# Thoughts without content are empty, intuitions without concepts are blind but you must set priorities and budgets for what you want to look at (with an eye to the EU's Digital Agenda and apologies to Kant)

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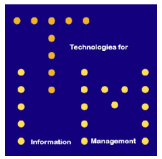
European Commission, DG Information Society and Media
Unit E2 – Technologies for Information Management

# OUTLINE


1. European Policies Content
2. Knowledge and content management + semantic technologies in ICT research
3. Perspectives, networking: WP 2011-2012
4. A kantian analysis and longer term perspectives

- Questions






European Commission
Information Society and Media

# INTRODUCTION

**EUROPEAN COMMISSION**

**The Information Society and Media Directorate General**

**Directorate Digital Content & Cognitive Systems** (based in Luxembourg)

E1: Language Technologies, Machine Translation

E2: **Technologies for Information Management**

E3: Cultural Heritage & Technology Enhanced Learning
E4: Access to Information
E5: Cognitive Systems & Robotics
E6: eContent and Safer Internet
E7: Administration and Finance

# Mission statement of DG INFORMATION SOCIETY and MEDIA

**To make every European digital by**:

- achieving the **digital single market**,

- **reinforcing Europe's competitiveness** by increasing investment in **ICT research and innovation**,

- promoting the access and use of **ICT to the benefit of EU society**

- **implementing** the related *"acquis communautaire"* (EU law).

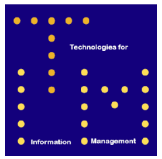
Main drivers are the objectives and actions of the **Digital Agenda for Europe** and related flagship initiatives of the **Europe 2020 strategy**.

# Key community instruments

## AN OVERALL STRATEGIC FRAMEWORK FOR COMMUNITY ACTION


- First pillar of "Europe 2010" to devise and implement adequate European policies


- To support RTD on next generation of ICTs





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Digital Agenda

1001100101011101110000100 2010–2020

for Europe

Digital Agenda
1001100101011101110000100 2010-2020
for Europe

# "Every European Digital"

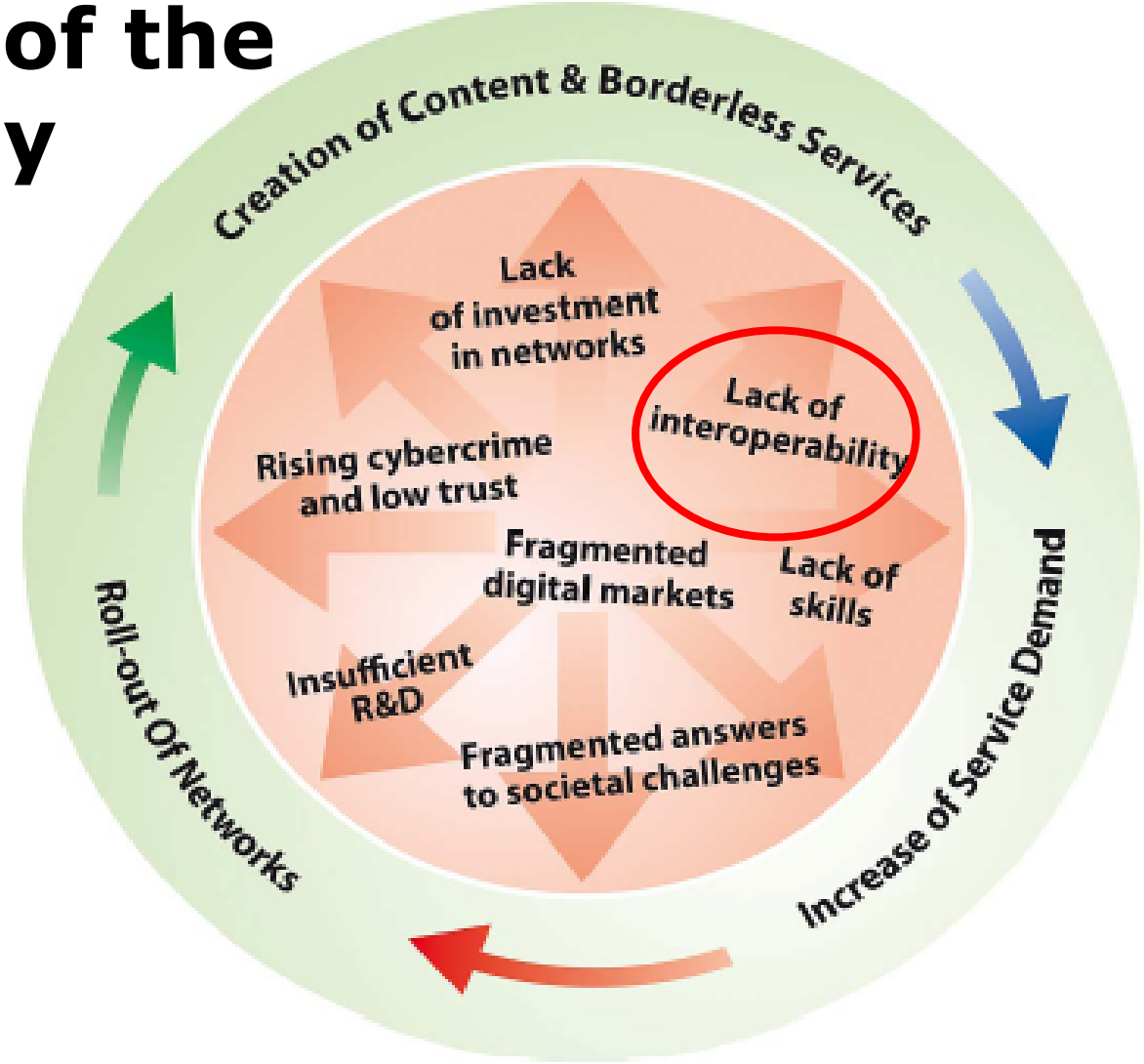
*N. Kroes*


# Why?

from **ICT as interesting**

to **ICT as hugely important**

# Virtuous cycle of the digital economy



Digital Agenda
1001100101011101110000100 2010–2020
for Europe

# To whom?

SMEs

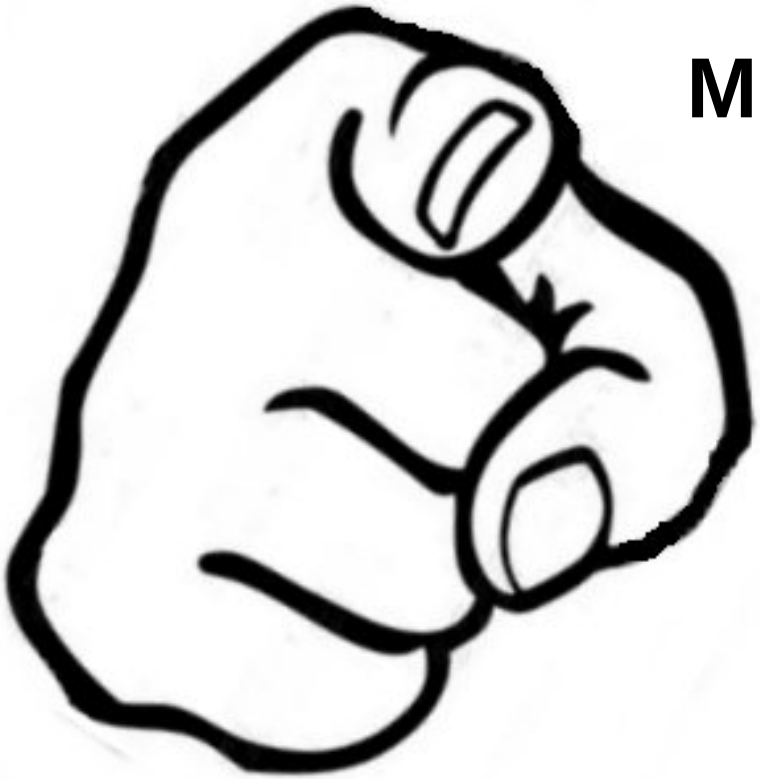
Workers

Doctors

Patients

Researchers

Authors



Musicians

Consumers

Elderly

Environment

Artists

Disabled

# Digital Single Market

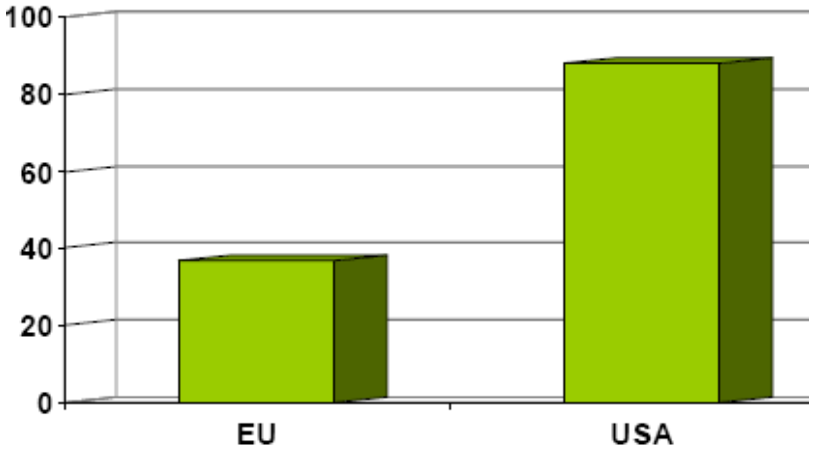
- ☑ online **access** to **legal content**
- ☑ **50%** shop **online**
- ☑ **20%** buy **cross-border**

# Openness and interoperability

- ☑ Recognize and create **more and better standards** in Europe

- ☑ **Make better use** of these standards
- ☑ **Ensure interoperability** even in absence of standards

# ICT research and innovation



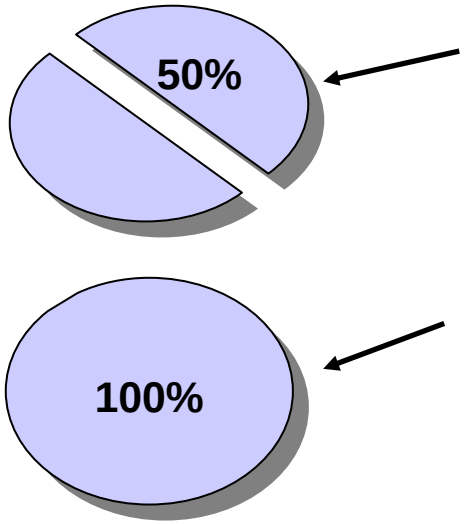

☑ **Funds**

**double** investment to **€11 bn**

***light & fast*** measures to access

☑ **Coordination**

# Digital public services




EU citizens use **eGovernment**

**Member States** have **online** cross-border **public services**

**ALSO:** EU citizens access **eHealth** online

# DAE Governance cycle

Digital Agenda Scoreboard

stakeholders

Member States

Digital Agenda Assembly

European Parliament

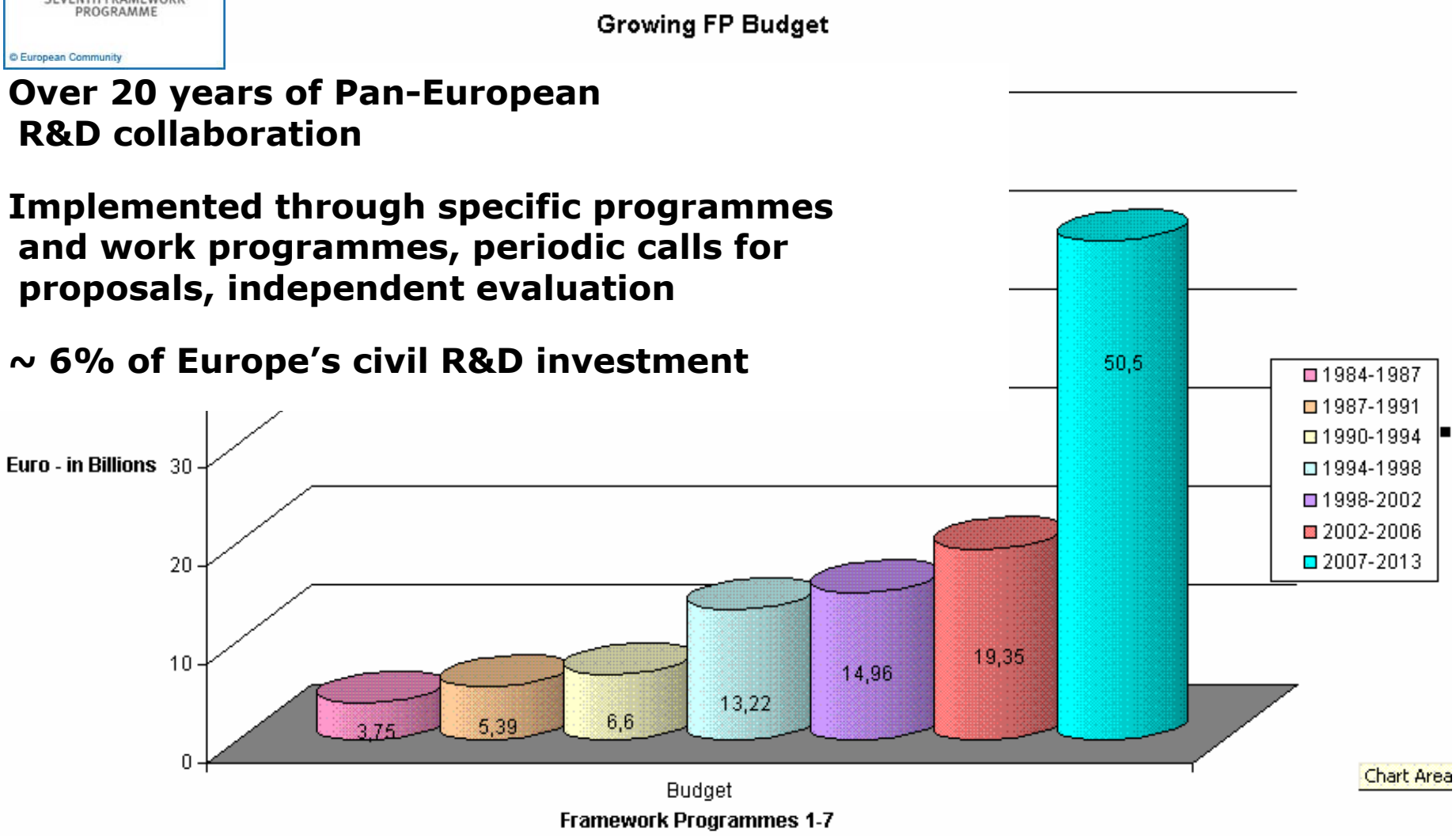
Yearly DAE Communication

European Council

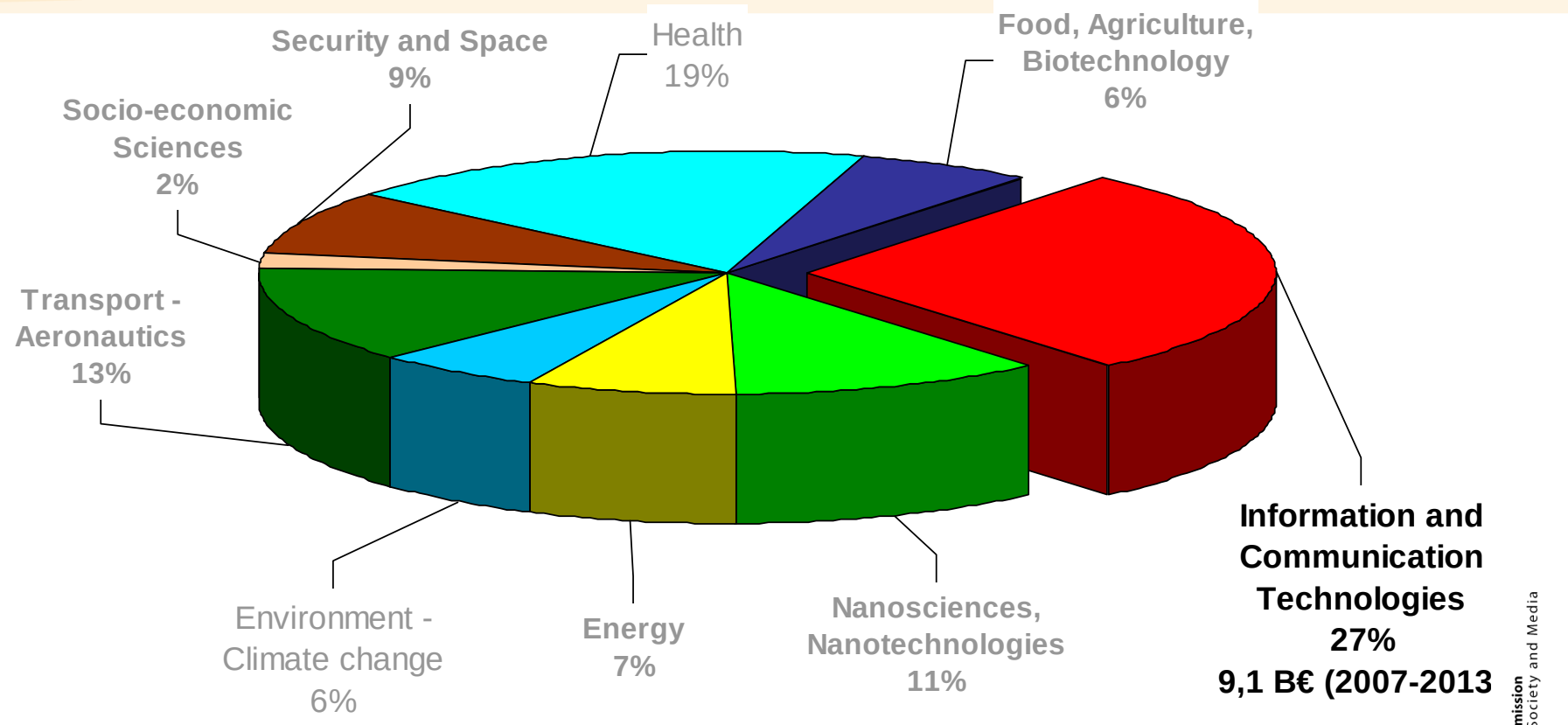
# Community Framework Programmes

## Main EU instrument to fund Community research

- **Over 20 years of Pan-European R&D collaboration**
- **Implemented through specific programmes and work programmes, periodic calls for proposals, independent evaluation**
- **~ 6% of Europe's civil R&D investment**



# FP7 Cooperation Programme
## (Total budget: 32.365 M€)



# FP7 aims to reinforce Europe's strongholds

- **Network and service infrastructures**
  - communication equipment and services, business software, security solutions …
- **Components and embedded systems**
  - semiconductors, equipment, photonics, plastic electronics, integrated micro/nano systems … embedded systems in vertical markets: cars, planes, medical, telecom …
- **A strong academic research community**
  - in core ICT fields and in other disciplines relevant for ICT: biotech, materials, cognitive sciences …

# … based on wide consultations

- 100+ thematic consultation meetings and workshops
- Thematic web consultations
- Strategic Research Agendas of European Technology Platforms and Joint Technology Initiatives
- ICT Advisory Group (former ISTAG)
- Consultations with national research and development programmes

# Challenges of ICT - Workprogramme 2011-2012

1. Pervasive and Trusted Network and Service Infrastructures
2. Cognitive Systems and Robotics
3. Alternative Paths to Components and Systems
4. Technologies for Digital Content and Languages
5. ICT for Health, Ageing Well, Inclusion and Governance
6. ICT for a low carbon economy
7. ICT for the Enterprise and Manufacturing
8. ICT for Learning and Access to Cultural Resources

FET: Future and Emerging Technologies

International Cooperation

Horizontal Actions

# … addressing semantic technologies and knowledge management

## Technology driven research approach:

- Technologies for Digital Content and Languages

## Application driven research approach and uptake of fundamental research:

- **In the challenges 1, 2, 5, 6, 7 and 8**

(e.g. eHealth, eGovernment, Business Information Systems, Future Internet, energy and environmental management)

# OUTLINE

- Welcome, Introduction

1. European Policies Content
2. **Knowledge and content management + semantic technologies in ICT research**
3. Outlook and perspectives: FP7 WP 2011-2012
4. Information and Networking Events

- Conclusions

# IST* in FP6

*I*nformation Society Technologies

# General Overview of IST in FP6 (*Information Society Technologies*)

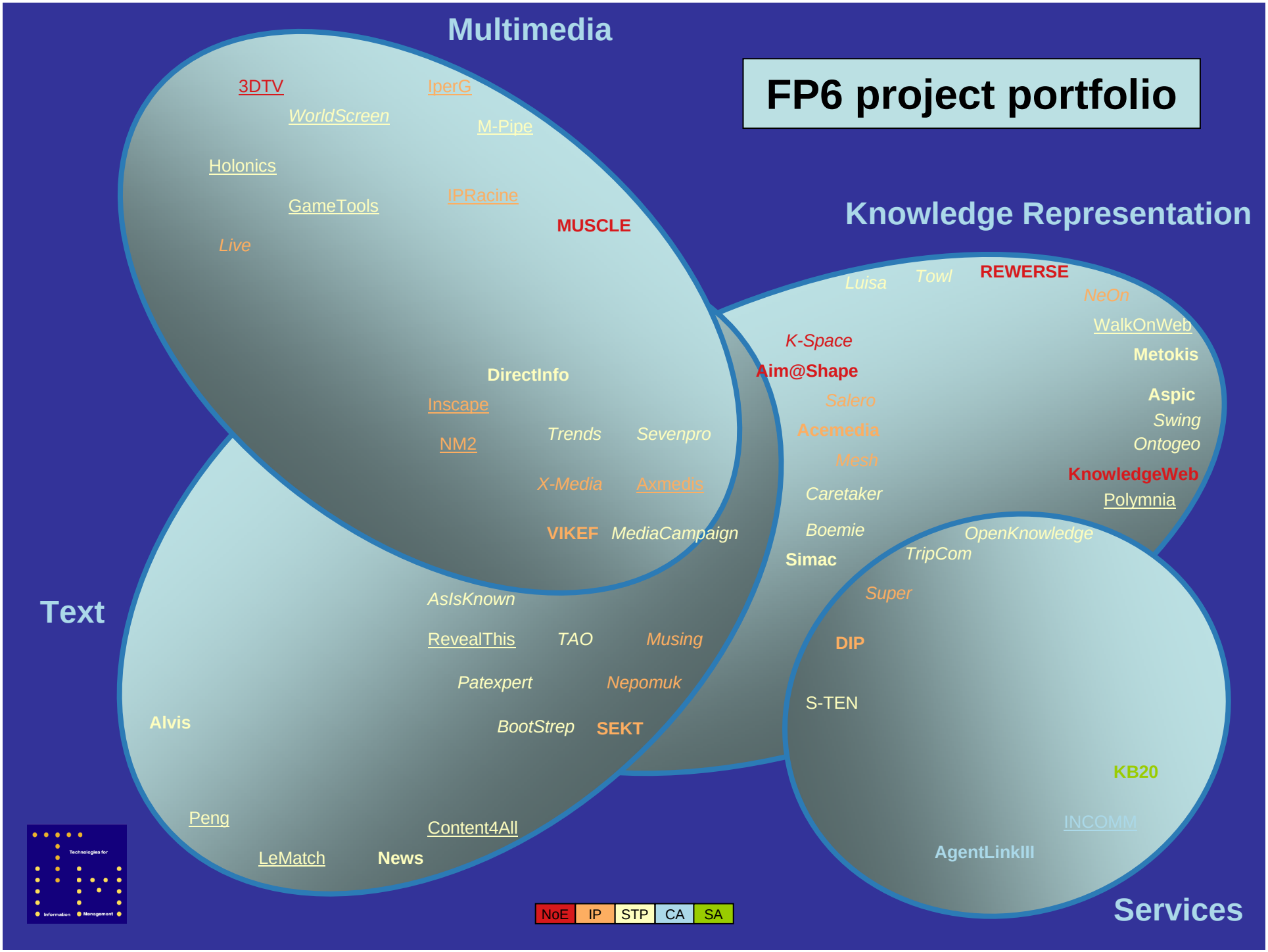
| | |
|---|---|
| Proposals received | 7 952 |
| Requested funding | 26 003 M€ |
| Contracts | ~ 1000 |
| EU contribution | 3 880 M€ |
| Contractors | 4 753 |

# Focus on Knowledge management and Content creation in FP6

- **62** projects, ~**700** contractors, **270** M€
- **RTD&D**:
  - long term research (formal, theoretical)
  - component technology research & development
  - applied, system-level research
  - demonstration
- **emphasis on**
  - generic, enabling technologies
  - flexible, cross-sectoral application platforms

# Main research challenges in FP6

- **Cross-media Content** (call 2):
  novel forms of digital content
  creativity & interactivity, user experience & control, story-telling & non-linear narratives…
- **Content & Knowledge** (call 4):
  intelligent, dynamic content
  access & management (meta data generation / extraction, semantic annotation & indexing, contextual retrieval…), automated workflows, aggregation & personalisation...
- **Knowledge** (calls 1 & 4):
  intersection of Web, MM and KR&R (*SemWeb+*)
  networked information & communities, automation of knowledge lifecycle, web / multimedia "documents", from static to dynamic information, interaction & evolving processes
- **Audiovisual Search Engines** (call 6):
  organising, searching and accessing large scale, distributed audiovisual content
  automated knowledge discovery and extraction, annotation and summarisation, indexing and retrieval of all types of digital content (text, image, video, audio, 3D objects etc.), including protected content

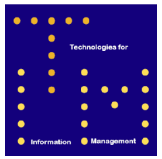

Multimedia
FP6 project portfolio
3DTV
IperG
WorldScreen
M-Pipe
Holonics
IPRacine
GameTools
MUSCLE
Live
Knowledge Representation
Luisa
Towl
REWERSE
NeOn
WalkOnWeb
K-Space
Metokis
Aim@Shape
DirectInfo
Aspic
Salero
Inscape
Swing
Acemedia
Trends
Sevenpro
Ontogeo
NM2
Mesh
KnowledgeWeb
X-Media
Axmedis
Caretaker
Polymnia
VIKEF
MediaCampaign
Boemie
OpenKnowledge
Simac
TripCom
Text
AsIsKnown
Super
RevealThis
TAO
Musing
DIP
Patexpert
Nepomuk
S-TEN
Alvis
BootStrep
SEKT
KB20
Peng
INCOMM
Content4All
AgentLinkIII
LeMatch
News
Services
NoE
IP
STP
CA
SA

# ICT* in FP7


*** Information Communication Technologies**

# FP7 Call1 and Call3 research themes


- **Content creation** & **processing**
- Development of **media post-production tools** (e.g. film, TV, advertising, games)
- **Knowledge management** in a range of business & public-interest domains including development of **Semantic wikis**
- **Integration of social software & semantics** for better social interaction to support activities of organisation or communities
- **Semantic foundations** including semantic coding of **3D objects**, sharing of 3D models
- **Personalisation** & **summarisation**
- **Reasoning** (temporal, dimensional and uncertainty, approximate & incomplete reasoning)



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# In Call5 addressed research:
## Intelligent Information Management

**Key work programme themes :**
(present in submissions)

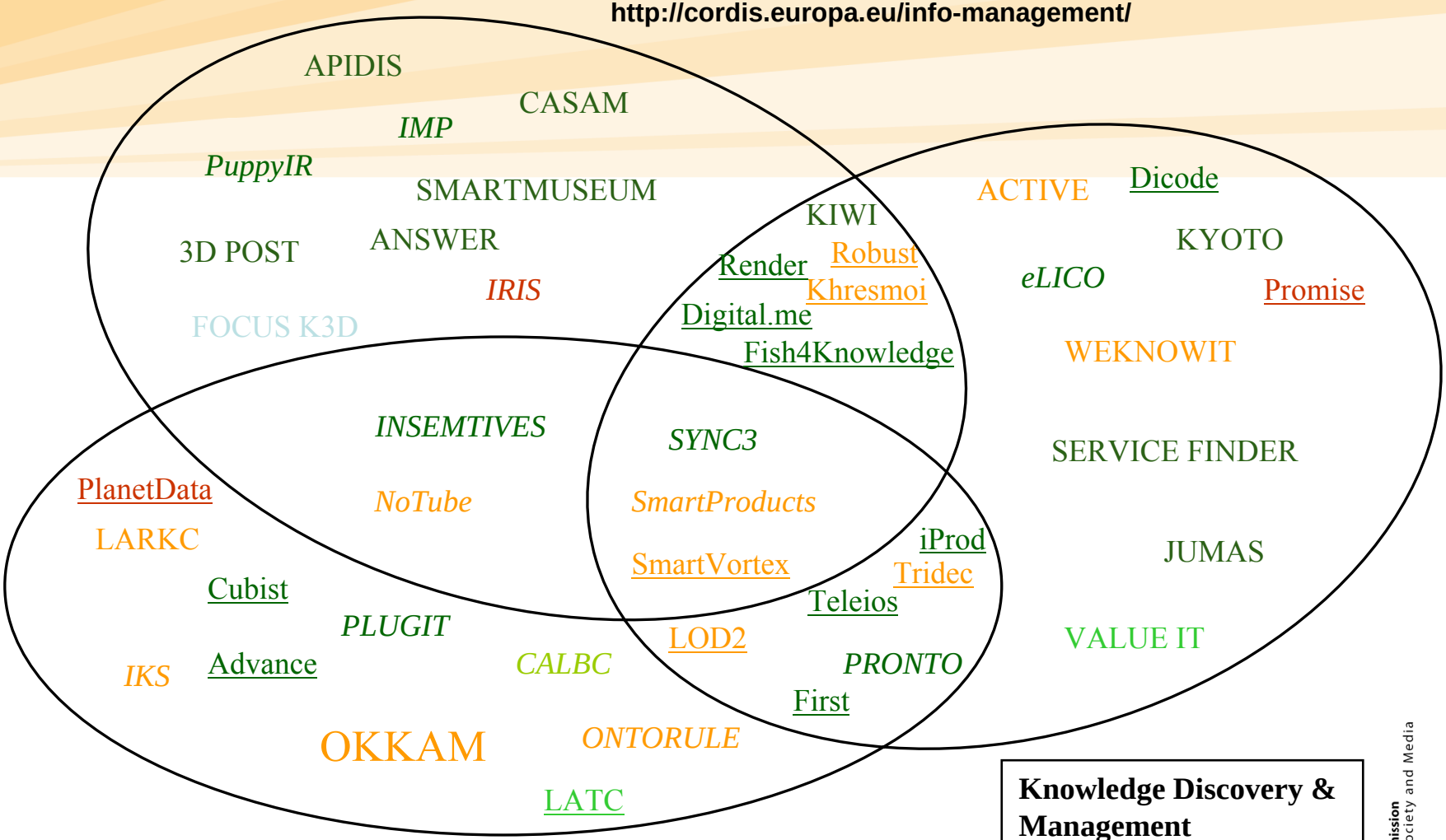
- Capturing tractable Information (ca 40%)
- Delivering pertinent information (ca 40%)
- Collaboration and decision support (ca 50%)
- Personal sphere (< 20%)
- Impact and S&T leadership (< 5%)

**Key dimensions:**
any kind of large data sets + real time

**Online Content, Interactive & Social Media**

# FP7 project portfolio

http://cordis.europa.eu/info-management/




**Knowledge Discovery & Management**

**Reasoning & Information Exploitation**

CALL1 *CALL3* CALL5

NoE | IP | STP | CA | SA

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# Call5 – main advancements

- **more scalable processing methods** for multimodal and multimedia information
- **novel and better scaling reasoning methods**, in particular for streams and very large scale RDF stores
- **advanced algorithms for data and knowledge mining**, in particular – relationship mining, entity identification, linking open data
- **novel real-time techniques** for processing and semantically fusing sensor data streams and extracting complex events and actions from them.

# Call5 – most representative domains covered by retained proposals

- Medical sciences data management
- Product engineering/design
- Earth sciences
- Financial and business intelligence
- Management of large on-line communities
- Improvement of linked-data resources
- Large scale public governmental data

# Closed FP7 Calls in figures

| **Inputs:** | **Call 1** | **Call 3** | **Call 5** |
|---|---|---|---|
| Proposals | 148 | 252 | 169 |
| Participants | 210 | 2017 | 1387 |
| Countries | 50 | 49 | 51 |
| Request M€ | 473 | 817 | 611 |
| Available M€ | 51 | 50 | 70 |
| **Outputs:** | **Call 1** | **Call 3** | **Call 5** |
| Projects | 15 | 13 | 17* |
| Participants | 128 | 106 | 148 |
| Countries | 21 | 21 | 22 |

**Total**: 48 projects, 392 contractors, 171 M€

* additional 3 enlargements of existing projects (10p)

# Project examples

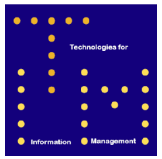


## Interactive Knowledge Stack for small to medium CMS/KMS providers

- IKS is a **semantics-based Open Source Platform** for Small to Medium CMS Providers.

-IKS will **raise the semantic capability** of European software houses to **develop intelligent content management solutions** for their customers.

- The major technological result of the project will be the **”Interactive Knowledge Stack”,** a layerd set of software components and specifications which will make traditional content management platforms capable of dealing with the future ”Semantic Web”.



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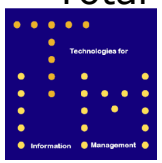
**Participants:**

1. Salzburg Research - AT
2. Deutsches Forschungsinstitut für Künstliche Intelligenz - DE
3. University of St. Gallen - CH
4. Consiglio Nazionale delle Ricerche - IT
5. Software Quality Lab, University of Paderborn - DE
6. Software Research and Development and Consultancy Ltd - TU
7. Hochschule Furtwangen University (HFU) - DE
8. Nuxeo SAS - FR
9. Alkacon Software GmbH - DE
10. TXT Polymedia SPA – IT
11. Pisano Holding GmbH - DE
12. Nemein Oy - FI
13. Day Software AG - CH

**Project website:** http://www.iks-project.eu

**Administrative Details:**

ICT FP7 Call 3 (IP)
Duration: January 2009 – December 2012 (48 months)
Total Cost: 8.6 MEUR – Contribution: 6.6 MEUR




**Technologies for Information Management Project portfolio:**
http://cordis.europa.eu/fp7/ict/content-knowledge/projects_en.html



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# Project examples


SEVENTH FRAMEWORK PROGRAMME

## Ontologies meet business rules

- ONTORULE aims to **lift the knowledge relevant to business rules** in an organisation from the IT level to the business level, allow management of this knowledge by the business professional, and make this knowledge available to the software applications in the organisation.

- The ONTORULE technology is validated and showcased using two **industrial case studies** (automotive and steel industry).

- The results of the project will not only improve the awareness and increase the use of Semantic Web technologies in the automotive industry and break new grounds in a traditional industry sector, but will be applied world-wide and in many different domains.

Technologies for Information Management

European Commission Information Society and Media

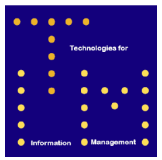

**Participants:**

1. ILOG - FR
2. Ontoprise GmbH Intelligente Loesungen fuer das Wissensmanagement - DE
3. Libera Universita di Bolzano - IT
4. Technische Universitaet Wien - AT
5. PNA Training BV - NL
6. Iniversite Paris 13 - FR
7. Fundacion Centro Tecnologico para el Desarrolo en Asturias de las Tecnologias de la Informacion - ES
8. Audi Aktiengesellschaft - DE
9. Arcelormittal Espana SA - ES

**Administrative Details:**

ICT FP7 Call 3 (IP)
Duration: January 2009 – December 2011 (36 months)
Total Cost: 8 MEUR – Contribution: 5.4 MEUR

**Project website:** http://www.ontorule-project.eu/




**Technologies for Information Management Project portfolio:**
http://cordis.europa.eu/fp7/ict/content-knowledge/projects_en.html



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# Project examples

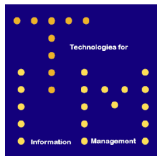


## Proactive Knowledge for Smart Products

- SmartProducts is a **new paradigm for the interaction of people and products**.

- The project develops the scientific and technological basis for building ”smart products” with **embedded ”proactive knowledge”**. It aims at researching all aspects relevant to the acquisition, modelling, reasoning, management, and use of proactive knowledge for smart products.

- The outcome of SmartProducts will impact the manufacturing and consumer domain, primarily targeting consumer goods, automotive and aerospace industries.



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**SmartProducts will be developed using MundoCore, a communication middleware specifically designed for the requirements of smart environments and smart items:**
http://www.tk.informatik.tu-darmstadt.de/de/research/smart-environments/mundocore/

**Participants:**
1. SAP AG – DE
2. Technische Universität Darmstadt - DE
3. EADS Innovation Works - FR
4. Philips Electronics Nederland B.V. - NL
5. University of Sheffield - UK
6. Centro Richerche FIAT - IT
7. Valtion Teknillinen Tutkimuskeskus - FI
8. Open University - UK
9. Universitat St Gallen - CH
10. Eidgenössische Technische Hochschule Zürich - CH

**Administrative Details:**
ICT FP7 Call 3 (IP)
Duration: January 2009 – January 2012 (36 months)
Total Cost: 10.5 MEUR – Contribution: 7 MEUR

**Project website:** http://www.smartproducts-project.eu/

**Technologies for Information Management Project portfolio:**
http://cordis.europa.eu/fp7/ict/content-knowledge/projects_en.html

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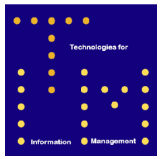
# FP7


# ICT Work programme 2011-2012

# Why do we need Intelligent Information Management


"Make content and knowledge abundant, accessible, interactive and usable over time by humans and machines alike."

- **content** must be **made available** and its long term usability, accessibility and preservation must be ensured
- **effective technologies** need to be developed **for intelligent content creation and management** and for supporting the **capture of knowledge** and its **sharing and reuse**




# Need of intelligent Content

Make digital resources that embody **creativity** and **semantics** (*"intelligence"*) easier and more cost effective to produce, organize, search, personalise, distribute and use across the value chain.

**media professionals, enterprise designers, talented amateurs**

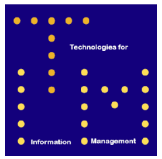
- more expressive, communicative & participative forms of content; enhanced productivity; greater ease of (re)use

**organisations, communities**

- more effective acquisition, processing & distribution of digital content and machine-tractable knowledge; sharing in collaborative environments

# Main general challenges


- Growth of organisational information
- Large and growing data quantity
- Multimodal information
- Unstructured data
- Heterogeneity of data and data sources
- Complexity
- Interoperability
- External shocks, e.g. financial crisis




# Addressed research focus in FP7

**WP 2007-2008** Intelligent Content

**WP 2009-2010** Intelligent Information Management with focus on large data

**WP 2011-2010:**

- SME initiative on Digital Content (SO 4.1)
- Intelligent Information Management with focus on large data (SO 4.4)

# **SME initiative on Digital content** and language technologies **(SO 4.1)**

- To **exploit and contribute to large digital resource pools**.

- **User-centred experimentation** with the aim of demonstrating the integration of data-intensive technologies within innovative solutions and processes.

# Intelligent Information Management
# SO 4.4. Expected impact

- **Reinforced ability** for a wide range of innovators **to tap data infrastructures and to add value beyond the original purpose of the data** through data analysis.
- **Reinforced ability to find, reuse and exploit data resources** (collections, software components) created in one environment in very different, distant and unforeseen contexts.
- **Value creation** through extensive data collection and analysis.
- **Increased economic value** of data resources or data analysis services
- **New scientific investigations** enabled by large, inter-connected data resources and attending infrastructure.
- **Increased efficiency of organisations and better management of societal challenges** through more timely and better decision making.

# ICT Proposers' Day 2011
# 19 - 20 May, Budapest
# Networking for European ICT R&D


- **Aim of the event**:
  to prepare for Calls 8 and 9 (together >1 billion €)
  - by networking and partnerships building
  - by first-hand information from >100 EC officials

2011.hu

- **Structure**:
  - thematic sessions with presentations of proposal ideas
  - information stands & meeting points

- **Registration**:
  free of charge, open from January 2011

http://ec.europa.eu/ictproposersday



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# Objectives

## Networking for Call 8 and 9

- Meet researchers with similar or complementary research interests
- Form project consortia
- Networking for Call 8 and 9 exclusively in Budapest
- Follow-up of the ICT Event 2010 in Brussels (mainly networking for Call 7)
- No other networking event or information day 3 months before and after

## Obtain information

- Content, Instruments, participation rules
- Around 100 Commission officials present

# Common Strategic Framework Green Paper (2014 onwards)

- European Commission inviting idas submissions
- Online questionnaire at http://www.ec.europa.eu/research/csfri
- Deadline for submission 20 May 2011

# Unit organised Information and Networking Events

## In planning: INFO + Registration

http://cordis.europa.eu/info-management/

**Follow us on Twitter! Join the conversation at: SO41 and SO44**

**Contact us via the unit Mailbox:**

infso-e2@ec.europa.eu

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# Further info

- **ICT under FP7**
  http://cordis.europa.eu/fp7/ict/

- **Experts data base:**
  https://cordis.europa.eu/emmfp7/

- **Unit E2** – Technologies for Information Management

  **URL**: http://cordis.europa.eu/info-management/

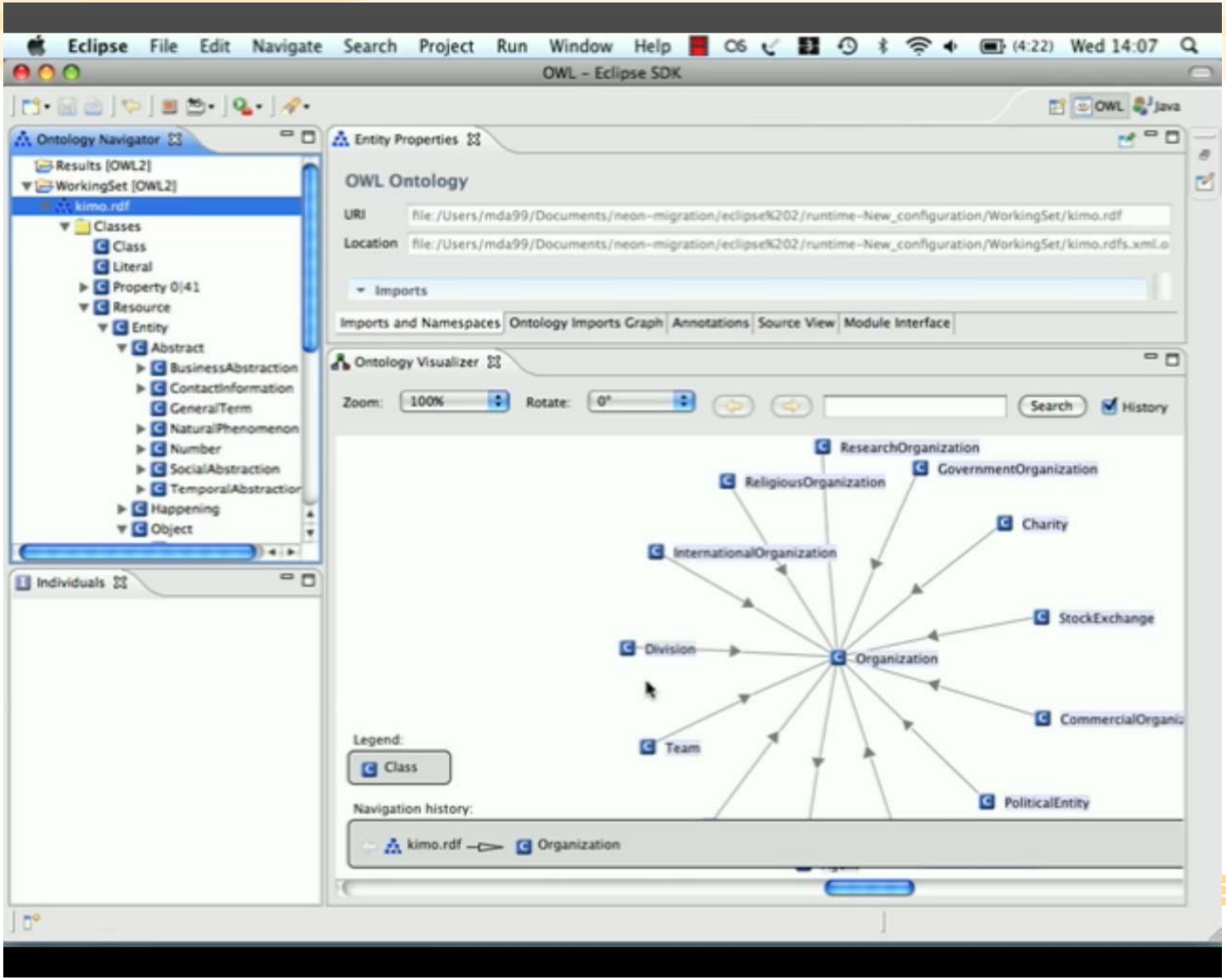
  **eMail to**: infso-e2@ec.europa.eu

# A kantian analysis

# FP6, the age of conceptual modelling

- In FP6 (2004-2008) we funded work on
  - ontology editors (NeOn)
  - ontology mapping (NeOn, KnowledgeWeb)
  - Ontologies for semantic web services (DIP, KnowledgeWeb, SUPER, TripCom SEKT)

# The NeOn ontology editor

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# The NeOn ontology editor

- Eclipse based, 20+ plugins
- Multiplatform (linux, windows, osx)
- Eclipse public license
- Actively maintained (latest release 2.4.2 05-03-2011)
- Fully documented (39 screencasts)
- Thousands of downloads

# The NeOn ontology editor

- Ontology development ~ software development
- distributed
- versioned
- Catalogs supporting search, reuse
- modularization
- Mapping
- Rapid prototyping, coverage

# FP7, the age of web (scale) data

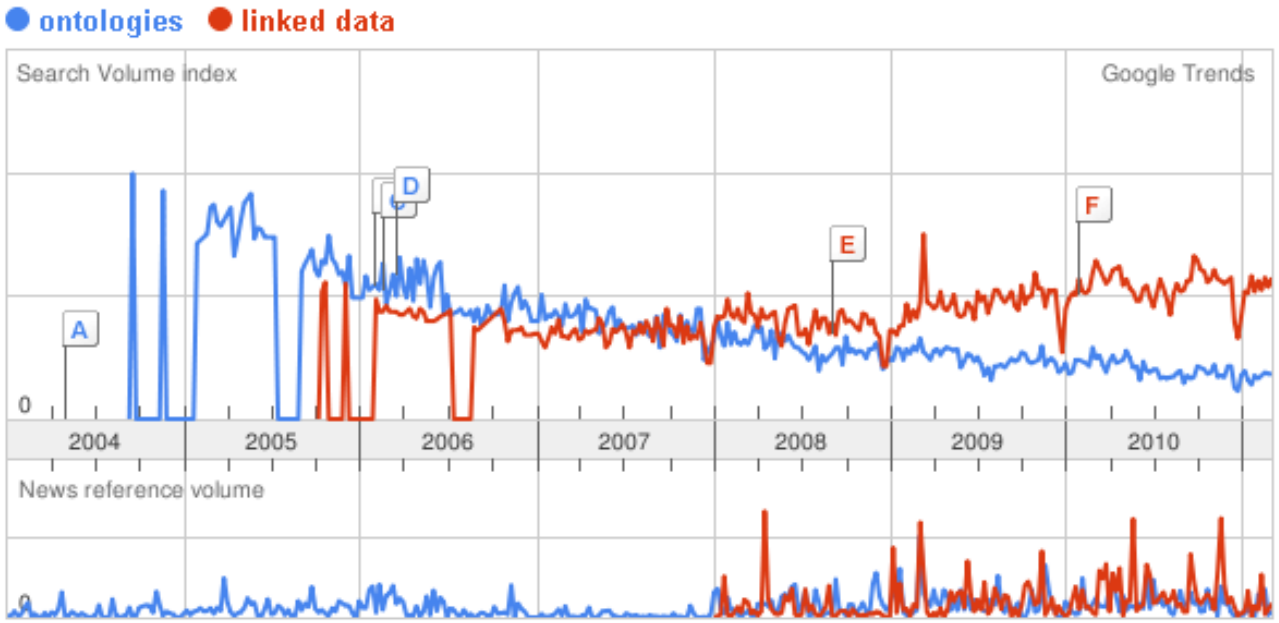
- In FP7 (2009-2010) we funded work on
  - Entity identifier management (OKKAM)
  - Large scale reasoning (LarKC, LOD2)
  - Linked data mapping (LATC)

# The Welty doctrine

**In the semantic web the part that is new is not the semantic part, it is the web part**

**(Chris Welty, ISWC 2005)**

# Web data happened



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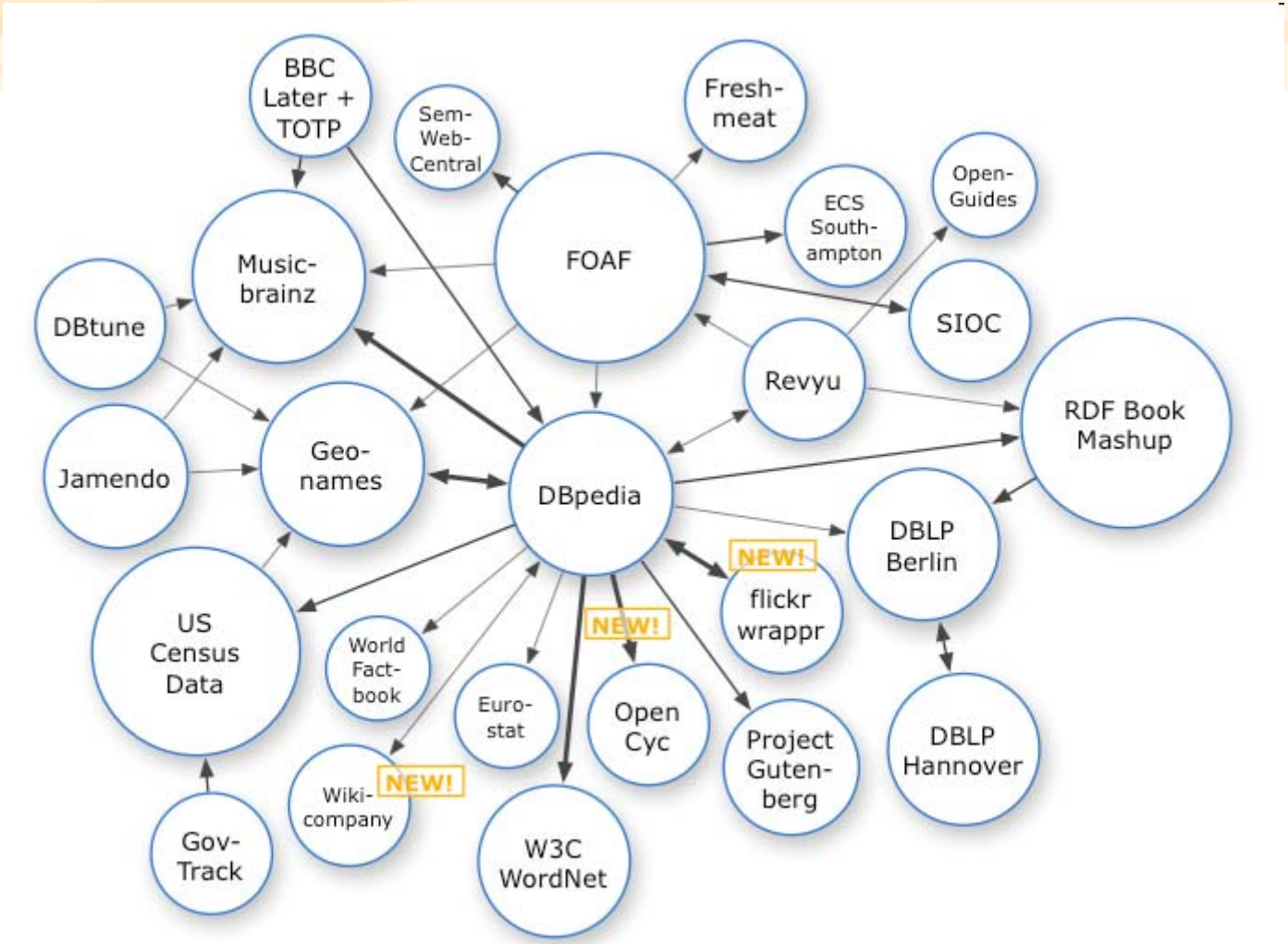
# Web data happened



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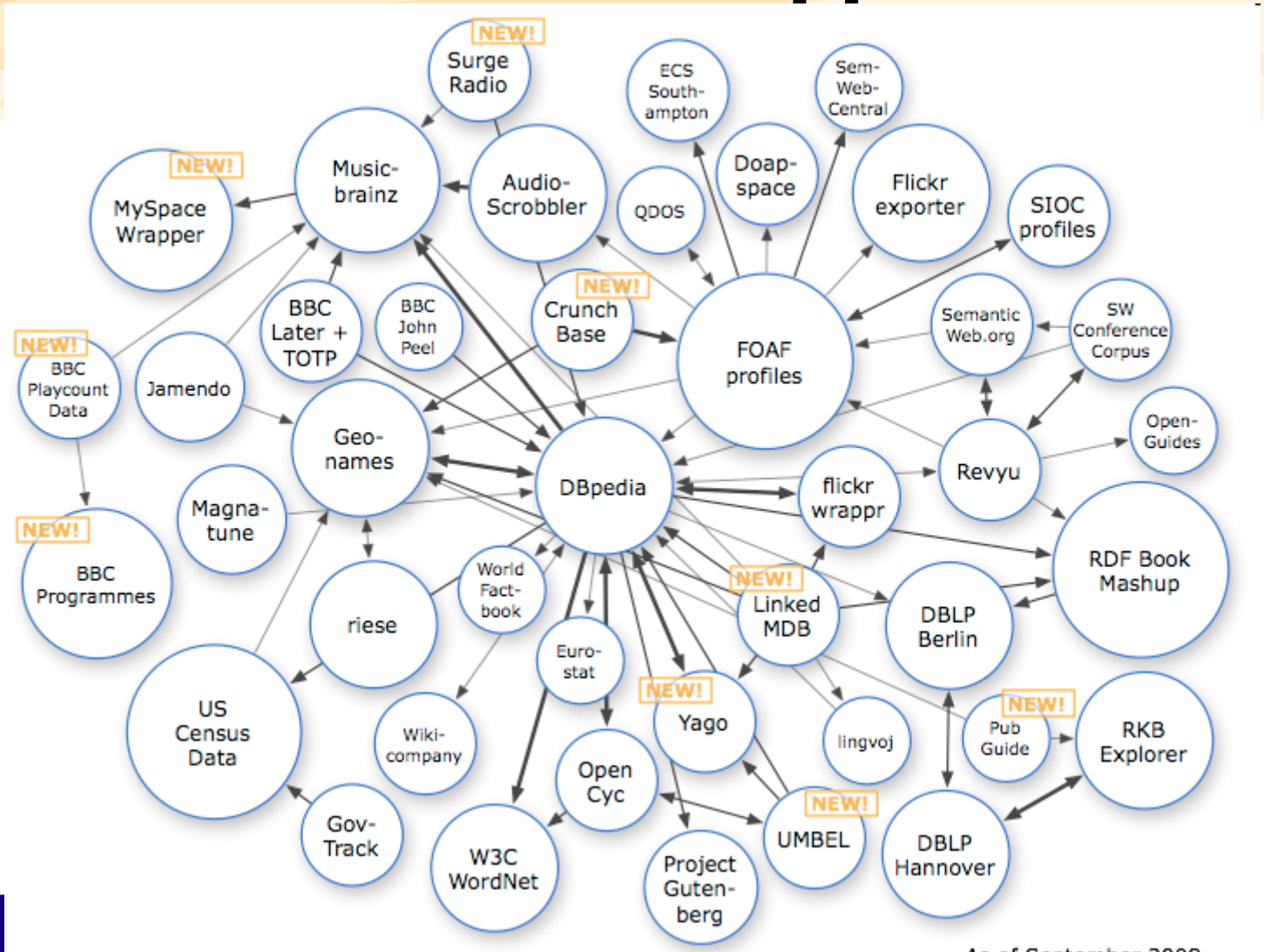
# Web data happened




2008

As of September 2008



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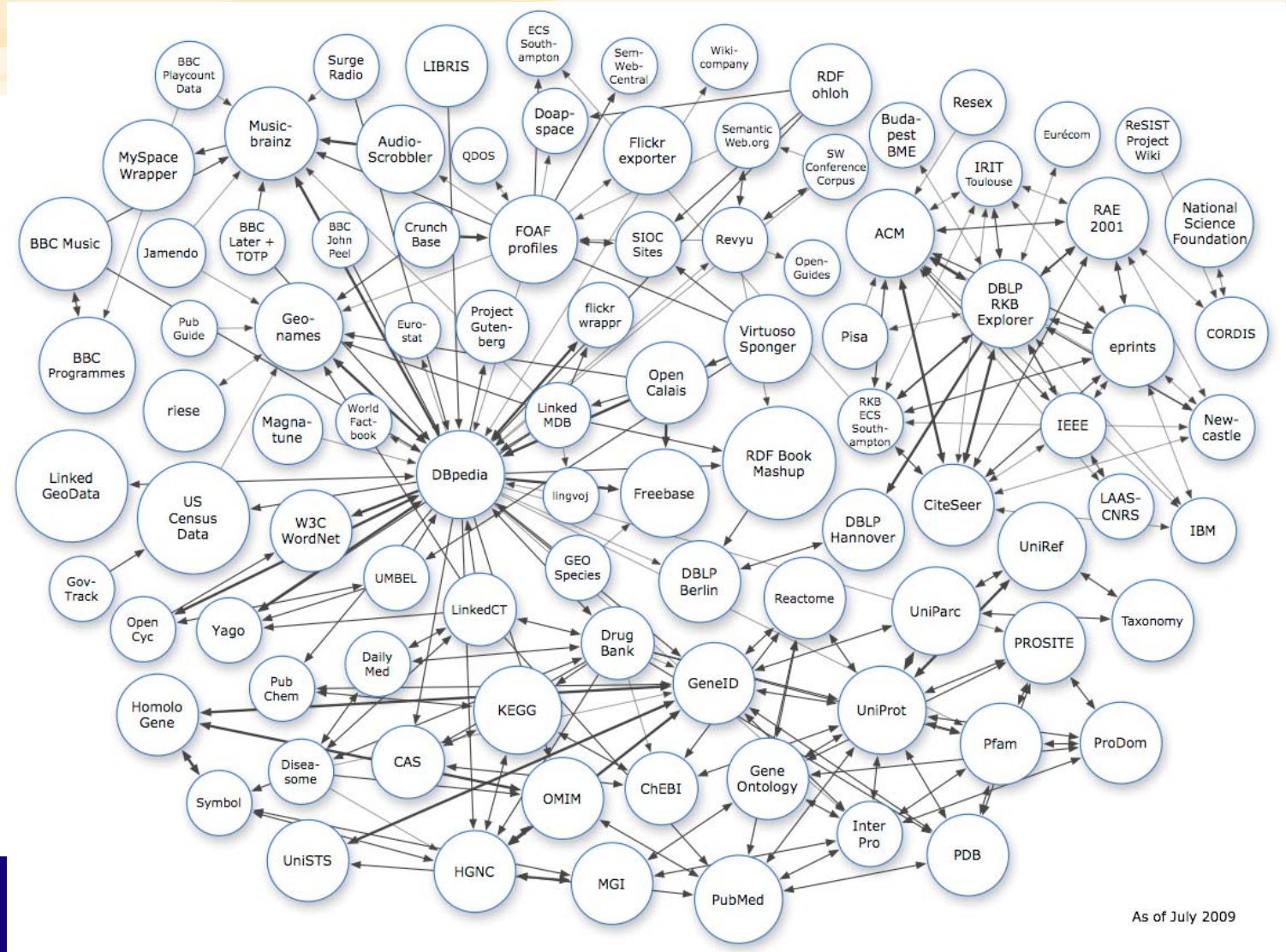
# Web data happened

2009




As of July 2009

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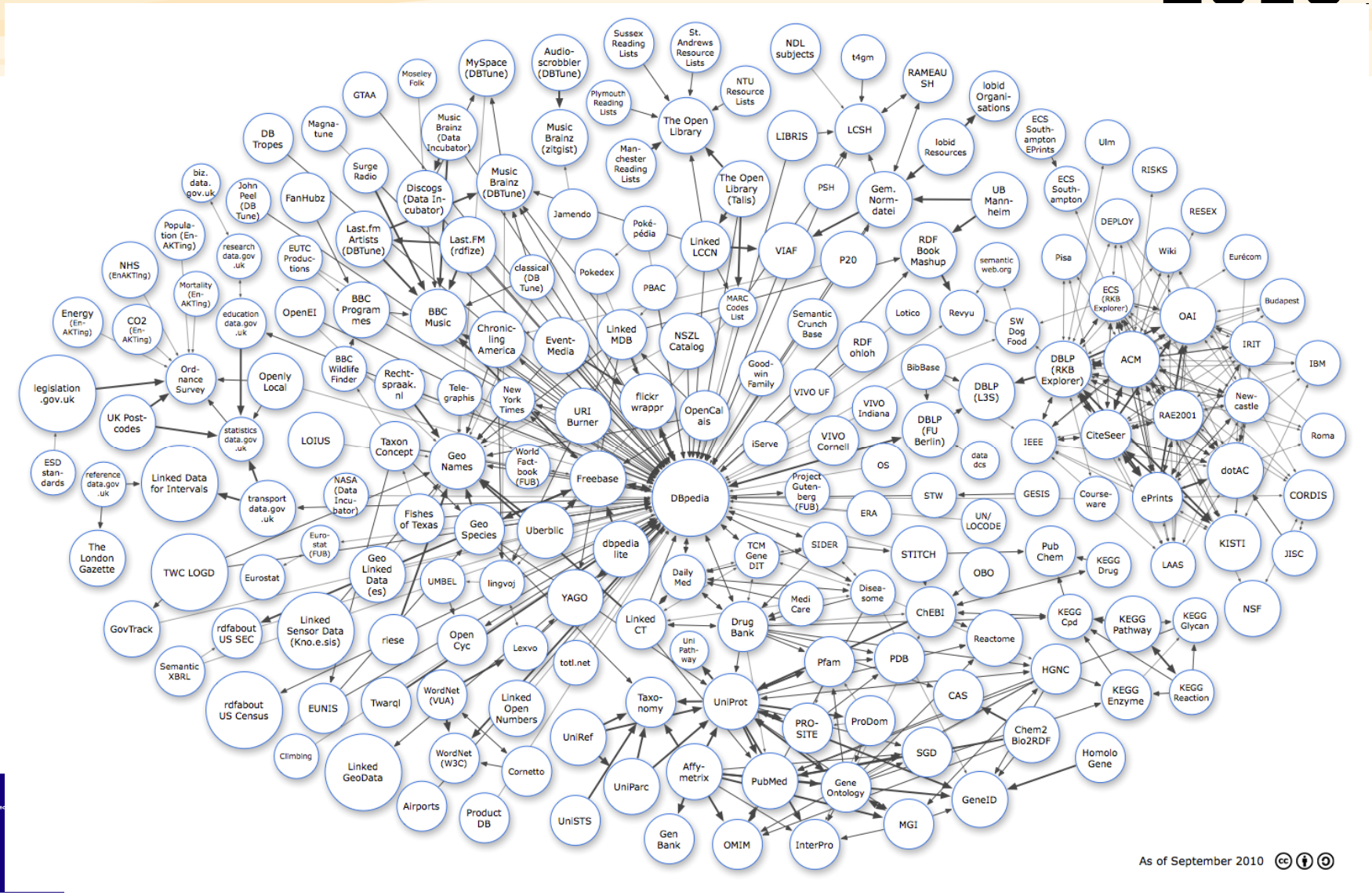
# Web data happened

# 2010



# Government web data happened

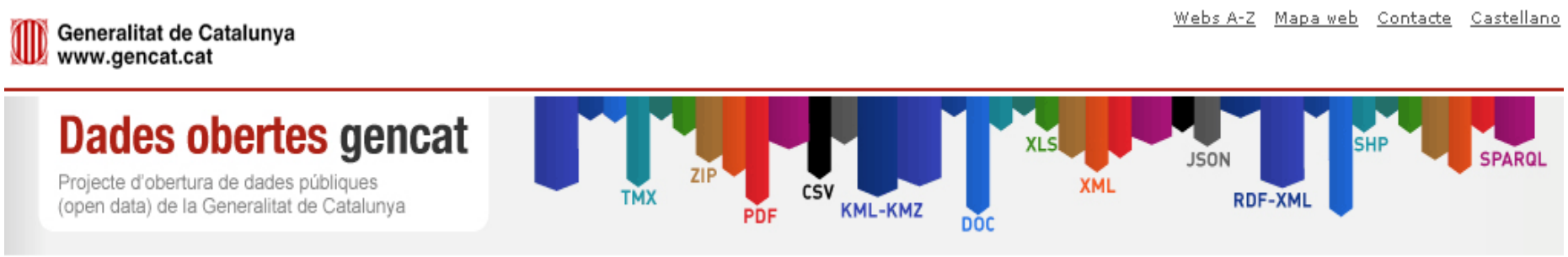

2009

# Government web data happened


**2010**

# Government web data happened

## 2010



# Government web data happened

## Searching in the TED system

Ted · tenders electronic daily

**The LOTED system gives you an RDF file with the tenders information regarding country and sector of your interest.**

### Select country and sector

Germany | Construction and Real Estate

From: 16/03/2011

To: 16/03/2011

Submit | Sparql

Select a country, a sector and an interval, and then press Submit.

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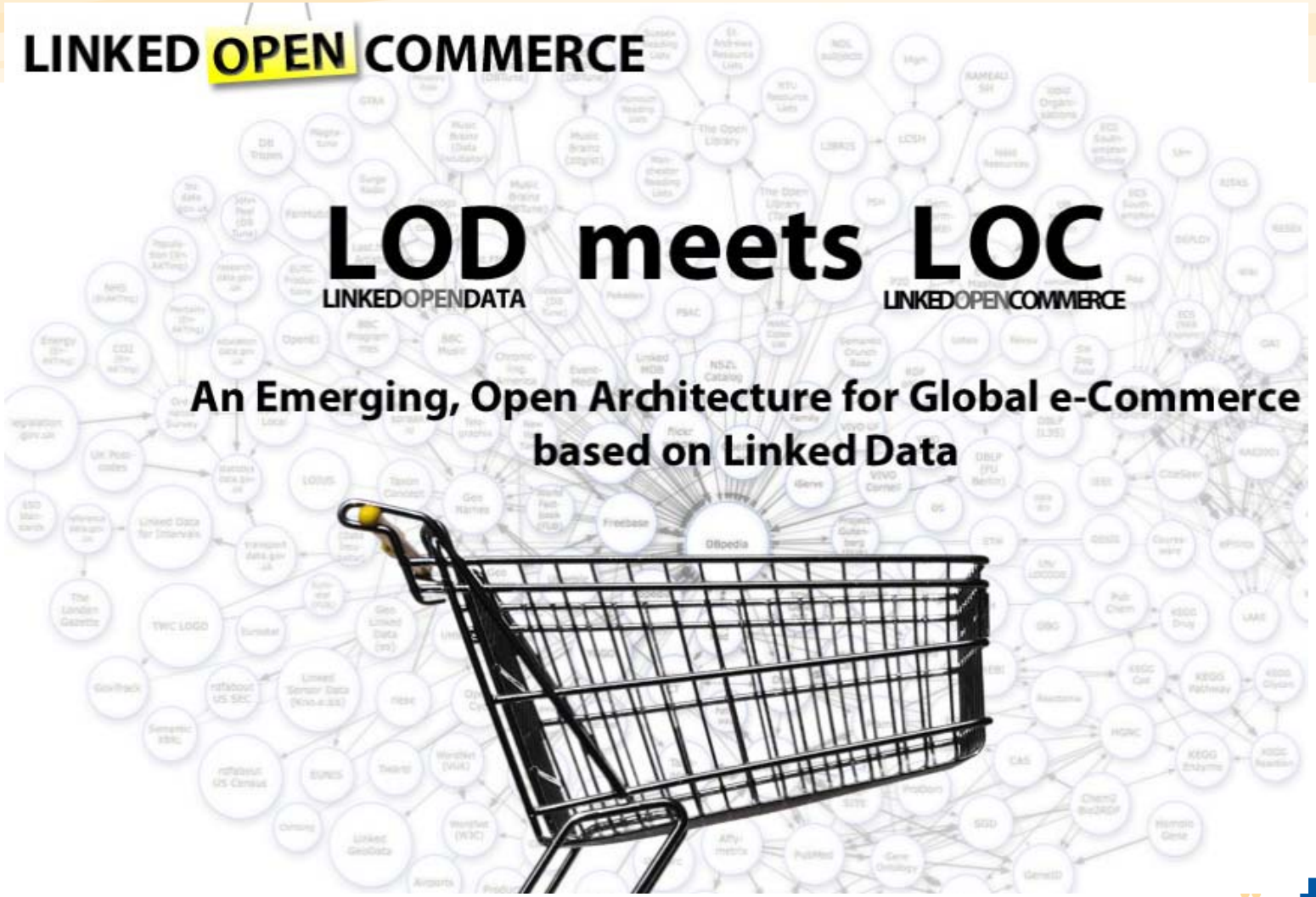
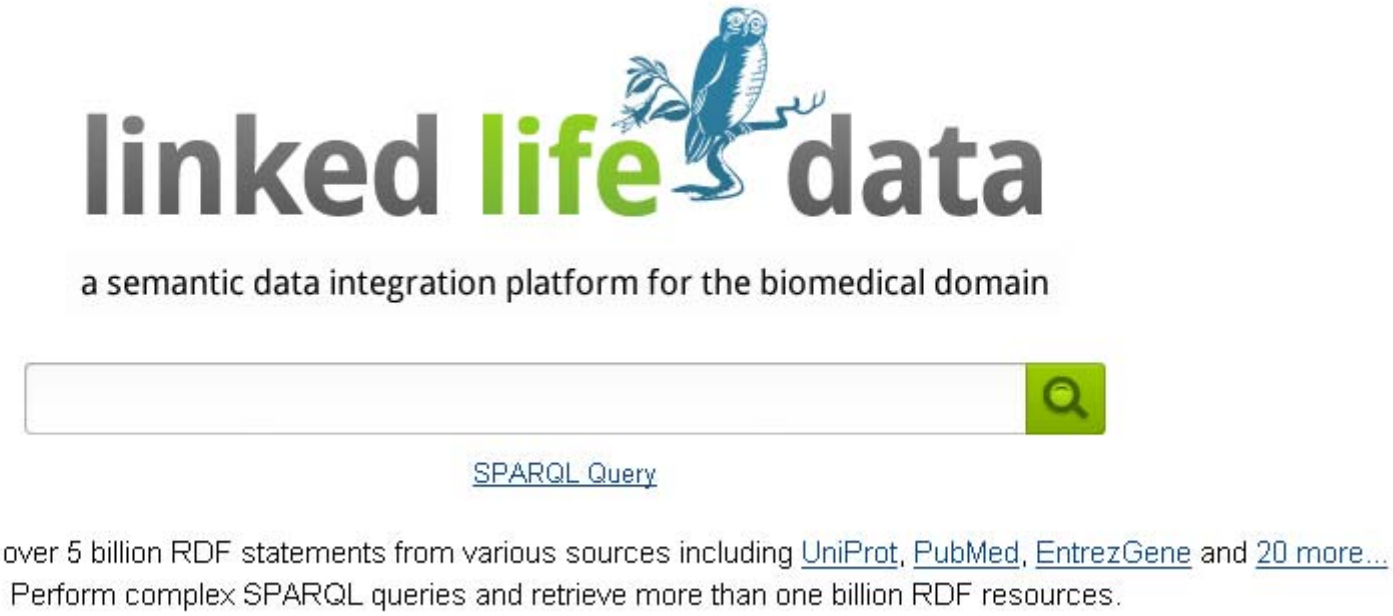
# eCommerce web data happened



# biomedical data happened



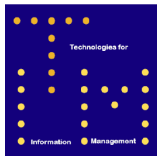
# The EU context for the next 5-10 years

- Ontologies will have a place insofar as they:
- Advance a policy objective (innovation, commerce, health, energy efficiency,…)
- Can be used to operate at extremely large scale

# The EU context for the next 5-10 years

Ontologies will have a place insofar as they:

- Bring insights into data sets
- Allow important inferences
- Are resistant against conceptual brittleness

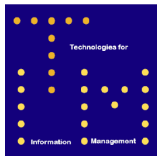







# Ontology Application Framework

- Agnostic: use what works best for you
- Hard to imagine we'd fund another one
- Principles of reuse, modularization, tool support, robust engineering remain important



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# Value Metrics

- Measure the cost/value of an ontologically naïve process
- Measure the cost/value of its ontologically sophisticated counterpart modulo
  - Cost of ontology development
  - Cost of ontology maintenance

# Value Models

- Show under what conditions the cost/value of sophisticated ontologies decreases/increases
- Show under what conditions sophisticated ontologies can be reused (cost amortization)

# Value Models

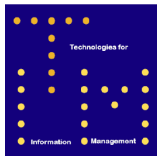
- Show under what conditions the cost/value of sophisticated ontologies decreases/increases
- Show under what conditions sophisticated ontologies can be reused (cost amortization)

# Applications and case studies

- Follow the data trails:
  - Volume trail: what's growing fastest?
  - Value trail: what's worth more?
  - Integration trail: where do data flows need to interface (across industries, legal systems, disciplines)

# Strategies for "making the case" for ontologies

- Identify large (or wealthy) groups with conceptual modeling problems
- Assume they know (and want to know) nothing about ontologies
- First solve their problems to their satisfaction
- Then (and only then) show how you did it
- Then ask for the next problem





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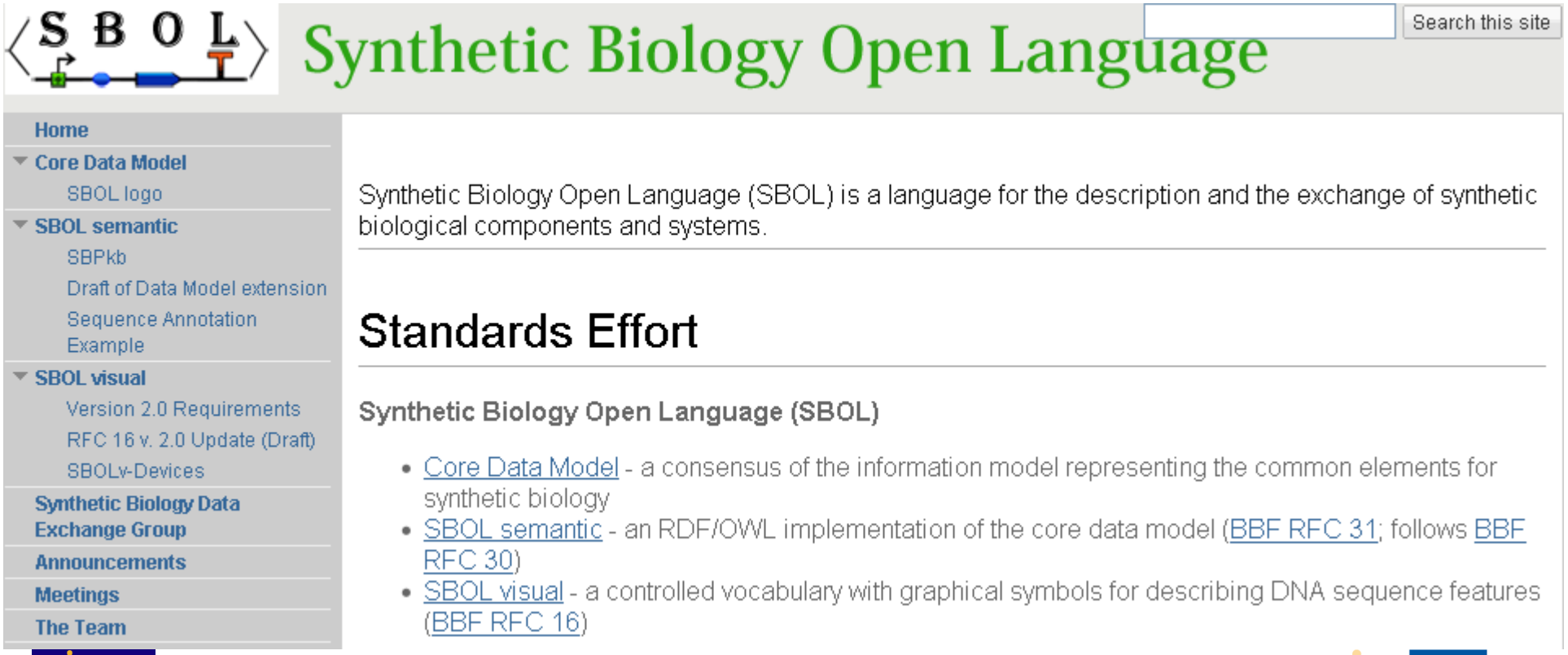
# Grand Challenges

- Graceful degradation of inconsistent models
- T-Box induction, refactoring, mapping with terascale A-boxes and A-box user interactions
- Process auditing, compliance

# Grand Challenges

Anything like



# Thank You!