

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

Luis Rodríguez-Roselló

Head of Unit "Networked Media Systems"

DG INFSO

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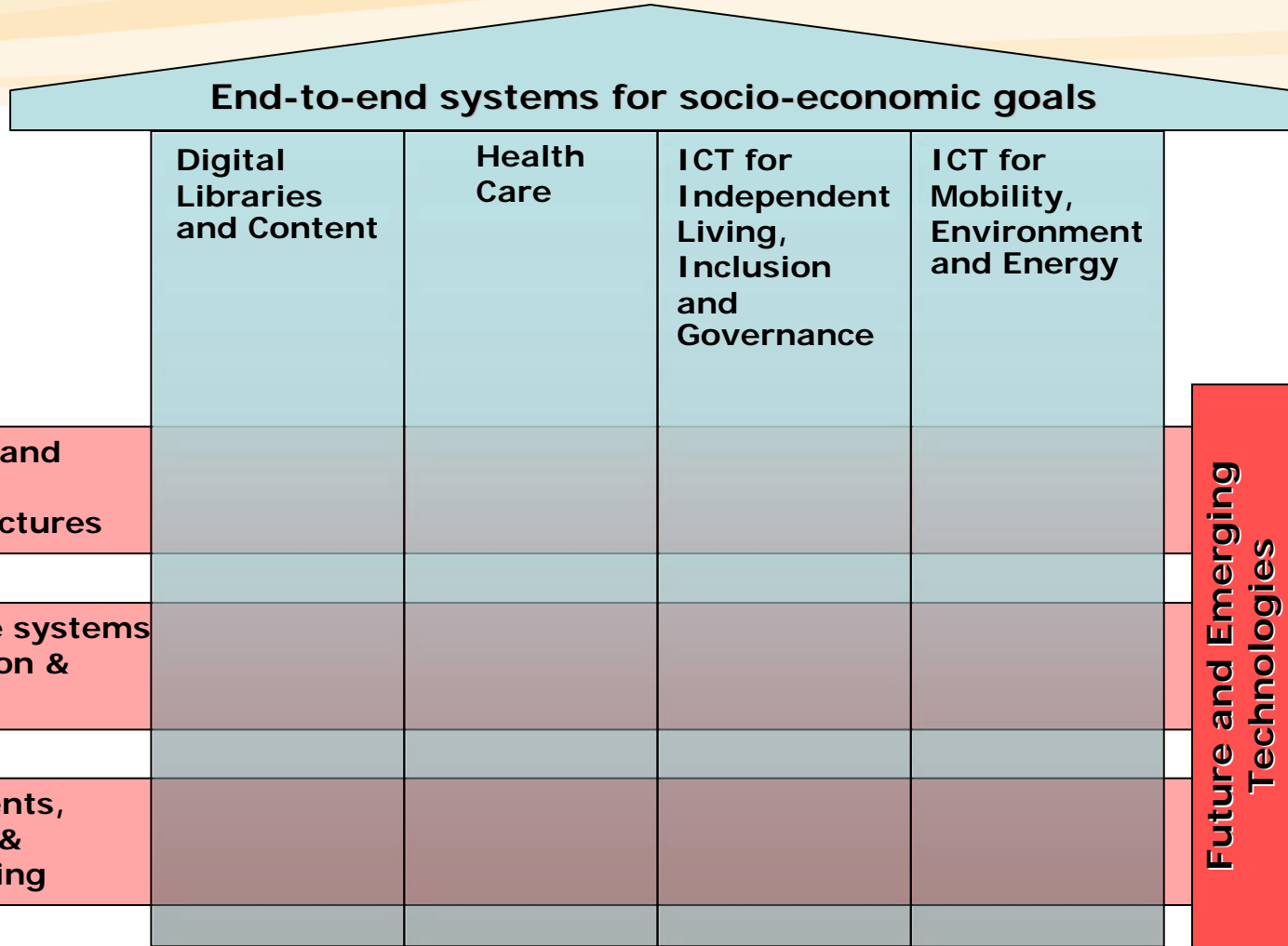


Research on Networked Media in the Framework Programme: Results, Trends and Prospects

- ✓ 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...



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

Challenge

- Making the Internet
 - mobile/broadband
 - manageable/scalable
 - QoS/QoE
 - secure, and trustworthy
 - 3D/Media enabled
- Virtualised resource, ad-hoc application design
- Enabling novel applications (RFID/sensor based)
- Social Internet, Net is the database, search
- Understand Internet “behaviours” (federated testbeds)
- World-wide access and interoperability

Approach

- Developing the technological and architectural foundations of the FI
- Building the Future Internet Assembly
- Support to reinforced co-operation with EU national initiatives
- International co-operation with regions having FI initiatives
- Leveraging EU assets, industrial drive
- Standards, International Cooperation

Challenge 1 and Future Internet

NETWORK

Cognitive Radio,
Spectrum
Management,
B3G...
Converged and
Optical Networks

Future Internet
Architectures
and Technologies

SERVICES

Complementary Issues

Service,
Software
Engineering

Future Internet
Service
architectures
and Platforms

ENTREPRISE

Future
Entreprise

Internet of
Things

MEDIA A/V

Beyond HDTV
and e_Cinema

Content aware
Nets, Net aware
Applications

Networked
Search

3D Media
Internet

Experimental Facilities + Experimentally Driven research

Trustworthy Networks + Trustworthy Services

Tools and technologies for Trust

Trust/Security/Dependability

TESTBEDS

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)

Challenge 1 - "Pervasive and Trustworthy Network and Service Infrastructures"

THE FUTURE INTERNET

Call 4
80 M€

Call 5
110 M€

Call 5
90 M€

1.4 Trustworthy ICT

1.5 Networked Media
& 3D Internet

1.3 Internet of
Things

1.2 Internet of Services & SW

1.1 The Networks of the Future

1.6 Future Internet
Experimental Facility

Call 5
37 M€

Call 5
50 M€

Call 4
110 M€

Call 5
80 M€



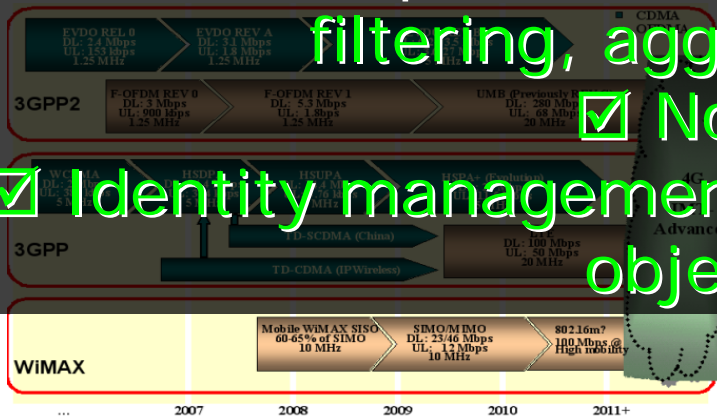
"Networked Media and 3D Internet": a driver for the Future Internet

Internet of Services, Service Web

3D & Media 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

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...)**



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.



Draft WP 2009-2010 : R&D on Networked Media and 3D Internet Target outcome c)

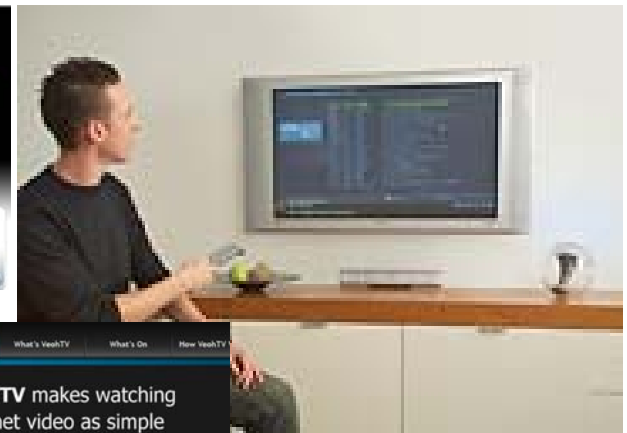
• Networked Search and Retrieval:

❑ 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)



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)

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...

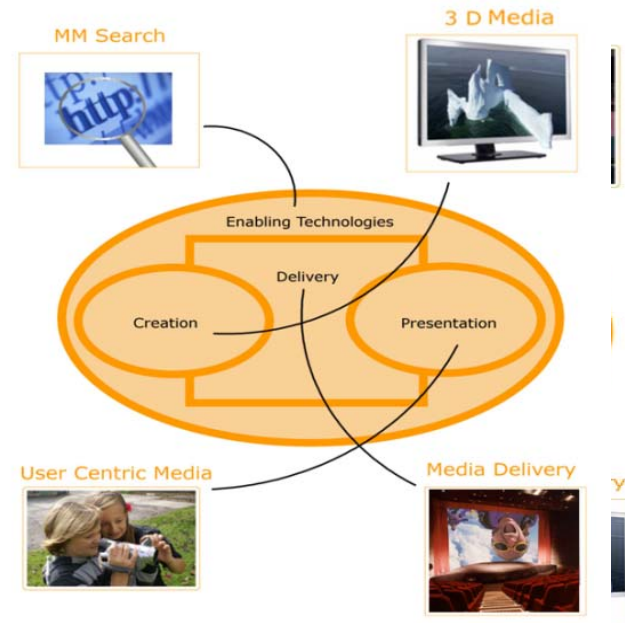
Current EU R&D on Networked Media

- **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
- 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



AV Search

AV Search



Raw Media material Search



Semantic Video Search



Geo Indexed Semantic Search



Audio-Visual Content Search and Retrieval in a Distributed P2P Repository

3D SE



Direct AV SE



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

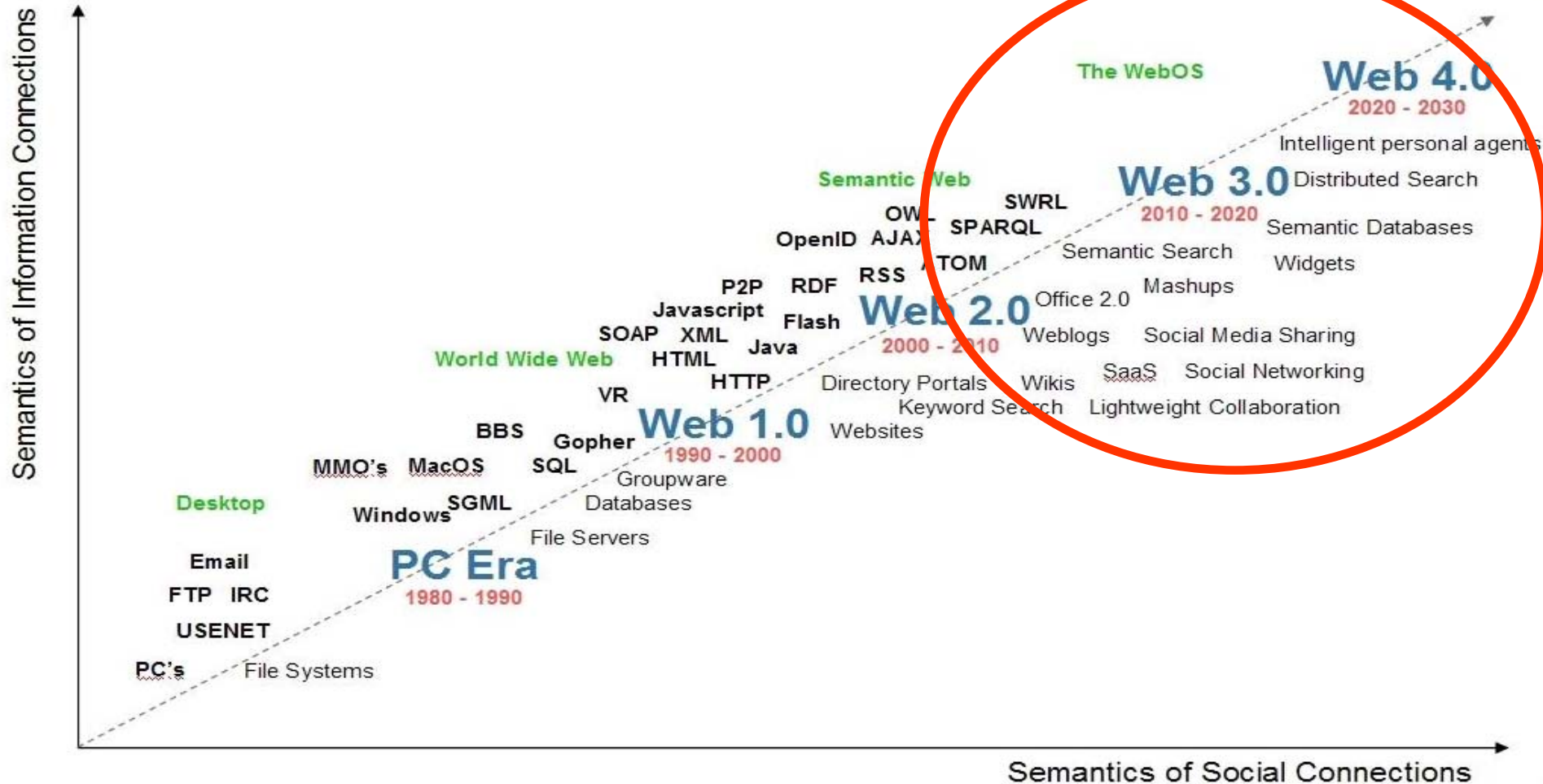


'90s - Today



...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

Multimedia

Geo- visualization

Virtual Worlds

How to archive,
categorize and search
this flood of data
"anytime - anywhere"?



Social networks

On the
move

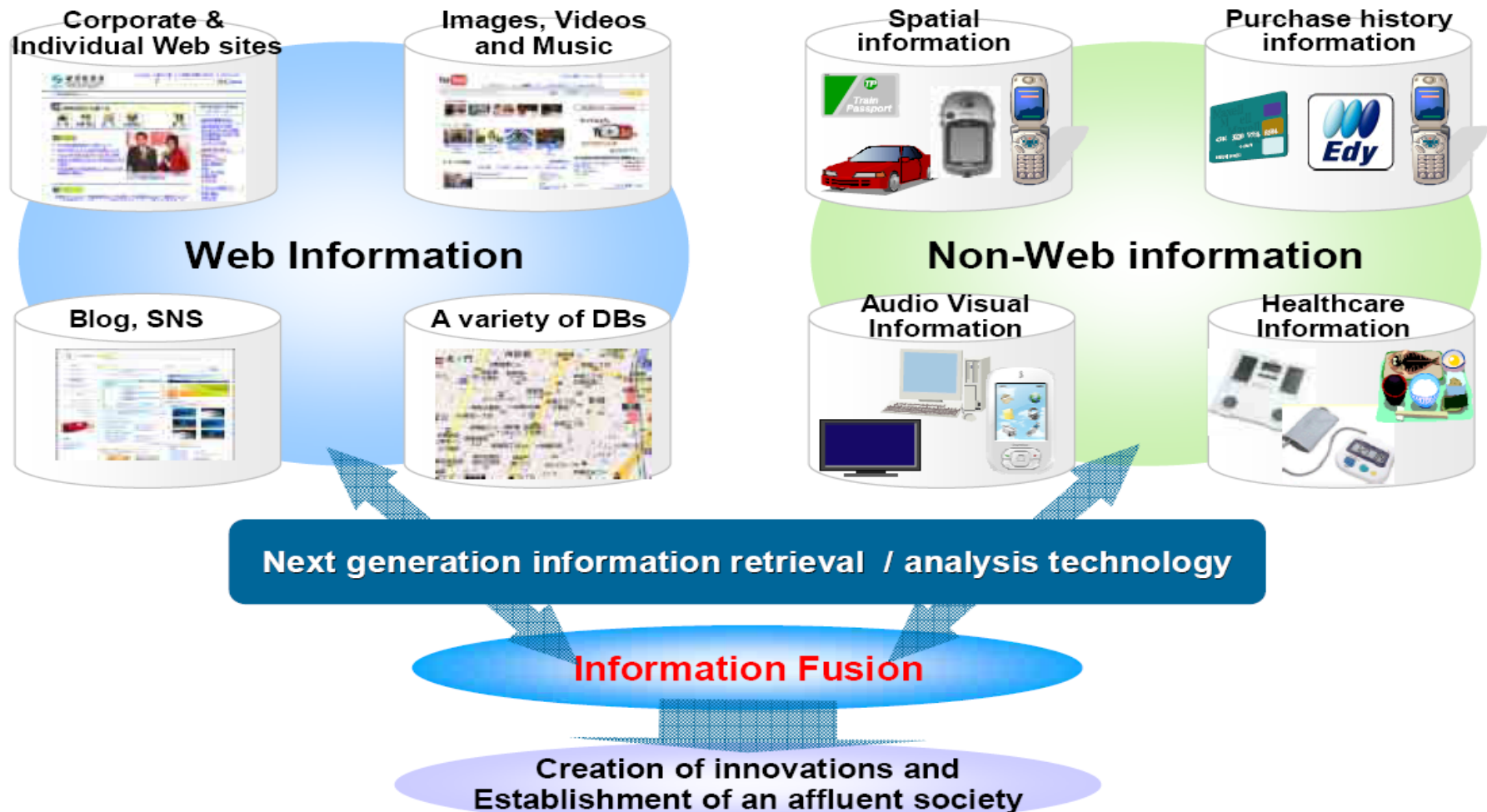


European Commission
Information Society and Media

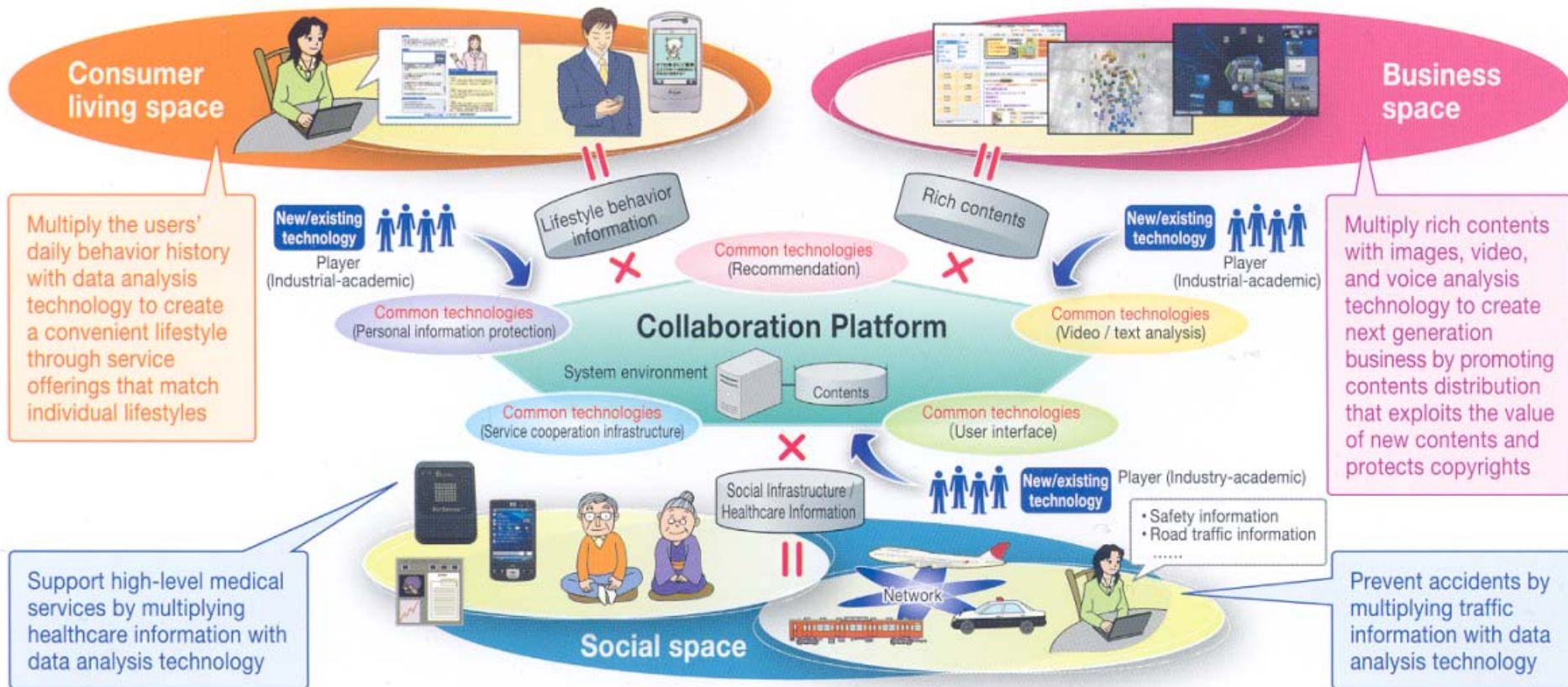
The Japanese Grand Voyage (1/2)

Information Grand Voyage Project

Information Fusion sought by the Information Grand Voyage Project



The Japanese Grand Voyage (2/2)



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



Who to Contact?

Francisco.Medeiros@ec.europa.eu

Bartolome.Arroyo-Fernandez@ec.europa.eu

Web sites:

http://ec.europa.eu/information_society/events/budapest_2009

<http://cordis.europa.eu/fp7/ict/netmedia>

