

Towards a Future Internet Public Private Partnership: Usage Areas Workshop

Brussels, 3rd March 2010

**Directorate-General Information Society & Media
European Commission**

FINAL REPORT



European Commission
Information Society and Media

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1. Introduction

The Usage Areas Workshop, held in Brussels on 3rd March 2010, was organised by the Directorate-General Information Society and Media, European Commission as part of the consultation process for a Future Internet Public Private Partnership (FI-PPP). The Workshop explored the role of and challenges for demand-side actors in the take-up of Future Internet-enabled applications and services.

The meeting brought together around 40 participants, including representatives from five key industry sectors ('usage areas'), the ICT industry and the research community. Industry participants were drawn from the following sectors: smart energy grids, utilities & environment, transport, mobility & logistics, health, and content. At the one-day meeting in Brussels, they heard presentations from Commission and ICT industry representatives and engaged in wide-ranging discussion on the way forward.

1.1 Workshop Objectives and Relation to Current Work

The Future Internet PPP initiative is primarily innovation driven and consequently a prominent role is expected to be played by industrial actors. In this respect, a group of leading European ICT companies - known as the European Future Internet Initiative (EFII) - has been developing proposals for a comprehensive approach towards the core content and implementation of the PPP. These are outlined in the recent EFII position paper¹.

Usage industries have an important role to play in this vision. The PPP will be operating in a highly dynamic environment, where achieving a good balance between technology push and application pull will be a prerequisite for success. This calls for tight collaboration between all stakeholder groups. While the proactive involvement of the ICT industry is welcomed, its views need to be complemented by those of other key stakeholders. The Usage Areas Workshop, therefore, was an opportunity for representatives from usage industries to provide their views on the planned Future Internet PPP and the potential role they see for their type of organisation.

The objectives of the Workshop were to sense and frame the interest of the usage areas in this PPP and to identify the issues of relevance to which this community may best contribute. During the meeting all usage area participants were invited to give a short position statement of up to 5 minutes supported by approx. three slides commenting on the initiative, the industry paper, and the potential interest and role of their organisation in the undertaking. They were asked, in particular, to address the following issues in their position statements:

1. General appreciation of the FI-PPP initiative from the perspective of usage area organisations.
2. How to achieve a good balance between technology push and application pull, as well as between a core platform of common enablers and platform specific instantiations.
3. Explore the potential of application and services mash-up cutting across application domains.

¹ http://www.future-internet.eu/fileadmin/initiative_documents/Publications/White_Paper/EFII_White_Paper_2010_Public.pdf

4. Application pilots: representative use cases, experimentation environments.
5. Governance issues.
6. Potential role and commitment of usage area organisations in the FI-PPP.

In addition, the meeting received a contribution from a group of European research centre representatives which met earlier in the year and is currently finalising its report.

2. The Future Internet Public Private Partnership

2.1 The Policy Context

The new European Commission has put the Digital Agenda at the core of Europe's future policy framework, known as EU-2020. An ambitious European Digital Agenda that takes concrete steps towards the completion of an online Single Market will be a key element in Europe's sustainable recovery and social development. The Future Internet will be at the core of the Digital Agenda, a key enabler for innovation that underpins EU policies at many levels.

The Communication² on a Public-Private Partnership for the Future Internet – adopted on 28th Oct 2009 - represented a very important development in this respect. In essence, the Communication proposes to leverage the high European research investments and momentum on Future Internet technologies through comprehensive network and service platforms that will form the basis for the next generation Internet-Enabled Service Economy.

Priorities identified in the Communication include: improving linkages between technologies and applications; supporting new business models and making the operation of infrastructures and applications (including those of social interest) more efficient; and fostering cross-sector industry partnerships. Important regulatory and policy issues will also need to be addressed. And to maximise societal benefit it will be essential to involve end-users, civil society and consumer organisations at local, regional and national levels.

The Communication sets a framework for the creation of a PPP on the Future Internet in Europe, providing a holistic perspective on how to leverage the internet infrastructure as an open, secure and trusted platform. It aims at a multi-sectoral approach that could cover sectors as diverse as health, energy, mobility, etc.. A PPP will provide a strong focus for a smarter world: smarter energy, smarter health, smarter transport, smarter cities, and smarter living.

The milestones to the creation of such a PPP are fairly well defined. The Communication has committed to funding of €300M over the period to 2013, with initial contributions under the ICT Work Programme for 2011-12. The PPP is expected to be launched under the Spanish Presidency at a meeting in Valencia in April 2010, alongside Council Conclusions on Europe's Future Internet policy. The first call for proposals under the PPP is expected in July 2010. Initial projects are expected to begin in early 2011.

² "A Public-Private Partnership on the Future Internet", COM(2009) 479 final, http://ec.europa.eu/information_society/activities/foi/lead/fipp/index_en.htm

2.2 Programme Objectives

The Future Internet PPP is about building industrial leadership beyond R&D. It aims to create new European-scale markets for smart infrastructures with integrated ICT functionalities, as the basis for the European Digital Society. Its ambitions are threefold:

- Providing the **European citizen and industry with better and smarter services and applications** that keep, extend in time, or enhance their quality of life and business.
- Fostering the **creation of a new extended economy environment over the net**, accessible by stakeholders in all 27 Member States, which guarantees service provision, service delivery, traceability, information quality and endorsement, and helps SMEs everywhere and especially Europe's emerging economies to grow and consolidate.
- Leveraging the **enlargement of service offering over the net**, allowing a wider range of better quality-enabled services to all economy stakeholders, from SMEs to large corporations, from academic centres to public agencies.

It is essential that activities are both cross-sector and sustainable. Stand-alone solutions developed in any one sector will not provide the efficiency and productivity gains that a networked solution will be able to provide and that the market can support. Similarly, a multidisciplinary and integrated approach, where massively distributed services and applications are run over large-scale and secure internet infrastructures, is the only means to deal with the increasing complexity of intertwined application and service demands.

The Future Internet PPP will seek maximum commonality across application sectors so as to achieve critical mass in building these new European-scale markets. The EFII has identified a number of representative Application Sectors (or Usage Areas) in which sets of applications may share common domain expertise, technological and services requirements so that they can, in turn, share framework, technologies, common enablers and architectures.

2.3 Programme Structure and Approach

The only effective way to deal with the increasing complexity of intertwined application and service demands of the Future Internet is a multidisciplinary and integrated approach, where massively distributed services and applications are run over large-scale and secure platforms.

The EFII has analysed a number of representative "Usage Areas" and determined sets of applications that may share common domain expertise, technological and services requirements so that they can, in turn, share framework, technologies, generic common enablers and architectures in the provision of working systems. This concept of maximum commonality across application sectors is crucial to facilitate the creation of a critical mass for advanced services.

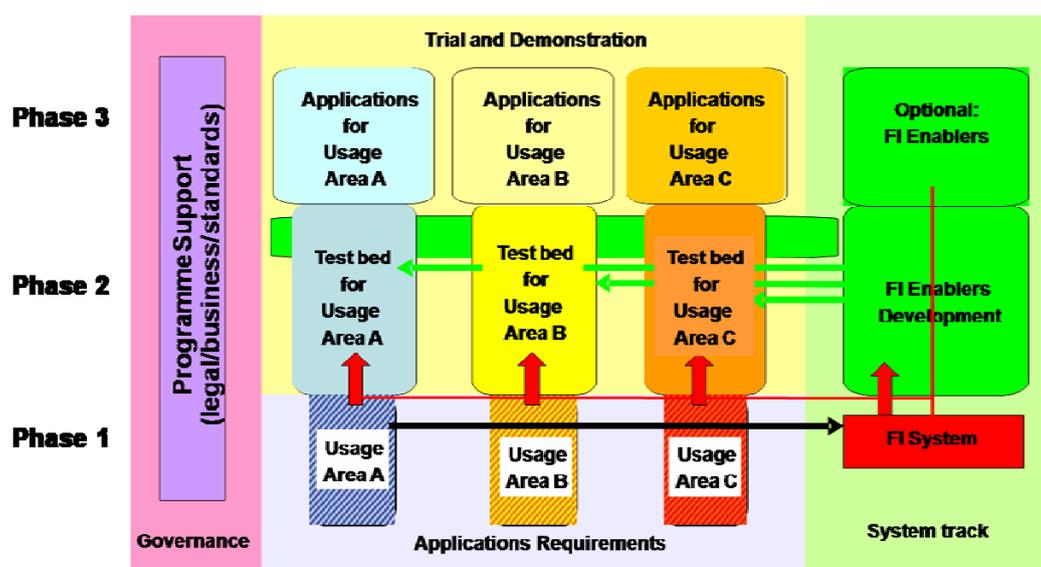
Hence, the EFII is proposing to develop and deploy a platform that instantiates a **unified and consolidated** open architectural approach that globally enables the creation, deployment and execution of applications by using hardware, software, network-enabling capabilities, etc. This is referred to as **the Future Internet Core Platform (FI-CP)**.

At the heart of this approach are the generic enablers, reusable pieces of functionality that are expected to be required by a significant number of usage areas. Examples include (among many others) functionalities such as: data management; service/content handling; rating and billing; identity and access management; rights management; and lifecycle management. Each of the Applications will typically be built on top of a Core Platform Instance, based on a selection of generic enablers.

The approach involves the tight coordination of efforts to detect generic enablers, develop them only once, identify and reuse existing components, and integrate them altogether. Thus, the Future Internet Core Platform would not be built from scratch but would be assembled on an iterative basis to meet design specifications coming initially from usage area domains. The analysis of the generic enablers is ongoing and a prioritization of all the generic enablers needs to be undertaken so as to identify those to be addressed in the first phase of the FI-PPP.

According to EFII the Programme is suggested to be implemented in three Phases, corresponding to three calls for proposals expected over the period to 2013 (Figure 1).

Figure 1: Proposed Structure of the European FI-PPP



Source: Industrial Position Paper "European Future Internet Initiative"

Phase 1 will focus on the 'System View'. It will set in motion the creation of the core platform and development of the basic enablers. A limited set of Usage Areas will be engaged in progressing their requirements on the Future Internet and how their business processes may be supported. They must also define their test scenarios and negotiate with available infrastructures to support their functionality. In addition they must begin preparing their domain-specific functionality for the test and demonstration work. This Phase would also establish a programme support/governance activity and start the evaluation of test infrastructures so as to identify gaps and future investments needs.

Phase 2 will focus on large-scale Core Platform development, integration, running and testing. It will ensure the availability of the necessary test infrastructure and instantiate the platforms with the common enablers that would allow the tests and demonstrations to run. As such, it will facilitate the integration of the test and trial infrastructure on a pan-European scale.

Phase 3 will provide global support to the Usage Areas in integrating and validating the applications. It will populate the test environments with a variety of applications to prove the feasibility of scale, use of common enablers and viability of the environments. Further work will be required to increase the scope and functionality of common enablers and support the application work. Some activity on the maintenance of the test and demonstration infrastructure is also envisaged.

3. Sector Perspectives on the Future Internet

The Workshop analysed the proposed Future Internet programme from a sector perspective providing insights on:

- i) Challenges and trends for the sector;
- ii) Potential contribution of the FI to these challenges and trends; and
- iii) Specific requirements and enablers for the FI.

The discussion is synthesised below in relation to these aspects for each of the five Usage Areas represented at the meeting.

3.1 Smart Energy Grids

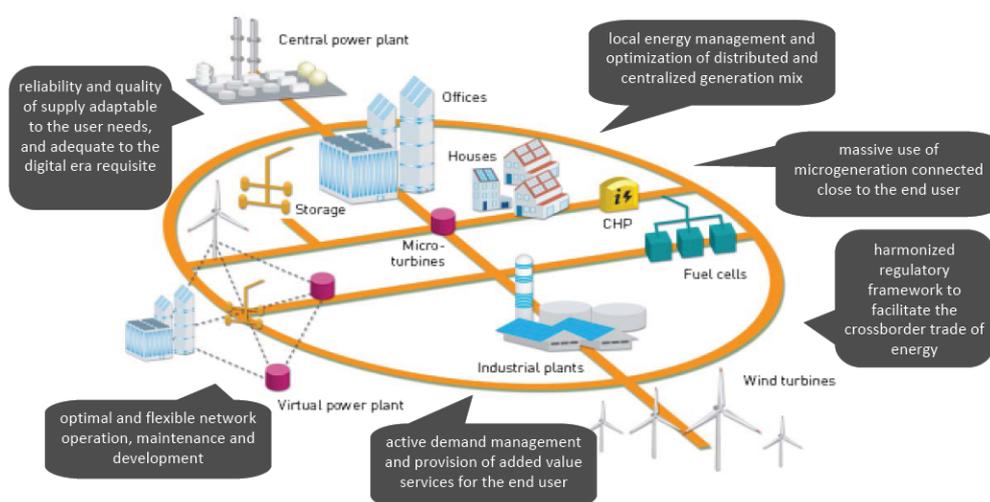
The EU has set ambitious goals for its energy policy, including a commitment to generate 20% of its electricity from renewable sources by 2020; and to decarbonise the European power system (80% reduction in greenhouse gas emissions by 2050). Technology is a key element to achieve these objectives. In particular, Smart Energy Grids (SEGs) is one of seven major technologies identified under the EU's Strategic Energy Technology (SET) plan.

ICT is of increasing importance within the energy sector. It can optimise the management of energy networks so as to match supply and demand in the most effective way; it can help facilitate demand management and the provision of added value services for the end-user; and it can help integrate 'prosumers' who deliver energy into the network from locally-based microgeneration schemes (including selling power from their own electric vehicles).

The Future Internet will be an enabler for Smart Energy Grids by providing, amongst other aspects (Figure 2):

- i) **Communication services** for mission-critical applications (e.g., protection, blackout prevention) and sensor/actuator networks;
- ii) **Efficient data-handling services** for power-grid status monitoring (via huge amounts of sensors), smart metering, and intelligent forecast systems; and
- iii) **Service management platforms**, such as customer and subscription management, accounting, and energy brokerage.

Figure 2: R&D Challenges in Smart Energy Grids



Source: Presentation of Enrique Areizaga, Tecnalia Group

There are many challenges to be overcome, however. From a systems viewpoint, it will be necessary to develop a global SEG architecture; identify and close standardisation gaps; analyse new business models; and develop credible deployment and evolution scenarios. Technical challenges include the development of a scalable, reliable and secure communication and control network; self-configuration and adaptation capabilities at different scales; reliable control systems; and robust privacy and security concepts. The need to deploy very large-scale sensor networks represents a particularly interesting feature. And from an experimental viewpoint, SEGs will require scalability testing across billions of devices, involving several 100 millions of end-users, many thousands of smaller and medium power plants (especially renewables), and possibly many millions of electric vehicles. This creates not only a bandwidth problem but also issues in relation to complexity for control algorithms, management systems and data handling/messaging.

Potential trials/testbeds, as identified by EFII, include the following³:

- **A Pan-European Smart Energy Grid test environment**, connecting at least three Smart Cities from different countries, involving at least 100,000 participants based on at least 50% of renewable energy production. The FI would be used as a test network for communication and control purposes.
- **Developing a Pan-European Black-Out Prevention Concept**, including verifying its functionality through proper testing in the test-bed/trial environment.
- **Enabling the European e-Energy Market**. Facilitating the energy broker's role as well as the interworking with the residential end-users (prosumers), and professional end-users across all chosen energy sources (especially renewable ones) and storages.

Participants cautioned that Smart Energy Grids is already a very active and crowded field. For instance, an SEG test environment involving just three Smart Cities might not be ambitious enough

³ N.B: All candidates for trials/testbeds suggested by the EFII are tentative at this stage and are a key focus for the consultation with the Usage Area community.

given the interest in the field in Europe. There is a risk that such actions get overtaken by developments elsewhere.

Hence, it will be necessary to **clarify the PPP's specific contributions**, moving beyond existing models that are already being addressed by industry. The focus should be on what is new and including the business models of tomorrow where users will be in control, since these offer the best prospects for Europe to create a new internet industry of the future. 'Prosumer' aspects, where end-users are both producers and consumers of energy, where considered novel and distinctive. This will bring significant changes for the demand side, requiring the deployment of appropriate ICT-based tools. For instance, the SEG test environment may be a good opportunity to start testing the impact of the large-scale introduction of electric vehicles in Europe, as foreseen under the Green Car PPP initiative.

Energy is a rather conservative sector and there is a risk that it could push back and not accept a Core Platform being imposed from outside. Intensive dialogue will be needed between the PPP and energy sector actors to ensure the initiative moves forward on a collaborative basis.

3.2 Utilities and Environment

Cities are demanding environments, requiring many types of services, such as waste management, public lighting, water and gas networks, parking, etc. Each application involves a complex chain of data, processes and actors, but with a common purpose – to provide end-to-end service for the user/customer (Figure 3). Machine-to-machine (M2M) interactions can provide monitoring and control solutions to optimise these processes. However, the market is fragmented and generic solutions are lacking. The solutions offered have to be improved in terms of genericity, flexibility, scalability, efficiency and security so as to make Smart City systems easier to deploy and manage.

Figure 3: Complex Value Chains for U&E Applications



Source: Presentation of André Bottaro, Orange Labs for EFII Utilities and Environment Working Group

In the Utilities & Environment context, the PPP aims to meet three major challenges:

- **Technical:** Developing and testing of an open IT platform for M2M, and demonstrating it through the implementation of urban services.
- **Financial:** Testing financial and business models that will facilitate the emergence of new city services, adapted to the needs of urban service operators (local institutions, etc.).
- **Environmental:** Demonstrating the positive impact of these solutions on a city's sustainable development, and developing eco-designed networks and sensors.

From a technical perspective, the initiative aims to overcome key roadblocks and bring chosen technologies together at a carrier-grade level. These include: low-energy use and long lifetime sensors (a very difficult problem); heterogeneous device access; scalability, simplicity, ease of deployment; quality of service; security; and efficient handling of huge amounts of data. Standards will also be an important issue.

At present, the EFII has identified the following as potential aims for trials and testbeds:

- Under Phase 1, addressing U&E requirements on monitoring, metering, management, distribution of urban services. Test the first components of the Core Platform.
- Under Phase 2, address the large-scale deployment of U&E services, using the first project infrastructure and components, and demonstrate the viability and robustness of the approach as a candidate solution for future industry developments.
- Under Phase 3, assess the methodologies and experience acquired through previous projects; and develop innovative applications and cross-area projects.

In discussion, participants noted that one of the main aims for such a collaboration in this domain should be the **adoption of standards**, which will lay the foundations for more standardised and harmonised Smart City systems. Administrations have to be prepared to let private firms **access geo-spatial and sensitive data**. **Open architectures** provide an ideal framework for the development of new business models based on services, particularly for SMEs with high technological potential (specific solutions). Such opportunities should not be limited to cities and we must ensure that **rural areas too have the infrastructures** necessary for such services to flourish.

Utilities & Environment is a natural context for cross-domain interactions, since it shares many common requirements and enablers with other sectors, leading to common applications and services. Examples include: smart energy grids (public lighting, integrating local meteorological and other data); transportation and mobility (emergency services, navigation, ...); and health (emergency and disaster management). Specifically, M2M edge networking technologies (e.g. IEEE 802.15, new PLC communications), M2M standards, and M2M network integration could provide the technology push, while application-specific middleware and service-oriented architectures could provide the application pull.

It will be necessary to access research results and technologies/services in these other domains. Human interfaces will be particularly important in ensuring information is provided to users effectively, as well as investing in education and training in the use of FI services in the rural/local context.

3.3 Transport, Mobility & Logistics

Safe, efficient and sustainable (i.e. low carbon) transportation systems are essential to the European economy and society. They are particularly important in the context of Smart Cities, where the concentration of travellers and different transport modes creates a need to share and distribute a wide variety of mobility-related information. ICT innovations based on the Future Internet offer significant opportunities to manage transportation systems in more efficient ways, combating congestion, reducing energy consumption and pollution, and making the most of multi-modal solutions (Figure 4).

Figure 4: Transport, Mobility & Logistics Services



Source: ETSI Technical Committee on Intelligent Transport Systems

Current generation ICT systems in the transport domain face several roadblocks, however. Many systems are proprietary, and platforms and devices lack the openness and interoperability necessary for effective solutions. To a significant degree, the standards necessary to achieve harmonisation are missing.

Various efforts are being made to address these shortcomings, bringing together stakeholders to develop the next generation of cooperative systems, including vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and infrastructure-to-vehicle (I2V) communications. In particular, the COMeSafety⁴ project is coordinating efforts to agree a Common European ITS Communication Architecture that is currently being considered as a European standard by ETSI and ISO/CEN. This common architecture complements the European ITS Framework Architecture (known as FRAME) and includes the integration of IPv6 and geonetworking.

⁴ www.ecomsafety.org

Other initiatives include the Intelligent Car Initiative and the eSafety Forum⁵, bringing together the relevant stakeholders to promote ICT-based systems and applications for safer, more efficient and cleaner mobility; the ITS Action Plan, aiming at promoting the deployment of ITS systems in Europe, and EasyWay, a Europe-wide project driven by 23 national road authorities including other operators to deploy ITS on the trans-European road network⁶. There are several other European projects relevant to this area; In-Time, a pilot project focusing on the delivery of multimodal real-time traffic and travel information services for drivers and travellers in European cities via a commonly agreed interface⁷; Freilot, a pilot aiming at increasing energy efficiency of urban freight through deployment of ITS services⁸; and EURIDICE, aiming at developing the concept of Intelligent Cargo⁹.

The Future Internet could contribute in several areas, providing mobility services for people and goods. For local authorities and transportation operators, potential solutions include systems for road traffic monitoring, infrastructure and incident management, public transportation monitoring, toll collection (parking, congestion charging schemes, etc.), advanced logistics management, and decision support. Citizens could benefit from services such as car-sharing, real travel and traffic information, easier and smarter navigation solutions, easy-to-use multimodal services, advanced safety systems, and on-demand public transport. For companies, efficient multimodal transport solutions, telediagnosis and remote maintenance systems, intelligent cargo applications, and advanced fleet management could be attractive.

The EFII has identified two main priorities regarding Intelligent Transport Systems. One is **Infomobility Applications**, providing individualised passenger information regarding transport and facilitating multi-modality and providing best route information for all transport modes. The second is **Logistics & Freight Transport**, addressing issues such as connection between "track & trace" of goods and their transport, including hazardous goods monitoring; real-time optimisation and rationalisation (cost & CO2 savings); protection against counterfeiting and illicit trading; and intelligent fleet monitoring & management.

Potential foci for trials/testbeds include:

- **Car as a Source of Data:** Providing an open and secured access to car sensors and their parameters, to deliver ITS services.
- **An Open Ecosystem for Personal Data and Services:** Devices and services neutrality as a common enabling infrastructure for an "Internet of mobility related Services" from an end-user perspective.
- **Intermodal Traffic Management:** IT for the underlying infrastructure of traffic signs, toll systems, traffic monitoring, etc., and control systems for automatic or semi-automatic vehicles (i.e. trains, people-mover or driver-less cars).
- **Intermodality for Goods Transportation:** Open and interoperable infrastructure for seamless pan-European "track & trace" services contributing to the Intelligent Cargo vision related to transport ecosystem.

⁵ See http://ec.europa.eu/information_society/activities/esafety/index_en.htm and www.esafetysupport.org

⁶ www.easyway-its.eu

⁷ www.in-time-project.eu

⁸ <http://www.freilot.eu/>

⁹ <http://www.euridice-project.eu/>

The pilots should take into account the work of current activities in the domain of cooperative vehicles (V2V, I2V and V2I communication¹⁰), including the results of the large-scale field operational tests now starting and the technical specifications emerging from ETSI and ISO/CEN.

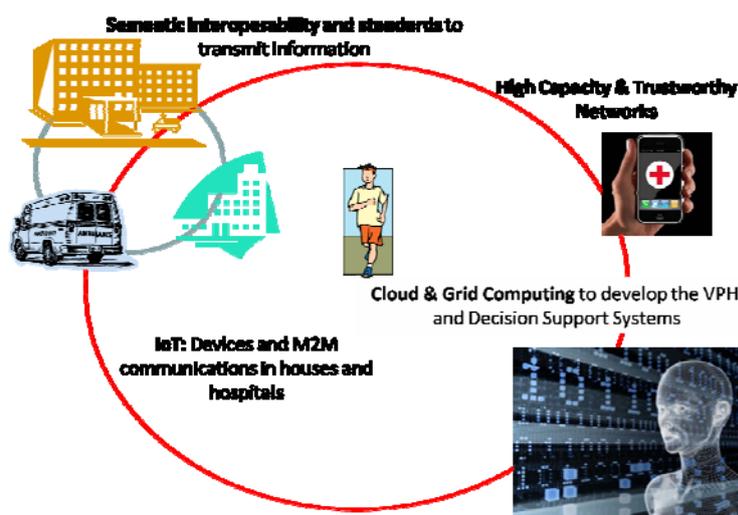
Participants stressed the need to ensure that such solutions are **service driven rather than system driven**. Here the FI-PPP needs to focus both on end-user services and on services to support the operators' tasks. It is expected that services will be driven mainly by the infrastructure operators as they have direct access to data and services relevant for other stakeholders as well as end-users. As in other usage areas, a value chain approach to innovation needs to be adopted, clearly identifying benefits for each type of stakeholder. Only this will ensure that services are accepted by users/consumers once the pilot phase is completed. Traveller information services (TIS) were considered to offer the best early prospects for 'win-win'.

3.4 Health

eHealth services are already well established in Europe and the Future Internet will facilitate their evolution even further. All areas of healthcare will benefit, from prevention and health promotion, through acute care and treatment in health centres, hospitals and at home, to rehabilitation. Citizens will be empowered to monitor their well-being and adopt healthy behaviour. Information systems will collect and integrate patient information, providing a more personalised treatment. Medical professionals and patients will be able to access the information in real-time and according to the context, whether in their local hospital, travelling abroad, rehabilitating at home, etc.

The Future Internet will allow the seamless connection of all potential actors and places related to healthcare in ways that have not been possible up to now.

Figure 5: Enablers for Future Internet in Healthcare



Source: Presentation of José-Maria Cavanillas, ATOS Origin, for EFII Healthcare Working Group

¹⁰ Relevant projects are COOPERS, CVIS, SAFESPOT, Pre-Drive C2X

Initial candidates for trials/testbeds include:

- **A Pan-European eHealth Knowledge Space:** based on semantic technologies involving a large number of participants (knowledge sources) from different countries. Interoperability of ontologies across the internet and advanced services developed on top are crucial for such a deployment and would stimulate the growth of thousands of hi-tech SMEs.
- **A Large-scale Collaborative Infrastructure for European Hospitals:** This would offer tools to support hospitals as well as to enhance homecare. Services based on mHealth to connect the whole set of involved actors in the healthcare provision constellation.
- **Enabling the Virtual Physiological Human (VPH):** Initial interoperable services utilising the VPH, duly connected to the information space and accessible by the mHealth infrastructure. This would be a longer-term objective (by 2020).

Healthcare is an extremely demanding environment. Specific challenges in this usage area include:

- Interoperability and standardisation of computer-based medical systems.
- Management and interoperability of Electronic Health Records (EHR).
- Interconnection of hospitals and medical team remotely.
- Integration of sensing technologies and data within large-scale eHealth systems.
- Guaranteeing very high levels of privacy and confidentiality of data, as well as safety and security.
- Bridging health and social care - enhanced remote care of patients especially for chronic diseases and elderly people.

Some participants thought that the scope of the trials/testbeds outlined in the EFII Paper was too ambitious. Given the relative maturity of eHealth, the challenge is not to collect more data but to exploit the information already available in a more efficient and useful way. Technology push needs to be balanced by user needs. The aim should be to put the citizen (both as healthy user or patient) at the centre of the healthcare information system. Relationships to existing sector and EU initiatives is also important.

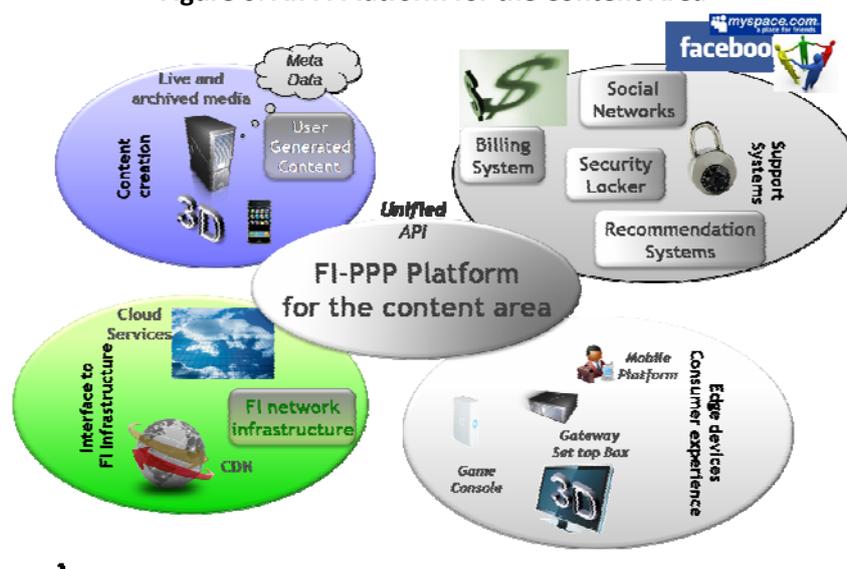
Interoperability for clinical information sharing could be a key focus area. Seamless sharing of such information would empower citizens and open the door to a huge range of services and facilities such as: personal electronic health records (PHRs) where citizens contribute their own information and choose who to share it with; regional health information systems based on shared EHRs; and bio-information systems based on historic, population level EHRs.

In health, the barriers to innovation tend to be organisational rather than technological. The cost of public health systems is set to increase over the next decades as life expectancy is rising steadily. The private sector will be increasingly important in being able to deliver user-centred health systems, but companies will only invest if they see a return on their investment. Thus, we need to look for new business models involving companies capable of providing infrastructures, SMEs capable of providing innovative services, and governments capable of assuming mid-long term agreements for the provision of eHealth services by private companies. In the short term, health and well-being – a new and emerging market – may offer better prospects for introducing new products and services than the conventional healthcare systems, and could prove particularly attractive for SMEs.

3.5 Content

Of all the usage areas represented at the workshop, perhaps none is changing as quickly as content. Developments such as mobile technologies and services, peer-to-peer (P2P) communication, and user-generated content are transforming the content landscape, but also straining existing infrastructure and networks. In particular, there is a shift in the topology of content networks, from centralised to decentralised models. Emerging developments, such as 3D content and very high quality video, are set to accelerate these shifts. All of this brings new demands on the networking infrastructure in terms of quality of service/experience. Changes are required at the business level, too, so that the walled gardens of network providers are opened up to service developers, integrators and end-users.

Figure 6: An FI Platform for the Content Area



Source: Presentation of Martin May, Technicolor, for the EFII Content Usage Area Working Group

In the content arena, the Future Internet holds the potential to create a large-scale, pan-European Content platform to unlock Europe's potential for creation, search, viewing, exchange, contribution and distribution of live and archived, digital content and to build innovative services for future economic growth. This involves creating and demonstrating: **networks and smart distribution systems** with access to media backbones and broadcast networks as part of the Future Internet topology; as well as **smart open content, interfaces and services**.

Here, the Future Internet PPP initiative should aim to:

- Enable consumers to produce and access high quality and 3D content from anywhere on any device;
- Ease the exchange of content globally (or on an European level), including content transcoding, interoperable DRM and billing systems;
- Develop novel content search and discovery mechanisms by adding meta data during the content creation or during the content workflow process; and

- Enable consistent experience on each device (how content is accessed), for example through user monitoring and including end-to-end network and media monitoring (QoE).

Potential areas identified for trials/testbeds by EFII include:

- **Deploying a ubiquitous, pan-European content exchange platform** to enable Europe's potential for creation, handling, and distribution of digital content.
- **Transforming content into smart content** by adding meta data during the content creation process or during exchange. This additional information will enable consumers to use any device or application to browse, search and purchase content from globally distributed collections of content catalogues.
- **Developing consolidated and open interfaces** between hardware and network resources and the applications and services running on top.

Participants stressed that the content area is not just about consumers but also about developers and producers. While user-generated content is important, professional content producers are, and will remain, a major feature in Europe. Developments such as digital switchover, the increasing take-up of High Definition television, and the emergence of new delivery technologies such as 3DTV and hybrid broadcast/broadband, have significant implications for professional producers and content creators. The trend is towards fully-digital production environments so as to be able to easily repurpose content for a particular channel or target device. Content archives are also being exploited and represent a rich resource for new services. Thus, trials should focus on the **whole content production and delivery chain**, including new services, not just 'content management'.

The media industry's main expectation of the Future Internet is for **an efficient infrastructure enabling the production of new content at lower costs**. Among other aspects, this will involve:

- Native exploitation of virtualisation and distributed storage solutions **in the cloud**;
- Set up of a **media-aware service marketplace** to dynamically select, orchestrate, deploy, new production chains and new commercial partnerships;
- **Semantic technologies** as widely adopted tools enabling efficient content-based integration and efficient search and retrieval methods;
- Abolition of professional/non-professional user distinction, in favour of a more **flexible management of user classes** and permissions.

Projects and pilots should be user centric and based on real-life experiences (e.g. smart homes, multiplatforms services, etc.). Open interfaces and APIs will be essential for a consistent and engaging user experience and to enable third-party applications and SME growth. Special attention should be paid to involving creative industries, which typically comprise very small companies and have little time for EC projects and procedures. Similarly, it will be necessary to share results to make them accessible/usable across a very wide community.

Accessibility is an important requirement, to ensure that content and services are open and are widely and easily accessible to and usable by all sectors of the community, including the disabled and the elderly. Governance, digital rights management (DRM), cross-border licensing, and trust within social networks were also flagged as issues requiring attention.

Business models will be especially important here. The media world is changing rapidly, such that it is no longer clear who contracts with whom and for what. There is scope for a 'thinktank' approach to experimenting with innovative business models.

3.6 Other Perspectives

Finally, a number of contributions emphasised other complementary perspectives to be taken into account in the Future Internet PPP.

At national level, initiatives and programme are being put in place in several EU Member States. In the UK, for instance, the UK Future Internet Strategy Group has recently been formed. It brings together key players from industry and academia and is developing a UK community to engage more effectively in UK and European Future Internet activities.

In Germany, THESEUS¹¹ is a €200M programme to develop new technologies for the Internet of Services. It combines a focus on breakthroughs in core technologies such as semantic technologies with applications of those technologies in real-life scenarios. Theseus applies a similar structure as envisaged for the FI PPP, in terms of technology push through a common horizontal layer and application pull through several vertical user scenarios. Its network of global partners guarantee efficient dissemination and early strategic positioning of the solutions developed. The scenarios include areas such as improving innovation processes, new medical diagnostics, and knowledge management for user-generated content, and all place particular emphasis on involving SMEs. Among other issues, the THESEUS experience suggests that scalability should be made a premium requirement for solutions from the outset; without this they are unlikely to be commercially viable.

At regional level, many complementary initiatives are starting, involving local governments, companies and research centres. For example, in the province of Trento, Italy, the academic and research system works together with companies in future internet related fields under the sponsorship of the local government. Government controlled companies in energy, transportation, health and utilities participate actively in the experimentation activities providing domain knowledge and using the results of the projects which crosses the various sectors.

A frequent theme was that much innovation comes from micro-enterprises, and hence it is essential that these are involved in the programme. We must find ways to turn the testbeds into seedbeds of innovation.

While industry was the main focus for this meeting, participants also stressed the need to engage with public sector stakeholders. These too are a natural constituency for FI applications and services and in particular could play a pivotal role in stimulating cross-domain applications.

¹¹ <http://www.theseus-programm.de>

4. Key Issues for PPP Development

The meeting led to the following initial conclusions in relation to the questions posed in the Terms of Reference.

4.1 General Appreciation of the Future Internet

Overall, participants unanimously welcomed the PPP initiative. Bringing together such a strong group of actors around an open platform was seen as attractive and to have a high potential for success. It should be remembered, however, that technology push needs to be balanced by the needs of users, and that application sectors will need to be intimately involved in the Programme's evolution.

Specific messages from the Workshop included the following:

- **The internet as a driver of disruptive innovation:** For all of the sectors concerned, the internet is already a major driver and further integration was seen as inevitable. This is not business as usual; for all sectors the shifts envisaged will be disruptive.
- **Significant areas of commonality are apparent:** Although each area has different characteristics and requirements, there is a substantial degree of commonality between them. Hence, the concept of generic enablers will bring real value, even though attention will still need to be given to application-specific functions.
- **The FI Core Platform is well justified:** The proposed Core Platform approach represents an appropriate response to this complex picture and needs to reflect the usage area requirements. The platforms developed must lead to **open, faster, more efficient and cheaper solutions**. Appropriate trade-offs need to be found between what is implemented in the Core Platform and what is addressed in the domain-specific APIs.
- **User needs and added value as key foci:** The European Future Internet PPP should be more than a technical programme. **It must put users (both end-users/consumers and professional/industry) and their needs centre stage** in all aspects. This requires, firstly, a strong focus on understanding user needs and requirements, and secondly on interlinking these needs so as to bring benefit for all stakeholders. **The PPP must have a strong and relentless pursuit of value:** understanding how value is created, how it can be protected, and how it is valued by the consumer. Thus, technological development needs to be balanced by a strong emphasis on socio-economics and innovation.
- **Be ambitious and distinctive:** Developing the usage domains could be problematic. Each is a mature field with its own strategies and objectives. PPP activities must be distinctive and bring real value for the sector: they should not duplicate existing initiatives; nor should they attempt to bite off too much. **Enabling the PPP to strike this right balance between ambition and realism will be one of the key contributions of usage area actors.**
- **Leveraging existing investments:** Given the scale and urgency of the challenge, there are neither the time nor the resources to start from scratch. Hence, for efficiency it will be essential that each area leverages previous investments and that the ICT sector is open-

mindful enough to take these 'legacy' investments on board. Activities should not proceed in isolation but take account of existing EU projects and initiatives (standardisation, FP7, etc.). Sector actors can make a particular contribution by making available existing large infrastructures, such as broadcasters' content networks and emerging ITS platforms.

4.2 Balancing Technology Push and Application Pull

Overall, the attempt to introduce a strong application perspective to the PPP at such an early stage was shared and appreciated. Relevant points included:

- **Activities should be multi-faceted:** development of enabling technologies, standards and integration can provide the technology push, while specific instantiations and middleware can provide the application pull.
- **Follow a value chain approach**, ensuring projects are service driven and not network/system driven. Platforms should facilitate inter-working of different actors (e.g. doctors and patients, drivers and infrastructure managers), within and across different application areas. This requires strong links to and understanding of usage area actors.
- **Be open:** developments should aim towards open architectures, interfaces, and standards wherever possible.
- **Multi-modality is key**, for example developing sub-systems that bring different requirements.
- **FI solutions must support day-to-day sector operations and management** (e.g. content production), not just services for the end-user.
- **Build wide and deep partnerships**, bringing together usage areas, the ICT industry, the research community, regional players, and international initiatives. Application-side industry, in particular, needs to be closely involved.
- **Adopt a broad application focus**, not limited to the five application areas indicated in the EFII paper.

4.3 Application Pilots

This question addressed how to approach the application pilots, including suggestions for representative use cases and experimentation environments.

- **Experimentations are key and in fact constitute the core added value of the PPP from a usage perspective.** User experimentations are especially important in the last phase, as they demonstrate applicability of the concepts/technologies in a more local/regional context.
- **Large-scale experimentations are preferred**, as they justify the EU added value. However, there is a risk these become too complex and we should also leave room for small-scale experimentations as well as ones involving small developers.

- **Smart Cities and Regions represent a good environment for (cross-domain) experiments** since they represent a natural concentration of people (i.e. users) and services.
- **Prosumer-like experiments will also be fertile ground.** We can leverage on them to create new business opportunities and application scenarios currently not foreseeable.
- **Other approaches/uses for experiments** include: to demonstrate mash ups; to help understand complexity; exploring rights-management issues; and combining experimentation with the production-level.
- **Use of semantics and meta data** will be required at all levels.

4.4 Cross-domain Applications and Services

This question asked Participants to focus on the potential for applications and services mash-ups cutting across application domains.

- **Mash-ups were seen as a core added value.** Key challenges include: putting all elements together (sensors and services assume different meanings in the different levels); and making sense of the diversity of application contexts and data.
- **Infrastructure-as-a-Service and Platform-as-a-Service**, among others, were identified as important notions to interface with the environment and to realise mash ups.
- **Technical goals to ensure the general applicability of solutions include:** device and service neutrality, infrastructure neutrality, data access neutrality, etc. Reference implementations are a must for all the applications.
- **Other issues** highlighted as common requirements included:
 - Standards and interoperability;
 - Legacy issues;
 - Very high guarantees of privacy, trust, security.

4.5 Governance Issues

Governance issues were not addressed in detail at this first meeting. Initial points raised were:

- **Governance is multi faceted**, covering research, technologies, business models, take up, etc.
- **Empowerment of users is key** (as citizens, consumers, patients, drivers, etc).
- **Other issues:** DRM, openness, and trust in social networks.

4.6 Players' Potential Role & Commitment

Finally, participants were asked to reflect on the potential role and commitment of usage area organisations in the Future Internet PPP.

Overall there was a strong commitment by the use cases players, with some important points suggested for improvement.

- **The active participation of sector players is key**, but such participation may also bring risks – disruptive changes to business models, etc. The "What's in it for me?" syndrome will be inevitable and this will need to be overcome.
- **The Future Internet is a moving target**. Players have to be ambitious or risk being overtaken. Success will rely on finding truly novel applications and models and running with them. Essentially, this involves monetising and commoditising the wealth of data that are going to be created in the future environments. Value creation is moving from centralised to decentralised models, with multiple roles and brokers, which are difficult to assess now. For use case industries, the PPP represents an opportunity to see where they can fit within this futuristic "user driven" landscape.
- **The PPP needs to ensure appropriate opportunities to innovative SMEs**, both through the Core Platform and sector-specific APIs.

5. Next Steps

The Workshop explored the Future Internet PPP from a number of perspectives. It brought together, for the first time, representatives from the ICT industry, research community and key user sectors. For some players, the meeting was their first exposure to the PPP; others were more familiar with its objectives. As such, it proved a useful forum for the different constituencies to exchange views, identify issues and explore common ground.

It is clear that significant further awareness raising will be required so as to engage a critical mass of stakeholders in each area. The open constituency building event in Nice on 12th March presents an important opportunity in this respect. Further opportunities to engage user industries should also be considered – for example through a 'Future Internet Stakeholder Forum' - so as to ensure the involvement of usage areas in PPP activities from the outset.

Further information and inspiration may be obtained from the following sources:

- European Future Internet Portal & European Future Internet Initiative: www.future-internet.eu
- Valencia Conference: www.r2sconference.eu
- European Commission: http://ec.europa.eu/information_society/activities/foi

Annex 1: Terms of Reference, Agenda, List of Participants

**TOWARDS A FUTURE INTERNET PUBLIC PRIVATE PARTNERSHIP:
USAGE AREAS WORKSHOP
BRUSSELS, 3 MARCH 2010**

Organised by the European Commission
Directorate General Information Society and Media
B-1160 Brussels, Avenue de Beaulieu 33, ground floor, room 54.
How to get to Avenue de Beaulieu: http://cordis.europa.eu/fp7/ict/ssai/brussels-beaulieu_en.html

Meeting Rapporteur: Mike Sharpe, MS Consulting & Research Ltd, UK
Responsible Meeting Organisers: Max Lemke, European Commission, INFISO-F

Terms of reference

The Commission adopted on 28 October a Communication calling for the setting up of a Future Internet Public Private Partnership (http://ec.europa.eu/information_society/activities/foi/lead/fippp/index_en.htm). In a nutshell, this Communication proposes to leverage the high European research investments and momentum on Future Internet technologies through comprehensive network and service platforms enabling the advent of Internet enabled innovative applications of public relevance. We aim at a multi sectoral approach that could cover sectors as diverse as health, energy, mobility, etc.. A budget of 300 M€ has been earmarked over the period 2011-2013 to support this PPP, which should be implemented under the existing legal framework of the ICT Thematic Priority of the 7th Framework Programme.

This initiative is primarily innovation driven and consequently a prominent role is expected to be played by industrial actors. In that respect, a core group of 16 key European ICT companies advises on a comprehensive approach towards the core content and implementation features of the PPP, which are outlined in their EFII position paper¹².

While such a proactive move by the ICT industry is welcomed, it is considered necessary and beneficial to complement the ICT industry view with the view of key representatives of other stakeholders. Therefore, in this workshop, a group of representatives from usage areas is invited to provide their view on the planned Future Internet Public Private Partnership and the potential role they see for their type organisation. In addition, a group of European research centre representatives has met in the beginning of this year and is preparing a report on their viewpoints and potential contributions. Tight collaboration between these groups of stakeholders in a Future Internet PPP is a prerequisite for success towards achieving a good balance between technology push and application pull.

The objective of this meeting is to sense and frame the interest of the usage areas in this PPP and to identify the issues of relevance to which this community may best contribute. During the meeting all usage area participants will be invited to give a short position statement of up to 5 minutes supported by ~ 3 slides commenting on the initiative, the industry paper, and the potential interest and role of your organisation in the undertaking. In particular, the following issues should be addressed in the position statements:

- General appreciation of the FI-PPP initiative from the perspective of usage area organisations.
- How to achieve a good balance between technology push and application pull as well as between a core platform of common enablers and platform specific instantiations.
- Exploring the potential of application and services mash-up cutting across application domains.
- Application pilots: representative use cases, experimentation environments.
- Potential role and commitment of usage area organisations in the FI-PPP, governance issues.

¹² http://www.future-internet.eu/fileadmin/initiative_documents/Publications/White_Paper/EFII_White_Paper_2010_Public.pdf

Agenda

09:00- 10:00 Introduction of the Future Internet PPP European Commission	
<ul style="list-style-type: none"> - Introduction - Presentation of the PPP from the Commission perspective - Short tour de table - name, affiliation, domain of interest - Questions and discussion 	Mario Campolargo Dir INFSO F Franco Accordino and Max Lemke
10:00 - 11:00 The FI PPP from the perspective of the ICT Industry Core Group – G16 and of the group of European Research Centres	
<ul style="list-style-type: none"> - Presentation of the PPP from the industrial perspective (20 min) - The FI PPP core platform: common enablers for domain specific implementations (15 min) - Feedback from the Group of Research Centres (15 min) - Questions and discussion 	David Kennedy (Eurescom) Enrique Menduiña (Telefonica) Collin Upstill (IT Innovation)
11:00 – 11:15 Coffee break	
11:15 – 12:30 Vertical usage areas	
<u>Smart Energy Grids</u>	
<ul style="list-style-type: none"> - Motivation and first ideas from the industrial core group (10 min) 	Johannes Riedl (Siemens)
<ul style="list-style-type: none"> - Position statements of usage areas representatives (5 min each) 	Enrique Areizaga (Robotiker) Jesús Bermejo (Telvent) Jean Luc Dormoy (EDF) José Javier de Las Heras Bueno (Acciona) [not present] Stephen Pattenden (TAHI)
<ul style="list-style-type: none"> - Questions and discussion 	
<u>Utilities and Environments</u>	
<ul style="list-style-type: none"> - Motivation and first ideas from the industrial core group (10 min) 	Andre Bottaro (Orange)
<ul style="list-style-type: none"> - Position statements of usage areas representatives (5 min each) 	David Caballero (MeteoGRID) Javier González-Castaño (Gradiant)
<ul style="list-style-type: none"> - Questions and discussion 	
12:30 – 13:30 Sandwich Lunch	

13:30 – 16:00 Vertical usage areas (continued)	
<u>Mobility</u>	
- Motivation and first ideas from the industrial core group (10 min)	Jacques Chambon (Orange)
- Position statements of usage areas representatives (5 min each)	Martin Böhm (Austria Tech)
- Questions and discussion	
<u>Health</u>	
- Motivation and first ideas from the industrial core group (10 min)	Jose-Maria Cavanillas (ATOS)
- Position statements of usage areas representatives (5 min each)	Iddo Bante (CTIT/U Twente) Antonio Campos (Asturias Hospital) Sabine Koch (Karolinska Institutet / IMIA) Andrew Dowsey (Imperial College) Paulo Faria (ALERT)
- Questions and discussion	
<u>Content</u>	
- Motivation and first ideas from the industrial core group (10 min)	Martin May (Technicolor)
- Position statements of usage areas representatives (5 min each)	Andy Bower (BBC) Alberto Messina (RAI) Andrew Oliphant (UK FI Progr.) Harry Sorgeloos (VRT) [not present] Jochen Spangenberg (Deutsche Welle)
- Questions and discussion	
<u>More General Position Statements</u>	Francisco Iglesias (i2CAT) Vali Lalioti (NEM) Thomas Niessen (THESEUS) Alessandro Zorer (Provincia di Trento)
16:00 – 16:15 Coffee break	
16:15 – 17:30 Closing Session	
- General discussion	
- Next steps	
- Roadmap towards a position paper and next meetings	

List of Participants :

Name	Last Name	Organisation
Usage Areas		
Enrique	Areizaga	Robotiker/(Tecnalia)
Iddo	Bante	CTIT/U Twente
Jesús	Bermejo	Telvent – Abengoa
Martin	Böhm	Austria Tech
Andy	Bower	BBC
David	Caballero	MeteoGRID
Antonio	Campos	Asturias Hospital
Jean Luc	Dormoy	EDF
Andrew	Dowsey	Imperial College
Paulo	Faria	ALERT Life Science Computing SA
Javier	González-Castaño	Gradiant - Centro Tecnológico de Telecomunicaciones de Galicia
Francisco	Iglesias	i2CAT
Sabine	Koch	Karolinska Institutet / IMIA
Vali	Laloti	BBC, NEM
Alberto	Messina	RAI
Thomas	Niessen	THESEUS
Andrew	Oliphant	UK FI Programme
Stephen	Pattenden	TAHI
Jochen	Spangenberg	Deutsche Welle
Alessandro	Zorer	Provincia di Trento
Research Centers		
Guillermo	Cisneros	UPM
Klaus	Moesner	University of Surrey
Collin	Upstill	IT Innovation, University of Southampton
Herbert	Weber	Fraunhofer ISST

Name	Last Name	Organisation
Industry Group		
Andre	Bottaro	Orange
Jose-Maria	Cavanillas	Atos
Jacques	Chambon	Orange
David	Kennedy	Eurescom
Martin	May	Technicolor
Enrique Fernando	Mendiña	Telefonica
Johannes	Riedl	Siemens
Rapporteur		
Michael	Sharpe	MS Consulting & Research Ltd
European Commission		
Franco	Accordino	Assistant to the Director INFSO-F
Bernard	Barani	Assistant to the Director INFSO-D
Mário	Campolargo	Director INFSO-F
Emilio	Davila	INFSO-G4
Peter	Fatelnig	Deputy Head of Unit INFSO-D5
Max	Lemke	Deputy Head of Unit INFSO-F4 – organiser of the event
Loukianos	Gatzoulis	INFSO-H1
Michel	Lacroix	INFSO-D3
Miguel	Montarelo	INFSO-D1
Rolf	Riemenschneider	INFSO-G3
Luis	Rodríguez-Roselló	Acting Director INFSO-D
Bror	Salmelin	Advisor to the Director INFSO-H
Georgios	Tselentis	INFSO-F4