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# (NetSoc)

## Deliverable D1.5
## Strategic Research and Innovation Agenda –Final Version

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**Abstract**

This deliverable reports the final version of the Strategic Research and Innovation Agenda of the Networld2020 European Technology Platform and the NEM Vision and SRIA position paper as produced on August 2014. The Networld2020 SRIA represents the harmonisation into a single document of the white papers produced by the Networld2020 expert group also reported here as attachments. The NEM Vision and SRIA position paper is the outcome of the NEM members activity. Both documents have been endorsed by the respective Steering Board.

This deliverable version considers recommendations received after the final NetSoc project review in September 2014.

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[1]    "*SRIA of Networld202*", August 1, 2014, included as Annex 1.

[2]    "*NEM Vision & SRIA Position Paper*", August 2014, included as Annex 2.

[3]    "*What is 5G (Really) About?*" Networld2020 White Paper, edited by Dirk Trossen and David Soldani, included as Annex 3.

[4]    "*Network and Service Virtualization*", Networld2020 White Paper, edited by Arturo Azcorra, included as Annex 4.

[5]    "*Mobility/Connectivity and Networking Layer*", Networld2020 White Paper, edited by Rui L. Aguiar, included as Annex 5.

[6]    "*Next Generation of Wireless Networks*", Networld2020 White Paper, edited by Emilio Calvanese Strinati, included as Annex 6.

[7]    "*The Role of Satellites in 5G",* Networld2020 White Paper, edited by Nicolas Chuberre and Barry Evans, included as Annex 7.

# 2  INTRODUCTION

This deliverable reports the final version of the Strategic Research and Innovation Agenda (SRIA) of the NetWorld2020 technological platform in its August 2014 release.

In November 2013, the Net!works and ISI ETPs launched a new single communication networks-oriented ETP named Networld2020. In order to define the required strategic research and innovation actions covering all of the components represented in the new ETP, the Networld2020 ETP started, through its Expert Group and with the support of the NetSoc SA, the production of a series of white papers (included, for the Reader convenience, in this document as annexes) which have then been consolidated into a final white paper containing all the strategic research and innovation actions identified. This consolidated white paper has been opened to public consultation through the NetWorld2020 website. The revised version of the document was then approved by the 5G Infrastructure Association and presented to the European Commission in the course of the 5G-PPP Partnership Board meeting of Oct 13, 2014. The approved document represents the Strategic Research and Innovation Agenda of the NetWorld2020 platform for 2014

In addition, this deliverable contains the NEM Vision and Position paper considering the landscapes of future research and economy from the perspective of European Technology Platform on New European Media (NEM).

Finally, a short chapter is dedicated to the initiative in favour of the SME started by the NetSoc Partners within the Networld2020 governance structure. In particular, the creation of a dedicated working group to promote and monitor the participation of SMEs to the SRIAs implementation has been finalized. The work of this dedicated group has started at the beginning of September 2014, after the end of Netsoc and is therefore not reported here.

This deliverable version considers recommendations received after the final NetSoc project review in September 2014. Thus, a new reference chapter (now chapter 1) has been added and the executive summary (now chapter 3) has been completely revised in accordance with the reviewers' recommendations.

# 3 5G: CHALLENGES, RESEARCH PRIORITIES, AND RECOMMENDATIONS: EXECUTIVE SUMMARY

The Strategic Research and Innovation Agenda of Networld2020 [1] represents the joint efforts of the NetWorld2020 expert community that was initially developed with five distinct whitepapers

- *What is 5G (Really) About?* [3],
- *Network and Service Virtualization* [4],
- *Mobility/Connectivity and Network Layer* [5],
- *Next Generation of Wireless Networks* [6],
- *The Role of Satellites in 5G* [7].

The Advanced 5G Infrastructure, defined as the ***ubiquitous ultra-broadband network that will carry the Future Internet***, is not only an ***evolution*** of current generations, but a ***revolution*** in the ICT field that will enable to deliver highly efficient, ultra reliable, dependable, secure, privacy preserving, and delay critical services to everyone and everything. Fully immersive experience, enriched by context information and realised as a "***All-as-a-Service***", will be the main drivers for a massive adoption of the new technology components and market uptake. This calls for

- **a complete redesign** of the architecture, services, and service capabilities of the new infrastructures, and for
- **a thorough re-thinking** of interfaces, access and non-access protocols and related procedures, functions, and advanced algorithms, for authorization, authentication, establishment, maintenance and reconfiguration of ICT services and any type of resource among cyber-physical entities, especially at the network edge**.**

To this aim, **several challenges** still need to be addressed to meet and exceed the expected key performance indicators, in terms of

- **throughput** (1000x more in aggregate and 10x more at link level);
- **service-level latency** (no interruption of service, latency performances according to the target application/service) );
- **energy efficiency** (90% less consumption for the same service compared to 2010 levels),
- **coverage** (global and seamless experience);
- **battery lifetime** (10x longer);
- **QoS, manageability.**

In addition to the above, ***integration of various access technologies*** will be a cornerstone for the advanced 5G infrastructure that needs to be

- ***highly flexible,*** *i.e.*, it shall be able to meet the foreseen requirements as well as those unknown in support of current and future stakeholders' expectations, and, at the same time,
- ***highly cost efficient***, *i.e.*, it shall be able to optimize the total cost of ownership in relation to different deployment contexts in Europe and beyond.

Research and innovation efforts needed to meet the identified requirements and face the described challenges, must be in place well before 2016: intensive standardization activities and large field test trials and testing shall in fact take place globally before 2020 when commercial products will be most probably available in the market.

In this context, ***Europe can make this vision happen through crucial investments in 5G technologies and related measures*** to focus and strengthen its knowledge in the new ICT fields. To

this aim, the EU 5G Infrastructure Public Private Partnership (5G PPP) is a viable initiative for the EU ICT industry to achieve a competitive advantage in the global marketplace by contributing to the research and investigations of the new technologies that will characterize 5G. To create an impactful programme, on the one end, it is imperative to ***approach the 5G development in a holistic way*** of joint exploitation between Information Technology (IT), Communication Technology (CT) and Key Enabling Technologies (KETs), strategy as defined in H2020 EC Communications[1], and on the other end, to support ***research effort on end-to-end systems***, as was the case with GSM, ***to further distinguish Europe's approach to 5G from the rest of the world!***

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[1] COM(2012) 341- A European Strategy for Key Enabling Technologies-A Bridge to Growth and Jobs

# 4 NEM VISION & SRIA POSITION PAPER: EXECUTIVE SUMMARY

Annex 2, "*NEM Vision & SRIA Position Paper*" represents the follow up to the previous NEM Vision[2] Specific Research Agenda3. In the document, we consider the landscapes of future research and economy from the perspective of NEM4, the European Technology Platform on New European Media.

The NEM European Technology platform has recently moved from networking electronic media towards a focus on Content, dealing with Connected, Converging and Interactive Media & Creative Industries . This new version of the Research & Innovation Agenda is taking into account the specific needs of this enlarge NEM community with the concern of developing a complete value chain including innovation and its catalysts (such as education, access to finance, broader Innovation trough cross-sector innovation, start-ups and innovative SMEs), addressing new business opportunities (including experimentation capabilities for new innovative services and involving the users / customers) and linked to the Grand Societal Challenges.

*The NEM Initiative is one of the recognized European Technology Platform s (ETPs) of Horizon 2020. The NEM ETP aims at building sustainable European leadership in content, media, and the creative industries. With the launch of the Horizon 2020 programme, the renewed NEM platform is pursuing its objective to promote an innovative European approach to convergent Media, Content and Creativity towards a Future Media Internet that will enhance the lives of European citizens through a richer media experience.*

*The NEM Initiative focuses on an innovative mix of various media forms, delivered ATAWAD (Any Time, Any Where, Any Device) over technologically transparent networks, to improve the quality, enjoyment and value of life for Europe's connected 'digital citizens' and digital content/media professional users. NEM is taking cognizance of existing and new technologies, including broadband, broadcast, mobile and new media across all ICT sectors, to create a new and exciting era of advanced professional and personalised services for various markets. A key focus of the NEM is on innovative services and applications that constitute different media.*

*The European Technology Platform NEM aims at being a key player in Interactive Content & Media and the Creative Industries, operating within the European innovation ecosystem to help turn Europe into an Innovation Union. NEM is taking a holistic view, identifying the pathway to commercial deployment of research, providing strategic insights into market opportunities and needs, and mobilising and connecting innovation actors across the EU in order to enable European companies and stakeholders to gain competitive advantage in global markets.*

Starting with an analysis of the future societal and business opportunities in the NEM sector, taking into account Europe's cultural diversity, and its awareness of environmental issues and societal challenges, the first part of the document (the **NEM vision**) highlights some key challenges and actions that Europe has ahead in the field of content and creative industries and considered

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[2] http://nem-initiative.org/wp-content/uploads/2013/11/NEM-V-004.pdf

[3] http://nem-initiative.org/wp-content/uploads/2013/11/NEM-SRA-080.pdf

[4] http://nem-initiative.org/

necessary to achieve the goals of the NEM initiative – either to be promoted or to be implemented by NEM and its stakeholders.

A detailed description of all relevant NEM research and innovation areas for Horizon2020 program 2016-2017 can be found in the part 3 of this document (**NEM Foreseen Innovation**). It confirms the list of topics issued from a survey performed among all NEM members. Those topics for which the NEM Community sees a specifically high importance in Horizon 2020 work program 2016-2017 are:

- Media -related applications and business models
  - Social Networking and Media Sharing
  - User Satisfaction and Quality of Experience

- Content Creation
  - New Forms of Content
  - Representation of Content
  - Tools for content creation and manipulation

- Networking and delivery infrastructure
  - Intelligent Delivery

- Content search and media presentation
  - User-system interaction
  - Authentic, true-to-original media reproduction including Virtual Reality

- Technology drivers and enabling technologies
  - Data security and personal privacy
  - Identity management and AAA (authentication, authorisation and accounting)
  - Personalisation/profiling: Smart user profiles across all services & devices
  - Power management technologies – energy saving in/by ICT
  - Machine-Machine Communication

In its last part, this document suggests also the setting up of a **Private Public Partnership** (PPP) in the field of immersive content that the NEM community expect to be a big business in the next 10 years.

The NEM stakeholders and authors of this Position Paper are firmly convinced that public initiatives, such as the European Commission's ICT Framework Programmes including its PPP approaches, form a powerful and effective instrument to profoundly foster European research, development, and innovation activities while accounting for the bigger picture of sustainable growth and societal challenges.

There are many competencies already available in research organisations, big companies but also in the numerous SMEs that work in that sector. The challenge is to involve all those stakeholders including SMEs in European projects in order to develop new innovative business and to help the development of this strategic sector. The approach taken by NEM as a cluster of clusters should be a facilitator and an accelerators towards this necessity and ambitious target to embed more start-ups and SMEs .

# 5 OPPORTUNITIES FOR SMEs

The new ETP, Networld2020, with the support of the NetSoc project analysed the status of the SME involvement and opportunities in the NetWorld ecosystem clearly identifying the need to establish a new working group dedicated to improve the SME participation into the European Research Area addressed by NetWorld2020. The new working group has been established and approved by the Networld2020 steering board on June 27, 2014. The first objectives of this working group were presented at the Steering Board meeting on September 2, 2014:

1. to promote and facilitate the involvement of SMEs in R&D projects related with the NetWorld2020 scope, including but not limited to the 5G PPP;
2. to promote the involvement of SMEs in other working groups including but not limited to the Experts Group for the definition and implementation of the SRIA;
3. to monitor and analyze SMEs involvement in R&D projects.
4. to propose corrective actions on the basis of the previous analysis.

At the time of writing of initial version of the present deliverable (August 2014), the SME working group has not been yet initiated formally. A kick-off telco was held on September 8, 2014 in order to agree on the first priority actions; it shall be followed by a formal kick-off telco or webinar to actually start the work.

## A.1    Networld2020 Strategic Research and Innovation Agenda

(see *NetSocD1-5_Annex_1_SRIA.pdf*)

## A.2    NEM Vision & SRIA Position Paper

(see *NetSocD1-5_Annex_2_NEM_VisionSRIA-PositionPaper.pdf*)

## A.3  Networld2020 white paper on: 5G Vision

(see *NetSocD1-5_Annex_3_5GVIsion-Whitepaper.pdf*)

## A.4   Networld2020 white paper on Software Architecture and Virtualization

(see *NetSocD1-5_Annex_4_Virtualization_Whitepaper.pdf*)

## A.5   Networld2020 white paper on Mobility/Connectivity and Network Layer

(see *NetSocD1-5_Annex_5_Mobility and Connectivity-Whitepaper.pdf*)

## A.6    Networld2020 white paper on Wireless and mmBand

(see *NetSocD1-5_Annex_6_Wireless -WhitePaper.pdf*)

## A.7    Networld2020 white paper on the Role of Satellites in 5G

(see *NetSocD1-5_Annex_7_SatCom_in_5G.pdf*)