Research on Networks and Media in the Framework Programme: Results, Trends and Prospects

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The overall picture for ICT R&D in FP7
The Challenge of the Future Internet
Networked Media and 3D Internet
The Work Programme 2009-2010 and the Call for Proposals
The current R&D on Networked Media
The results so far on Search Engines
The target outcome for Networked Media Search: scope, impact, challenges...
Other world initiatives
Conclusions
FP7 ICT WP: Where We Want to Go...

End-to-end systems for socio-economic goals

- Digital Libraries and Content
- Health Care
- ICT for Independent Living, Inclusion and Governance
- ICT for Mobility, Environment and Energy

Technology roadblocks
- Network and Service Infrastructures
- Cognitive systems Interaction & Robotics
- Components, Systems & Engineering

Future and Emerging Technologies
Challenge 1 and Future Internet: Why

- The Internet is going **mobile**
- The Internet is going (ultra) broadband
- Novel **Media** classes of applications be supported (e.g. **3D**)
- Device/object/machine connectivity - towards an **Internet of Things**
- Huge number of on-line – user controlled - dynamic services open the door to an **Internet of Services**
- Security, Trust, Identity raising novel classes of issues
- Internet manageability and scalability are limited

“As novel and unforeseen usages are pushing the original Internet architecture to its limits, a fresh technological and architectural approach is needed.”
### Challenge 1 and Future Internet: What

<table>
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<tr>
<th>Challenge</th>
<th>Approach</th>
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<tr>
<td>• Making the Internet</td>
<td>• Developing the technological and architectural foundations of the FI</td>
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<td>• mobile/broadband</td>
<td>• Building the Future Internet Assembly</td>
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<td>• manageable/scalable</td>
<td>• Support to reinforced co-operation with EU national initiatives</td>
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<td>• QoS/QoE</td>
<td>• International co-operation with regions having FI initiatives</td>
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<td>• secure, and trustworthy</td>
<td>• Leveraging EU assets, industrial drive</td>
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<td>• 3D/Media enabled</td>
<td>• Standards, International Cooperation</td>
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<td>• Virtualised resource, ad-hoc application design</td>
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<td>• Enabling novel applications (RFID/sensor based)</td>
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<td>• Social Internet, Net is the database, search</td>
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<td>• Understand Internet “behaviours” (federated testbeds)</td>
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<td>• World-wide access and interoperability</td>
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Challenge 1 and Future Internet

**NETWORK**
- Cognitive Radio, Spectrum Management, B3G...
- Converged and Optical Networks
- Future Internet Architectures and Technologies

**SERVICES**
- Service, Software Engineering
- Future Internet Service architectures and Platforms
- Internet of Things

**ENTREPRISE**
- Future Entreprise
- Networked Search

**MEDIA A/V**
- Beyond HDTV and e_Cinema
- Content aware Nets, Net aware Applications
- 3D Media Internet

**Complementary Issues**

**Experimental Facilities + Experimentally Driven research**

**Trustworthy Networks + Trustworthy Services**

Tools and technologies for Trust

**TESTBeds**

Trust/Security/Dependability
Challenge 1 and Future Internet: How

Call 4: 19 Nov – 1 April 2009 = 190 M€
Call 5: 31 July – 3 Nov 2009 = 367 M€ (tentative)
“Networked Media and 3D Internet”: a driver for the Future Internet

For a Future Internet of creative media based on:
- Content-centric networks
- Collaborative user-generated content
- 3D innovative applications (gaming, virtual worlds...)
- New requirements for information representation, filtering, aggregation and networking
- Novel search tools
- Identity management, ownership and trading of digital objects, right to use

Networks of the Future

Internet of Things

Sources:
- 3GPP, 3GPP2, Qualcomm, WiMAX Forum
- http://www.itu.int/osg/spu/publications/internetofthings/
- Second Life
Networks and Media: Context and driving forces for R&D

- Convergence introduces additional complexity:
  - Multiplicity of actors, technologies, business models, regional differences
- Networked devices and sensors impact on the network and the organisations (Internet of Things)
- Flexible service platform and SOA (Service Oriented Architectures), Event-driven... Software as a Service, “Cloud computing”
- Wireless Communications and mobility: 4G
- Towards a Mobile Universal Internet
- Over-abundance of on-line content (networked): Search and P2P, broadcasting over Internet, streaming...
- Distributed storage of media, new forms of contents (user generated, “social/community media”, personalisation, ubiquity, 3D, virtual reality, gaming...)
WP 2009/10
R&D on Networked Media and 3D Internet
Target Outcome a)

• Content-aware Networks and Network-aware Applications:
  - Architectures and technologies for converged and scalable delivery of MM content and services (content and context-aware, personalised, social...).
    - Home services, location, mobility scenarios.
    - Multiple user roles (producer, consumer, manager of content).
  - Integrity and quality of media in collaborative creation and delivery scenarios (sharing, storage, retrieval, fusion...).
    - Open architectures (e.g. for MM real-time and immersive applications for optimal blend of end devices power and network bandwidth).
    - Enhancement of SVC, 3D & Multi-viewpoint coding for optimal network/device adaptation.
WP 2009-2010
R&D on Networked Media and 3D Internet
Target outcome b)

- **3D Media Internet:**
  - Architectures and technologies for Future Media Internet and 3D for mass distribution, caching, filtering, aggregation and networking. Optimal real time delivery and rendering from personalised user perspectives.
  - Technologies for 3D content representation (configuration, adaptation, user control...).
  - Architectures and technologies for 3D augmented worlds and applications tightly coupled to physical world.
Networked Search and Retrieval:

- Optimised search in large-scale distributed digital MM content (repositories and cached) from diverse sources and scenarios (including linked to the physical world, e.g. nomadicity).

- Interaction with content
- Media-to-network and to (mobile) device dynamic adaptation to context and application (P2P, mobile)

- Adaptive technologies for personalised search (relevance, user contexts, perception, feedback, usage profile)
WP 2009-2010
R&D on Networked Media and 3D Internet
Target outcome d)

- Immersive media experiences beyond HDTV and Electronic Cinema
  - E2E architectures for next generation MM and cinema:
    - higher quality of experience,
    - higher frame rates,
    - wider contrast range
    - colour gamut,
    - screen resolution,
    - “spacialised” sound
    - 3D capabilities
    - pervasive environments
    - immersive environments
    - innovative 3D/multi-viewpoint coding methods

optimised for coping with massive increase of throughput
WP 2009-2010
R&D on Networked Media and 3D Internet
Targeted Outcome e)

Networks of Excellence for:

a) Content aware networks and network aware applications
   - To consolidate and establish a European leadership in the field

b) 3D Media Internet
   - Multi-disciplinary education
   - Sharing research facilities
   - Integration of foundational research capacities
   - Forward looking R&D agendas

d) Immersive experiences beyond HDTV & Electronic Cinema
   - Integration of industry/academia R&D capacities
     - Advanced research agendas
     - Sharing research facilities
**WP 2009-2010**

**R&D on Networked Media and 3D Internet**

**Targeted Outcome f)**

- **Support Measures for:**
  - a) Content aware networks and network aware applications
  - b) 3D Media Internet
    - Collaboration with national initiatives and 3rd countries
    - Dissemination and organization of events
    - Research roadmaps
    - Policy and socio-economic aspects
  - c) Networked Search and Retrieval
    - Coordination of activities at EU level on MM Search
    - Cooperation with 3rd countries
    - Dissemination and organization of events
    - Research roadmaps
    - Policy and socio-economic aspects
Networked Media and 3D Internet: Expected impact

- **Reinforced positioning of industry in Europe in:**
  - Networking and delivery of MM content and services
  - 3D Media Internet technologies
  - Networked Search
  - MM experiences beyond HDTV, Electronic Cinema

- **Wider uptake** of networked and collaborative platforms based on “3D Media Internet”

- **Global standards** and European IPRs (federated, coherent roadmaps)

- **Wider market opportunities** (including for content-related SMEs) from innovative business and societal applications (e.g. games, entertainment, education, culture, service creations) based on novel networked media technologies and systems.
Networked Media and 3D Internet: Funding Schemes and Indicative Budget

- **Total budget:** 80 M€
  - Collaborative projects (IPs and STREPs): 70 M€
    - Minimum of 50% for IPs: 35 M€ (35-49 M€)
    - Minimum of 30% for STREPs: 21 M€ (21-35 M€)
  - Networks of Excellence: 6 M€
  - Support Measures: 4 M€

- **Deadline for submissions:** April 1st
- **Negotiations:** from early July
- **Contracts:** Q4 2009
FP7 ICT Obj. 1.5 - Where we are... Current EU R&D on Networked Media

- **Media Delivery Platforms and Content Delivery Networks** (IPTV via P2P, CDN, Digital Cinema, Next generation of P2P...)

- **User Centric Media** (Shared interactive experiences, New Forms of Media...)

- **3D Media** (Digital Cinema, Digital TV, All-3D imaging Mobile phone...)

- **AV Search Engines** (P2P, Location-based, 3D objects, Direct Search...)

**Support Measures:**
- “Networked & Electronic Media” - European Technology Platform [www.nem-initiative.org](http://www.nem-initiative.org)
- International Collaboration (Latin America, China)
EU management of focused R&D

Networking and co-ordination of research and innovation activities
- Exchange of Best Practice, dissemination of “good practices”
- State of the Art, R&D Roadmap, Gap Analysis
- CHORUS CONFERENCE May 25-27 BRUSSELS

Generate the new knowledge: fill the “semantic gap”
Integration of a critical mass of activities and resources within
a high scale collaborative European dimension.
AV Search Engines: Examples of Results

- Automatic annotation
- Retrieval techniques
- Heterogeneous data fusion
- Mixed media queries
- Large scale P2P solutions for indexing and AV search (inc. in real time)
- Direct search
Progress and results so far

- Advanced solutions for organising, searching and accessing large-scale distributed audio-visual content & 3D objects:
  - **3D search**
  - **Multimodal fusion strategy** (processing visual and textual information together)

- Ideas for innovation beyond existing research efforts and identification of future scenarios:
  - Think tank, use-cases, benchmarking, roadmap

- Developing technologies to represent & interpret, navigate & retrieve audio-visual objects
  - **P2P search engine** (no centralized approach to semantics)

- Strengthen adaptive search by content and/or context, tested in realistic settings, based on relevance feedback
  - Plug-ins, mobile platform
  - Geo-referenced search, 3D city models

- Development of methods of information retrieval (knowledge discovery, metadata extraction, annotation and summarisation, indexing) of diverse content types (text, image, video, audio, 3D graphical objects, etc)
  - Direct search with no metadata
  - Web semantics tools
  - Socially-derived profiling, raw video indexing
  - Semantics of video (many detectors, learning)
The Evolution of Search...

1908

'90s - Today

...And that, in simple terms, is how you increase your ranking on search engines.
How will the Internet Evolve?
R&D on Networked Search and Retrieval

Scope: Media search rather than targeted algorithms (platforms, integration, interoperability, across heterogeneous databases of digital objects)

Impact & Relevance:
- Search in the context of everyday life (user needs)
- Use-case scenarios (novel service development)
- Innovative approaches, high-risk, high potential impact

Challenges:
- Comprehending the full information space (“non-Web” dark information space – spatial, history, cadastre…)
- Gains in SE accuracy, indexing, completeness, meeting user’s expectations, automation, improving query matching, personalisation
- Accessibility for all (inclusiveness, fixed/mobile devices)

Media Search as part of the E2E chain (i.e. in 3D Media Internet, search for avatars... in Content Delivery Networks...)
Matching Users’ needs

How to archive, categorize and search this flood of data "anytime - anywhere"?
The Japanese Grand Voyage (1/2)

Information Fusion sought by the Information Grand Voyage Project

Next generation information retrieval / analysis technology

Information Fusion

Creation of innovations and Establishment of an affluent society
The Japanese Grand Voyage (2/2)

Multiply the users’ daily behavior history with data analysis technology to create a convenient lifestyle through service offerings that match individual lifestyles.

Support high-level medical services by multiplying healthcare information with data analysis technology.

Multiply rich contents with images, video, and voice analysis technology to create next generation business by promoting contents distribution that exploits the value of new contents and protects copyrights.

Prevent accidents by multiplying traffic information with data analysis technology.
Networked Media and 3D Internet: Concluding remarks

- Media Search will play a prominent role in all future Networked Media Systems
- Media Search will be crucial in the 3D & Media Future Internet
- Beyond semantics we need real impact (services, applications)
- Taking on board users is a must

*Media Search represents a challenge for researchers ... an opportunity for European industry ... and a key cultural challenge for Europeans too!!!*
ICT Proposers’ Day

Budapest, Hungary
22 January 2009

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