



Vision

“Networked and Electronic Media” European Technology Platform

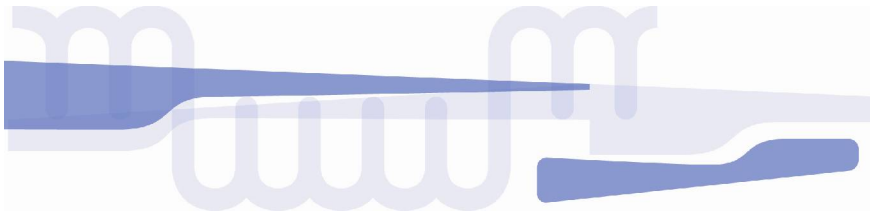
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April 2007



**NETWORKED
& ELECTRONIC
MEDIA**





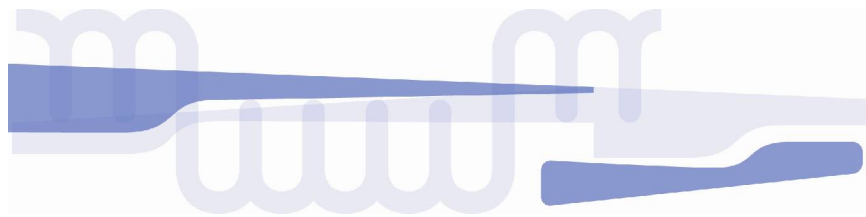
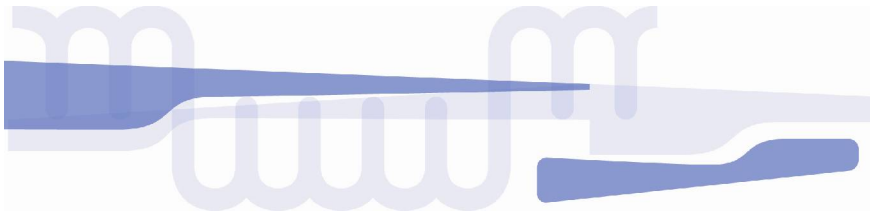


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1. INTRODUCTION

Scientific research, technological development and innovation are key factors for economic growth, competitiveness of companies, creating employment and improving the quality of life. This implies that the impact of R&D investment needs to be maximised and the industrial competitiveness and productivity must be improved through a structured and coordinated approach based on pan-European public/private partnerships.

The mechanism of the European Industrial Initiatives (also known as Technology Platforms) is one of the means to mobilise research and innovation effort and facilitate the emergence of "lead markets" in Europe. By defining common research agendas, they facilitate and provide an impulse for Europe's potential in advanced technologies. These European Industrial Initiatives help to establish effective public-private relations between researchers, industry, the financial community and policy makers. In particular, the participation of representatives from the private sector in these European Industrial Initiatives ensures that they take full account of the needs and expectations of the future potential market. Furthermore, they offer unique opportunities to establish a regulatory environment that favours competitiveness and innovation. Networked and Electronic Media (NEM) is one of these European Industrial Initiatives. It is the result of discussions among key European stakeholders in NEM technologies and associated businesses and is fully committed to be functional in the context of the EU 7th Framework Programme of R&D, other European R&D programmes, such as CELTIC, and national R&D initiatives which are happening in several European countries.

The NEM sector relies heavily on innovation and contributes substantially to the growth of the economy. The convergence of media, communications, consumer electronics, and IT opens a wide range of opportunities for future growth, by taking advantage of generalised broadband access, increased mobility, availability of richer media formats and contents. In particular, the advent of home and extended home networks and platforms is a very promising growth opportunity for the next decade.

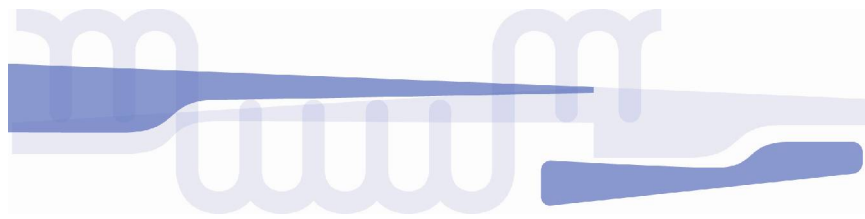
Many challenges, however, have to be addressed to reap the benefits of the evolution of the networked and electronic media sector. These challenges are of different nature, for example:

- **Technological:** To master the full range of communications and networking technologies, to enable the development of new converged electronic media markets in the domain of home networks, residential platforms, and extended home environments. To empower the end-users and consumers with the appropriate means and tools to use and access value-added services and applications in a simple, effective, pleasant and beneficial fashion.

- **Business:** To establish the conditions, which favour open business models, that enable competition and safeguard, consumer choice while ensuring a significant depth of interoperability, at as many nodes of the value networks as possible (content, service, aggregation, software, network, device providers, and vendors).
- **Societal/policy:** To understand how the range of new networked and electronic media technologies may impact the quality of life of the EU citizens and provide policy makers with options for coherent and effective policies. To develop new services and technologies such that their implications don't augment but effectively include people and communities living in less privileged areas. To ensure that small and medium size enterprises find opportunities for socio-economical developments and participate actively in the design and execution of the NEM strategic research agenda.
- **Regulatory:** To influence the development of the most appropriate regulatory framework in a sector that is characterised by a plethora of diverse content types, wide distribution means, new Digital Rights Management issues, technologically neutral spectrum usage issues, and consumer protection issues. Convergence of services and applications that use the same technological infrastructures induce new challenges that have to be addressed by means of regulatory policies, that is, as the traditional borders between fixed and mobile, wired and wireless, satellite and terrestrial infrastructures are becoming unidentifiable, new regulatory policies are needed.
- **Sustainability:** To foster technological development that genuinely meets the needs of all people, no matter what their circumstances, in ways that truly help them, now and in the future. That is, to develop new technologies and meaningful innovations that improve people's lives and enhance economic prosperity, environmental quality and social equity. This also implies the overcoming of limitations caused by the state of technology and social organization on the environment's ability to meet present, as well as future needs.. To exploit and foster application domains in which Europe has a stronghold, for example, eHealth and automotive, with innovative approaches derived from NEM technology and developments to achieve sustainability for 'tomorrow's value' .
- **International co-operation:** To foster the establishment of cooperation agreements and joint R&D projects with non-EU partners with a view to influence the development of globally accepted standards and specifications. To develop road-maps for research agendas with key regions around the globe with the aim to empower economies of scale and foster critical masses for research actions.

NEM addresses these challenges and others that will emerge in the future through the establishment of a strategic research agenda for long term technological and market development.

This document presents first the vision statement of the Networked and Electronic Media (NEM) Initiative. In the second and third part of the document the current situation and the key challenges that the NEM sector will have to face towards the 2015 horizon are described. The description of the NEM picture today and the vision from industry for the future is based on the input from stakeholders of the NEM field, including broadcasters, telecom operators, manufacturers of professional equipment, and manufacturers of consumer electronics, academia, and standardisation bodies.



2. NETWORKED AND ELECTRONIC MEDIA: VISION

The main objective of the Networked and Electronic Media Technology Platform (NEM) is to foster the development and introduction of novel audiovisual and multimedia broadband services and applications to benefit European citizens and enterprises. The Networked and Electronic Media (NEM) Technology Platform focuses on an innovative mix of various media forms, delivered seamlessly over technologically transparent networks, to improve the quality, enjoyment and value of life. NEM represents the convergence of existing and new technologies, including broadband, mobile and new media across all ICT sectors, to create a new and exciting era of advanced personalised services.

The major focus of NEM is on innovative services and applications that constitute different media forms and that are delivered over a wide variety of complementary access networks (satellite, terrestrial, cable, twisted pairs, optical fibre, community installations, microwaves infrastructures, etc.) in a seamless and interactive way to a variety of end-user terminals and devices, including fixed and handheld terminals. Improving the quality, enjoyment and value of the user experience is at the heart of NEM. Empowering end-users to create their environments in which the quality of access to value-added content and services is the key enabling factor.

NEM is an industry-led initiative to promote and direct the large-scale initiative needed to accelerate the pace of innovation and rate of technology evolution to the level that will place European industry at the forefront of the global technology markets and give users an abundance of value-added services and applications to choose from for achieving optimal benefits for all. All these efforts bear in mind the evolutionary framework from home and office environments towards broadband extended home and office environments.

NEM represents a broad consensus among European R&D stakeholders to achieve and provide ambitious inputs for the European Union 7th Framework Programme, and supports the renewed Lisbon Strategy (aligned with the i2010 Initiative) for a competitive, knowledge-based society. NEM will work with other European and national R&D initiatives, such as the CELTIC Eureka programme and national technology platforms. One of the main goals of NEM is to produce and maintain the NEM Strategic Research Agenda (SRA) as the most important mechanism for implementation of the NEM vision and achieving critical mass for European R&D. The NEM SRA is based on the contributions from key players in the overall NEM value network, including amongst others, content producers (television, gaming, etc.), broadcasters, telecom equipment manufacturers and operators, consumer electronics manufacturers, silicon manufacturers, service providers, academic institutions, European and national initiatives, standardization organizations, industry associations, universities and technological centres and, in particular, SMEs.



The NEM includes more than 500 participants. It is governed by a Steering Board composed of 39 members, who are (in alphabetical order): Aido, Abertis Telecom, Alcatel-Lucent, Atos-Origin, BBC, British Telecom, Engineering Ingeneria Informatica Spa, Ericsson, Eurescom, European Broadcast Union, France Télécom, GET, GAME, GWT-TUD, Hewlett-Packard, Homega Research, Huawei, INRIA, Intel, Intracom, IRT, Nokia, Philips, Portugal Telecom Inovacao, Queen Mary University of London, Rose Vision, Siemens, StMicroelectronics, Swissmedia, TDF, Telecom Italia, Telefónica, TeliaSonera, Thomson, Universidad Politécnica de Madrid, University of Amsterdam, Waterford Institute of Technology, CELTIC, Pôle de Compétivité "Images & Reséaux".

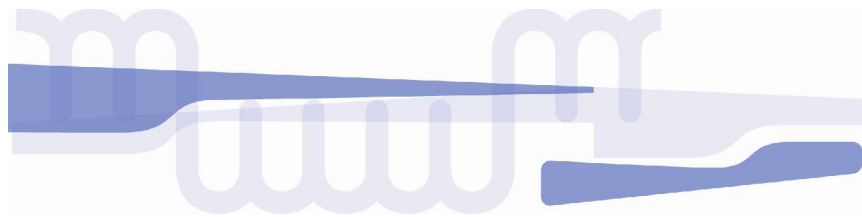
The daily activities are carried out by an Executive Group assisted by a Support Action project funded by the European Commission.

The NEM vision is based on contributions of NEM stakeholders, compiled by means of a consensus process.

The NEM 2015 VISION positions:

- **A leading European networked and electronic media industry competitive with other business regions in the world.**
 - Public and private partnerships, which are coordinated at the European level to ensure optimum use of investment efforts by individual Member States to consistently contribute to the European position in the world.
 - Consistent research teams working in cooperation and in competition achieving visionary and challenging goals.
 - Partnerships on a win-win basis with other regions of the world.
- **A regulatory environment favouring the deployment of NEM technologies to improve the quality of life and maximize economic growth and skilled employment in Europe.**
 - Effective public policies in domains such as health, culture, education, government, E-inclusion, based on understanding the social, cultural and economic impact of NEM technologies.
 - Open standards and interoperability as powerful enablers for growing and emerging horizontal markets that are highly competitive and avoid the locking-in of consumers.
- **Open business models across the value network and novel revenue generating models.**
 - Enlarged European market for content creation, management, distribution, presentation and consumption by and for users.
 - Empowered end-users accessing any content, anytime, anywhere from trusted services and applications in a simple, secure, fast and reliable fashion.

In this vision, NEM assumes the challenges, risks and opportunities derived from the convergence of audiovisual technologies, broadband technologies and networks, and consumer and professional equipment for multimedia applications and services. NEM stimulates worldwide regulations and standardization policies. As such, NEM enables EU industry and sector stakeholders to master the required technologies of the value chain, to develop a consensus on the required standards, to promote international co-operation, to support the regulatory process, and to contribute substantially to the growth of the economy.

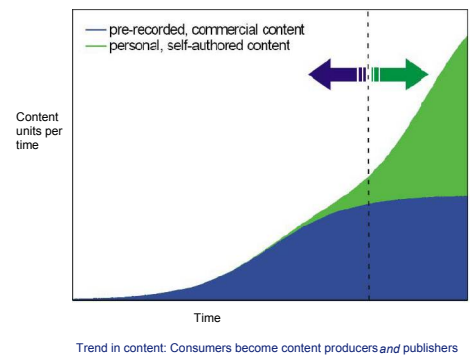
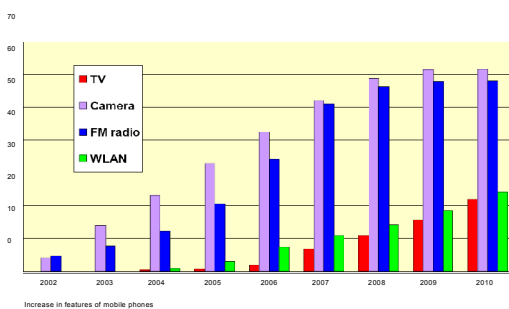


3. NETWORKED AND ELECTRONIC MEDIA SECTOR

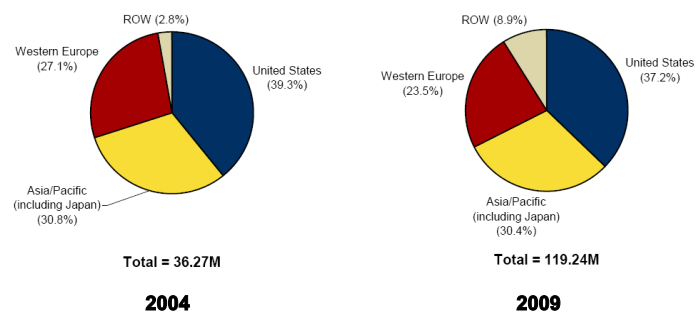
3.1. NEM - a European Strategic Asset

The economic domain encompassing Networked and Electronic Media brings a key contribution to the achievement of the European Union's Lisbon strategy. This domain, which is critically dependent on advanced technologies developed under cross-sector R&D programmes, be they publicly or privately sponsored, brings in, in return, a significant contribution to the economy.

This strategic position is created by the new opportunities and perspectives induced by the converging of the traditional market segments of IT, telecommunications, Consumer Electronics (CE) and new media for which digital value chains are evolving towards value networks. Technology convergence and the maturing of the consumer PC and related markets are spurring the creation of new consumer products, such as, camera phones, PC-media centres, and MP3 players. The following tables illustrate these trends with the prognosis for the increase in features of mobile phones from 2002 to 2010 and the shifts in use of content, i.e., user-centric media creation and consumption.



These trends are supported by the convergence of communications and media in the home network, appealing to a basic user need for freedom and mobility, i.e, the nomadic or roaming user. The following 2 diagrams show the installed base of home networks per region and how this will change and spread to the rest of the world in a 5 year forecast period. (Source IDC, 2005).



Worldwide Households with a Home Network by Region

The breakdown for Western Europe for the installed base by type of home networks and assuming the coexistence of multiple technologies and networks in the home is shown in the following table (source: IDC, 2005).



	2004	2005	2006	2007	2008	2009
PC Networks	8,985	12,553	14,466	15,412	17,095	20,363
Multimedia Networks	829	1,515	2,503	4,086	5,476	7,676
Entertainment Networks	67	246	777	1,267	1,820	2,432
Total households with networks	9,806	14,050	17,002	19,704	23,075	28,039

Western Europe: Installed Base of Home Networks by Type, 2004-2009 (000) (source: IDC, 2005)

These trends illustrate also the strong consumer expectations for the future for innovative digital products and for a complete new range of on-line interactive services.

The NEM market is also a strong contributor to employment. More than one million people are directly employed by the NEM sector in the European Union and a significant share of this employment is for highly qualified engineering jobs. Consequently, Europe has a very favourable position to further exploit the market pull, based on evolving and growing consumer expectations and needs for simple and easy to use inexpensive devices, and the technology push, made possible by the highly qualified labour force available throughout the European Union. In terms of employment, more than 1.5 millions direct jobs are today accounted for in the NEM sector. This employment ratio has a huge potential of growth if Europe positions itself at the front-end of the technologies in this field within a global economy.

3.2. Driving Innovation

Innovation is at the heart of the growth and success of the Networked and Electronic Media sector. The European industry and associated research facilities have largely contributed to the various innovations waves that have so far paved the way towards the introduction of digital audio visual applications and services.

In the early 90's, it was common thinking to consider that HDTV (High Definition Television) would eventually reach households over fibre optic cables, with data rates in the order of 150 Mb/s per programme. The dramatic – and to a large extent unexpected- progress of image coding and compression have allowed to bring this rate down to about 10 MB/s today. This spectacular improvement by a factor of 15 is paving the way towards viable commercial implementation of HDTV, notably in the US, which was still considered as a remote prospect a few years ago. Such technology leaps have also had profound implications for the telecommunication sector, by making it possible to develop viable business models based on the use of other networks than fibre based networks, in particular wireless networks. The possibilities that are currently available to display pictures and video on mobile terminals are also a direct consequence of the innovative research in the NEM domain. Furthermore, the constant research on lowering the cost of broadband communications led to the implementation of DSL-based infrastructures, which are challenging the cable infrastructures. However, the ever-increasing user demand for new audio-visual services, both fixed and mobile, now needs a fast parallel progression of both compression techniques and bandwidth.

European industry and research centres have been at the heart of this progress in technology through various initiatives, notably sponsored under the Eureka umbrella or under the Framework Programmes of the European Union. These collaborative programmes have, for example, enabled the development of the DCT and audio compression algorithms, and the testing and validation of the overall digital movie delivery chain in a collaborative pre-normative context. European research entities have also been leading the developments of the OFDM technology, notably in the context

of DAB, be it under the Eureka 147 framework, or under the Framework Programme of the European Union. This technology, pioneered by the CE and audio-visual sector in the 90's, is currently successfully implemented and deployed in Europe; i.e., the DTV networks are replacing the analogue networks, hence bringing down the delivery costs and increasing the consumer choices and application capabilities. Spin offs of this technology are now pervading the mobile communication world, with the introduction of the DVB-H standard. Efforts are also being made by ESA and the IST programmes to develop Digital Multimedia Broadcasting (DMB) systems, which combine terrestrial and satellite components in a seamless fashion to the user.

Other key audio-visual technologies that have been driven by European research and innovation initiatives include the:

- Technologies embedded in the various MPEG standards;
- MHP environment, which paves the way towards i-TV services with the OCAP version being currently considered for introduction on the US market;
- DVB technology, which is adopted as a world standard for terrestrial, cable or satellite distribution;
- DVD technology;
- MP3 technology;
- DAB technologies;
- Digital Multimedia Broadcasting technologies;

These technologies are exploited to offer applications and services to the users through a multiplicity of transport technologies and delivery networks, blurring the distinctions between services and even provoking outdated National and European Community regulation of the telecom and broadcasting services.

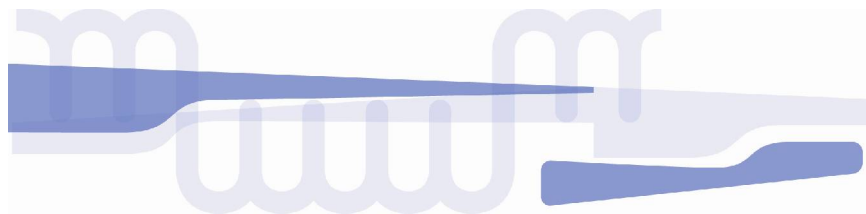
European services and applications are currently based on a multiplicity of infrastructures. This scenario is expected to prevail, or even increase, in the next decade. For example, the following delivery media are candidate for the provision of interactive multimedia services:

- Cable-based systems: coaxial and optical access networks.
- Terrestrial wireless broadcasting.
- Satellite broadcasting in broadcast, fixed and mobile service spectrum.
- Fibre and Wireless Access systems (LMDS, MMDS, FFTx, etc.).
- PSTN networks using xDSL technologies.
- Cellular and telecommunication networks (GSM, GPRS, UMTS, 3G Mobile).

All these innovative digital technologies and standards have largely benefited the European economy, as the leading edge research was conducted in Europe and allowed industry and research centres to control a large amount of the key IPR's.

3.3. Driving and Setting Standards

The European Networked and Electronic Media industry has prominently promoted its research results in standardisation fora. This is a distinguishing feature of the European research approach, where standardisation and consensus are addressed very early in the R&D process, in contrast to the more "de facto" standardisation approach, which characterizes the US approach. This approach has been key to "export" the European research results and to reap the benefits of the corresponding investments at a global level. DVB is probably the most striking example of this approach. Today, with globalisation and intense competition pushing sector actors to differentiate their offerings, the standardisation/consensus approach is possibly more difficult to follow. It is however considered as a key requirement for Europe, if it wants to collectively replicate successes at a global level for the next generation of systems and services. The next decade will be crucial for



the consolidation of some European originated standards (terrestrial DVB broadcasting, DAB, DVB-H, etc.) and their adoption in a worldwide scene.

The cooperation of European industry in fora, like DLNA, ISMA, 3GPP, and HGI, and the leading and active roles of European organisations in, for example, the IETF/Ipv6, ETSIU, W3C, MPEG standardization activities, are the empowering mechanisms for driving and setting standards for achieving success in the global market. Furthermore, Europe has powerful Standardization Organizations, like CEN, CENELEC, ETSI, who are supported at the national level by corresponding National Standardization Organizations. The European standardization system provides a tremendous opportunity for the NEM community to optimally exploit results of research.

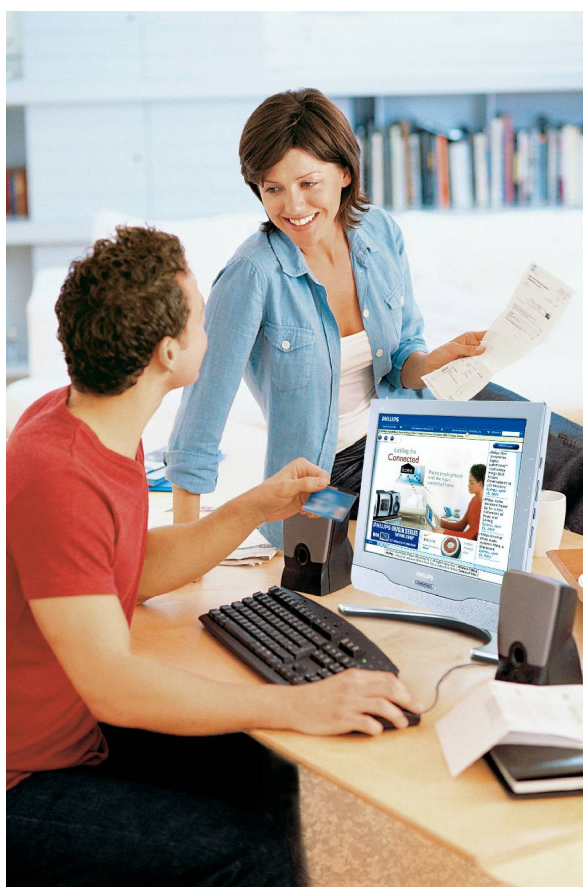
3.4. Driving Convergence

Convergence is defined in the NEM sector as the ability to provide content to a wide variety of terminals and consumer devices over all possible delivery platforms. Content and end-user devices and environments are the main drivers for convergence requirements in the value networks. The NEM audio-visual and CE sectors play a key role in this converging landscape. This evolution represents an opportunity for Europe, with prospects for the introduction of innovative devices, multiplicity of content access platforms, and consumer accrued choice. European domains of excellence, such as the mobile and broadband industry in direct partnership with the audio-visual, broadcasting and consumer electronics sectors represent strategic assets to develop the right technologies and markets. Emerging examples show that the future of Networked and Electronic Media depends on more than just the availability of content on a wide set of end-user devices. The inclusion of interactivity features in electronic media adds a social dimension to multimedia content consumption. Interaction and real-time communication between users is rapidly becoming an important component of the multimedia content consumption experience. For example, interactive television and on-line gaming applications will continue to expand their interaction and communication capabilities, including multi-modal user interaction. A multitude of in-home devices are used to generate and play out the various multimedia interaction streams. This fast and flexible creation of interactive content applications requires open software interfaces on all broadband home devices. The increase of end-user generated multimedia streams will furthermore create new challenges in terms of bandwidth and QoS for the broadband networks. Group interaction as part of the content consumption experience requires interoperable 'social software' components, allowing end-users to find each other, schedule shared events, and share personal content and experiences. The "profile" approach, by which the services and associated resources to deliver them are optimised, is another example. Technologies based on toolbox components, facilitate the personalization of the intermediate or end user services and applications. As bandwidth requirements and technology complexities would dramatically vary from one application, or a given consumer scenario, to another, the "profile" characterization permits competition in many layers and many contexts.

3.5. Culture and Education

The existing cultural diversity in the European Union clearly indicates that networked multimedia content has a special role to play in the context of culture, education, and social cohesion. "Networked" culture and education are today still in their infancy. Although, education channels provided by universities, among others, exist today and the Internet is also systematically used for education in schools and universities, we are still very far from having exhausted the educational potential that future networked content access, search, retrieval, and interactive cooperation and sharing of content between users enables. This represents a significant opportunity, for individuals to take advantage of life long learning, for governments to optimise education costs and effectiveness, and for countering digital exclusion of users who are living in less privileged circumstances.





4. NETWORKED AND ELECTRONIC MEDIA SECTOR:

TECHNOLOGY PILLARS FOR THE FUTURE

The evolution path foreseen by the NEM sector builds on the technology trends and societal changes that were identified in the previous chapter and that will be amplified and made more systematic across technologies, industrial and innovation sectors, usages and regulation. Major foundations for these developments are formed by three salient NEM technology pillars, i.e., broadband, convergence, and home and extended home technologies. Complexity is one of the key issues to address, when these technologies, players, interfaces, environments, media types and consumption modes are proliferating. For example, providing unified service portfolios to users with distributed infrastructures is not a simple task. The complexity level of such future environments for providing easy to use media based services to users is expected to increase dramatically. This is certainly one of the biggest challenges faced by the NEM industry and R&D players for the coming years.

4.1. Broadband - an Enabling Technology

Broadband networks are a critical enabling technology, whose further developments and wide spread availability are intimately coupled with technological advances related to content creation, access, transfer and manipulation. They provide significant prospects for the introduction of complete ranges of novel multimedia services and applications, by taking advantage of digitisation, feature rich content, interactivity, mobility and broadband access, independent of the delivery

network or channel. Broadband availability functions as the catalyst for multimedia content delivery and consumption. The following table, which lists the differences in Internet usage for two groups of users, i.e., broadband users and non-broadband users illustrates this catalytic role.

Typical Internet Usage	Broadband Users	All Users
Chat rooms	10%	5%
Travel info	23%	6%
File sharing	17%	4%
Content creation	16%	3%
Photography	14%	1%
Games, video. D/L	22%	4%
Radio station	19%	4%
Online game	22%	10%
Product purchase	21%	3%

Source, Pew Internet Report, 2003

4.2. Convergence, Heterogeneity and Interoperability

The future converged networked media landscape will include a multiplicity of stakeholders covering various facets in the value network, e.g., traditional stakeholders, such as content, service, network providers, equipment manufacturers, service aggregators and new stakeholders, such as DRM aggregators, trusted third parties taking care of payment, billing, and customer management services, white good manufacturers, building and civil engineering companies, car manufacturers, and office equipment suppliers. Other application domains, like eHealth, automotive, will expand the prospects for the development of new and innovative value-added services. (Digital) Rights Management research will need to take into account the viewpoints of all the stakeholders, namely, the content users, the content producers and all the different content mediators. Also, it needs to be noted that a single actor may perform one or more of the stated roles and not all roles are needed in all business cases. Also, these actors may be either individual persons, or organisations.

Interactive entertainment, particularly gaming, will continue to expand with ubiquitous bi-directional broadband connectivity, display and processing power, enabling far more realistic game environments to be produced. Three dimensional display technologies, multimodal and affective user system interaction technologies, virtual, augmented and mixed reality environments, as well as ambiance affecting technologies will begin to have impact. It is expected that these technologies will also enable other types of multiparty virtual environments, as e.g. professional or private gatherings where colleagues or family members share experiences and presence over large distances.

Connected devices will have to be true low cost and mass-market products. Life cycles of such products will be shortened, increasing the need for quick reaction time of equipment manufacturers. Alternatively, upward compatible and re-configurable equipments will be introduced, though as higher end products. The full economic potential of the “networked media economy”, however, has still to be realised, within a technological domain that is still in its infancy. It is likely that the convergence strategies that fuelled the evolution of the sector in the early 2000th will have to be continuously revised.

End-user initiative will not just be limited to the creation of personal content, but will expand into the services creation domain. The addition of interactivity features to Networked and Electronic Media

by professional content providers will also drive end-users to do the same with their personal content, creating, for example, small-group on-line iTV applications. Easy-to-use interactive networked multimedia creation tools that support the inclusion of mobile hand-helds are, among others, necessary enablers for this evolution.

4.3. From Home to Extended Home

Home Platforms and Broadband Service Platforms will become pervasive, enabling the creation and delivery of multimedia services for entertainment, education, communications, security, healthcare, remote control, etc. Home appliances will be inherently connected to at least one very high capacity local network and increasingly to a global broadband network. Both types of platforms will evolve to systems with more and more embedded intelligence. In other words, the future house will change. The home will have the beginnings of autonomous control over many of its functions ranging from intelligent environmental controls and energy management to sophisticated security and safety systems. Many of the devices that today plug into the wall and are programmed manually will become intelligent to their particular function and collaborate with other related devices. Increasing energy costs will encourage the deployment of intelligent systems in the home to optimise efficiency.

One of the key points is the easy installation of these new services based on the combination of heterogeneous home networks and home devices. That complexity of the home networking organised around the home residential gateway will be a reality and users have to be able to set up device and services as easy as possible.

Electronics are not visible anymore, the remote controls have vanished and user interfaces are relying on natural human abilities such as speech, gesture, drawing, and writing, pointing or touching. Persons at home will be reading an e-book, displays will be integrated with the windows, walls and textiles and might serve the purpose of watching television, or providing shared content and communication messages. Combination of traditional audiovisual services for entertainment purposes with control and management of white good appliances, security home devices, and automation devices (garden, garage, safety tools, etc.), and the exploitation of RFID, will integrate the home to an extended home environment. From this vision, the current home and business office will evolve towards extended home and extended office environments, accompanying people whenever and wherever they might be at any time. A seamless provision of services to the user will be materialized through extended home environments, in which users have access to all and any of the available electronic media services in their physical homes. The same development will happen in the office, which will evolve towards an extended office, serving workers at any time and in any location.

As the boundaries between home and work will blur, activities of the nomadic citizens will be carried out by seamlessly using a multiplicity of networks and technologies, both fixed and mobile. It will be an enormous challenge to manage these large numbers of interconnected digital assets kept within the home (access, protection, etc.). The extended home and office environments will be materialized in a completely seamless manner to the users through an intelligent combination and integration of content technologies and delivery networks.

The power of such extended home-work environments will be measured with their ability to provide and exploit context information. The need for greater context is rising when devices and services become more mobile and distributed and as the volume of media, information and content and the breadth of available functionality to users may explode out of control.

Compatibility and interoperability are key requirements for consumers. The associated technological challenges are huge. P2P connectivity and ad-hoc networks, Ultra Wide Band evolution and media adaptability, service discovery, user controlled content creation and rights management, media control and adaptation to different mobility or networking environments are just a few examples to be further developed. This, in turn, re-opens a complete range of policy/regulatory issues, for a much more complex and diverse environment than we know today. At issue are user controlled content protection, rights to use and produce content, payment exchange, increased usage of unlicensed bands, converged broadcast and telecom legislation, novel standards for ad-hoc peer to peer connectivity for the CE domain, etc.

Many more opportunities arise when the focus changes from selling products to selling experiences and as such reducing the gaps caused by the complexity of digital products and services and by a legacy of retail, manufacturing and service structures that leaves the burden of integration to consumers (Forrester Research, Dec. 2005). This revenue gap is illustrated in the following table:

Technology	Households today (millions)	Source of gap	Gap	Annual or product cost	Annual revenue gap (millions)	Potential revenue gap in 2010 (millions)
HDTV	14.6	Households with an HDTV that don't have HD programming	50%*	\$120, the annual cost of a typical HD programming service	\$876	\$3,420
Digital still camera	43.3	Households with digital cameras that don't print photos	34%†	\$4.60, the cost of the average number of pictures printed monthly	\$813	\$1,633
MP3 player	10.8	Households with an MP3 player that don't buy music online	78%	\$8.00, the cost of the average number of songs purchased monthly	\$809	\$2,995
Web-enabled phones	18.1	Households with a Web-enabled phone that don't buy mobile data services	80%*	\$90, a conservative annual cost for a data service	\$1,303	\$5,040
Total					\$3,801	\$13,088

Base: US households

Source: Forrester's Consumer Technographics® 2005 North American Benchmark Study

*Source: February 17, 2005, Trends "HDTV And The Coming Bandwidth Crunch"

†Source: Consumer Technographics Q2 2005 North American Survey

Source: Forrester Research, Inc.

Experience Gaps Cause Firms to Leave \$3.8 Billion On The Table

4.4 Social Computing

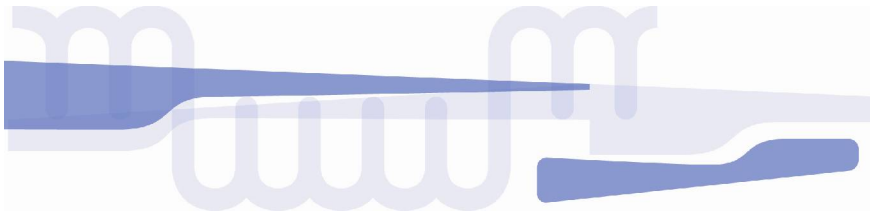
This mass adoption of digital technology will accelerate the power shift to consumer-controlled media, communications, and retail, and will propel Social Computing into the mainstream. The explosive growth of these social computing tools provides numerous ways in which organisations can boost their business and create innovative services that fulfill people's needs. Social computing is defined as: ' a social structure in which technology puts power in communities, not institutions (Forrester Research, January 2007)'. Social computing applications that are relevant to, for example, the development of new businesses and innovative business models are shown in the following table (adapted from Forrester Research, January 2007).

Social Computing Applications Relevant To eCommerce

Social technology	Examples	Why it matters to eCommerce	For whom should consider it
<p>Social networks: Technology that allows users to leverage personal connections.</p> <p>Tags: Metadata assigned to items like photos or Web pages to facilitate searching and sharing.</p> <p>Open source software: Publicly available software that can be copied or modified without payment.</p> <p>Blogs: Online diaries of text, photos, or other media.</p>	<ul style="list-style-type: none"> • Kaboodle • ThisNext • Amazon.com • LibraryThing • Wists 	<p>Enables users to edit the Internet's product universe in a manner that is relevant; this edited information is shareable across users.</p> <p>Users can classify products, brands, or categories in the way they think is most appropriate; these classifications are also shareable across users.</p>	<ul style="list-style-type: none"> • Business and products in search of viral marketing tools • Companies with niche demographics or Gen Y consumers <p>Sites with a large number of items or a robust on-site search tool</p>
<p>RSS: An XML standard that lets users collect and read content feeds.</p> <p>User reviews: Content that allows users to post and search for peer reviews on a product or service.</p> <p>Games: Internet games that enable users to create and share their experiences</p> <p>Wikis/Collaboration Software: Shared publishing software or site that allows users to edit content.</p>	<ul style="list-style-type: none"> • Fair Indigo • Engadget • ShoppingBlog.com • Wells Fargo's Student LoanDown • The Home Depot • Amazon.com • Buy.com • eBags • My3cents • PowerReviews • TripAdvisor • Second Life • ShopWiki 	<p>Unencumbers companies from hefty licensing fees associated with building an eCommerce functional site.</p> <p>Empowers users to present unvarnished viewpoints about products or companies they feel strongly about.</p> <p>Provides companies with a new way to connect with customers and gives consumers the ability to filter out anything they don't want to receive</p> <p>Aggregates and presents unfiltered perspectives, both good and bad, from consumers on products and brands that can help with a purchase decision; user reviews can also aid in search engine optimization efforts.</p> <p>Gives companies an innovative new approach to connect with bleeding-edge customers and to test new ideas in a relatively lax environment</p> <p>Allows users who may be experts to create content for others, such as shopping guides.</p>	<p>Anyone with an appetite to experiment, a meager budget, and a strong IT skillset.</p> <ul style="list-style-type: none"> • Business and products in search of viral marketing tools • Companies with niche demographics or Gen Y consumers <p>Companies experiencing diminishing returns on interactive marketing vehicles like email</p> <ul style="list-style-type: none"> • All companies interested in unvarnished feedback from consumers on their brand or products • Companies with predominantly perennial (versus seasonal) products <p>Bleeding-edge companies with significant marketing budgets that believe in the value of "buzz"</p> <p>Companies where purchasing decisions are complex and empowered users can provide advice</p>

Source: Forrester Research, Inc.

Besides social computing, there will be a dramatic increase in the importance of and need for contextual content, i.e., context is king for the new networked electronic media world. The onset of social computing, the rapid and dynamic formation of online communities, Web 2.0, amplifies underlying deeply social needs for: communication, collaboration, connectedness and creation.





5. NETWORKED AND ELECTRONIC MEDIA SECTOR: SOCIETAL IMPACTS

Networked and Electronic Media are of major influence on the quality of life. Notably in the context of extended home environments, they will further create changes to societies, democracy, education, health and culture, in addition to providing major opportunities for wealth and job creation. Ambitious targets should be to create, by 2015, three million new jobs in the NEM relevant sectors, direct (industry and research) and indirect (finance, advertising) and to foster the wide development of NEM services and applications to the widest majorities of European citizens and business organizations whichever their geographical location is. Care in the community will be feasible and practical with home systems providing a caring and secure environment, nurturing the ageing and less agile in their own homes and trusted environments. Networked audio-visual systems have a major role to play.

European citizens will expect instantly available multimedia content at any time, anywhere and in a seamless and non-discriminatory way. Content will be delivery technology agnostic and means will be available to cope with varying formats for display and auto conversion. Multilingualism needs to be handled if all citizens are to benefit from the opportunities offered in quality of life, culture and commerce by new networked and electronic media. The current trend for end-users to produce their own content for dissemination to peer groups, business colleagues and the world at large will accelerate, combining web, iTV and communication technologies. This will accelerate opportunities for sophisticated but simple-to-use content creation products and means for bringing order and understanding to the unimaginable amounts of content so produced. The creation and distribution of personal content (by individuals and small groups of non-professional content creators like sports clubs, local communities and socio-cultural organisations) generates opportunities and needs for: sophisticated but simple-to-use content creation products, content capturing and storage devices, easy personal multimedia database tools for organisation of and access to personal content, and light-weight DRM (including watermarking) tools for protection of personal content and the rights to use it.

National governments and regional administrations will continue to work to regulate and legislate for fair competition, public decency, creator's rights, prevention of crime and terrorism, whilst technology and human ingenuity will continue to make such tasks increasingly difficult. This will reinforce the requirements towards powerful and interoperable DRM systems.

As personalisation becomes the expectation with audio-visual entertainment being 'on-demand', the duties demanded of broadcasters with a public service mission to 'entertain, inform and

educate' will be a challenge, but one for which a wider range of tools will be available, hence opening a range of regulatory issues mainly on privacy aspects.

NEM pays attention to mechanisms to foster active participation of small and medium size enterprises as ways to promote the socio-economical development. The European political principle of "think small first" is also assumed by NEM.



6. NEM ACTIVITIES

Industrial Initiatives (also known as European Technology Platforms) have been introduced by the European industry and are supported by the European Commission as public-private partnerships to develop a coherent and integrated European research and deployment initiative in a number of technology driven areas that are strategic at the EU level and that have the potential for high economical and societal spin off and impact, and to federate research on a given subject in Europe, through creation of critical mass. In that context, Industrial Initiatives are not only expected to address pure technological issues, but also the policy, regulatory, and international co-operation aspects that may be related. One of the first tasks of an Industrial Initiative is to define a strategic research agenda (SRA) that can be considered as a common ownership by all sector actors and is endorsed at the highest possible level within the concerned companies and research entities. NEM is expected to be a major contributor to the successful implementation of Research and Development within the EU FP7 by mobilising research and innovation efforts, by agreeing common goals, and by accelerating innovation and growth by identifying barriers to deployment, and recommending means of overcoming them through partnership and EU intervention.

NEM represents the convergence of existing and new technologies, including broadband, mobile and new media across all ICT sectors, for creating a new and exciting era of advanced value-added services based on an innovative mix of various media forms, seamlessly delivered over technologically transparent networks to improve the quality, enjoyment and value of life for people. NEM is an industry-led initiative to promote and direct the large-scale momentum needed to accelerate the pace of innovation and rate of technology evolution to the level that will place European industries at the forefront of the technology and give users an abundance of value-added services and applications to choose from to achieve optimal benefits for all. All these efforts will bring to bear the evolutionary framework from home and office environments towards broadband extended home and office environments. In this vision, NEM assumes the challenges, risks and opportunities derived from the convergence of the audiovisual technologies (content, processing, delivery and presentation), the broadband technologies and networks, the consumer and professional equipment for multimedia applications and services.

NEM will also pursue the optimum harmonization with European-wide and other national R&D initiatives. The objective of this liaison is the establishment of pan-European virtual laboratories in the new Networked and Electronic Media by fostering strong cooperation among European researchers as well as the creation of opportunities for the cooperation of European R&D forces with other teams beyond Europe. This has been already achieved through the establishment of a European Member States Mirror Group in the NEM technologies to foster sharing of information about national R+D programmes and initiatives. The decision making processes of participating Member States R+D organizations will be significantly improved thanks to the wide availability of R&D information, that will be subject to exchanges among responsible entities within each Member State, particularly, to assist NMS and ACC countries to better shape their own national programmes based on the experiences and priorities common to other Member States.

The focus of the NEM strategy is to:

- Extend EU strength with regard to innovation capability in the networked electronic media domain, in close collaboration with all associated R&D and SME entities, to build up a visionary sector that catalyses the creation of novel markets and enterprises to the benefit of the general public;
- Seize opportunities, notably, those offered by the emergence of new untested markets, such as the home/extended home and nomadic environments and the virtual home and office environments, the co-operation opportunities with Asia and other world regions with regard to standardisation, the new forms of convergence that emergence, e.g., between movie and game industry, and totally new application domains;
- Combat weaknesses, notably through greater association of all players in the value networks, including content providers;
- Promote system approaches in which all elements of the evolving value networks are covered. Such initiatives should be able to address all levels in the value network, from basic technologies at component level to application level, to achieve consistency and economy of scale;
- Address the issues in a sectorial manner, i.e., carried by the strong and well-identified EU industrial/research basis;
- Promote an End-to-End, long-term and integrated approach to provide a level of funding commensurate with the economic importance of the sector;
- Involve Member States, through their national programmes (BMBF, RNRT, RIAM, PROFIT, etc.) and also other European Initiatives (in particular: Eureka CELTIC initiative, SmartHouse Initiative, etc.);
- Foster and catalyze the potential of European industries to cooperate in a wider international environment, by extending the research activities beyond Europe.

In addition to focusing on the core R&D agenda, NEM will:

- Advise on the achievement of a programme of standards' development that encourages investment and innovation, engenders industrial and consumer confidence, whilst protecting European consumer and commercial interests.
- Disseminate the NEM vision towards its widest acceptance by all constituencies and research groups in Europe.
- Develop a deployment strategy involving the major global companies with large European presence. The deployment strategy will be influenced by the 'European Roadmap' derived from the results of the research programme and will include an analysis of transition strategies.
- Advise on proposals to stimulate and encourage collaborations beyond Europe that benefit European employment and local wealth creation.
- Encourage a monitoring methodology for evaluating the impact of particular projects and of the overall 'NEM Industrial Initiative', against scientific, commercial and social criteria. An impact assessment methodology will be proposed to include tangible measures of value and impact.
- Advise on competition, regulation and other legislative issues to address for maximum impact of the NEM sector.