Challenges Beyond Technology: The Findings of Chorus

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Overview

- Who we are? Ways of operation?
- Recommendations from Chorus to decision makers in academia, industry and governments
- Selected choice of upcoming Challenges and Opportunities
- Conclusions
Who we are

European Commission – Joint Research Centre
Institute for Prospective Technological Studies (IPTS)

IPTS
Part of DG JRC of the EC

Mission:
“to provide customer-driven support to the EU policy-making process by researching science-based responses to policy challenges that have both a socio-economic as well as a scientific/technological dimension”
CHORUS Objectives and organisation

Objective
- Bridge the gap between researchers view (academia and industry) and the new services and applications prospective for every day life needs

Cross-disciplinary aspects:
- Identify challenges and recommendations for technological approaches
- Derive critical with regard to socio-economic and legal issues,

CHORUS community:
- EU projects,
- national initiatives
- key players in the domain of multimedia search engines

Structures and events:
- working groups,
- Think-Tank,
- D2 "A-V Search" cluster,
- information exchange platform and workshops
## Trends and challenges (I)

### Techno-economic evolution
- Privacy enhancement technologies
- Metadata for content enrichment
- Semantic web
- Current search engines similar to 10 years ago
- eCommerce search
- Local + social + mobile = real + virtual
- Context / situation awareness
- Cloud computing as disruptive search context
- Organization/navigation of information
- Mobile search: user/site/content centric
- A/v search
- P2P search
- User-generated services
- Search bundled: integrate, morph, disappear
- Symbolic information manipulation
- Enterprise search: extensible platform leveraging metadata and breaking silo models, scalability an issue

### Competition - Market behaviour
- Natural monopoly (economies of scale – critical infrastr.) – Need to increase the level of competition – Market dynamics (future structure) – Not EU search due to external reasons – Mobile domain?
- Advertising as the only business model
- Ombudsperson – trusted third party
- Openness – Interoperability - Neutrality
- Web search mature?
- Combination of users’ information into several services
- Dynamic innovation possible
- Lock-in and network effects
- Portability of data
- “Just in case” scenario

### Social computing – users’ role
- Web search mature?
- Free lunch with hidden costs
- The power of “the default”
- Fighting for audience, not content (audience economics)
- Lock-in and network effects
- Portability of data
- “Just in case” scenario

### Quality – Bias – Editorial responsibility – Diversity
- The influence of advertising markets
- Minorities under-representation, but accessible
- Public domain – other languages
- Freedom of expression - education
- Filtering
- Measurements of quality of search
- Transparency
- Existence of biases
- Consequences of biases
- Safeguards from harmful content
- Evidences of usage: self-referencing
- Relevance of local culture
- Access to geo-spatial data
- Preserve information bio-diversity
- Lack of editorial agenda

### Further discussion needed
- High consensus
- Some consensus
- Further discussion needed
Trends and challenges (II)

Privacy
- Economies of privacy
- Balance personalized search
- Examine the future of consent
- Can the poor buy privacy?
- Health records
- Viability of alternatives
- Balance between privacy and quality - minority culture
- Is market providing a choice of levels of privacy?
- Communication of the guarantees of use
- Lack of awareness about public exposure

Specific Public involvement requested (European flavour)
- Awareness of consumers
- Education of users
- Public sector more visible
- Independence of Europe
- Invest in r&d
- Defence of public interest
- Public information at marginal distribution cost
- Open government projects for search engines access to information
- Increase education - knowledge of search technologies - invest in education - increase pool of skills
- Develop own technology

Potential policy responses
- Search as an elementary service
- Public oversight required due to unbalance
- Aggregation of information needs regulation
- Auditing of business/data procedures
- Regulation place between innovation and privacy (and intellectual property)
- Search engines are not neutral: require regulation
- Good governance: social responsibility
- Not market, nor technology will fix the flaws in search: economic or cultural issues
- A two sided market similar to broadcasting / media
- Use of generic regulation (competition, constitutional) difficult
- A case for converged regulation?: SMP, access, minimum QoS, transparency, editorial responsibility, advertising, privacy, consumer empowerment

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Recommendations

10 Points CHORUS recommendations towards making search engines more efficient to make implicit knowledge reachable and in fair and attractive ways to the user

1. Achieve **more efficient indexing** techniques for multimedia **content enrichment** and automatic meta-data creation.
   - Socially-enriched automated indexing will empower the robustness of the indexing techniques.

2. Develop new multimedia **search paradigms based on content/context/event**, to go beyond current retrieval systems that are merely keyword-based or query-by-example-based.
   - Event structures are expected to be the main driver for media contextualization.
3. Model efficiently both the implicit and explicit feedback to improve personalization and recommendation abilities of a search engine including collaborative tags filtering, user preference detection ...

4. Develop more informative user interfaces for future applications
   - too little overlap between networked media technology providers and UI designers
   - toward smart visualization of media delivery and enhanced user quality of experience.

5. Break complexity and afford scalability: besides the amount of input data and generated features, complexity need to be managed for other growing quantities such as the number of users, the number of information sources and the number of data attributes / features dimension
6. Develop interoperable meta-data standards
   - open ended content, association with object and preservation through its life,
   - preservation of metadata across transfer, migration issues, postproduction and restoration
   - Beyond Internet of Media

7. Make available and develop open multimedia corpora
   - Corpora is a key enabler for MSE scientific and commercial success,

8. Address privacy concerns to afford guarantees to the users:
   - minimum regulation is necessary for consumer protection, privacy protection or unfair competition.
   - Current EU regulation does not seem to cover adequately or are not applicable to search engines,
9. Address security, integrity and trust issues related to search and networked storage
   - International cooperation will be needed
   - Foster user participation on a bidirectional media scene while preserving the trust models afforded by editorial material

10. Support Pan-European privacy certification of IT products or IT-based services compliance with European data protection regulation
- Web search
  - billions, millions
- Personalised TV
  - video volumes
- Enterprise Content search
  - variety, business
- Library search
  - High value content, old formats
- Personal Content Search
  - variety, local
- Monitoring, Detection & Alert
  - flux vs base

Differences in key attributes, in particular content management, content ownership, access rights and the revenue model
The turnovers of the nine top ESS providers in 2007 (in million Euros)

Autonomy: 251.8
Fast: 143
Endeca: 100
Inquira: 27.4
Exalead: 8.03
Sinequa: 3.43
Recomind: 2.85
DieselPoint: 0.46
DtSearch: 0.16
(Possible) acquisitions of Enterprise Search providers by adjacent industries.
How can providers of pure Enterprise Search solutions survive in the long run within a very competitive market?

What actions could and should be taken to strengthen the position of European companies, while maintaining the regulatory ‘rules of the game’?
Personal Content Search

Government

Enterprises

Phishers, stalkers, identity thieves

Data Protection

Privacy Legislation

Citizen

Explicit eID

Tacit eID

Enterprises

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Behavioural economics and other research highlight significant gaps between stated preferences and behaviours

- Privacy paradox
- The Control paradox
- The Responsibility paradox
- The Awareness paradox
How is it possible to specify solutions that is understandable and acceptable by users and is effective in responding to the user’s and policy maker’s concerns?

Better to use technical tools (design) or legislative tools (law)?

What opportunities for safe, private and proper management and search of EU citizens' personal content? (choice)
## Mobile internet penetration (2008)

<table>
<thead>
<tr>
<th>Region</th>
<th>Mobile penetration 2008 (%)</th>
<th>Mobile internet penetration (%)</th>
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<tbody>
<tr>
<td>North America</td>
<td>70%</td>
<td>11%</td>
</tr>
<tr>
<td>South America</td>
<td>77%</td>
<td>4%</td>
</tr>
<tr>
<td>West Europe</td>
<td>119%</td>
<td>16%</td>
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<tr>
<td>East Europe</td>
<td>110%</td>
<td>15%</td>
</tr>
<tr>
<td>Far East &amp; China</td>
<td>69%</td>
<td>19%</td>
</tr>
<tr>
<td>Indian Sub Continent</td>
<td>21%</td>
<td>5%</td>
</tr>
<tr>
<td>Rest of Asia Pacific</td>
<td>62%</td>
<td>8%</td>
</tr>
<tr>
<td>Africa &amp; Middle East</td>
<td>57%</td>
<td>8%</td>
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## Mobile Search: SWOT

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Technological puzzle pieces in place</td>
<td>Fragmentation (roaming, regulation, cultural)</td>
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<tr>
<td>Good research standards</td>
<td>Need for better / understandable / more secure pricing models</td>
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<tr>
<td>Content of higher quality for mobile use</td>
<td>Roaming charges</td>
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<td>(geo, cadastre, …)</td>
<td>Strategic decisions on innovation and investments are outside EU</td>
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<tr>
<td>Strong Industrial landscape</td>
<td>Venture capital / Entrepreneurship</td>
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<tr>
<td>Public funded broadcasting</td>
<td>Lack of interoperability and (open) standards</td>
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<table>
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<tr>
<th>Opportunities</th>
<th>Threats</th>
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<tr>
<td>Improving integration between web/mobile/pc</td>
<td>Lack of technology development</td>
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<tr>
<td>platform for a richer user experience</td>
<td>Fragmented market (silos, platforms)</td>
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<tr>
<td>Niche markets/services</td>
<td>Privacy issues, data protection</td>
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<tr>
<td>Local content (multicultural)</td>
<td>Companies outside EU will control the developments in mobile search</td>
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<tr>
<td>New regulatory framework needed for API’s,</td>
<td>Asymmetry of regulation</td>
</tr>
<tr>
<td>privacy, …</td>
<td>Regulatory lag (spectrum management)</td>
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<tr>
<td>Data portability</td>
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<td>Liberation of public data</td>
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<td>Disruptions (cloud computing)</td>
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Traditional Mobile Value Chain

Where is Search in the mobile internet ecosystem?

Which are viable business models and revenue schemes?

Which are the new actors in this new game?

Is the supply side matching the demand side?
Summary

- **Chorus Activities are cross-disciplinary**
  - Identify challenges and recommendations for technological approaches
  - Derive critical socio-economic assessments

- **Chorus 10 Points Recommendations**

- **New Themes for discussion**
  - Enterprise Search Solution
  - Personal Data Search
  - Mobile Search