obstacles to place a game on a game terminal. These obstacles must be analysed in depth and solutions must be found to overcome them. It is not sure that financial support alone can help in this situation, this question definitely also has a regulatory dimension.

## 5. The ubiquitous game

Innovation in game genres includes the development of completely new kinds of games based upon pervasive and ubiquitous computing environments; these games represent an area of high innovation and commercial potential unconstrained by significant entrenched business models and commercial structures. Innovation in engine technologies, architectures and production systems can feed into these new markets as well as into existing markets for contemporary computer games.

In the users area games will become the most important entertainment fields over the next ten years. Their impact on society will be constantly growing – mainly outside of public regulation. Communities will be content-driven, not platform driven. For communities the genre – orientation will remain an important element, but experience shows that games cross genres. New games or inventions of new types of genres can be very successful in a limited number of cases.

A complete replacement of the value chain by a content creation network is not likely to happen. So called ‘Mods’ (Modification of and new creations for existing games created by end customers) and adaptations will stay important as long as they are tolerated by the IP holders. But there will always be a certain amount of people that create content for others to be aggregated and dispatched and finally to be consumed.

Two types of business strategies are emerging.

The technological cutting edge of strategy with quickly raising production costs, high personnel and strong power requirements is targeting mainly the mass market. This will be very expensive and therefore only produced by very few. Many of these productions might eventually not come from Western Europe.

The other will be the small business case. Here we will eventually see some games similar to arthouse films. Produced on a small budget, highly content – related, and original with a smaller target group. Technically they will have to rely more strongly on open source elements because they cannot afford to use commercial and expensive game middleware (which is key to work in a content-driven manner). These productions are a chance for Europe and these products will be the trigger of content-wise innovation (similar to the film industry today) and eventually inspire the mass-marketers.

Based on the assumption that interactive entertainment requires higher attention than passive entertainment, there is a good chance that more and more advertisement-driven projects will be realized similar to (and in replacement of) of free TV. This means that more games will be dispatched for promotional reasons, or will simply contain more promotional content. In this context it is likely, that interactive entertainment takes over characteristics of free TV, such as series or episodic elements. On the other hand subscription based charging models are good for quality, as the gamers have to be convinced by the games themselves and not by the icons. In this area we believe long-term, quality-based strategies for focused communities can generate new business arenas – just as profitable as the others.

## 6. Research and game development

The essence of game development is research. The game industry, however, has not traditionally labelled its work “research” but simply done what is necessary to get the user experience right. Many areas of research in commercial game development touch on or overlap traditional industrial or academic research; however despite this fact, the industry has made few efforts to co-ordinate its own research with that of the academia, adjacent industries or even within the game industry. But this is changing rapidly. The academic community has taken more and more interest in game related studies in recent years and the traditional game industry has begun to learn about the advantages of knowledge transfer to games for everything from simulation to viral marketing tools.

Game development companies have begun recruiting not only from the engineering institutes, but also from dedicated game development educations and internships for students at game studios have become common practice. Research may also lead to the accelerated creation of specialised companies building middleware for game companies (eg. for graphics rendering, physics simulation or artificial intelligence).

Game research can provide technical innovations supporting new game features and concepts, by investigating new markets and player groups and their design requirements, and investigating new game concepts by the production and evaluation of demonstrators. Traditional industries like the automotive industry or construction industry call upon game developers to solve their simulation requirements.

Some research topics cover the following elements. Man-machine interfaces will change and in consequence the logic of media consumption will be different. In this context we require tools to reduce costs in order to automate processes. Technologies such as automated (procedural) content creation are emerging and will gain importance. Personalization and Service, agent techniques are another important subject. 3D graphics, physics and artificial intelligence (AI) research, as well as gaming theory as such are also highly relevant topics.

## 7. South Korea

A good example of a well established and implemented strategic approach on game policy can be observed in the republic of South Korea. The focus of the market has already shifted to online distribution thanks to high penetration of broadband and the ‘PC-room’ culture (A bit similar to Internet Cafes, which are called ‘PC bans’ in Korea and are frequented enormously just to meet and play online). In 2004 61,9 % of the revenues sold per platform were spent on online games, 13,7 % arcade games, 3,2 % PC single player retail games, 11,3 % console games and 9,8 % mobile games.

Computer games are perceived as cultural medium and in addition as high-end technology. The content – side is considered as the key to boost hardware sales in higher quality and numbers. Further the economic side is also seen in the growth of the content – economy as such. The technological and economic importance of games is already well set in the public awareness. The cultural dimension is actively seen and even supported by the government.

The Korean government is following a precise plan. The policy approach could be described as "concentrated action", built on several columns. The government supports the production of games in giving financial development support. Further it initiates and supports activities which support the development indirectly. The Ministry of culture & sport unites now nearly all responsibilities for game relevant topics under one roof and created a specific institution, the KDGI (Korea Game Development & Promotion Institute).

The KDGI understands itself as one stop support system that is active in all game relevant fields. Since 2000 it sets its infrastructure achievements at disposal. The direct development support of computer games deals in particular with the needs of small to medium enterprises. The KDGI provides financial support for the development phase (Pre production, quality writing and prototypes) and incubators.

The institution funds research on standardisation questions in close co-operation with training institutions and generates data. In 2005 alone the KDGI allowed 236 enterprises to participate in international trade fairs. Other activities support the cultural value of games. Law projects support these initiatives. Apart from the national promotion there are also regional institutions e.g. in Seoul the SBA or those in the region directly in the north of Seoul. These stand in strong competition among themselves around the settlement of the new rising enterprises.

Last but not least it is questionable that this focused Korean approach towards on massively multiplayer online games will not be the correct approach for Europe if just seen isolated from the rest of the world. Many European SME development studios create so far classic PC and console games and are therefore today depending on success in the North American and even Japanese markets. It is important to find a balance between classic PC and console game development as well as online games and mobile gaming applications. The requirement for affordable, accessible, high performance middleware is what unites all these different sectors. Time will show, if the "Korean approach" will supersede.

EGDF, 2006

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