



SALERO

Digital Media Technology, Research, and Production Trends Report. Version 3

SALERO Deliverable D10.3.3



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Author(s) and company: G. Vilar, S. Miarnau (AM), M. Yan (DTS),
R. Fach (GVG), R. Villa (UG), T. Stolt,
M. Tuomola (TAIK), G. Kienast, G. Thallinger (JRS),
T. Bürger (LFUI), C. Goodman (PGP),
M. Matthews (BLITZ), A. Evans (FBM-UPF),
O. Mayor (UPF), C. Cullen (DIT).

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1 Executive Summary

This deliverable follows on from the D10.3.2 survey of digital media technology trends, delivered in November 2007, and maintains the same approach to identifying trends in the development of intelligent media technologies and services. D10.3.3 was written in October 2008 towards the end of the third year of the SALERO project, and while many of the trends have developed as predicted, some unpredicted and potentially disruptive technologies have appeared.

Through both the professional and domestic sectors, we continue to see convergence taking place between digital technologies to create the necessary preconditions for Intelligent Content and the funding of a significant body or research designed to add intelligence or smart functionality to media tools, products and services.

2 Introduction

2.1 Purpose of this Document

To exploit the results of SALERO successfully, it is necessary to understand the present and evolving market place. Gathering information on this is time consuming. Currently, while each manufacturer carries out what market awareness studies they can, these are restricted to their individual niche and location within the chain: because of time and cost pressures, each manufacturer tends to look only at his direct competition.

The Integration of activities within the consortium provides SALERO with the opportunity to make an economy of scale and carry out this function at a project level to produce a broader picture of Intelligent Media technology and markets as they evolve, to the benefit of all the partners and as the basis for exploitation planning.

This Deliverable is the third in a series of reports designed to record and present trends in media production in the sectors that would be interested related to SALERO outputs (including the Film post production area, broadcasting postproduction, games production, 3-D Animation, On line Streaming, mobile content production and audio post production) and trends in research that may support the development of intelligent content technologies.

2.2 Scope of this Document

This document concentrates on events and developments occurring in the period from 1 December 2007 to 30th November 2008.

2.3 Status of this Document

This is the final version of D10.3.3

2.4 Related Documents

Before reading this document it is recommended to be familiar with the following document:

- D10.3.1 Digital Media Technology, Research, and Production Trends Report. Version 1
- D10.3.2 Digital Media Technology, Research, and Production Trends Report. Version 2

3 Digital Media Technology Today

3.1 The Content Sector and Creative Industries

The creative industries or creative economy refers to a set of interlocking tertiary industry sectors and are often cited as being a growing part of the global economy. As a representative example, the UK Government Department for Culture, Media and Sport (DCMS) defines this as follows:

“Those industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property.”

This is broadly non-contentious; the DCMS also identifies eleven creative sectors:

Advertising, Architecture, Arts and antiques, Crafts, Design, Fashion, Film / Video / Photography, Software / Games / Electronic Publishing, Music and Visual Performing Arts, Publishing, Television and Radio.

“The DCMS list has been influential, and many other nations have formally adopted it. It has also been criticized. It has been argued that the division into sectors obscures a divide between lifestyle business, non-profits, and larger businesses, and between those who receive state subsidies (e.g., film) and those who do not (e.g., computer games). The inclusion of the antiques trade is often questioned, since it does not generally involve production except of reproductions and fakes. The inclusion of all computer services has also been questioned” (Wikipedia)

Caves¹ (2000), provides another interesting insight: in that creative industries are characterized by seven economic properties:

1. *Nobody knows principle*: Demand uncertainty exists because consumer reactions to a product are neither known beforehand, nor easily understood afterwards.
2. *Art for art's sake*: Workers care about originality, technical professional skill, harmony, etc. of creative goods and are willing to settle for lower wages than offered by 'humdrum' jobs.
3. *Motley crew principle*: For relative complex creative products (e.g., films), the production requires diversely skilled inputs. Each skilled input must be present and perform at some minimum level to produce a valuable outcome.
4. *Infinite variety*: Products are differentiated by quality and by uniqueness: each product is a distinct combination of inputs leading to infinite variety options (e.g., works of creative writing, whether poetry, novel, screenplays or otherwise).
5. *A list / B list*: Skills are vertically differentiated. Artists are ranked on their skills, originality, and proficiency in creative processes and/or products. Small differences in skills and talent may yield huge differences in (financial) success.
6. *Time flies*: When coordinating complex projects with diversely skilled inputs, time is of the essence.
7. *Ars longa*: Some creative products have durability aspects that invoke copyright protection, allowing a creator or performer to collect rents.

The above can be viewed as useful background information when looking at the creative sectors in the light of a) SALERO and b) recent economic downturn.

In SALERO; plainly not all of the eleven DCMS sectors are addressed; it seems reasonable to say that Advertising, Film / Video / Photography, Software / Games / Electronic Publishing, and Television come under the scope of the project. In the context of SALERO it is useful to review each of these in terms of a) technology, b) commercial trends, c) impact of downturn.

¹ Richard Caves from Harvard University, <http://www.economics.harvard.edu/faculty/caves>

Advertising

There will be more detail on this later in this document, but PGP was recently invited to attend a Royal Television Society discussion with Sir Martin Sorrell, chairman of WPP group, owners of J Walter Thompson, Grey Advertising, Young and Rubicam and around fifty other creative services companies and generally considered to be the largest advertising group in the world. It is generally representative to note that in the past two years WPP stock price has halved in value.

Traditional advertising is under intense pressure from online alternatives, most especially Google; from December 2006 through to August 2008 the value fell by 200 points as a result of this encroachment. By September WPP had in fact recovered somewhat, peaking at 557; at writing this had fallen to 345.25 with very large numbers of shares being dumped – this latter would appear to be as a direct result of the credit crunch, and the assumption that WPP will suffer as ad spends are cut back further and clients go bust.

Technology can be viewed in traditional terms of contribution and distribution, but the two are inextricably linked. In distribution, there is a 'significant' move away from old media to new, and in new media it is the search engine companies which predominate. In contribution budgets are plainly under pressure, so new technologies (such as the use of HDRI and CGI images for car advertising) are employed wherever they do not compromise the creative standards, which remain extremely high.

Film / Video / Photography

In this rather broad sector digital imaging tools have had massive impact. Again contribution and distribution models can be referenced. In film and video the event (or possibly non-event) of the year was the failure of the HD-DVD format proposed by Toshiba in favour of the Sony Blu-Ray system. In general, whilst sales of flat panel televisions have been a success story, the switch to HDTV has been less than successful. Sony was relying on the success of Play Station 3 to launch Blu-Ray in the same way Play Station 2 created a significant upswing in the DVD market. This did not happen. Toshiba exited the high definition DVD format market on the belief that it will never happen, and that electronic download of high definition movies will instead become the norm. In that regard them and most other manufacturers in this area are now producing low cost 'up-scaling' DVD players in a deliberate bid to undermine Sony.

On the contribution side, the release of the Red One camera in 2007 seems to have been the significant event in video of the year. "The Red One was announced in 2006 and released in 2007 as the first camera produced by Red Digital Cinema Camera Company. It has a 12 megapixel bayer pattern CMOS sensor, called the Mysterium. The sensor measures 24.4 mm x 13.7 mm, and has 4520 by 2540 active pixels, though the camera only records data from a 4096 by 2304 pixel area in normal operation. The Mysterium sensor has about the same active area as a Super 35 film frame masked to the 16:9 aspect ratio, allowing the same depth of field to be produced in conjunction with lenses designed to cover the 35 mm film format. The camera also allows the sensor to be used in a windowed mode in which the sensor can emulate the active area of a Super 16 film frame while capturing 2048 pixel resolution footage. This allows the camera to be used with Super 16 lenses."

In business, studio owners seemed to be experiencing mixed fortunes; Viacom fell 63.42% year on year against the Dow Jones Industrial Average drop of 37.02%; Dreamworks SKG showed unusual volatility but managed to reach mid December 0.37% up on the year, which is extraordinary; Jeffery Katzenberg made recent claims as to the 'recession proof' nature of the business. MGM Mirage fell 88.78% (like Disney, hotels were a factor in this). News Corp (owners of 20th Century Fox and Fox Broadcasting) were down 62.85% year on year.

In terms of computer generated imagery, the acquisition of Soft Image by Autodesk from AVID ranked as the most notable event of the year. This means that one company now owns three (Max, MAYA, XSI) of what were once considered to be the four (Lightwave being the fourth) production CGI software systems. Lightwave now retails at around USD 900, as compared to USD 4000 for MAYA. Plainly consolidation is the order of play here.

In photography, digital photography continues its inexorable encroachment on the market.

Film (media) production is scaling down globally in both consumer and professional markets. In professional use cameras capable of shooting 12 – 14 megapixels in 14 bits per pixel raw mode are routinely used. In consumer 10 megapixel cameras fell below the £200 mark. Kodak recently

announced a flash memory HDTV resolution home video camera to compete with the increasingly popular Flip video cameras; it is priced at £130.

Software / Games / Electronic Publishing

The surprise success of the Nintendo Wii continues, however X-Box and Sony Play Station 3 penetration has increased as a result of retail price reductions. The PC games market is anticipated to benefit from the falling price of notebook computers. A number of manufacturers are now promoting sub £300 notebooks with quite competitive specifications. However Intel is predicting a marked slowdown in chip sales in 09, and their stock has halved during 08; AMD have fared somewhat worse, their value is now at 25% of the 2007 close. In contrast Nintendo saw sales remain strong:

"Following combined hardware sales in November of more than 3.6 million units, Nintendo has said its products "fuel the engine" of the industry. The Wii sold 2.04 million units during November, a record for a non-December month, according to Nintendo, while the DS shifted 1.57 million units.

"Looking at the industry as a whole, Nintendo products continue to fuel the engine of the videogame industry," said the company in a statement.

"In November alone, Nintendo represented 198 per cent of industry growth over 2007. Nintendo systems represented 66 per cent of all hardware sales in November, including 59 per cent of all console sales and 79 percent of all portable hardware sales."

The DS has now sold over 24.6 million units in North America since launch in 2004, while the Wii has sold 15.4 million units in the region since November 2006." (Gamesindustry.biz)

Nevertheless Nintendo's share price was affected badly by the fall in the Nikkei index in Tokyo; by October 08 it was 50% off. It is harder to make comparisons with Sony (Play Station) and Microsoft (X-Box) because of the diversified nature of their businesses; however Sony Corporation Nikkei listing had fallen from around 6000 in December 07 to a low of 1800 a year later, with generally bad performance (70.48% loss on year as against 46.99% loss on the Nikkei 225 average). Microsoft saw a 46.51% decline year on year in comparison to the Dow Jones Industrial Average falling 37.59%. (Nintendo were down 48.61% as against the 46.99% of the Nikkei 225, which at least suggests a neutral performance overall). Google fell 56.70% (Dow fell 37.59%) and curiously Yahoo only lost 47.33%, but takeover speculation muddied this picture.

The movement of consumers online seems inexorable in many areas. Indicators include: the continued expansion of Facebook and similar social networking sites, the switch from television to the web in the children's market, continued revenue increases from virtual worlds such as Club Penguin (but consolidation in the market as venture capital backed companies fail to achieve next-round funding due to credit-crunch) (Note Disney's stock price; this has been stable throughout 08 until Q4 where it halved, but on expectations that revenues from travel destinations would fall dramatically – media components remained broadly stable). BBC iPlayer proved extremely successful in terms of adoption but less so with ISP's (because of the bandwidth consumed) and legislators because of anti-competition issues. Project Kangaroo, a joint venture between BBC and ITV in the UK aimed at moving towards a walled-garden on-line video solution was blocked by the competition commission. In the US the Federal Trade Commission prosecuted Sony BMG for infringement of COPPA laws:

"Sony BMG Music Settles Charges Its Music Fan Websites Violated the Children's Online Privacy Protection Act; Company Will Pay \$1 Million Civil Penalty.

Sony BMG Music Entertainment (Sony Music) has agreed to pay \$1 million as part of a settlement to resolve Federal Trade Commission charges that it violated the Children's Online Privacy Protection Act (COPPA) and the Commission's implementing Rule. The Commission's complaint alleges that, through its music fan Web sites, Sony Music improperly collected, maintained and disclosed personal information from thousands of children under the age of 13, without their parents' consent. The civil penalty to be paid by Sony Music matches the largest penalty ever in a COPPA case.

COPPA prohibits unfair or deceptive acts or practices in connection with the collection, use, or disclosure of personally identifiable information from and about children under 13 on the Internet. The law requires operators to notify parents and obtain their consent before collecting, using, or disclosing children's personal information."

Television

According to a survey commissioned by video search service, Blinkx, almost 70% of adults in Britain go onto the internet while watching television. Younger viewers are particularly fond of going online while watching TV - over 20% of 16-24 year olds said this was something they always did. The survey found that 30% of those going online while watching television did so to search for products or services featured in the program they were watching, while 27% searched for information on advertised products. Blinkx also found that it is becoming increasingly popular to watch TV programming online. Over 50% of British adults with access to the internet watch programming online. One in five watches full-length television shows, movies or sporting events online. News is the most popular online viewing category, viewed by 31% of men and 22% of women with online access. Sport is watched online by 27% of men but only 8% of women, while comedy is popular with younger viewers. Around 35% of 16-24 year olds watch comedy content online, compared with 16% of those over the age of 55.

The survey was conducted for Blinkx by Harris Interactive. It took place in February 2008 and covered a representative cross section of 2,471 adults in the United States and 2,228 users over the age of 16 in the United Kingdom.

TV Week magazine reported the following in May 2008:

“Low ratings during the February sweeps may have been a fluke due to the writer’s strike, but the May sweeps period is painting a picture of viewers out of sync with broadcast television: Shows across multiple networks rang up series lows during a time that historically lures in the viewers.

On average, the networks are off the mark by 10% from last year in total viewers and off 17% in the 18- to 49-year-old demographic.

Consistently performing shows like ABC’s Grey’s Anatomy, NBC’s Deal or No Deal and Fox’s The Simpsons garnered ratings near or at their series lows in the 18-49 demo during this May sweeps period, which began April 24 and ends May 21.

The sweeps period is important in determining ad rates for TV stations, and lower viewership might send ad buyers looking elsewhere, including cable and the Internet.”

By the same token, Universal McCann published a report that suggested that new media is rapidly becoming mainstream media right around the world. It is worth restating some of these findings (below).

The comparative study looks at social media trends through three “waves”:

- Wave 1 - September 2006
- Wave 2 - June 2007
- Wave 3 - March 2008

Research highlights:

- Social media is a global phenomenon happening in all markets regardless of wider economic, social and cultural development.
- Asian markets (not including Japan) are leading in terms of participation, creating more content than any other region
- All social media platforms have grown significantly over the three Waves: Video Clips are the quickest growing platform, up from 31% penetration in Wave 1 to 83% in Wave 3
- 57% have joined a Social Network, making it the number one platform for creating and sharing content: 55% of users have uploaded photos, 22% of users have uploaded videos
- The widget economy – 23% of social network users have installed an application – 18% of bloggers have installed applications in their blog templates
- Blogs are a mainstream media world-wide and a collective rival to traditional media (184m bloggers world-wide, China has the largest blogging community in the world with 42m bloggers) – 73% have read a blog, 45% have started a blog
- Social media has strong impacts over brand’s reputation – 34% post opinions about products and brands on their blog – 36% think more positively about companies that have blogs

The report offers additional details on Internet media use:

Video Sharing:

- Brazil leads on 68%, Asian countries dominate (not including Japan)
- Significant variation in involvement (Hungary 16% < Brazil 68%).
- High frequency of involvement: 20% are uploading every day

Watching video clips:

- Growth is universal across all countries (31% to 82% global reach seen in all markets)
- Lowest difference between markets of any social media platform (Range 63% – 99%)
- Very high frequency medium: 71% weekly reach

Downloading podcasts:

- Growth *massive* between Waves 2 and 3 (from 21% to 49% world-wide).
- China is the world's biggest podcast market (74% use, with an estimated 45m users)
- Actively involved medium: 18% listen and download everyday

Methodology:

Universal McCann Wave 3 survey was conducted on 17,000 internet users in 29 countries and was completed in March 2008.

In general, television companies under-performed against an under-performing market; ITV fell 55.67% year on year as against the FTSE 100 decline of 33.17%. BSkyB fell by 22.37%. Pearson fell by 10.80%, Thompson Reuters by 22.76% and Reed Elsevier by 37.08%.

Conclusions

The content sector and creative industries are beset by the current volatility of the markets as is the rest of business, but there are marked differentiators. Hardware related activities seem especially prone to drops in value, although Nintendo in particular seems to be suffering from external factors which appear to undervalue them in the long term. Film studios such as Disney which have in the past relied on their theme parks and hotels to get them through lean periods in the movie business seem to be finding these causing a drag on profits as vacation destinations lose popularity. Advertising is seeing a shift online as the balance of power moves away from traditional to new media. Television is suffering globally, but is beginning to move into new content creation areas.

Pressures on costs in production are increasing; games seem to be out of step with the rest of the market here. As Film studios put pressure on effects budgets and squeeze primary (movie theatres) and secondary (DVD et al) distribution channels, many games companies seem to be trapped in the same escalating cost cycle Hollywood experienced a few years ago. The result of this seems to be reduction in staff (as with Sony Games). Smaller, leaner games companies seem to be well positioned if they can weather the credit crunch.

Overall media seems fairly well set to weather the current economic climate providing over-reliance on advertising revenues (which are set to fall or be moved to new media) can be avoided.

3.2 Domestic Digital Media Technology

3.2.1 Introduction

Domestic digital media technology has continued to evolve and grow during this third year of the SALERO project.

In the area of mobile devices, Apple has moved one step further launching the iPhone 3G that gives fast access to the Internet and email over mobile networks around the world. This launching has entailed that other manufacturers as Nokia and Siemens have designed new devices with touch screens and 3G connectivity.

This year there has been a clear winner in the so called “next-generation DVD format war” between HD-DVD and Blu-Ray.

Also, new technologies have appeared to let multiple devices connect to the television or to different digital devices. Game consoles have incorporate new functionalities that have made them not just an object to play with but also an important media centre for the living room.

The last point explains how user generated content can be exploited.

3.2.2 HD-DVD and Blu-Ray

At the beginning of 2008, Toshiba, the main proponent for HD-DVD, announced the discontinuation of HD-DVD format². This effectively ended its HD format war with Sony's Blu-Ray that had lasted for several years. It was widely believed at the time that the single remaining format would end the confusion and clear the way for market's take-up of HD format. However, sales of Blu-Ray players fell short of projection due to several reasons. The main one is its pricing point being too high when compared to its gain in picture quality, at least for average consumers. The subsequent downturn in global economy only added to the slowness to Blu-Ray sales, and Sony has recently lower down its sales figure from earlier project budget for 2008. Yet, they are signs and hope that it may pick up again during coming festive seasons. Blu-Ray units with pricing point below US\$150 is expected to come onto market, and new PS3 unit with HDMI 1.3 support may also boost sales with its on board Blu-Ray player.

3.2.3 “Digital Living Room”

Since the advent of the internet, we've steadily moved away from the living room television as the hub that connects us with the rest of the world. The rebirth of the sector of television manufacturers originated with the HDTV and with HDMI enables the connection of many devices to televisions. Every device has a place in a home theatre in which we connect the web and the existing social networking platforms. Devices like Wii, Slinbox, Vudu, TiVo, Apple TV of even the digital cable STB allow people to connect their television and their living room to the rest of the world. This fact will obviously change the way that we consume television and some content and technology providers are creating synergies to be ready to new digital consumers.

The certification DLNA has to be mentioned as a new way to create networks between different devices as PCs, consumer electronic products and mobile devices. It lets consumers to acquire, view and manage an increasing variety of digital content, in an easy and way from any location in their home and beyond. This digital network will deliver the freedom that consumers desire, while providing manufacturers the opportunity to innovate and differentiate their products.

3.2.4 Games

The current generation of games consoles is now well established with an estimated total installed base of 75m Microsoft XBOX 360, Sony PlayStation3 and Nintendo Wii machines in global households (Financial Times Dec 08). The global installed base of PCs has passed 1 billion and is said to be growing at 12% per year (Gartner July 2008), while half of the world's population now carries a mobile phone (Mobile Intelligence Statistics).

Handheld games devices such as the Nintendo DS and Sony Portable PlayStation (PSP) also have good market penetration. Screen Digest forecasts that at the end of 2011, Nintendo DS will have an installed base of 112 million and PSP, 67 million.

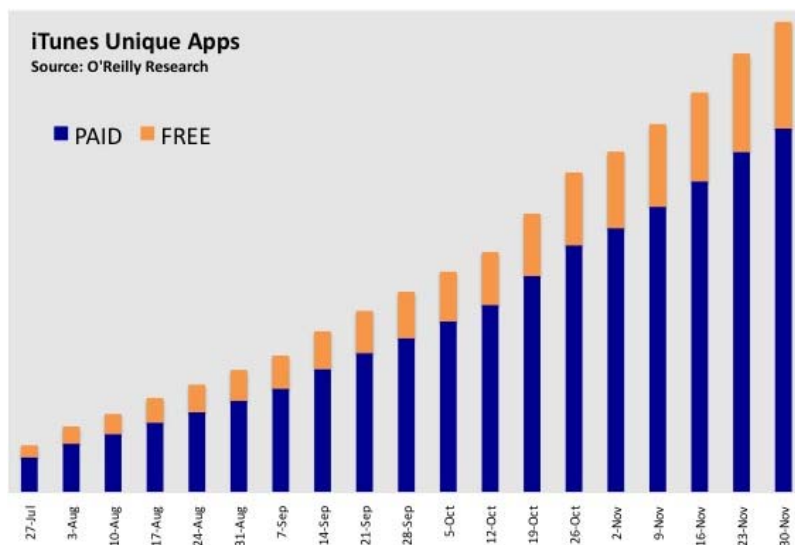
The majority of the top ten selling boxed games in November 08, traditionally the peak period for sales, were sequels rather than original ideas. This demonstrates the difficulty of bringing full scale new IP to the hit driven retail market due to the high investment, approximately \$25m, and therefore high risk involved. Digital distribution is becoming a useful route to market for developers wishing to bring new IP direct to consumers. New business models are emerging that see some games sold directly, some games sold to publishers and some being commissioned outright. The size of game that can be distributed is smaller and therefore the risk is lower and the challenge of creating an engaging game is a small file size is spurring innovation. There have been some experiments in creating episodic downloadable games, which build to become a larger game, but we have yet to see a ‘blockbuster’ in

² http://www.toshiba.co.jp/about/press/2008_02/pr1903.htm

this space. Distribution and multiplayer services such as Steam support players to access larger games over the internet via PC. In October 2008 Steam claimed to have over 16 million active user accounts.

The casual or short session games market, whether downloaded to console, played online or via mobile has seen good growth in 08. One study by Research and Markets³ estimates that the casual games market will be worth 9.2 billion Euros by the end of 2008 and projects that by 2012 casual games across all platforms will account for 46% of the games industry's total sales. Most of the major games publishers like EA and Ubisoft have made significant investments; Disney and SEGA have launched their own casual games portals. In June US broadcaster NBC bought a controlling stake in the German casual games portal Bigpoint for \$110m. The first conference solely dedicated to discussion, showcasing and evaluation of casual games was held in London in 08.

Mobile gaming is growing with the launch of the iPhone and the new 'Google' phone, which offer open SDKs giving more certainty in performance and a clear route to market; these are attracting content, widget and mini game producers with mainly small innovative applications sold for low prices. At the end of November 08 the average download price for an iPhone app was \$2.60. The high numbers of applications on offer, with poor visibility in search menus for many games means that this is currently an unproven route to market for games companies with high production costs and technology more suited to consoles or high end PCs. Companies solely focussed on servicing mobile and handheld devices are emerging, many with cross platform technology which rapidly repurposes games for these platforms. Some of these companies have a heritage in the videogames industry and have made a strategic move to reduce the risks of the high investment needed to produce a 'Triple A' video game title. Others have come from web development, seeing a new market to enter or to extend their web offer. 2008 saw many of the videogames industry's iconic titles such as Lara Croft appear on mobile platforms, an indicator of the improvement in 3D graphic capability.



A trend that has continued to grow in 08 has been the movement towards 'purposeful play', which is targeted at a wide demographic and offers user friendly, intuitive interfaces and control devices. These games, such as Nintendo's Wii Fit offer an opportunity for self-improvement in a fun environment. Nintendo's lead in this market has brought a new demographic to games, with organisations such as Age Concern using the Wii Fit and Wii Games to support the UK's elderly in keeping fit and mentally agile. An extension of this genre is the current drive produce music games such as the Rock Band, Guitar Hero and Karaoke series. Here improvement in musical prowess, whether singing, drumming or playing guitar is at the heart of the games. SALERO's approach to find ways of working smarter not harder is essential in this market where rapid production and a first to market approach can secure best market share.

Music games are also bridging games and the web through social networks, which enable users to share their performances captured either in game or via a webcam. Sony's Sing Star community site had 140,000 European registered users in October 08 who, combined with visitors to

³ http://www.researchandmarkets.com/reports/659480/casual_gaming_games_for_everyone

<http://www.singstargame.com> shared over 20,000 videos of their SingStar performances that have been watched a total of 2.5 million times. This crossover is a trend that is expected to continue and may also bring complete, pervasive interconnectivity through games that have a console, web and mobile presence and which are interlinked rather than being played separately.

Web based games, usually created in Flash or Macromedia have become a preferred tool for many corporates and broadcasters to engage audiences more deeply with their brands. While advertising budgets in general are under pressure, spending online is predicted to be stable in the coming year, representing a bigger slice of overall spend. The BBC has invested in a virtual world for children, which extends the Cbeebies and CBBC experiences. In both sites users enter the virtual world and can then play minigames, which ensure the sites have 'stickiness'. Not all of these games are built in the traditional sense, there's an emerging trend for Alternate Reality Games – where the aim is often to collect clues from the web or physical locations using GPS enabled mobiles and then solve a web based puzzle either individually or as part of a community. UK based company Six to Start⁴ is one of the market leaders in this field.

In game advertising has moved into the mainstream and is likely to also continue to grow in 2009; in 2008 US presidential candidate Barak Obama placed advertising on a dynamic billboard in a number of online XBOX 360 games, including Burnout Paradise, pictured below.



Advertising market research company eMarketer predicts that spending in the USA on adverts using games platforms will almost double by 2012.

US Video Game Advertising Spending, by Segment, 2007-2012 (millions)

	2007	2008	2009	2010	2011	2012
In-game advertising* total	\$295	\$403	\$511	\$589	\$625	\$650
Console-and PC-based	\$90	\$117	\$143	\$162	\$169	\$172
Web-based	\$205	\$286	\$368	\$427	\$456	\$478
Advergaming	\$207	\$262	\$311	\$339	\$344	\$350
Video game advertising total	\$502	\$665	\$822	\$928	\$969	\$1,000

*Note: *includes static ads, dynamic ads, product placements, game portal display ads and sponsored sessions; excludes advertising on mobile games*
Source: eMarketer, February 2008

092325 www.eMarketer.com

Web based Massively Multiplayer games have continued to increase their market; World Of Warcraft, which has 62% of the MMORPG market, reached 10 million active subscribers in April 08. There is a growing interest in virtual worlds with social, enterprise and commerce applications such as Second Life, Club Penguin and mirror worlds like Twinity. There are already 100 virtual worlds with more planned to launch in 09. Research organisation Gartner (Virtual Worlds What to Expect in 2009, Prentice) estimates that by 2011 80% of heavy internet users will have a presence in one or more

⁴ <http://www.sixtostart.com>

virtual worlds, however Gartner also estimates that only 10% of active users pay for premium content. Virtual Worlds Management⁵ estimates that close to half a billion dollars has been invested in Virtual Worlds in 2008.

2008 also saw the world's first game that is largely generated by users. Little Big Planet, which is exclusive to PS3. While games like the Far Cry and Halo series offer mapmaker tools for players to create and share their own scenarios, they stay within the game's structure and gameplay. Little Big Planet imposes no genre, narrative and little gameplay structure. The game contains a bank of assets that can be combined to produce the illusion of a limitless sandpit experience; it also offers users the tools to upload photographs and video to incorporate into their worlds, which can then be shared on line with a community. The developers Media Molecule publicly acknowledged that it had been a challenging experience and that the more they limited the users' access to assets, the better the experience for players became. Further expansion of this new genre is likely to benefit from SALERO's insights into intelligent content creation due to the high level of asset reuse, retrieval and repurposing required.

The crossover between film and game promotion continues, 2008's latest instalment in the James Bond series of films 'Quantum of Solace' saw film footage and ingame footage used to promote both entertainment experiences in the same trailers. More generally the number of video games advertised using cinema and TV trailers has increased in 2008 as video games are increasingly accepted as mainstream entertainment.

The games industry is said to be outperforming other sectors in the global financial crisis that has emerged in the last quarter of 2008, however it should be noted that this is based on retail sales figures rather than investment in new games. The world's games publishers and the console manufacturers have all lost market value. Early indications are that publishers are re-evaluating their portfolios of planned games and are divesting themselves of both staff and internal studios to cut overheads and improve profitability. This will undoubtedly lead to a more difficult production climate in 2009 and SALERO's approach of working smarter not harder, of improving the efficiency of production pipelines and of procedurally generating content will be an important contributor to the sector's survival, if not outright growth.

3.2.5 User-Generated Content

Exploitation of user generated content as a tool for both social networking and increasing the 'stickiness' of web sites continued during the course of 2008, but a number of interesting trends started to develop. The first of these might be described as 'semi-professional' or 'professionally augmented' content, where users are encouraged to re-purpose media assets of one sort or another in order to extend a brand or property. A number of Movie releases used this technique on promotional web sites, most recently 'The Day the Earth Stood Still' which encouraged users to create speculative artwork for one of the central characters. In particular Disney, with Pixie Hollow, a virtual world to support the 'Tinkerbelle' movie and Nickelodeon with various Sponge Bob Square Pants activities made use of this approach.

Professionalism seemed to be a recurring theme in 2008 with UGC, with the number of semi-professional movies being created with inexpensive equipment and being posted on You Tube on the increase. Productions from pastiches of Pop videos to fan-flicks of movies and TV series benefited from better quality domestic cameras, editing tools and more capable camerawork and editing.

The question of revenue generation still remained; Mark Zuckerberg famously commented that he would be able to figure out a business model for Facebook 'in a couple of years'. Price Waterhouse Coopers held a small industry event which questioned the sustainability of advertising revenues in this market, except in a 'long-tail' model.

The issues surrounding the publication and moderation of UGC began to crystallise; increasing international co-operation between legislators and enforcement agencies made the prosecution of defamatory or libellous material, copyright infringement and file sharing more practicable. The US FTC's actions against Sony were an example of how this tendency towards regulation and prosecution is set to increase, as was the increasingly punitive moves against file sharing sites such as Pirate Bay. Gradually the internet is becoming less of a 'wild west' environment.

⁵ <http://www.virtualworldsmanagement.com>

It has a long way to go though; the flip side of free publishing is the increasing use of UGC in traditional media, especially news. Use of content which from a production perspective would not have been considered broadcast acceptable just a couple of years ago is now routine. Increasingly users are becoming reporters it seems, and reporters are becoming celebrities.

3.3 Professional Digital Media Technology

3.3.1 Introduction

As usual the primary driver in professional media production is to bring down production costs at higher levels of image quality. New applications have to take this into account.

It can be seen that professional video is being infiltrated by IP networking technology as the costs of IP networks continue to decline both in absolute terms and relative to the costs of other types of networks.

It is expected that use of video over IP continues to grow in 2008 in terms of market penetration and new applications. Manufacturers of digital media equipment adopt this technology and incorporate IT equipment in traditional equipment using conventional 'broadcast networks'.

3.3.2 Acquisition

Electronic Film Cameras

As mentioned in the last report, the 'Red' camera has become reality. It has been used in several real productions. It seems that this camera system is getting acceptance in the 4K market while other digital acquisition cameras do not promise to fulfil commercial goals. Dalsa, the Canadian manufacturer of a 4K film stream camera, announced that they will quit the film camera business and sold the technology.

Point of View Cameras⁶

Point of view cameras are now ready for 2k digital cinema and are suitable for HD and adaptable for 3D applications as well. POV cameras become versatile platforms that can be utilized in mobile and fixed productions. HD-POV cameras have become a definitive requirement for special venues such as sports, hostile environments, or confined spaces where humans cannot get easy access to.

For versatility, the newest generation camera system features a capability of 45 format and frame rate conversions. Capturing and outputting video for 2K digital cinema formats at 2048 x 1080p and 2048 x 1080PsF at rates of 23.98, 24, 25, 29.97, and 30 frames/sec. The same platform handles HD resolutions of 720p, 1080i, and 1080p at rates of 24, 25, 30, 50, and 60 frames/sec, as well as NTSC and PAL.

Broadcast Cameras⁷

Replacement of legacy SD camera equipment will be a lengthy process worldwide and will be accompanied with a move towards file based cameras for many applications. As camera technology advances, lower level camcorders are becoming suitable for broadcast acquisition. Falling camera prices may mean users such as production companies will buy rather than rent.

There are now several file based options already available such as Panasonic P2 solid state cards, Sony XDCAM optical discs and Grass Valley's infinity range using REV PRO cartridges developed together with IOMEGA. Each system offers slightly different capabilities. At this time no trend can be seen that the industry settles upon one particular format. Future observations will show if and how multiple formats are able to co-exist in the media world.

Technology Progress

The past year has seen advances in on-board image processing for studio and handheld HD camera systems. Common packages include now:

⁶ <http://www.iconixvideo.com/products.html>

SMPTE Motion Imaging Journal September 2008

⁷ Karl Paulsen SMPTE Motion Imaging Journal September 2008

- precise control over skin-tone
- gamma correction to match contrast settings within the image
- range stretching for variable lighting condition compensation
- protective control over hue shifts in high light areas or brightly lit scenes.

Signal-to-noise ratios at or above 60 dB are being achieved with portable systems in the 54- to 58-dB regions dependent on the type of sensor.

The European Broadcast Union (EBU) colour matrix presets ensure that colour response is consistent when using the cameras in HD and SD video intermixing. Higher sensitivity for low-light shooting (F10 at 2000 lux) and low vertical smear (less than -130 dB) are coupled with even lower power consumption (in the range of 30 W without viewfinder).

3.3.3 Storage

According to the global market research group IDC, storage capacity is exploding at a rate of almost 60% per year⁸. That type of accelerated growth is forcing IT executives to rethink what type of storage system is best suited for their data and to consider the costs in light of shrinking floor space and rising costs of power. Business models for 2008 had to address new storage models as object based storage and so called "green storage technology" that helps companies reduce their energy expenditure. New forms of storage delivery such as online storage devices got attention.

Storage continues to become cheaper and cheaper. As a guide figure, the 'street' price for a Terabyte is typically €100 Euros (coming down from €300 in 2007). Hardware prices are just one side of a medal when digital media archives have to be considered.

The Science and Technology Council of the Academy of Motion Picture Arts and Sciences already begun to tackle the numerous challenges of archiving digital motion picture materials. Their report, *The Digital Dilemma*⁹, presents its research on current practices both inside and outside the film industry as well as investigates the implications of relying on digital technology for long-term preservation needs. The report includes case studies of motion pictures that were either "born digital" or used digital processes for production and mastering. According to this documentation the total costs per Terabyte of a hard disc based storage system were \$1500 in 2006. The expense for large tape storage systems were approximately 30% lower. It is interesting to note that storage media costs are less than one third of the total annual operating costs. Labour costs for maintenance, facility costs, license costs and capital costs have to be taken into account. In addition the ultimate total-cost-of-ownership calculation has to include the cost of data replication: that is multiple copies for data protection versus loss.

Amazon.com, the large online retailer, recently introduced an online storage service called Simple Storage Service, or S3, targeted at software developers. Customers can upload data to the S3 service and pay a monthly storage fee of \$0.15/month/gigabyte plus a transaction fee of \$0.10/gigabyte for data uploading and between \$0.13 and \$0.18/gigabyte for data access, depending on volume. This translates to \$1,843/terabyte/year for data storage services, plus \$102 per terabyte for initial data upload, plus between \$133 and \$184 per terabyte per access.

3.3.4 Special Effects¹⁰

Increases in performance of PC platforms lead to architectural designs that tightly integrate software and hardware with the CPU and interface cards.

Host graphics cards are getting more and more powerful and are widely used as number crunchers for image processing algorithms in addition to their primary function as interface for displays. Together with the almost established PCIe express bus new PC platforms can deliver an outstanding processing performance.

The high-bandwidth, high performance effects engines eliminate the lag time in responsiveness, improving the user confidence especially working with HD or even 4K material.

⁸ Source: Computerworld December 2007

⁹ Source: *The Digital Dilemma* http://www.oscars.org/council/digital_dilemma/index.html

¹⁰ SMPTE Motion Imaging Journal September 2008

The post-production process now combines 3-D applications typically tailored for architects, designers, and visualization specialists, opening a new door to combining isolated segments of visual design.

Technology from Autodesk, that took home its fifth Academy of Motion Picture Arts and Sciences honour with a Scientific and Technical Award earlier in the year, continues to lead the visual effects industry with releases of its Flame, Smoke, Lustre, Maya, Toxik and Motion Builder, which is augmented with new versions of 3Ds Max modelling, animation, and rendering software.

3.3.5 Post Production¹¹

For the past year, steady growth has been evident in software-based systems for editorial work, graphic and special effects, audio and video composition, and animation. Nonlinear editing (NLE) offerings continue to add new editing features and format capabilities that fill in the gap between the mainstream players. There is also tremendous pressure in the production community, especially in the high-end motion picture visual effects and finishing sectors, to move four times as much data than was possible a few years ago. More efficient workflows, more capability, and better interoperability are keys to managing and reaching those goals.

3.3.6 Industry trends

Last year this report indicated that the digital that 3D will continue to gather pace. Now it can be seen that 3D content is ramping up in several media areas.

Cinema¹²

In 2005, "Chicken Little 3D" was the first Digital 3D feature film shown in 85 theatres. The 3D version proved 5% of the total box office revenues. Since then 3D content is ramping up. All movies so far have been computer generated (CG) as it allows easy 3D content creation, along with 2D. This was the "Market Testing" period. In 2007, DreamWorks announced that all his CG content will be released both in 2D and 3D stereo starting from 2009.

At the end of 2007, there are 1298 3D screens worldwide, out of which 75% are located in the US (20% of all DCI screens worldwide are 3D). This number is expected to grow to 6000 by the end of 2009 out of which 4000 will be in the US (enough for a blockbuster release).

In the US, the number of 3D Digital Cinema is growing fast, supported by the successful 3D releases. At the end of 2007 approximately 18% of the cinemas are 3D enabled.

The cinema industry thinks that 3D provides interesting differentiation with home large HDTV to stimulate a cinema attendance which has been showing signs of decline. 3D is also a good anti camcorder system.

2008 can be considered as the beginning of the "Deployment Phase" during which enough content should be produced to operate one 3D screen by multiplex all year long (25-30 releases, one every 2 weeks). In 2009, in the US, it is expected there will be at least 21 films in 3D (out of about 500 releases a year). These will include the first 3D Live Action feature film released (Avatar, by James Cameron).

MUSIC - 3D concerts

In 2008, a new kind of content came to the theatre: 3D concerts.

American teen singer Miley Cyrus (15) did break records with the concert film "Hannah Montana/Miley Cyrus: Best of both worlds concert tour"¹³ during the starting weekend. The 3D concert movie made 31m\$ on the opening week end and was #1 of the weekly box office although it was playing at only 683 screens. Tickets were selling at 15\$ which is a 150% premium. The initial plan was to have the movie on for only one week. It has been extended to more than 3 weeks. Disney sold 2.5m Hannah Montana's CD (+DVD) Album in 2007 (20\$) yielding 50m\$. 3D concert yielded 60m\$ in 3 weeks with 15\$ tickets.

¹¹ Ibid

¹² Source : ScreenDigest, Thomson Strategy & Marketing

¹³ [http://en.wikipedia.org/wiki/Best_of_Both_Worlds_Tour_\(film\)](http://en.wikipedia.org/wiki/Best_of_Both_Worlds_Tour_(film))

http://www.digitalproduction.com/dp/news_detail.asp?ID=6214&NS=1

Irish rock band U2 released a 3D concert film using material shot during a 2006 tour¹⁴.

This is the first live-action film shot, produced, and screened exclusively with both 3-D and digital cinema technology. Footage from nine concerts was incorporated using as many as 18 cameras at a time. The material was edited together to create an 85 minute film featuring a 14-song performance.

The film was praised for its 3-D technology and innovation. After its preview screening at the 2007 Cannes Film Festival, the film held its premiere at the 2008 Sundance Film Festival, and was later shown at over 600 theatres internationally following its wide release in February 2008. It brought in US\$17 million after the first seven months, surpassing the film's budget. It received mostly positive reviews, with many critics stating that viewing the 3-D effects in the film was actually better than going to a live concert.

Sports¹⁵

The BBC test-screened the RBS Six Nations rugby match between Scotland and England live in 3D HDTV as a joint venture between BBC Sport and "The3DFirm", a consortium comprising media communications firm "Can Communicate". 3D specialist company "Inition" and hire and post production house "Axis Films".

Thought to be the first-ever live test screening of an international sports event in 3D HDTV via satellite shown to a selected audience, the process is very much at a test stage.

Home Entertainment¹⁶

Hyundai announced a new 3D TV set which is able to use 3D content which is distributed via satellite in Japan. The price of the 46" screen is below 4000€. Shipments are scheduled for Japan only. The TV uses stereoscopic technology called TriDef from DDD Group Plc in Santa Monica, California, which works by sending the same image separately for the left eye and the right eye.

Ryo Saito of BS 11, the cable channel that runs the 3-D shows, says more content is needed for the technology to catch on, and other manufacturers need to start making 3-D televisions.

The 3D glasses are expected to cost less than 20€ per piece.

2D digital Cinema¹⁷

While test installations of 3D digital cinema projects race forward the market uptake of 2D digital cinema technology remains slow. Growth in purchase orders fall behind expectations in 2008.

Although equipment costs have decreased over the years the cost of digital cinema projection equipment is still too high for wide-scale adoption of this technology around the world. Comparisons of the cost of ownership during the life cycle of movie projection system indicate clearly the cost effectiveness of conventional projection systems.

3.4 Standards including MPEG Implementations

Some standardisation activities have been done for Movie Industry and Digital Cinema, several initiatives dealing with the standardisation issues in the movie industry were started in 2008.

The 35mm negative film has been the standard interchange for motion picture workflows for 70 years. As new sensor and display technologies arrive there is a need for a new 'Digital Source Master' which has to take into account

- Wide gamut displays

¹⁴ http://en.wikipedia.org/wiki/U2_3D

<http://www.u23dmovie.com/>

¹⁵ <http://news.sky.com/skynews/xml/article/tech/0,,91221-13368,00.html>

<http://www.engadget.com/2008/02/28/bbc-broadcasting-rugby-six-nations-match-in-3d/>

¹⁶ http://www.welt.de/english-news/article2123695/Hyundai_offers_3D_TV_for_Japan_market.html

¹⁷ SMPTE Motion Imaging Journal 2008

- High dynamic range imaging
- Increased precision
- Mixed media production
- 4K and greater pipelines
- Multiple distribution formats (film, digital, HDTV, etc.)

The Science and Technology Council of the Academy of Motion Picture Arts and Sciences started work to create a format allowing smooth interchange of media content between different software/hardware applications. The new format has to be able to merge digital-sourced and film-sourced Material eliminating image conversion errors while preserving the cinematographer's intent. It has to provide improved colour management within pipelines and across facilities. In addition it has to be used as a digital master in archives.

The new format should be usable in as many parts of the digital workflow as possible but allowing facilities to keep their own expertise. It is assumed that the new format will be implemented within colour correctors, digital cameras, renderers, scanners and telecines.

Closely related to these activities is Adobe's approach to solve existing video format woes. Adobe wants to do the same for video as it did for print documents and RAW camera files. The company has announced a new open video format, CinemaDNG¹⁸, which it hopes will do for digital video what the DNG format has done for Camera RAW. CinemaDNG will be an open standard, free for manufacturers to implement, and, as DNG has done for images, it will improve compatibility between RAW video files from different camera manufacturers. CinemaDNG will be developed in collaboration with camera makers like Panavision and Dalsa, as well as software vendors, with the goal of creating more streamlined video workflows and offering better options for cross-application editing.

Adobe claims the new CinemaDNG spec will offer a number of benefits to manufacturers and filmmakers — including eliminating format incompatibilities and lessening the need for proprietary tools.

SMPTE¹⁹ is the primary organization for the development of D-Cinema Standards but there are other organizations as well releasing standard documents for digital cinema.

In 2008 several significant documents were released:

- Digital Cinema Initiatives (DCI) released its v1.2 Digital Cinema Specification (DCSS) following the release v1.1 in April 2007.
- The National Association of Theatre Owners (NATO) released v2.0 of its Digital Cinema System Requirements document.

The two documents are complementary and together form a set of requirements for digital cinema systems.

2008 also saw further moves towards standardisation within the fields of 3D asset generation and use. Autodesk, previously the creator of the Maya modelling and animation software, completed its purchase of Alias and thus is responsible for 3D Studio Max. As a result, the two most common modelling and animation software programs are now the responsibility of one company. Autodesk recently committed themselves to fully supporting and further developing the FBX open file-format for 3D assets. This is an important step for the standardisation of such assets, as it will enable much easier transfer of assets between different software, allowing animators, artists and developers to collaborate beyond the boundaries of the software that they use.

¹⁸ <http://www.adobe.com/aboutadobe/pressroom/pressreleases/200804/041408AdobeCinemaDNG.html>
<http://blog.wired.com/monkeybites/2008/04/adobe-cinemadng.html>

¹⁹ SMPTE Motion Imaging Journal 2008

4 Production Trends

4.1 Audiovisual Market Production Trends: Cross-Media and Movies

In the audiovisual market, a continued growing trend in digitalization can be observed. When it comes to film, only about 10% of cinemas in the biggest market areas are stated as fully digital theatres (minimum 2K digital projection)²⁰. Once more cinemas are digital, there will be increasing opportunities in the market for alternative content – also known as ODS, “Other Digital Stuff” aside from traditional narrative film. This suggests an increasing use of Cross-Media production formats, in which the same content or theme is expressed through multiple platforms. Alternative screenings can take the form of live broadcasts of performances from opera halls, such as the successful opera performances of La Scala in Milano and the MET that have been broadcasted live in digital cinemas across Europe in recent years. Demand for these kinds of entertainment forms is growing.²¹

Aside of an increasing number of 3D animated films being produced; also 3-D stereoscopic cinema is clearly gaining popularity in the audiovisual market. S3D productions have a strong potential to generate revenue and invigorate the box office²². Currently, the majority of S3D productions are stereo versions of CG animation films. However, the S3D format is of interest to many studios, as can be seen from the fact that a number of live-action stereo productions are in planning. As an example of the potential revenue S3D films can generate, it can be mentioned that Disney’s production *Hanna Montana/Miley Cyrus: Best of Both Worlds Concert Tour*, which was shot, produced and distributed entirely in S3D, averaged a per screen gross income of 45 000 US dollars, despite being released during the Superbowl Weekend²³.

On the subject of alternative content, according to cinematographer PhD Pia Tikka, there is a new form of cinematic authoring in audiovisual productions: *“The novel concept of enactive cinema is [...] an interactive cinematic montage system in which the narrative flow follows the unconscious psychophysiological enactment of the spectator, as a dynamical abstraction of the [neurological] mirroring system.”* Tikka’s doctoral thesis²⁴ implies that the role of the author should be reconsidered. *“With the notion of second-order authorship, the focus is shifted from the conventional idea of explicit linear control over the cinematic narrative to designing the cinematic artifact as a complex dynamical system with emergent behavior.”*²⁵

The kind of novel concepts of filmmaking demonstrated by e.g. Tikka’s enactive cinema project *Obsession* (2005) can inspire a spectrum of alternative content productions, bringing with them new future trends in the audiovisual market, where audience interaction in the cinematic/audiovisual experience is not only affected by conscious chosen participatory actions, but also directly, for instance, by emotional or sensory-based involuntary reactions. From the viewpoint of future markets for SALERO outputs, it could be projected that the use of SALERO 3D animation tools that aid the creation of emotionally credible characters could be of interest to those filmmakers/animators – and audiences– who are involved in developing enactive cinema or similar new forms of nonlinear narrative / entertainment. Should enactive cinema as a genre succeed to attract major audiences, it could be applied to several distribution platforms, thus opening up new opportunities of revenue both within the content creation industries and the distribution/sales markets.

The entire entertainment industry, including the audiovisual sector, will look entirely different within five-ten years. New visual effects production technologies will have an impact on the production costs,

²⁰ Finnish Film Foundation: SES-lehti news, 3/2008

²¹ Ibid.

²² Whitepaper on Stereoscopic Filmmaking. Autodesk© , 9/2008

²³ Ibid.

²⁴ P.Tikka, Enactive Cinema: Simulatorium Eisensteinense.

University of Art and Design Helsinki Publication series ,11/2008

²⁵ Ibid.

workflow and cultural changes in the industry.²⁶ Bearing this in mind, it is important for the industry professionals, producers and representatives of the market sectors to understand that it is not solely the technology itself that will be creating the content, nor attracting audiences. A better understanding of the possibilities of new forms of audiovisual production needs to be achieved through better communications with the artists and designers utilizing the new authoring technologies. At the moment it is estimated that the top 25 highest grossing films are visual effects films, and in animation films even more.²⁷ It is most important to realize, that while projecting the future trends in the audiovisual market, one has to listen to the artistic innovators in the field, who can visualize forms of audiovisual (and other sensory) entertainment beyond the currently imaginable technological frameworks. Tools and interfaces will increasingly need to be developed from his starting point. The audiences cannot know what they want until they are shown examples of previously unknown entertainment experiences. Initiatives, like SALERO, are helpful in this regard. Through the interaction of artists, researchers and tool developers; and by examples of this collaborative development work presented in integrated productions, innovative forms of expression using new technologies are encouraged.

4.2 Games

Game consoles offer a known platform with known parameters and performance and are therefore the preferred platform for many games development studios working at the high end of the market. Many of these companies continue to strive to make games that look just like films, and realism increases every year. The specialist facial animation technology company Image Metrics²⁸ revealed the photo-real Emily Project at Siggraph 2008. This recreated a performance by actress Emily O'Brien and shows a highly realistic animated character. Emily was created using video capture and proprietary software to analyse movement which then drives a specially built animation rig. The trailer can be viewed at <http://www.image-metrics.com/project/emily-project>. Emily shows a significant leap in realism when compared to 2007's leading demonstration from the French company, Quantic Dream²⁹, which published a trailer 'The Casting' of the 'Heavy Rain' project', available from <http://www.fileplanet.com/163443/160000/fileinfo/Heavy-Rain:-The-Casting-E3-2006-Trailer-%5BHigh-Res%5D>. Production of a Heavy Rain game was announced in August 08 at the Leipzig Games Convention.

Image Metrics began planning the Emily project in March 2008. After the performance was scripted, recorded and analysed it took 2 man months to complete 90 seconds of video. More details can be accessed through this link. <http://www.image-metrics.com/project/see-how-emily-was-made>. While the level of realism is far higher than anything previously seen, the process is still labour intensive, costly and the resulting data file is 'heavy', meaning it's currently more suited to film than games; undoubtedly this will change in the future. SALERO's approach of intelligent content creation, enabling the re-use of assets and procedurally driven emotional animation is still valid and offers a cost effective route to realistic characters purposed for real time in-game animation.

2009 is likely to see growing interest in the production of stereoscopic 3D games to complement the growth in the production of 3D movies. In the USA there are currently estimated to be 2,000 3D projection systems in cinemas, at least 22 3D movies in production (MarketSaw blog) and approximately 1m 3D enabled domestic TV sets, with major manufacturers such as Samsung, Philips and Sharp pursuing strategies to grow the market and experimenting with different technologies, with and without 3D glasses. Blitz Games Studios scored a world first in December 2008 by presenting the first true stereoscopic videogame demonstration running on a domestic games console at the 3D Entertainment Summit Los Angeles. Technologies developed with the support of SALERO contributed to the rapid production of the prototype shown.

The short session casual games market is expected to continue to grow, with games being sold direct to consumers via console download, PC download, PC pay to play (such as King.com) and mobile as well boxed games for the Nintendo DS. Higher production values are emerging as the storage,

²⁶ R.Dunlop, P. Malcolm, E. Roth: The State of Visual Effects in the Entertainment Industry. Visual Arts Society, 7/2008.

²⁷ Ibid.

²⁸ <http://www.image-metrics.com>

²⁹ <http://www.quanticroam.com>

connectivity and graphics capability of the devices increase. There has been an expectation that the new demographics drawn to game playing by the ease of access and minimum time investment needed to enjoy a casual game will migrate to longer playing console games; there is currently little evidence to support this.

The influence of games on virtual worlds other than MMORPGS may be seen in the coming year as virtual world companies seek to engage the cash rich teens to late twenties. Currently this age group spends time in social networks and game playing, while virtual worlds like "Second Life", "Eve Online" or "There" are populated largely by the 30+ age group. Several virtual worlds are being built using games engines but currently do not offer game play.

There is growing interest in 'serious' games or games for learning and training. The UK government has several studies underway to examine the potential for engaging people – young and old - in lifelong learning and Immersive Learning is one of the key strands of policy for the UK Technology Strategy Board. The German education sector has commissioned a serious game to support curriculum, while the USA has invested heavily in game based tools for healthcare and military training. The sector includes web based games, authoring toolsets as well as videogame companies looking to diversify into new markets. This sector is still embryonic.

The market for peripherals and new forms of controllers for games is likely to continue to expand. Voice controlled games are now part of the mainstream with the Tom Clancy series of games. Microphones, cameras, guitars and drums are all part of the landscape. The Wii Fit balance board has sparked new forms of games, headbands that allow a game to be controlled by the mind are now available and skilled demonstrators can move objects around a screen simply by thinking about what they want to happen.

Cross media production is now embracing TV as well as film, the popular TV series Deal or No Deal and Are You Smarter than a 5th Grader have made the transition into games and the XBOX 360 Live platform is launching a quiz channel, made up of built and user generated quizzes. We have yet to see the first game that becomes a TV show, but the convergence of the formats makes that seem likely. There have been some experiments in continuing TV dramas online using avatars and a recreation of the set to allow players to create their own narratives, or even become part of the storyline using their own avatars³⁰.

The games industry is still taken to mean console games, but the diversity of technologies and applications that could be said to be providing engaging and enjoyable game play is growing. The challenge for the console game developers is to continue to deliver high production values and a depth of experience that cannot be achieved by casual or short session web or mobile games and so maintain their market share. SALERO's intelligent content technologies will be valuable in a market that is driven by consumer expectations of high quality content but limited by available investment as the international credit squeeze hits production budgets.

4.3 Television

In spite of Television is still the preferred platform to entertainment in Europe, new platforms (or new screens) are becoming a reality beyond a trend. Television content producers are starting to produce based on screen and distance variables.

IPTV is another trend that is becoming reality. It is expected that IPTV households grow to 12 million in 2010. This fact opens the door to new kind of interactive possibilities. Video On Demand (VOD) will be probably the killer service of this new television culture.

The International Institute for Television Leadership has detected the following trends on television sector during 2008³¹:

³⁰ <http://www.daden.com>

³¹ Source: International Institute for Television Leadership <http://www.leadership.tv/>

Multi Channel Universe

TV is still Europe's preferred forum of media entertainment. In fact there has been significant fall-off in the movie-going activity in favor of TV or gaming or internet entertainment. Distributors of broadcaster signals and other offerings such as VOD and Sports channels are capturing most market share.

European markets are already starting to look at both production and distribution based upon screen size/location and are talking about the concept of distance from screen to viewer:

- 100 ft - Public Screen (outdoor/sports complex/bars, etc.) - "Event" content & HD format
- 10 ft - Home Entertainment & Engagement in the experience - HD programming
- 1 ft - Computer/Mobile entertainment - short programming cycles and options HD not req'd but multiple formats of carriers and end-consumer technology are necessitating multi-format productions.

The content and the writing required for each of these programming environments is quite different and many are developing stories or entertainment streams in parallel by different creative groups for the different environments right from the start.

Technology and Broadband Penetration

Broadband uptake in Europe is exploding. From a base of approximately 56million homes in 2005, it is estimated that by 2009 approx. 110 million homes will have high-speed internet access. Likewise IPTV households are expected to grow from just under 5 million in 2007 to about 12 million in 2010.

The Europeans are farther advanced than anyone in mobile TV/entertainment - perhaps due to the commuter culture around the big European cities. The cellphone as an entertainment device, plus general resource for retail, travel directions and inter-personal networking is very well developed. This is providing some interesting new production opportunities. However, ususally the content is simply re-packaged from a regular broadcast format. Much can be learned from this Geo with respect to broadband entertainment.

Language and Geographic Boundaries are Dropping

With the growth of the EU, and the increased travel across EU and outside EU to Asia and Americas, the younger demographics are increasingly comfortable and capable in the English language. Most use it day to day in their work, on computers, and increasingly in their entertainment. In addition, many speak several languages German, French, Spanish, English, etc.

As a result the traditional boundaries for broadcasting of terrestrial signals in host country language are falling. For example, Danish viewers can get Norwegian programming via satellite or cable, and are generally happy to experience their entertainment in either language.

So now, what was once a geographic space protected by both language and state boundaries, is a smorgasbord of programmatic options in a variety of languages - where the best, most engaging programming will "win" the viewer eyeballs regardless of country of origin or language. This is particularly so in the younger demographics.

Versioning of USA programming is very popular across Europe due to the high production value; but even this is likely to give over to broadcasting such shows in English without the versioning in the coming years.

Most important - beyond the language issue - is that good "entertainment engagement" and cultural stories/legends with insightful content can much more easily be adapted or taken into new territories and markets than ever before.

A great recent example - "Beowulf" originally an Anglo-Saxon poem and cultural legend - is now being brought to the big screen in English and other languages, along with multi-platform components over the internet. There is BIG potential for indigenous/traditional story-telling in new concepts/platforms from Irish, Spanish, Scandinavian, Romanian or other.

British / French / German Dominance in Programming

The big broadcasters and production houses of Britain, France and Germany dominate the European TV landscape today. And they are also dominating the web-based programming emanating from this region.

This region is also strong in the production and export of Reality TV & Formats for Game-type shows. Of course they have a lower budget than drama, but they are also successfully being exported to USA, Canada, Australia, South America, etc.

Despite the dominance of these 3 countries in the region there is however, still good potential for co-production with North American or Asian-Australian initiatives, especially in new growth areas of old Eastern Europe: Poland, Czech Republic, Ukraine.

What is unclear is if there is an "event" viewing culture as is prominent in North America for other than sporting events. The DVR (Digital Video Recorder) is also really starting to make headway into these markets.

VOD is growing in popularity and with the huge growth in broadband/IPTV as mentioned above, this region will soon be accessing productions from around the world in a subscription or pay-per-view model, and quite possible through internet search engines rather than traditional broadcasters. Remember, Joost originates from Europe!

Public Broadcasters Dominate 60+ Age Group

Unlike North America, the biggest broadcasters such as BBC, ZDF, and the leading broadcaster in each country are public broadcasters. They have been defining the evolution of TV in their countries and "protected markets" for decades.

Indeed most of the Public Broadcasters have their biggest audience segment at the Age 60+ group as well as the young children on the other end. GenX³² and even the young people are all watching the private broadcasters which generally dominate market share in the 12 - 59 age segment.

These mighty powerhouses are struggling for relevancy with the majority of the population with disposable income. The role of public broadcasters in European society is not that far behind the challenges being faced by public broadcasters in North America.

Programming style, development approaches and story-engagement plus multi-platform extension to the entertainment experience, is markedly different in Europe between the public and private broadcasters.

4.4 Advertising

Production trends within advertising follow the general downward pressure on price being experienced globally. Traditional advertising is in an especially fractious state because it is being pressured from two directions, its clients and competing distribution channels and media formats.

Sir Martin Sorrell of WPP recently made a presentation to the Royal Television Society, and with reference to the experience of Group M made the following comments:

"The company believes that UK internet ad spend will overtake TV for the first time in 2009. By the end of 2008, meanwhile, UK internet revenue will have climbed 30.8% year on year to £3.4bn. This compares with just 1% year-on-year growth for TV ad spend which will end the year at around £3.56bn.

Paid-for search accounted for 63% of online revenue in 2007, according to Group M's estimates, fuelled either by new money or money diverted from direct marketing, rather than budgets already allocated to TV. In 2008, meanwhile, search is expected to grow by 35% year on year, with display and classifieds each growing by around 20%".

In terms of creative output, this is not especially good news in the short term; production values for internet campaigns tend to be lower than those for television, and payment for search creativity is often not required at all. However the longer term prognosis is somewhat better, with the increasing need of advertisers to differentiate themselves from the background noise of paid search. Again, good promotional creativity will be required, but with a greater diversity of delivery formats from flash animation through to high quality video, photography and innovative viral campaigns.

By contrast, advertising in conjunction with user generated content may actually be set to decline; at the 'Thinkbox Televisionaries' event a number of industry luminaries attacked sites such as You Tube:

³² Generation X, http://en.wikipedia.org/wiki/Generation_X

“Apparently brands don’t like advertising around “edgy” content that isn’t produced by monolithic broadcasting organizations. One person called Youtube “a failed model” and Work Research’s Justin Gibbons hailed as revelatory the statistic that the BBC iPlayer had overtaken YouTube as the most popular online video viewing destination (conveniently forgetting that iPlayer does not carry advertising so is useless for clients). The desire of the public to see professionally produced content in “big shows” was hammered home by speakers including Peter Bazalgette.”

It will be interesting to see how comparatively new innovations such as Facebook Ads stand up to the scrutiny of brands in this area; even with Google Adwords there is an increasing trend for brand-related advertisers to refuse showing on ‘ad networks’ (i.e. on 3rd party web-sites which use Google Adword code, not in the search engine itself) because of the fear of being related with inappropriate (or just plain bad) content.

It is very apparent that advertising is going through as great a transition as television; 2009 may well be a pivotal year for this industry as the impact of new production technologies, new distribution media, behavioural changes of audiences and the credit crunch is felt.

5 Digital Media Research

5.1 Introduction: Research Trends and Directions

Based on a survey of the project descriptions on the Cordis³³ website new media-related projects in FP7 (starting in 2008) cover the following three research topics 3D content, content personalization and delivery platforms.

Also, in this section we outline the main, current, research directions for research into image and video retrieval. We confine ourselves to the work on content-based retrieval, the focus of Work Package 5.

Furthermore, we introduce the research done in other areas.

5.1.1 3D Content Creation, Interaction and Delivery

The **MOBILE3DTV**³⁴ project aims at developing core elements of the next generation of mobile 3D television (3DTV). The project scenario assumes that stereoscopic video is captured and converted to a proper content format, then compressed, encapsulated, and broadcasted to a large audience of mobile users, whose terminal devices receive, decode, and display the 3D content. Building upon two established technologies, namely the European DVB-H standard and auto-stereoscopic displays, the consortium will develop optimal mobile 3DTV data formats and the associated content creation methods.

3D Presence³⁵ project will implement a multi-party, high-end 3D videoconferencing concept that will tackle the problem of transmitting the feeling of physical presence in real-time to multiple remote locations in a transparent and natural way. In order to realize this objective, 3D Presence will go beyond the current state of the art by emphasizing the transmission, efficient coding and accurate representation of physical presence cues such as multiple user (auto) stereopsis, multi-party eye contact and multi-party gesture-based interaction.

The **3D4YOU**³⁶ project will develop the key elements of a practical 3D television system, particularly, the definition of a 3D delivery format and guidelines for a 3D content creation process. The project will develop 3D capture techniques, convert captured content for broadcasting and develop 3D coding for delivery via broadcast, i.e. suitable to transmit and make public.

3D broadcasting is seen as the next major step in home entertainment. The cinema and computer games industries have already shown that there is considerable public demand for 3D content, but special glasses are needed which limits their appeal. 3D4YOU will address the consumer market which coexists with digital cinema and computer games. The 3D4YOU project aims to pave the way for the introduction a 3D TV system. The project will build on previous European research on 3D, such as the FP5 project ATTEST, which has enabled European organisations to become world leaders in this field. 3D4YOU will maintain the momentum built up and to capitalise on the wealth of experience of the participants in this project.

The **3DPHONE**³⁷ project aims to develop technologies and core applications enabling a new level of mobile 3D experience, by developing an all-3D imaging mobile phone. The aim of the project is to realise all fundamental functions of the phone i.e. media display, user interface (UI), and personal information management (PIM) applications in 3D but usable without any stereo glasses. Users will be able to: a) Capture memories in 3D and communicate with others in 3D virtual spaces b) Interact with their device and applications in 3D and c) Manage their personal media content in 3D.

³³ <http://cordis.europa.eu>

³⁴ <http://www.mobile3dtv.eu>

³⁵ <http://www.3dpresence.eu>

³⁶ <http://www.3d4you.eu>

³⁷ <http://www.3dphone.org>

5.1.2 Personalisation of Content

The main idea of **My-e-Director**³⁸ is to research and develop a unique interactive broadcasting service enabling end-users to select focal actors and points of interest within real-time broadcasted scenes. The service will resemble an automated ambient intelligent director that will operate with minimal or even without human intervention. Contrary to state-of-the art services of similar nature that focus on few targets and low-level activity scenes, My-e-Director will be implemented in the scope of large-scale multi-actor, multi-target environments and high-activity scenes.

MyMedia³⁹ addresses the key social problem of what has been called the "Crisis of Choice", the problem of information overload. We want to increase the level of relevant content over the "noise". The problem worsens year-by-year as more and more content, including self-created content, becomes available online as well as through traditional broadcast means (delivered through satellite, over-the-air, IPTV, and cable). This is not a new problem yet it still has not been solved in a way that satisfies end-users. We will address this problem by creating an open source software framework to dynamically personalize the delivery and consumption of multimedia. MyMedia will tame growing volume of content streams by combining them and allow users to sip from a single manageable stream of the most personally relevant content.

MyMedia will pioneer the integration of multiple, content catalogues and recommender algorithms in a single system. The project delivers an open source software framework which allows researchers and potential commercial exploiters outside of the consortium to easily plug-in and experiment with new recommender algorithms and content sources. This simplifies take-up outside the consortium and creates an even wider impact. The project will evaluate resulting theoretical user models through a set of lab analysis and field trials. The framework will also be evaluated on multiple trial platforms and will be language agnostic. To understand cultural differences field trials will be conducted in multiple countries and languages.

Family letters are often written from one family to another; family games are played between families. Memories in the form of videos and photographs are often shared within families. **TA2**⁴⁰ wants to enhance and support these processes; enabling people to share their stories, pass digital photos and videos around, add comments to them, and to pass them back. TA2 wants to build systems that allow people to play games with each other, seeing and hearing each other as they laugh with, and at, each other, as they struggle with games like Ludo, Labyrinth or Pictionary. And TA2 also wants to find ways in which modern sensors and IT equipment can support the family to gain better awareness of each others activity, whilst maintaining each individual's right to privacy. TA2 media and communication experiences will be characterised by their naturalness; clear relaxed voice communication and intelligently edited video. Through the TA2 system, stories are automatically generated from home-related content, the personal home video or from the antics of a lively game.

5.1.3 Content Delivery Platforms

In the forthcoming age, where everyone may be content producer, mediator and consumer, **SEA**⁴¹ aims to offer a new experience of personalised, seamless content delivery, maintaining the integrity and wherever applicable, enriching the perceived QoS⁴² (PQoS) of the media across the whole distribution chain. SEA is a project focused on seamless, personalised, trusted and PQoS-optimised multimedia content delivery, across broadband networks, varying from broadcasting to Peer-to-Peer (P2P) topologies.

The **iNEM4U**⁴³ project will support: a) Delivery of interactive multimedia content and services across technology domains b) Seamless integration of professional and user-generated multimedia content

³⁸ <http://www.mydirector2012.eu>

³⁹ <http://www.mymediaproject.org>

⁴⁰ <http://www.ta2-project.eu>

⁴¹ <http://www.ist-sea.eu/news.html>

⁴² QoS: Quality of service; PQoS: Perceived Quality of Service

⁴³ <http://www.telin.nl/inem4u/>

across devices and locations c) Personalised interaction with multimedia services and content d) Synchronous community-based content and experience sharing

P2P-Next⁴⁴ develops an open source, efficient, trusted, personalized, user-centric, and participatory television and media delivery system with social and collaborative connotation using the emerging Peer-to-Peer (P2P) paradigm, which takes into account the existing EU legal framework. The P2P-Next integrated project will build a next generation Peer-to-Peer (P2P) content delivery platform, to be designed, developed, and applied jointly by a consortium consisting of high-profile academic and industrial players.

The **OPTIMIX**⁴⁵ project will focus on studying innovative solutions enabling enhanced video streaming in an IP based wireless heterogeneous system, based on cross layer adaptation of the whole transmission chain. To achieve this goal, it is proposed to develop a scheme including all elements of major importance in a point to multi point video streaming chain, in particular video coding, networking modules, MAC layer and physical layer, efficiently communicating together through the use of joint controllers (at the server side) and mobile unit observers (at the client side).

5.1.4 Other SALERO Digital Media Research

In the domain of video retrieval, the TRECvid⁴⁶ effort continues to provide the main focus for research groups around the work. TRECvid is sponsored by the US government via NIST (National Institute of Standards and Technology), and is an offshoot of the earlier TREC (Text Retrieval Conference) effort. TRECvid provides research groups with access to large video collections, search topics and associated relevance judgements – all vital resources for video retrieval research.

URL research is oriented to speech technologies; specifically we are working on text-to-speech (TTS) conversion. Subjective synthesis quality improvement is the main goal for unit selection based synthesis (US-TTS). Weights adjustment and new output signal processing strategies based on harmonic-stochastic modelling (HSM) will be integrated in order to build systems more flexible and suitable to the requirements of different scenarios. These improvements will overcome the necessity of new corpora. In addition, we are also working on a first proposal for full statistical approach based on hidden Markov models (HMM). Using HSM and HMM together will produce more stable quality. Then, TTS systems will be allowed in more generic applications.

Research involving virtual characters and expressivity is now developing beginning to reach a first stage of maturity. Systems that allow personalisation of characters, with respect to their appearance, dress and demeanour are now common place, both within 2D web-based scenarios, as well as more complex 3D systems. The new research challenges that face this field are those include link character animation and behaviour to expressivity and emotion, doing so in an automatic way. It has already been shown⁴⁷ that the concept of *believability* is more important than that of *realism*, and research is now beginning to move towards the automatising of processes that can create such believable characters for use in productions that are limited with respect to time/budget resources.

MTG work related to intelligent authoring tools, help sound designers and audio content creators easily transform audio in an intelligent way. The Voice transformation software allows creating a set of new voices by means of transforming a voice recording, or transforming a synthesized voice that comes from a Text to Speech system like the one developed by URL in the context of SALERO. The tempo transformation software easily allows changing the tempo/speed of a song and/or giving a swing character to it to make it more danceable. The preservation of timbre in the audio allows for instance to shorten slightly an audio clip to match with the duration of a corresponding video sequence (imagine an advertisement on TV where the duration is crucial). The work related to source separation, allows remixing songs to give more importance or just remove some instruments within a polyphonic mix as if you had the multi-track recording of any piece. This allows customizing the equalization of a song beyond the classical frequency equalizer.

⁴⁴ <http://www.p2p-next.org/>

⁴⁵ <http://www.ict-optimix.eu/index.php>

⁴⁶ <http://www-nlpir.nist.gov/projects/trecvid/>

⁴⁷ Wallraven et al. "Psychophysical evaluation of animated facial expressions", 2005

DIT has pursued research relating to emotional speech, from state of the art experimental methodologies and equipment strategies through to standardised corpora for online storage and retrieval in conjunction with user rating tools. In addition, DIT has also developed a patent pending framework for speech analysis that has been implemented in character animation tools in conjunction with UPF-GTI and PGP. The DIT framework provides a means for re-usable content in multiple languages to be authored and delivered as part of a single production process, with current tests involving PGP assessing the potential of this technique in live user environments.

5.2 Emerging Results from Current Research

Based on the results of the last TRECVID conference, there has been a general trend towards the better performing systems using automatic annotations in search, and away from using low level visual features. The top three teams in the automatic runs in this year's TRECVID (2008) were the Chinese Academy of Science, University of Amsterdam (MediaMill) and the City University of Hong Kong. Of these three, only the top performing system from the Chinese Academy of Science used low-level visual features. Automatic retrieval runs were performed without human intervention, using the provided 48 search topics, each topic consisting of a text query and visual examples of that topic.

The Glasgow University research experiments which employed classification based retrieval at TRECVID 2008 achieved a relatively large number of relevant documents in the top one thousand results, showing the potential of this approach. Through the development of novel ranking techniques, we hope to achieve better results in the future.

For the interactive runs in TRECVID 2008, which involved a human searching for up to 10 minutes on each TRECVID search topic, the two top teams were the University of Amsterdam (MediaMill) and FX Palo Alto. In both of these interfaces, the emphasis is on video browsing and presentation of many shots to the user. The FX Palo Alto system also investigated collaborative retrieval, where more than one user searched on each topic. Interactive systems all used very much simpler retrieval techniques than the automatic systems, to enable more rapid searching – automatic search systems may take many minutes (or longer), to generate search results, which is unsuitable for use in an interactive system.

Outside of TRECVID, collaborative search involving more than one user searching together is becoming more popular in the research community, such as via a workshop in the Joint Conference for Digital Libraries (JCDL 2008). Within the SALERO search work package, the developed FacetBrowser and collaborative browsing systems, which although not employed in TRECVID, have showed promise in the domain of exploratory search, an area which is of particular relevance to SALERO, and the early concept generation and idea-reuse stages of production development.

FBM-UPF's research in the field of character expression and animation has yielded several important results (see D7.3.2) which are published or soon to be published within the academic field. Further afield, there have been interesting results that have emerged in the field of automatic full-body animation, such as the Pinocchio system⁴⁸.

MTG research on Voice Transformation has emerged in multiple applications including real-time installations for museums, software plug-ins aimed from amateur to professional users as well as web applications where the technology is implemented as a web-service to transform sound files provided by any web client. Also the technology has been successfully integrated with the URL text-to-speech system to transform the output synthetic voice to many different characters (male, female, old, child, robot, alien, monster, clown...).

Subsequent to publication of speech corpora research, DIT's speech corpora have been welcomed by leading emotional speech researchers as a first concerted attempt to define standardised, high quality audio emotional speech assets for analysis and retrieval. Work is progressing towards visualisation tools for such corpora, with a deliverable due in the first month of 2009. DIT's prototype online animation authoring and rendering tools have been very well received by industrial collaborators-notably PGP within the SALERO project. It is intended to progress with these tools in online content delivery research in the next year of the SALERO project.

⁴⁸ Automatic Rigging and Animation of 3D Characters, Baran, I, & Popovic, J., Proceedings SIGGRAPH 2007 A good paper on automatically applying a pre-existing animation to a mesh <http://www.mit.edu/~ibaran/autorig/>

5.3 Semantic & Intelligent Content Technologies Research Projects

5.3.1 Semantic

ANSWER⁴⁹ is a new approach to the creative process of film and game production. Musicians and choreographers have long been able to express their intentions using logical symbolic structures (music notation and dance notation), yet those working in the movie industry and the games industry have to rely on cartoons and verbal description, and the only record of their artistry is the result itself. The film and games industries are converging in the way that their creative content is perceived by consumers; ANSWER will produce a notation system for describing the creation of multimedia content, thus offering a bridge between digital media production and animation for game design. Development of a successful notation becomes appropriate today because of its dependence upon the parallel development of effective notation-based tools to support the artist in visualisation of their intention, communication to other members of the production team, and analysis of the production process, whilst still maintaining control of their creative intention. To achieve our objective, in addition to the development of DirectorNotation to symbolically describe creative intention, ANSWER will develop tools for automatic generation of animated pre-visualisations for film and game pre-production from the notation itself and from metadata which is extracted from the Director's initial input. An interface will be created to allow the Director to work imaginatively with the notation as it is authored, and an iterative scheme is introduced to ensure that developments of ideas and the realities of the actual production are reflected in the final notation description. Professional users from the film production and games production industry are integral partners in the project, which will ensure that we work together towards a common goal and are not dominated by technological considerations before artistic needs.

BOEMIE⁵⁰ will pave the way towards automation of the process of knowledge acquisition from multimedia content, by introducing the notion of evolving multimedia ontologies, which will be used for the extraction of information from multimedia content in networked sources, both public and proprietary. BOEMIE advocates a synergistic approach that combines multimedia extraction and ontology evolution in a bootstrapping process involving, on the one hand, the continuous extraction of semantic information from multimedia content in order to populate and enrich the ontologies and, on the other hand, the deployment of these ontologies to enhance the robustness of the extraction system.

CASAM⁵¹ introduces the concept of computer-aided semantic annotation to accelerate the adoption of semiautomatic multimedia annotation in the industry. It facilitates the synergy of human and machine intelligence to speed up human-produced semantic annotation of multimedia content.

The CASAM project will provide the technology for knowledge-driven multimedia analysis and develop reasoning methods for multimedia interpretation around information exchange between the multimedia analysis procedure and the human. Unique intelligent human-computer interaction methods that act in order to maximize the expected information gain from the user's input while at the same time provide a cooperative environment to the human and underlying machine reasoning to guide the knowledge aggregation process.

K-SPACE⁵² integrates leading European research teams to create a Network of Excellence in semantic inference for semi-automatic annotation and retrieval of multimedia content. The aim is to narrow the gap between content descriptors that can be computed automatically by current machines and algorithms, and the richness and subjectivity of semantics in high-level human interpretations of audiovisual media: *The Semantic Gap*. The joint research activities of the network are aimed at convergence and resources optimization by exploiting important multidisciplinary aspects of multimedia knowledge extraction.

- Content-based multimedia analysis: Tools and methodologies for low-level signal processing, object segmentation, audio processing, text analysis, and audiovisual content structuring and description.

⁴⁹ <http://www.answer-project.org>

⁵⁰ <http://www.boemie.org>

⁵¹ <http://www.casam-project.eu>

⁵² <http://kspace.qmul.net>

- Knowledge extraction: Building of a multimedia ontology infrastructure, knowledge acquisition from multimedia content, knowledge-assisted multimedia analysis, context based multimedia mining and intelligent exploitation of user relevance feedback.
- Semantic multimedia: knowledge representation for multimedia, distributed semantic management of multimedia data, semantics-based interaction with multimedia and multimodal media analysis.

For more details visit the project website at <http://kspace.qmul.net>.

CANTATA⁵³ energizes the European industry with respect to the development of content aware systems. This is based on the vision that there is a large industrial potential for such content aware systems. Where the Serket project is focusing on combining signals from a wide variety of sensors, CANTATA is focusing on multimedia streams. The content awareness fits also with long-term trends in the European society, such as the growing population of older people requiring more care and observation in security and healthcare aspects. There are a number of factors that impede this large industrial potential, the goal of CANTATA is to address these impeding factors.

5.3.2 Video Retrieval

REVEAL THIS⁵⁴ develops semantics-based content processing technology that:

- helps people keep up with the explosion of digital content scattered over different platforms (radio, TV, WWW), modalities (speech, text, image, video) and languages (focus on English and Greek for EU politics and travel)
- provides users with search, retrieval, categorization, summarisation & translation functionalities for multimedia content, through the use of automatically created semantic indices & links across media

The **RUSHES** project⁵⁵ creates a system for indexing, accessing and delivering raw, unedited audio-visual footage known in broadcasting industry as "rushes". The goal is to promote the reuse of such material, and especially its content in the production of new multimedia assets by offering semantic media search capabilities.

SEMEDIA⁵⁶ creates new methods, environments and widely usable tools for media labelling, searching and retrieval from very large collections of heterogeneous data, building on and extending research in media technologies, web semantics, AI, content-based IR and interface design.

The results are innovations in the form of:

- retrieval and data-mining models for multimedia objects;
- plug and play modular search tools to sit on a wide range of media management platforms;
- query interfaces that integrate secure access and rights management; and
- usage based annotation and feedback models for multimedia objects

VIDI-VIDEO⁵⁷ will substantially enhance access to video, by developing a semantic search engine. The project will boost the performance of video search by developing a 1000 element thesaurus for automatically detecting instances of semantic concepts in the audio-visual content. The main novelties of VIDI-Video are the size and quality of the thesaurus.

There will be a significant impact on indexing and retrieval practices currently employed by broadcasting archivists. The broadcasting community as a whole will benefit from the project, since it is expected that a sophisticated set of software tools for broadcast video annotation and retrieval will be made available.

⁵³ <http://www.itea-cantata.org>

⁵⁴ <http://www.reveal-this.org>

⁵⁵ <http://www.rushes-project.eu>

⁵⁶ <http://www.semedia.org>

⁵⁷ <http://www.vidi-video.it>

The secondary effect of video search engines will be even bigger with applications in surveillance, conferencing, event reconstruction, diaries, and logging.

VITALAS⁵⁸ plans to deliver a reliable and efficient pre-industrial prototype, allowing intelligent access to multimedia professional archives. The original VITALAS technology will not only be applied in B2B applications, but will also reach out for larger public adoption, by addressing consumers' need for efficient and reliable multimedia content search engines.

In this perspective, VITALAS will address three major challenges:

- Cross-media indexing (automatic annotation) and retrieval,
- Large scale search techniques,
- Visualisation and Context adapting (personalized services considering both on- and off-line).

The VITALAS achievement relies on the development of efficient and advanced informative content description methods, robust machine learning approaches towards automatic annotation and interactive content search.

Ultimately, the project will deliver a pre-industrial search engine designed and validated by audiovisual Professionals exhibiting functionalities that allow interactive indexing and semi-automatic annotation, with interactive and personalized access to large-scale multimedia content resources.

APIDIS⁵⁹ develops cost-effective solutions for autonomous and/or personalized production of video summaries for controlled scenarios (sports events or surveillance). Democratic and personalized production of multimedia content is one of the most exciting challenges that content providers will have to face in the near future. APIDIS plans to address this challenge by proposing a framework to automate the collection and distribution of digital content. As a federating objective, APIDIS targets cost-effective autonomous production, so as to make the creation of audiovisual reports profitable, even in case of small- or medium-size audience.

WeKnowIt⁶⁰ develops novel techniques for exploiting multiple layers of intelligence from user-contributed content, which together constitute Collective Intelligence, a form of intelligence that emerges from the collaboration and competition among many individuals, and that seemingly has a mind of its own.

5.3.3 3D Content

The aim of **FOCUS K3D**⁶¹ is to foster the comprehension, adoption and use of knowledge intensive technologies for coding and sharing 3D media content in consolidate and emerging application communities by:

- exploiting the scientific and technological advances in the representation of the semantics of 3D media to increase awareness of the new technologies for intelligent 3D content creation and management;
- building user-driven scenarios to evaluate and adapt the technologies so far developed to the requirements of application environments;
- foster a shift of role of 3D content users, from passive consumers of technologies to active creators.

i3DPost⁶² will develop new methods and intelligent technologies for the extraction of structured 3D content models from video, at a level of quality suitable for use in digital cinema and interactive games. and will enable the increasingly automatic manipulation and re-use of characters, with changes of viewpoint and lighting.

⁵⁸ <http://vitalas.ercim.org>

⁵⁹ <http://www.apidis.org>

⁶⁰ <http://www.weknowit.eu>

⁶¹ <http://83.212.32.19>

⁶² <http://www.i3dpost.eu>

i3DPost will combine advances in 3D data capture, 3D motion estimation, post-production tools and media semantics. The result will be film quality 3D content in a structured form, with semantic tagging, which can be manipulated in a graphic production pipeline and reused across different media platforms.

5.4 Future Directions for Research

Based on the results of the TRECVID 2008 effort, it is likely that future research effort will continue to be placed on automatically detecting concepts from video streams or static images. Automatic annotation still requires the use of low-level visual features, however, and so it is very unlikely that the use of this information will disappear, and indeed the good performance of the Chinese Academy of Science does suggest that there may still be an argument for continuing to use low-level visual information directly in search. This is especially true in interactive search systems where retrieval response is important.

At Glasgow University, forthcoming work can be split into two main streams: developing new interfaces to support user tasks, and improving the underlying search systems. Work dealing with the interface side has an emphasis on supporting complex search tasks with interfaces such as the FacetBrowser (D5.5.2), and on integrating tools (such as query by sketch) to provide users with flexible methods of retrieving information from non-textual databases of images and videos. Efforts to improve the underlying retrieval include further work on automatic annotation, the development of indexing strategies which identify “visual terms”, and other retrieval modelling approaches including the use of video mining techniques such as automatic event detection.

Future URL related research in speech technologies, is expected to continue working in US-TTS, HSM and HMM TTS systems. Moreover, we will investigate new voice modification modules based on HSM. Therefore, the TTS will allow different output voices over the same corpus. Finally, there is a special motivation towards high quality expressive synthesis, which could be allowing adaptability for different applications where the natural communication has to be taken into account. In this way, different speech characteristics like prosody and voice quality will be used; therefore a continuous speech quality improvement is expected.

The future direction for research for virtual character animation will be focused on expanding on the link between automatic animation and expressivity (which currently is mainly focused on facial animation) to treat the whole body. There are still several considerable challenges with the fields of animation tweaking and procedural body animation, and these lie within the scope of WP7 Task 1.

Future directions for research by MTG will be related to voice conversion, allowing transforming the timbre of the voice of a source speaker into the voice of a target speaker, maintaining the prosody and intonation of the source, a lot of difficulties arise, some of them difficult to solve, but the applications of this research are enormous.

Work has been performed in relation to online animation tools by DIT, UPF-GTI and PGP as part of the SALERO project. It is intended to focus on this work in the coming year, aiming to build on initial results obtained as a result of extensive collaboration between the relevant partners.

6 SWOT Analysis of SALERO, in the Light of Current Trends

We are clearly seeing wider ways of 'consuming' media, whereby a large amount of cross media is produced with manual intervention. It is reasonably obvious that the trend we will see next is the automatic cross purposing of media productions.

The current trend in "intelligent content" represents a great opportunity to the SALERO project but as D10.3.2 reported it also increases the competitiveness. For this reason the project results have to be fit at the real sector trends.

Digital Media Technology trends analysis reported in the present document show that even if the SWOT analysis of the previous version of the document is still valid, there have been some advancement and slight changes in the strengths and opportunities cells.

Strengths	Weaknesses
<p>RTD in intelligent media (in audio, visual and language domains) capable of leading to advances in media production and cross-media repurposing at reduced costs.</p> <p>Involvement of creative professionals and users as well as technologists.</p> <p>Integration of technologies in experimental productions (using standards, web services, etc.).</p> <p>Up-to-date with regards to FBX standardisation</p> <p>Publishing research within the field of character animation</p>	<p>It is difficult for intelligent technologies to meet both the quality standards required by high-end media professionals <i>and</i> the speed and simplicity required for UGC and mobile content.</p> <p>Lack of suitable multimedia standards platforms.</p> <p>Interoperability may be reduced by lack of appropriate standards.</p> <p>Experimental productions need to integrate different formats in cross-media contexts.</p>
Opportunities	Threats
<p>Use of intelligent content technology tools to enable low-cost production by a wide range of content creators.</p> <p>Niche content creation by SME producers.</p> <p>New business based on cross-media development, user-generated content and IPTV services.</p> <p>User Group activities to get feedback from outside professionals.</p>	<p>ICT solutions from other providers and research groups in a fast-moving area.</p> <p>Low-cost content from outside Europe.</p> <p>Lack of interoperability due to stop-down standardisation process.</p>

7 Glossary

Partner Acronyms

AM	Activa Multimedia, ES
BLITZ	Blitz Games, UK
DIT	Dublin Institute of Technology, IE
DTS	Digital Theatre Systems, UK
FBM-UPF	Fundació Universitat Pompeu Fabra, ES
GVG	Grass Valley Germany, DE
JRS	JOANNEUM RESEARCH Forschungsgesellschaft mbH, AT
LFUI	Leopold-Franzenzs Universtät Innsbruck, AT
PGP	Pepper's Ghost Productions Ltd., UK
TAIK	Taideteollinen Korkeakoulu, FI
UG	University of Glasgow, UK
UPF	Universitat Pompeu Fabra, ES
URL	Universitat Ramon Llull, ES