Vision 2020
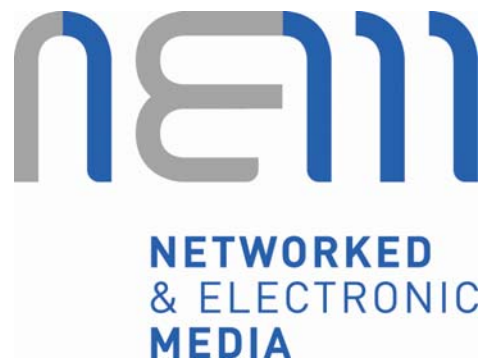## "Networked and Electronic Media"
European Technology Platform

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"Social networks and user generated content are among the current boosters of the economy of the internet. Mobility will further contribute to the emergence of new business models. The relations between these innovative offers and traditional offers such as the press, the music and the audiovisual industry are confrontational in Europe and"[1] ….

"The Internet has the potential to affect almost every aspect of our lives – how we communicate with each other, where we work, how we educate our children, how we entertain ourselves and how we receive our healthcare."[2]

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[1] Viviane Reding, Member of the European Commission responsible for Information Society and Media, at OECD Ministerial Meeting "Future of the Internet Economy",Seoul, Korea, 17-18 June 2008, http://www.oecd.org/dataoecd/37/40/40972025.pdf)

[2] Kevin Martin, U.S. Federal Communications Commission, at OECD Ministerial Meeting "Future of the Internet Economy", Seoul, Korea, June 17, 2008.

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1   INTRODUCTION

The main objective of the Networked and Electronic Media (NEM) European Technology Platform 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 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, trust and value of the user experience is at the heart of NEM. Empowering end-users to dynamically create their environments in which the quality of access to value-added content and services is the key enabling factor.

NEM is a large-scale industry-led initiative aimed at promoting, directing and accelerating 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.

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.

The NEM platform includes more than 600 participants. It is governed by a Steering Board composed of 39 members (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 & Réseaux".

2 NETWORKED MEDIA: AN EVOLVING LANDSCAPE

The Media "revolution" is in full progress. Integrated complex systems are becoming business, social and growth enablers instead of just single technologies. This convergence and the ICT business strategies that are being developed induce more complexity at all levels in the media eco-systems than have ever been seen before. In addition, predictions and expectations that were made on current situations did not come true or they fully underestimated the driving power of technology users.

Current networks and infrastructures for content and communication will be gradually replaced by the future Internet. NEM technologies are crucial to build this future Internet landscape. Changing demographics, changing lifestyles, demanding educated consumers, media literate prosumers, and trends in globalization are driving forces for the exploitation of technological developments. Networked devices and flexible service platforms have emerged as new R&D drivers. These changes affect the context and scope for R&D in the NEM domain dramatically.

The major challenge that the NEM domain needs to envisage for 2020 is derived from the magnitude with which the overall digital universe increases: much faster than 10-times-in-five-years. This explosion in complexity and size of the digital universe is documented[3] and widely cited as forecast data for 2011.

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[3] [IDC White Paper, March2008, updated Forecast of Worldwide Information Growth Through 2011]

Major points and implications from this forecast are:

> **Visual digital universe**

The digital universe – information that is created, captured and/or replicated in digital form – is predominantly visual (images, camcorder clips, digital TV signals, surveillance streams). Its size is predicted to grow from 281 exabytes in 2007 to 1800 exabytes in 2011 (exa: 10^{18}; still less than Avogadro's number). These numbers are clearly beyond human imagination and certainly so when extrapolated to the year 2020.

> **Physical information overload**

The storage space and memory that is usable and available in the market is nearly equal to the total amount of information that was being created or captured in 2007, i.e., about 264 exabytes. This balance will not be the case in the future. The gap between the amount of information that is being created and captured and the available storage capacity will grow exponentially from 0 to a predicted 1000 exabytes in 2011. Another extrapolation to 2020 results in dramatic unimaginable figures.

> **Storage consumption**

The growth of storage consumption was underestimated by 10% for the period 2007-2010. The main factors for this underestimate were the consumer needs for protection of personal data information (preservation of information heritage), carrying around their storage in mobile devices, and the integration of local storage and access to networked storage that is needed for mobility and global access.

> **Diversity**

6% of the digital universe in 2007 contained 99% of the information units, while 94% contains opaque and unstructured content. This implies that searching for meaning and managing these databases will become a nightmare, not to mention the cognitive overload that people need to cope with.

Enterprises are faced with a dilemma: More than 70% of the digital universe is created, captured or replicated by individuals, while enterprises are

responsible and liable for 85% of this volume with regard to security, privacy protection, copyright protection, screening, fraud detection, etc.

> **Industry distribution**

The distribution between information processing and impact on digital universe varies widely amongst industries. For example, the financial services industry accounts for 6% of the worldwide gross economic output with a share of 6% of the digital universe, while the broadcast, media and entertainment industries account for 4% of the worldwide gross economic output with a share of 50% of the digital universe. Another illustrative example is provided by the 100 million daily video streams of YouTube that account for almost as much as all of medical imaging.

> **Complexity – simplicity trade-off**

The quality of the user experience, the perceived simplicity of accessing and interacting with systems and services, and the effective and acceptable hiding of the complexity of underlying technologies are determining factors for success or failure of novel services.

> *'What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it (p40-41[4]).*

These developments imply two major aspects that need to be taken into account at a very high level:

> **Technology level:** A dissipation of the digital universe has to be envisaged. In other words, finding ways for timing and throwing away information, instead of storing all that is created and handling the crashing Internet.

> **Human level:** A stable people factor with regard to basic social and emotional needs for communication and being connected, for privacy, for mobility, for liberation of spatial inhibitors, for satisfying physical and cognitive needs. Fast emerging global nomads and social networks are exemplary.

The onset of producing and maintaining mobile spaces of sociality, that are enabled by a complex intersection of face-to-face interaction and mediated communication, co-presence and virtual proximity, physical travel and virtual

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[4] H. Simon in Computers, Communications and the Public Interest, pages 40-41, Martin Greenberger, ed., The Johns Hopkins Press, 1971

mobility, provide challenges that are beyond imagination. Personal communities become a mobile phenomenon, re-localized in a plurality of online and offline social spaces. These network relationships are reshaped and mobilized through reconfigurations of co-presence, proximity and distance in relation to the use of new media.

Societal changes with regard to evolving demographics – ageing population in the developed world and growing population in the developing world - cause huge gaps in literacy, accessibility, affordability and ability for ICT technologies. NEM technologies will play a crucial role in bridging these digital gaps. To achieve e-Inclusion for all[5], including the ageing population as well as marginalised young people and other groups of people that are at risk of exclusion, is an indispensible and essential condition for the NEM Vision2020. Table 1 is just one example illustrating these behavioural changes that contribute to all-inclusion as well as bear the risk for exclusion.

> *'The Internet is changing our traditional behaviour. Daily activities, such as mailing, telephoning, shopping, banking, playing music and games are increasingly done on line' (p.13 [6])*

*Table 1: Percentages of individuals who are using Internet for communicating in 2007 (from **p.13[7]**).*
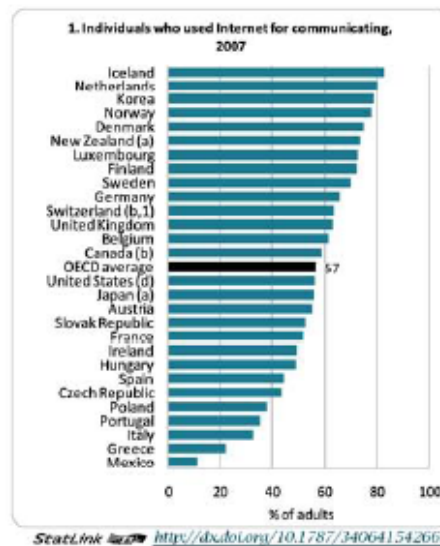

Table 1 shows just one example, i.e., the use of Internet for communicating, of how these behaviours are developing. On average, 57% of adult users in the OECD countries used Internet for sending e-mails or making telephone calls.

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[5] For example the Ambient Assisted Living (AAL) programme, http://www.aal-europe.eu/
[6] The Future of the Internet Economy. A statistical profile. OECD, June 2008
[7] The Future of the Internet Economy. A statistical profile. OECD, June 2008

"The internet is everywhere and in everything[8]. The internet unlocks the global wealth of information and knowledge. Its universality allows formerly unconnected people and organisations with similar and diverse interests to find each other, resulting in new and wide-ranging communities of interest, supply chains, and markets and networks – for good and for bad intent" (p13).

We are currently experiencing an exponential growth of the internet and innovation in applications, but also with growing risks of failure and their consequences. Problems can accumulate faster than they are being fixed. There has been no significant architectural change to the network core in decades. NEM then is challenged by paving the way for evolving this out-of-date infrastructure into a future internet that still accounts for the installed base and the by now innate needs and requirements of its users.

"Since the 1990s, the internet has changed our life and has transformed our economy. This process will accelerate as the mobile internet and ultra-fast broadband make it possible to deliver innovative services such as eHealth and eLearning everywhere, even in the poorest and most remote communities"[9].

The term prosumer was coined in 1980 by the futurist Alvin Toffler — in his book The Third Wave — as a blend of producer and consumer to describe a possible future type of consumer who would become involved in the design and manufacture of products, so they could be made to individual specification. The term prosumer is now setting the trend for how companies relate to their customers. In this evolving model, prosumers add value throughout the product lifecycle, from:

- The "prosuming" of production - prosumers as business process producers,

- Pre-market prosumption - identifying demand, design, testing, and defining the benefits,

- Marketing - word of mouth, being brand evangelists, blogging, reviewing, and discussing, to

- Post market - finding new uses for things people own - hacking, recycling, repairing, sharing.

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8 Netherlands Ministry of Economic Affairs: The Internet: a shared future. The Hague, May 2008
9 Viviane Reding, Member of the European Commission responsible for Information Society and Media:
Seizing the Opportunities of the Global Internet Economy, Presentation given at OECD Ministerial Meeting "Future of the internet economy", Seoul, Korea, 17-18 June 2008

How can companies take advantage and what role should they play in, for example, online "prosumer communities," where customers swap tools, tips, and product hacks? These are significant questions that affect the overall NEM value chain.

Our progressive energy consumption and rapidly growing needs for sustainability are dramatically affecting the traditional NEM operational landscape. The NEM community is challenged to take a proactive role. For NEM, socially and environmentally sound behaviour contributes to sustained profitable growth and value creation. Key global trends that are of particular interest for the NEM strategic domain are presented in table 2[10]. That is, for these global challenges, NEM technologies and applications could pursue advantages with regard to sustainability, energy footprint and people wellbeing.

NEM visions a future society where NEM technologies are capable to reduce the power consumption of NEM related devices between 10 to 30 %. In addition, a proper promotion of NEM technologies in other fields of the economy should provoke a significant reduction of energy demand (transportation, urban structures, etc.). This vision is in concordance with the current European[11] and worldwide societal challenges, amongst them, the need to make ICT a contributor for energy efficiency.

Table 2: Key global trends

Societal	*Business / Economics*
Growing population in developing world	New and emerging markets
Aging population in developed world	Shift from West to East
Instability/terrorism	Off-shoring/outsourcing
Emerging roles of industries and non-governmental organizations	New business models
	New technologies
Digital divide	Knowledge management
Privacy	IP (infringement, licensing and enforcement)
Rising attention on human rights	Business integrity
	Transparency/accountability

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[10] (Simpler, stronger, greener. Philips Sustainability Report 2007, www.philips.com/sustainability)
[11] COM (2008) 241: Addressing the challenge of energy efficiency through Information and Communication Technologies

3   NETWORKED AND ELECTRONIC MEDIA: VISION 2020

The NEM Vision2020 provides the focus for tuning the research priorities for the long term and not so near future. Given the difficulties, not to mention, the impossibility of predicting how the digital future will be in 2020, the NEM Vision2020 provides a high level view extrapolated from current trends and amenable to repositioning towards societal and economic developments.

The NEM aims are to foster and promote a consistent European approach to the convergence of media, telecommunication and information technologies. Its constituency includes all organisations working in the area, including content providers, broadcasters, network equipment manufacturers, networks and service providers, academia, standardisation bodies and government institutions. They produce a common Vision and a Strategic Research Agenda, as well as position papers in order to accelerate the development of the NEM sector in a harmonised and fruitful way, and place European industry at the forefront of the information era.

NEM's objective is to foster the development and introduction of novel audiovisual and multimedia broadband services and applications to benefit European citizens and enterprises. The focus of NEM is on providing an innovative mix of various media forms, delivered seamlessly over technologically transparent networks, to improve the quality, enjoyment and value of life.

The research priorities for the coming years –short and mid-term- have been identified. They concern research on:

- ➢ **Digital Content** – Design of rich media content by professionals and non-professionals supported by open and standardised tools for content creation, storage, representation, and indexing ensuring interoperability of various content formats, including efficient search and selection engines, and creation of new innovative media applications.

- ➢ **Distributed Media Applications** – Realisation of integrated multi-content communications, integration of classical and new media applications, and creation or adaptation of content dedicated to specific user groups, supported by novel open software and tools for integration of multimedia communications applications.

- ➢ **Future Media Delivery Networks and Network Services** – Establishment of autonomous networking and communications architectures, multidimensional network interoperability, universal and seamless service provisioning, Quality of Service and Quality of Experience in future service aware networks for media transport.

- ➢ **New User Devices and Terminals** - Integrated, scalable, and modular multimedia devices and gateways for home, portable and mobile devices with auto-configuration and auto-maintenance features and application programming interfaces for new media applications.

- ➢ **NEM Enabling Technologies** – Development of full set of necessary horizontal enabling technologies, providing security, privacy, trust, dependability and ensuring realisation and implementation of NEM research objectives.

In addition to the above high level priorities, NEM aims at developing technologies and services capable to feed the creation of the Future Media Internet ecosystem.

As a horizontal target, NEM aims at development of technologies in which the demand of energy will be reduced by a factor between 10 to 30 %. Because of the high impact of NEM technologies on the saving of energy in other sectors, when NEM services and applications are used, NEM visions a significant increase of NEM technologies across many sectors of the economy, thus contributing to additional savings on the societal energy demands.

NEM is the cradle for a new business sector at the heart of the Future Media Internet, addressing the challenges posed by evolving global societal trends. This position is reflected in the NEM Vision2020. It is based on contributions of NEM stakeholders and compiled by means of a consensus process

The NEM 2020 VISION positions:

⇒ An infrastructure of effective and productive ubiquitous, seamless social networks that is people-centric. These networks are easy and efficient to use, accessible when needed, effective and trust worthy. They give people interesting and motivating immersive and sensory experiences. Voice, video and data convergence are handled in a transparent fashion and, when appropriate, in an understandable way for users. Users have access to services whenever they want, anywhere and anyhow.

⇒ A service oriented society in which ambient and context sensitive services are created and provided, personalized and customized to people's individual and social needs, available to communities of users and including ALL citizens.

⇒ Open business models and revenue generating models that anticipate and exploit disruptive innovation patterns that are very flexible and derived from radically changed value chains. A loose network of niche markets, exploitation of the opportunities provided by the 'long tail' of the Zipf distribution, and a multitude of fast moving and operating small enterprises governed by 'soft' regulation and general principles and by specific rights and obligations.