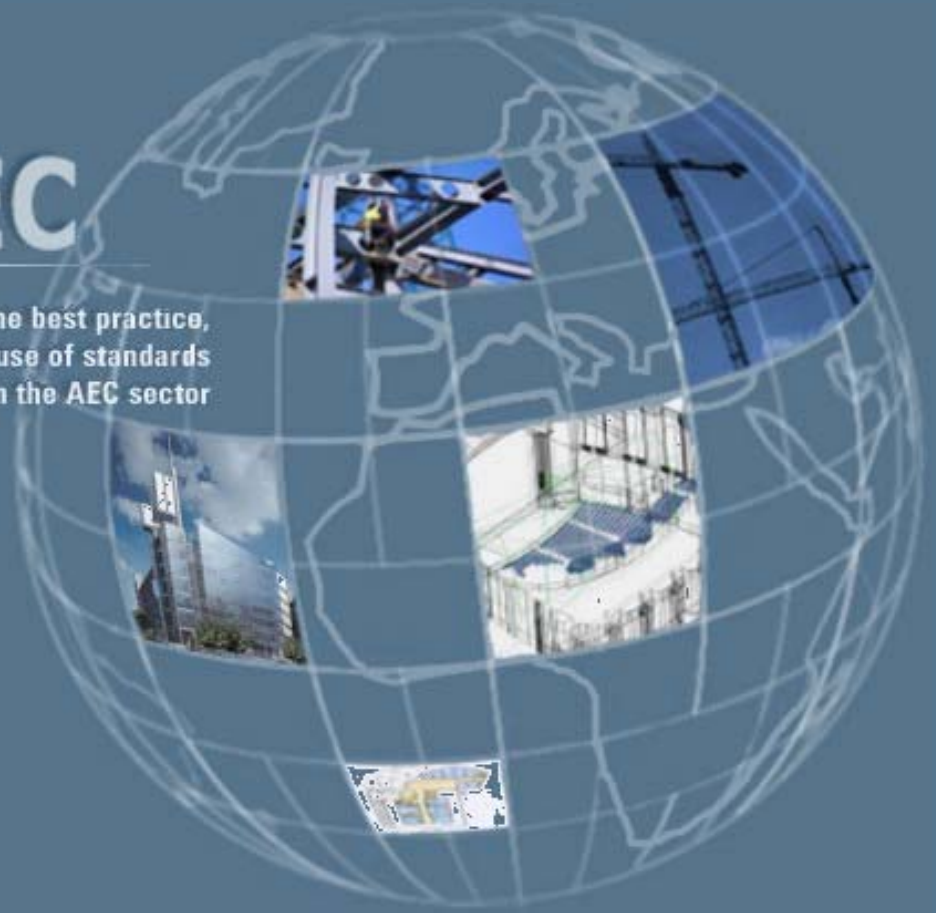
prodAEC

European Network supporting the best practice, harmonisation, implementation and use of standards for data exchange, e-work and e-business in the AEC sector



French NIP : Parisa Ghodous (Lyon I University), Celson Lima (CSTB)
Project Manager : Manuel Martinez (AIDICO)

Information Society Technologies

IST-2001-32035

prodAEC Goals

- Be the primary source of information for standards on data exchange and e-business in European AEC/FM sector
- Support and bring together national, local and industrial initiatives promoting standards development/use in AEC/FM
- Increase SME competitiveness by adoption/implementation of standards
- Provide an extensive process-based overview of proper modelling standards
- Promote harmonisation of standards in the AEC sector

prodAEC project

Industrial Needs

- Findings of past inquiries into ICT needs of European AEC
- **prodAEC Benchmarker**

ICT related Standards in AEC

- State of the art, gap analysis, and roadmap for harmonisation
  - Procurement
  - 2D-CAD data exchange and Layering
  - 3D-CAD data exchange & Building Models
  - Metadata interconnecting EDM/PDM
- **proMAP tool. Process-oriented**

e-Business in AEC

- State-of-the-art e-business in AEC
  - eMarket places
  - Software tools
  - B2A
- e-Business Standardisation Initiatives
- **Best practice cases**

Industry ICT requirements

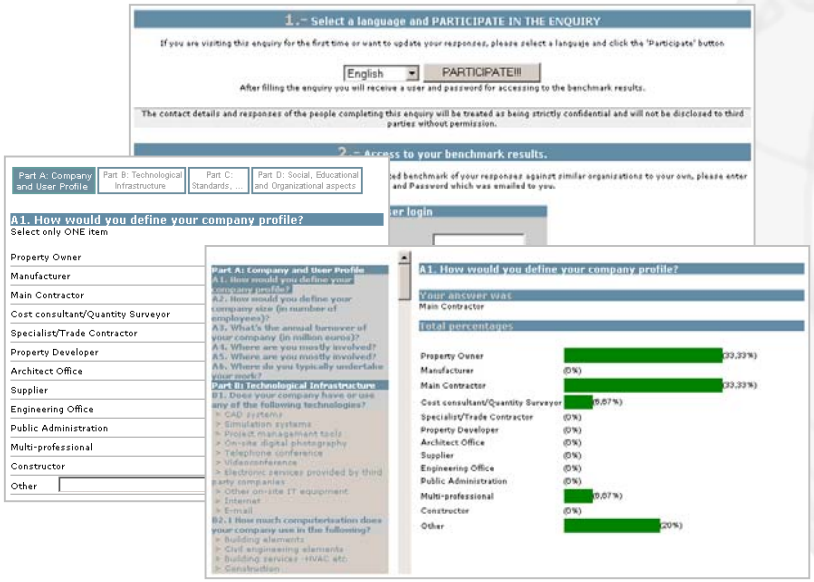
- Summary on results of previous investigations into industrial requirements undertaken at a European level including:
  - eLSEwise, discussion workshop, 2 industry working groups, 3 projects

- prodAEC Observations on achievements of past initiatives

- EC hosted Discussion Workshop 23rd Sept. 1999
- Construction Competitiveness ICT WG Phase 2 (2003)
- SCENIC (Best practice network in ESPRIT programme)
- ECCREDI Working Group June 1999
- ELSEwise ESPRIT Project #20876
- CIMsteel EUREKA project (#130)
- ICCI IST-2000-33022 Project

Benchmarking Service (I)

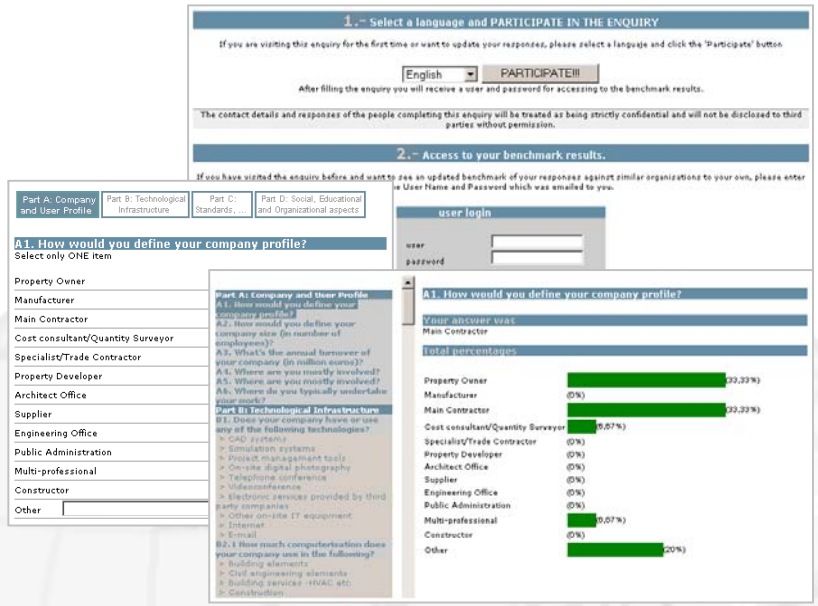
- Compare relative position in ICT use and awareness in AEC …
  - With companies of same profile/segment,
  - Without effort for collecting competitor's data
- Multilingual enquiry. Web forms
- Automated & personalised immediate report available.
- Useful hyperlinks to glossary.
- Information updated on-line and in a single international database



- Identify lacks in ICT awareness level and implementation at industrial level
- Updated knowledge about the actual awareness level and the status of ICT in AEC/FM. Keep track of the sector evolution

Benchmarking Users

- Industry
  - Designers
  - Contractors.
  - Supply chain.
- R/D community
  - Tech Needs
- Education
  - Training needs.
- Vendors
  - Product development strategies.
  - Country,discipline and topic specific reports.



Benchmarking Service (II)

Part A: Company and User Profile
A1. How would you define your company profile?
A2. How would you define your company size (in number of employees)?
A3. What's the annual turnover of your company (in million euros)?
A4. Where are you mostly involved?
A5. Where are you mostly involved?
A6. Where do you typically undertake your work?
Part B: Technological Infrastructure
B1. Does your company have or use any of the following technologies?
> CAD systems
> Simulation systems
> Project management tools
> On-site digital photography
> Telephone conference
> Videoconference
> Electronic services provided by third party companies
> Other on-site IT equipment
> Internet
> E-mail

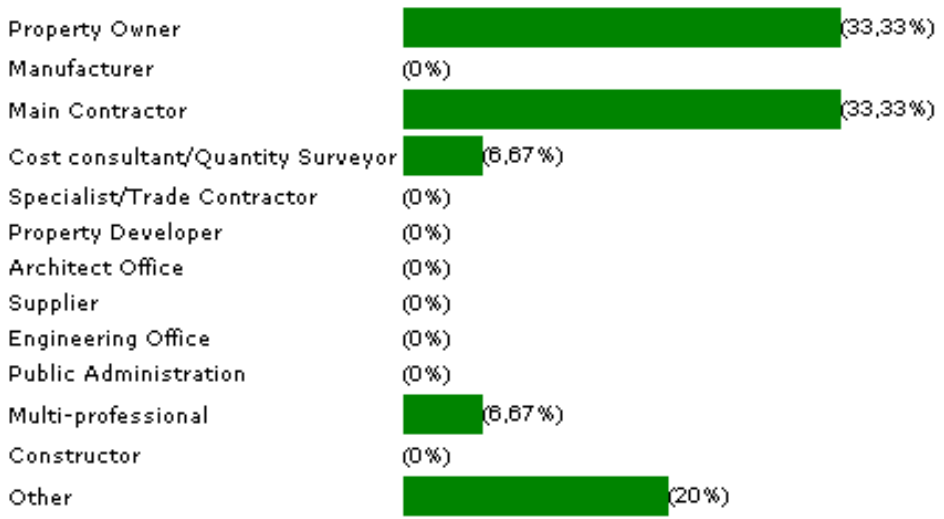
B2.1 How much computerisation does your company use in the following?
> Building elements
> Civil engineering elements
> Building services -HVAC etc.
> Construction

A1. How would you define your company profile?

Your answer was

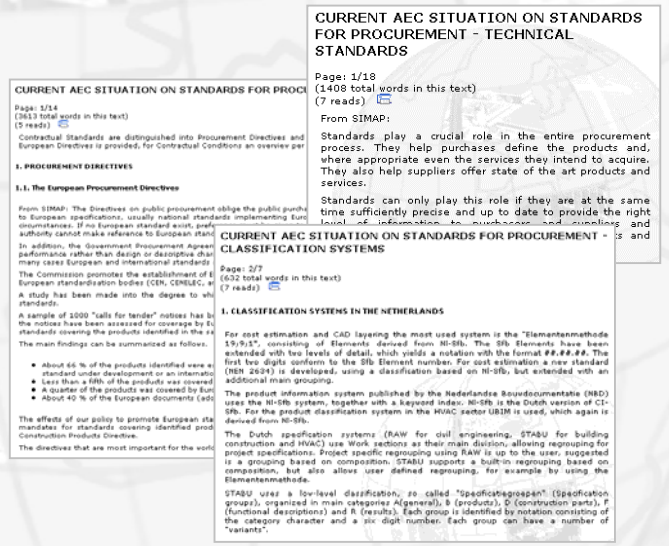
Main Contractor

Total percentages

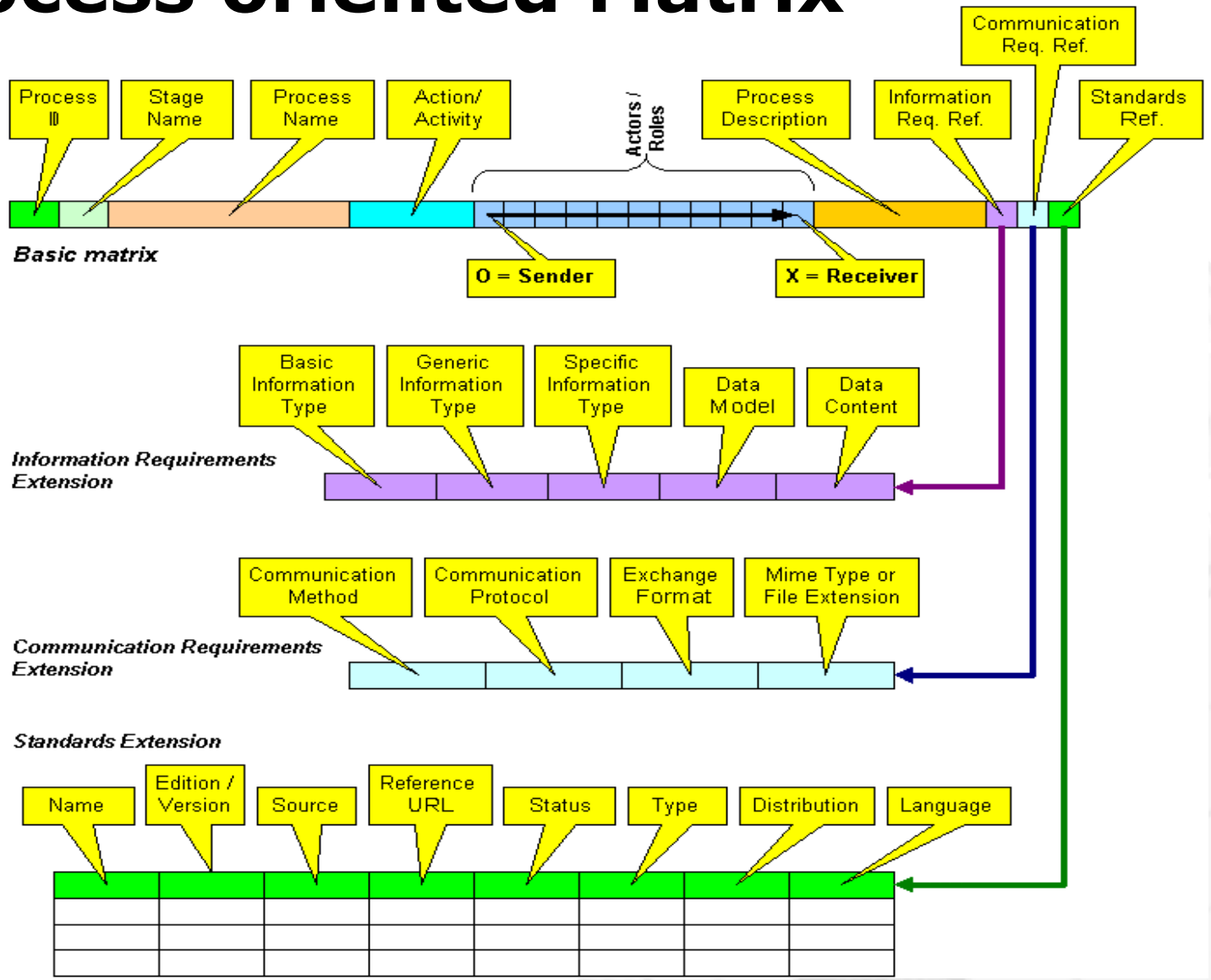


Standards

- Current situation concerning ICT standards in European AEC sector
- Procurement
  - Existing standards and methods of working for procurement and related topics investigated in Europe
- 3D-CAD data exchange & Building Models
  - Current situation on use of building model related standards in AEC: **IFC, AP225**, but also CIMsteel, PSS, funSTEP, and other related ISO standards
- 2D-CAD data exchange and Layering
  - Standards for exchange of 2D design drawings with layering mechanisms
- Metadata interconnecting EDM/PDM
  - Identify standards, specifications and technologies relevant for exchanging metadata; evaluate usage and corresponding EDM systems in AEC/FM; implementation level by software



Process oriented Matrix



Standards-Process oriented Matrix

ge D	Process Identity	Stage Name	Process Name	Referenced Standards (see and extend sheet 'Standards' for numbered codes) 0. Process (design/construction/FM standards) -- no input needed --	1. Basic Information Type (META Data Standard) -- input by TUD, ALL --	2. Generic Data Type (Classification System) -- input by STABU --	3. Data Model (EDM, PDM Standard) -- input by AEC3 --	4. Layering System (Drawing Standards) -- input by H+P --	5. Communication Protocol (Comm. protocol standard) -- input by TUD, ALL --	6. Exchange Format (Standard for data exchange)
	00100	Demonstrating the need	Client briefing: specification of functional requirements		EXPRESS XSD		IFC-REQ			SPF (1,3) ifcXML (1,3
	00200	Conception of need	Model-based development of business plan							
	00400	Conception of need	Model-based Initial Site Planning							
	00600	Conception of need	Capturing and realising clients needs		EXPRESS XSD		IFC-REQ			SPF (1,3) ifcXML (1,3
2	00300	Outline feasibility	Conceptual sketching							
2	00500	Outline feasibility	Model-based Site Planning (Capture Design Intent)		EXPRESS XSD		IFC-REQ			SPF (1,3) ifcXML (1,3
2	00700	Outline feasibility	Model-based Cost Planning (magnitude)		EXPRESS XSD		IFC-COST			SPF (1,3) ifcXML (1,3
4	00100	Outline conceptual design	Issue the building sketch		ISO-LAYER BS1192					

	Acronym	Name	Edition / Version	Year of issue	Source / Issuing Organisation	Reference / URL	Status	Functional Focus	Scope	Distribution	Lang
00	HTML	Hypertext Markup Language	4.0		W3C	www.w3.org/MarkUp	final	Document	Data Exchange/Sharing	International	Eng
00	IFC	Industry Foundation Classes	2x	2000	IAI	www.iai-international.org	final	Product	Composite content	International	Eng
205	IFC-COORD	IFC Coordination View					final	Product	Data Definition	International	Eng
210	IFC-PAS	ISO PAS 16739		2002	ISO	www.iso.org	final	Product	Data Definition	International	Eng
230	IFC-AR	IFC Architectural Design Support	2x2	2003	IAI	www.iai-international.org	draft	Product	Data Definition	International	Eng
280	IFC-REQ	IFC Requirements Capture Support	2x2	2003	IAI	www.iai-international.org	living doc	Product	Requirements	International	Eng
00	SGML	Standard Generalized Markup	ISO 8879	1986	ISO	www.w3.org/MarkUp/SGML/	final	General	Metadata Exchange/Sharing	International	Eng
410	Topic Maps	Topic Maps		2000	ISO		draft	General	Metadata Exchange/Sharing	International	Eng
00	XML	Extensible Markup Language	1.1		W3C	www.w3.org/XML	final	General	Metadata Exchange/Sharing	International	Eng
510	XSD	Extensible Markup Language	1.1	2000	W3C	www.w3.org/XML/schema	final	General	Metadata Exchange/Sharing	International	Eng

Service on standards. ProMAP

- Web engine enabling access to meaningful modelling, data-exchange standards represented in a process-oriented approach
- Direct link to accurate/structured information regarding standards
- Extensive construction process outline in processes/sub-processes
- Action identification with associated actors and roles

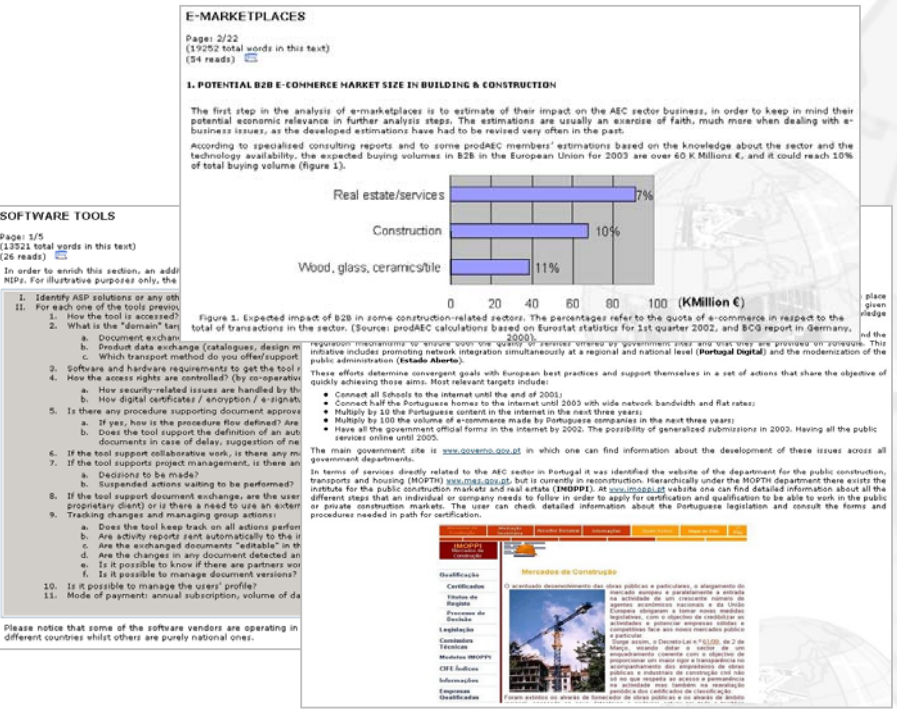
- Retrieve info concerning standards on AEC
- Reference framework describing project activities
- Aware of available standards process-oriented
- Use standard ways, not proprietary solutions
- Open path for project centred collaboration
- Identify clusters, gaps, coherencies, requirements
- Capture processes info and ICT requirements
- First step in the application development process

eBusiness

- Includes the electronic trading of physical goods and of intangibles such as information
- All the trading steps such as online marketing, ordering, payment, and support for delivery
- The electronic provision of services (after-sales support or online legal advice), electronic support for collaboration between companies (collaborative design)

e-Business AEC in Europe

- E-Marketplaces (services, modus operandi, etc)
- Software tools for e-business (capabilities, costs, providers)
- Business-to-Administration (e-public services, competitors)



E-MARKETPLACES

Page: 2/22
(19252 total words in this text)
(34 reads)

1. POTENTIAL B2B E-COMMERCE MARKET SIZE IN BUILDING & CONSTRUCTION

The first step in the analysis of e-marketplaces is to estimate of their impact on the AEC sector business, in order to keep in mind their potential economic relevance in further analysis steps. The estimations are usually an exercise of faith, much more when dealing with e-business issues, as the developed estimations have had to be revised very often in the past.

According to specialised consulting reports and to some prodAEC members' estimations based on the knowledge about the sector and the technology availability, the expected buying volumes in B2B in the European Union for 2003 are over 60 K Millions €, and it could reach 10% of total buying volume (figure 1).

Figure 1. Expected impact of B2B in some construction-related sectors. The percentages refer to the quota of e-commerce in respect to the total of transactions in the sector. (Source: prodAEC calculations based on Eurostat statistics for 1st quarter 2002, and BCG report in Germany, 2000).

SOFTWARE TOOLS

Page: 1/5
(13521 total words in this text)
(26 reads)

In order to enrich this section, an addi
NIPs. For illustrative purposes only, the

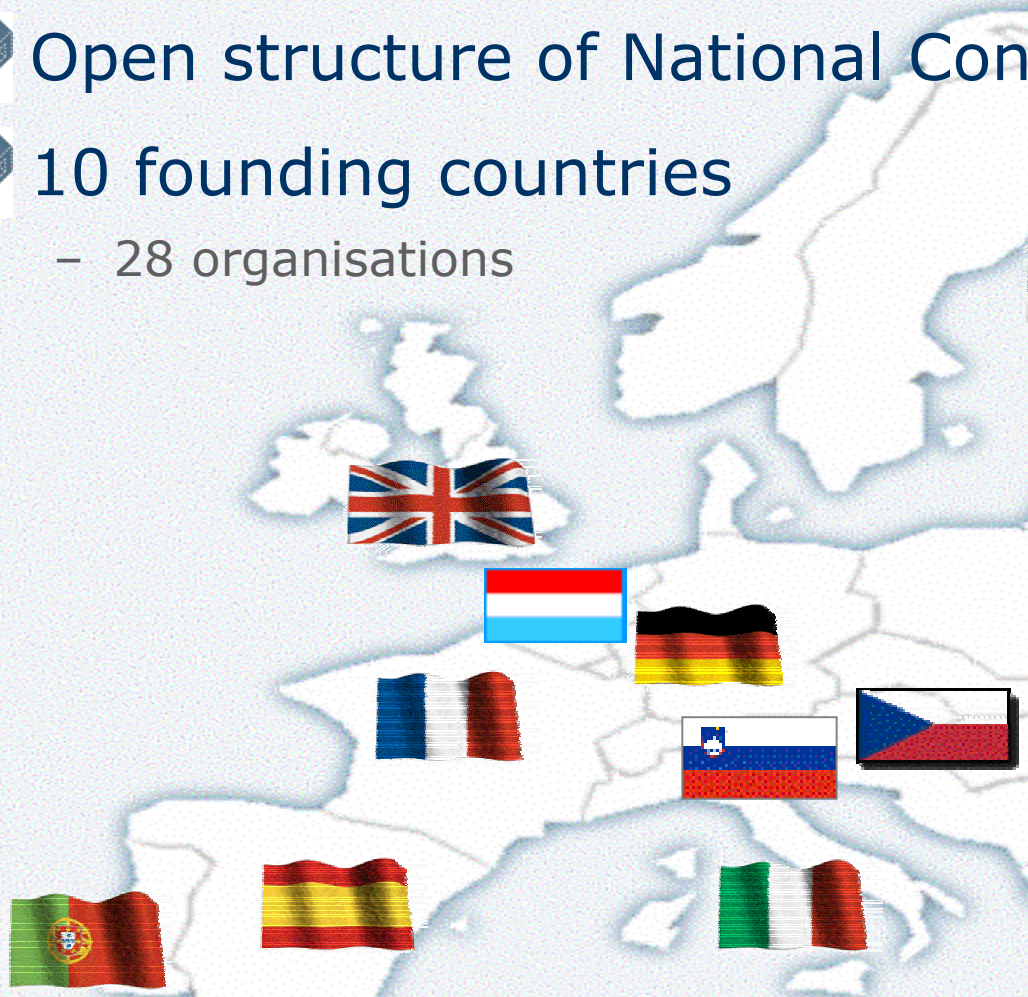
I. Identify ASP solutions or any oth
II. For each one of the tools previou
1. How the tool is accessed?
2. What is the "domain" tar
a. Document exchan
b. Product data exchange (catalogues, design m
c. Which transport method do you offer/support
3. Software and hardware requirements to get the tool r
4. How the access rights are controlled? (by co-operativ
a. How security-related issues are handled by th
b. How digital certificates / encryption / e-signatu
5. Is there any procedure supporting document approva
a. If yes, how is the procedure flow defined? Are
b. Does the tool support the definition of an aut
documents in case of delay, suggestion of ne
6. If the tool support collaborative work, is there any m
7. If the tool supports project management, is there an
a. Decisions to be made?
b. Suspended actions waiting to be performed?
8. If the tool support document exchange, are the user
proprietary client) or is there a need to use an exter
9. Tracking changes and managing group actions:
a. Does the tool keep track on all actions perfor
b. Are activity reports sent automatically to the i
c. Are the exchanged documents "editable" in th
d. Are the changes in any document detected an
e. Is it possible to know if there are partners wor
f. Is it possible to manage document versions?
10. Is it possible to manage the users' profile?
11. Mode of payment: annual subscription, volume of da

Please notice that some of the software vendors are operating in different countries whilst others are purely national ones.

- eBusiness related standards
  - Analysis of standards
  - Applicability
  - Best practice cases
  - Recomendations

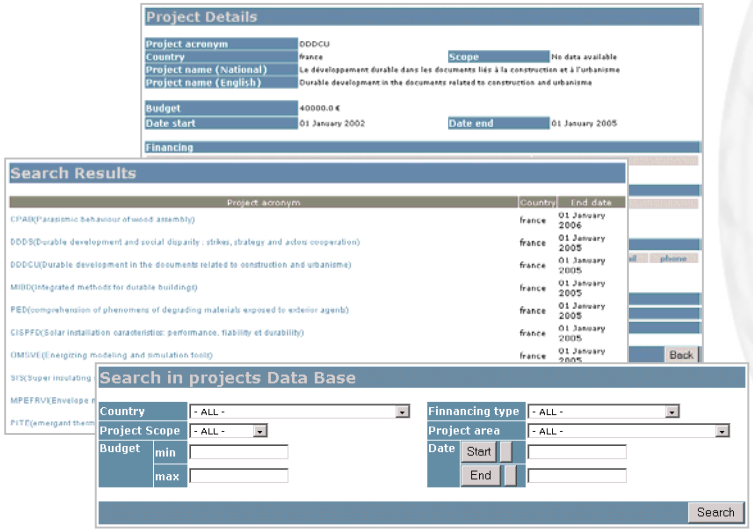
National Contact Points

- Open structure of National Contact Points
- 10 founding countries
  - 28 organisations



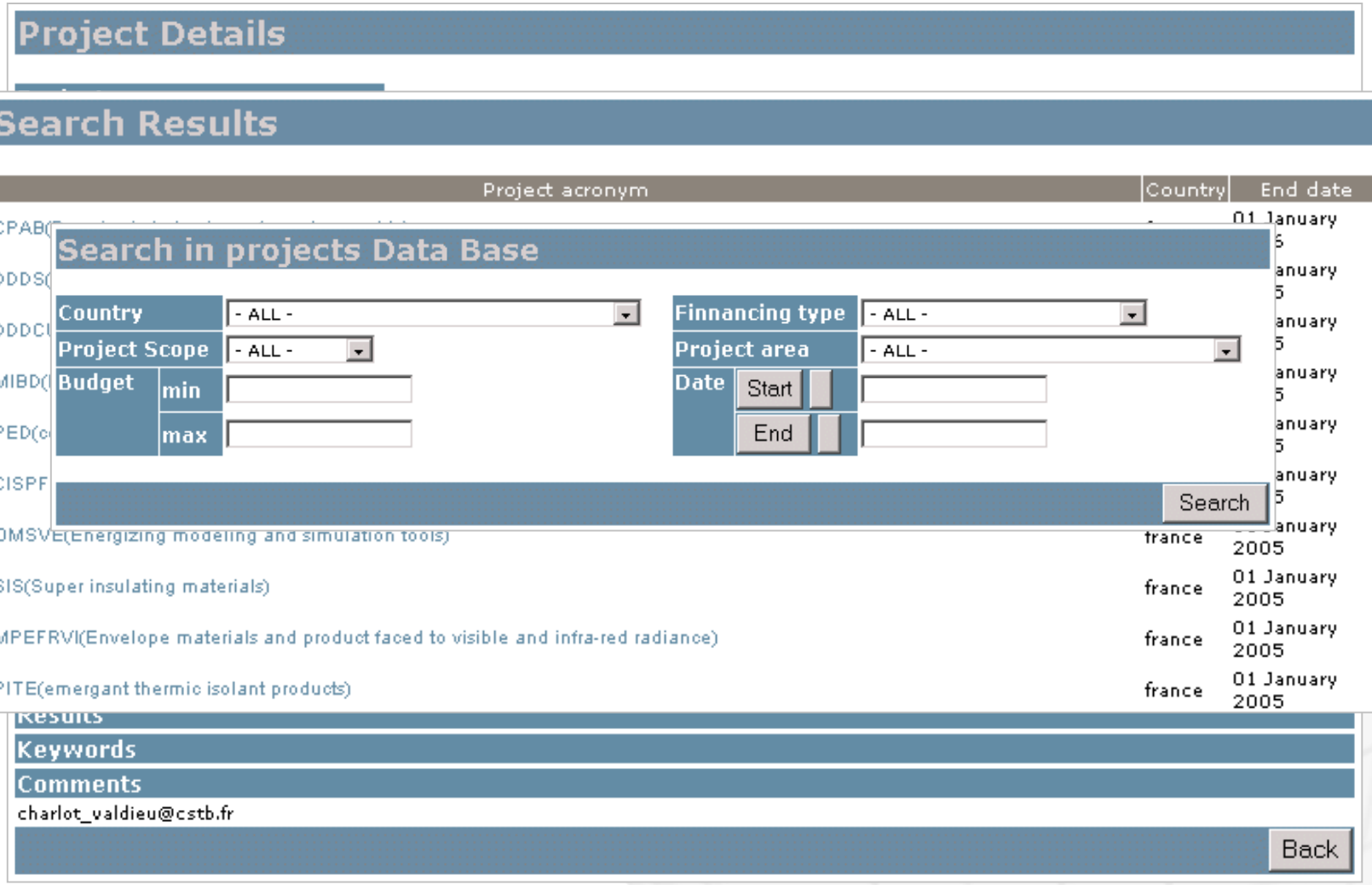
AEC-IT Projects Database

- Web based IT projects database on AEC/FM at National and European levels with sensible querying & filtering engine
- Project description, objectives, results and scope
- Scheduling facts (Project Start, Duration and Global Budget)
- Financing data (by Region, Kind of, Rate of)
- Categorisation by Area (e-Work, Legal issues, Procurement, ...)
- Partnership information (including contact information)



- State-of-the-art update information on AEC/FM IT
- Know about projects in a specific area and/or country
- Identify/contact people with experience in designated areas to share knowledge, experience and expertise
- Process data for statistical purposes: position each country against EU, retrieve the global EU picture of IT on AEC/FM and match with the world, obtain funding characteristics, etc

Web AEC-IT Projects Database



Main deliverables produced

Standards related

- Standards Analysis. Current AEC Situation
- Analysis of detected tendencies
- Standardisation Roadmap for the AEC Sector

eBusiness related

- e-Business state-of-the-art in AEC
- Analysis of e-Business standards applicability
- e-Business Best Practices in AEC

Industrial requirements related

- Achievements of Previous European Projects & Initiatives
- Requirements Analysis Report (Industrial Needs)
- Enquiry Results. (Benchmarking service)

National Contact Points

- Countries Information Report

Information Society

prodAEC Details

prodAEC

european network for Product and Data exchange, e-work and e-business in Architecture, Engineering and Construction

www.prodaec.net

- Budget: ~1 Million €
- IST 2001-32035
- Start: February 2002
- Finish: February 2004

E-COGNOS Project Technical Overview

Methodologies, tools and architecture for electronic, consistent knowledge management across projects and between enterprises in the construction sector

nformation Society Technologies

Lyon, March 2004

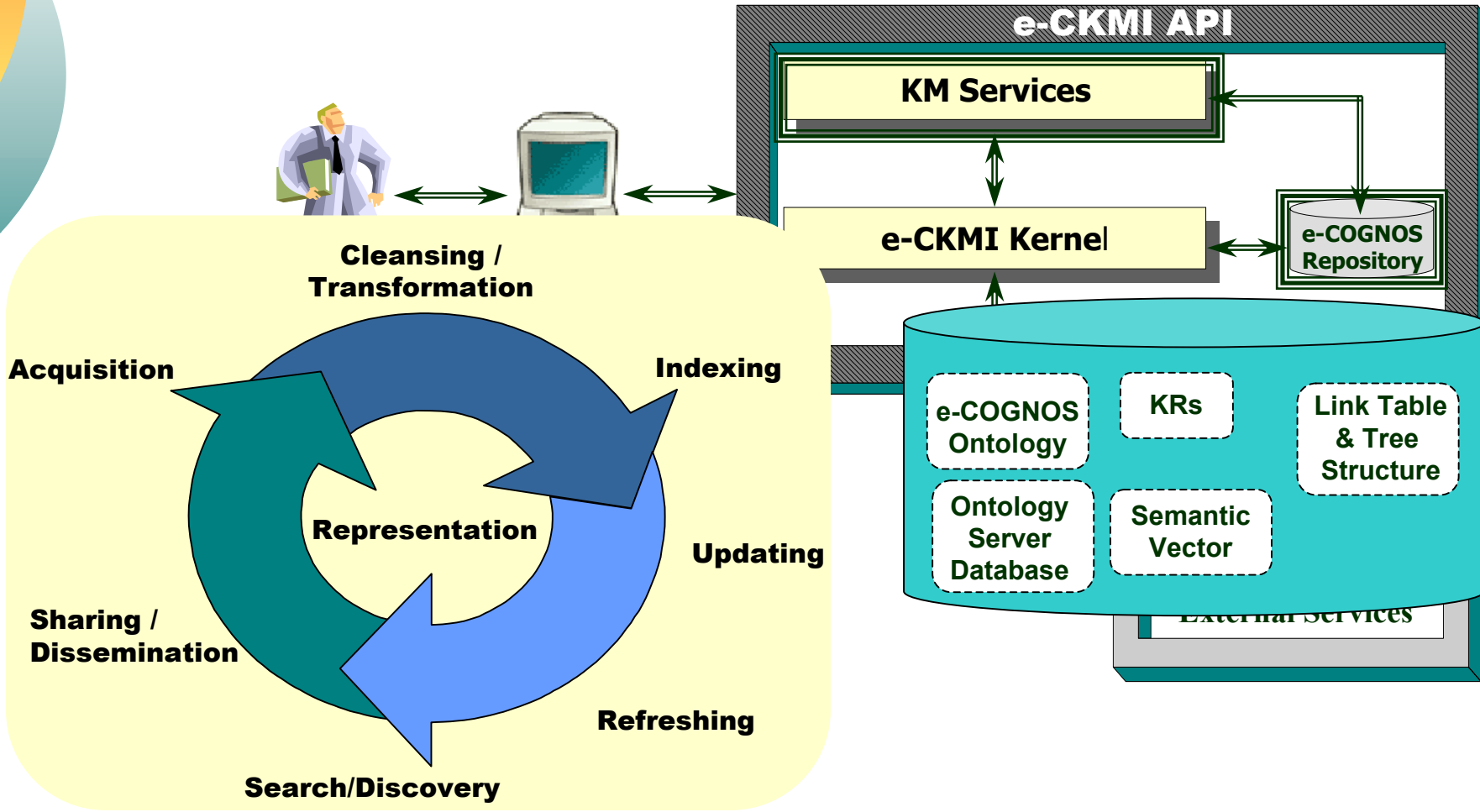
Outline

- ✓ Requirements
- ✓ The e-CKMI
- ✓ The end users Applications
- ✓ The Ontology
- ✓ The e-COSer
- ✓ Lessons Learned
- ✓ Open points

End Users' Requirements

- Approach: selection of "**Knowledge Intensive**" BPs
- Requirements identification
  - **Functional: human-centred**, easy to use, coverage, appealing, adaptive, **configurable**, rely on results/solutions already found, **flexible**, based on autonomous processes,
  - **Technical: Web-centred**, **ontology-based**, **push mechanisms**, autonomous processes, and interdependence among knowledge layers
  - **Architectural:** interoperability, **integration**, flexibility, scalability, sustainability, **heterogeneous inter-related knowledge sources**, and large knowledge sources

The e-CKMI Architecture



The e-CKMI Main Features

Capture and manage diverse organizational knowledge: documents, actors, projects, organisations, interests, user profiles

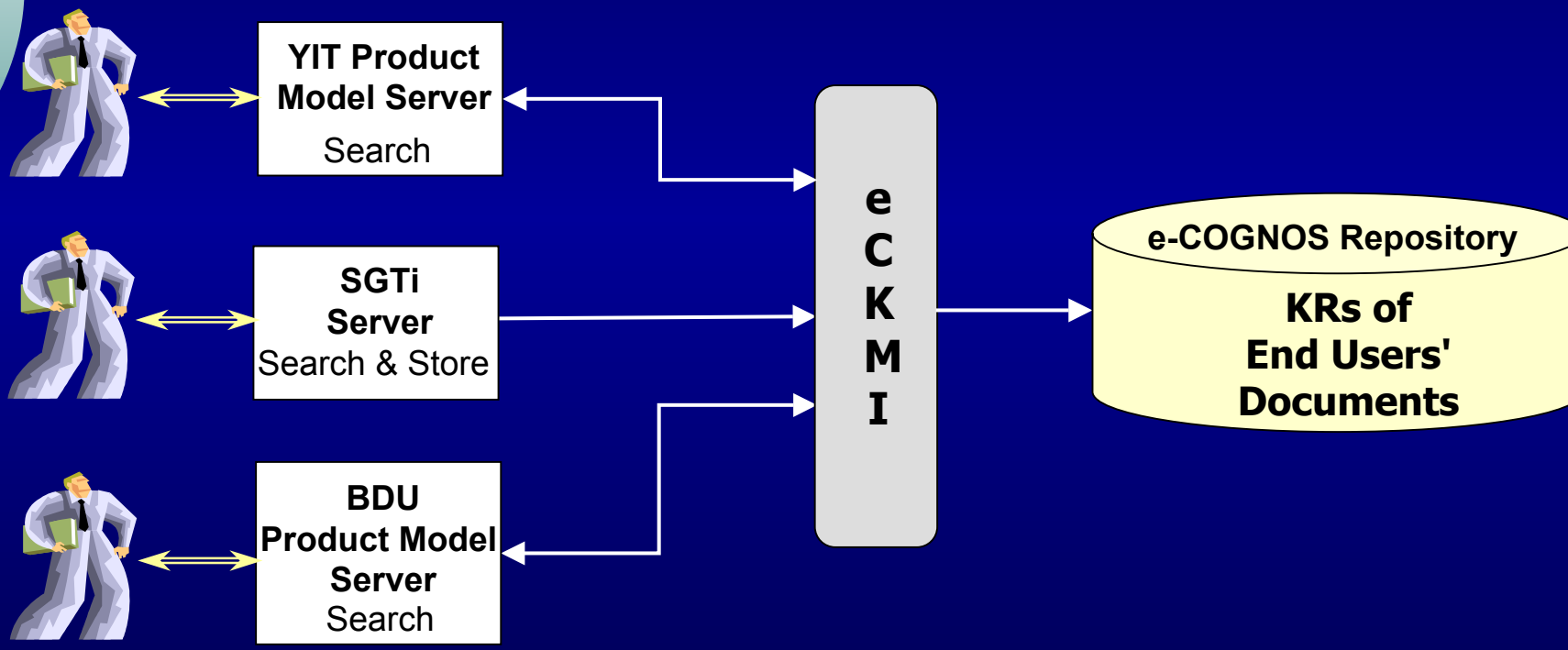
Provide support for knowledge acquisition, transformation, indexing, updating, refreshing, searching, and dissemination

"Service"-based, flexible, open framework (end-user chooses appropriate services)

Linguistic and semantic functionalities based on ontology-enabled mechanisms

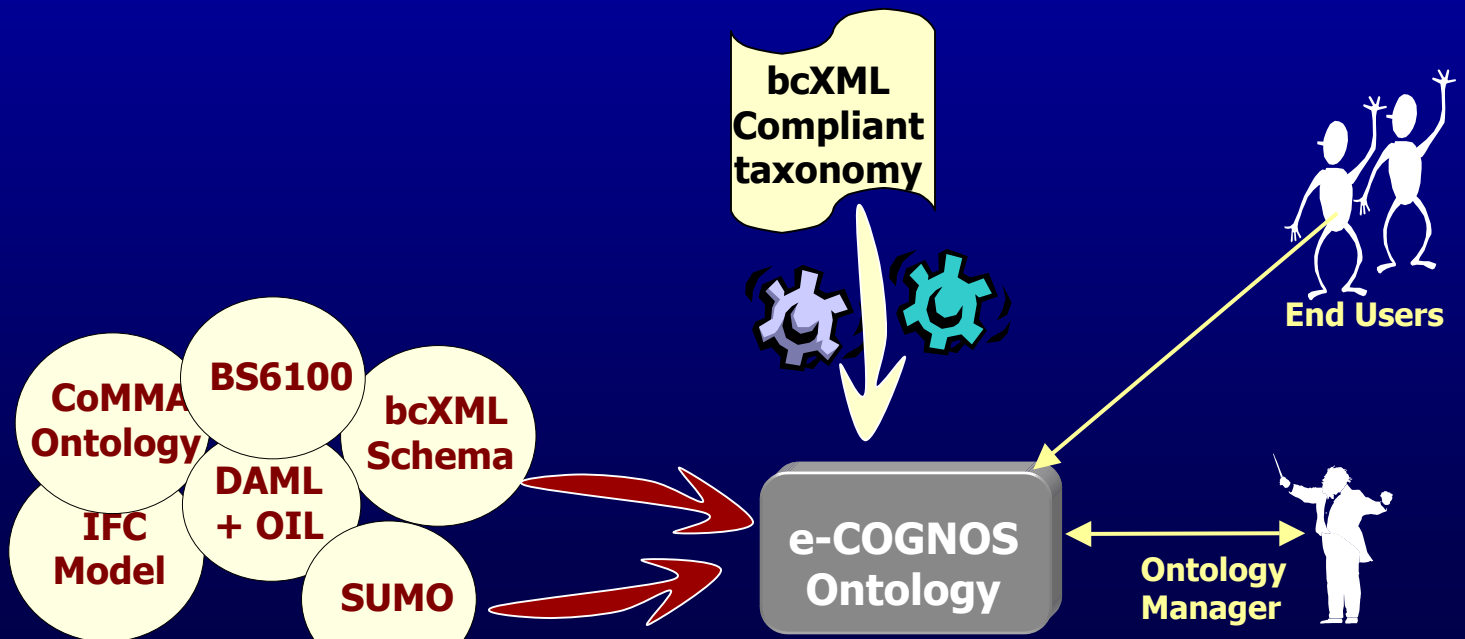
Human-centred, Web-based, configurable, API-based, ontology-based, open source

End User's applications

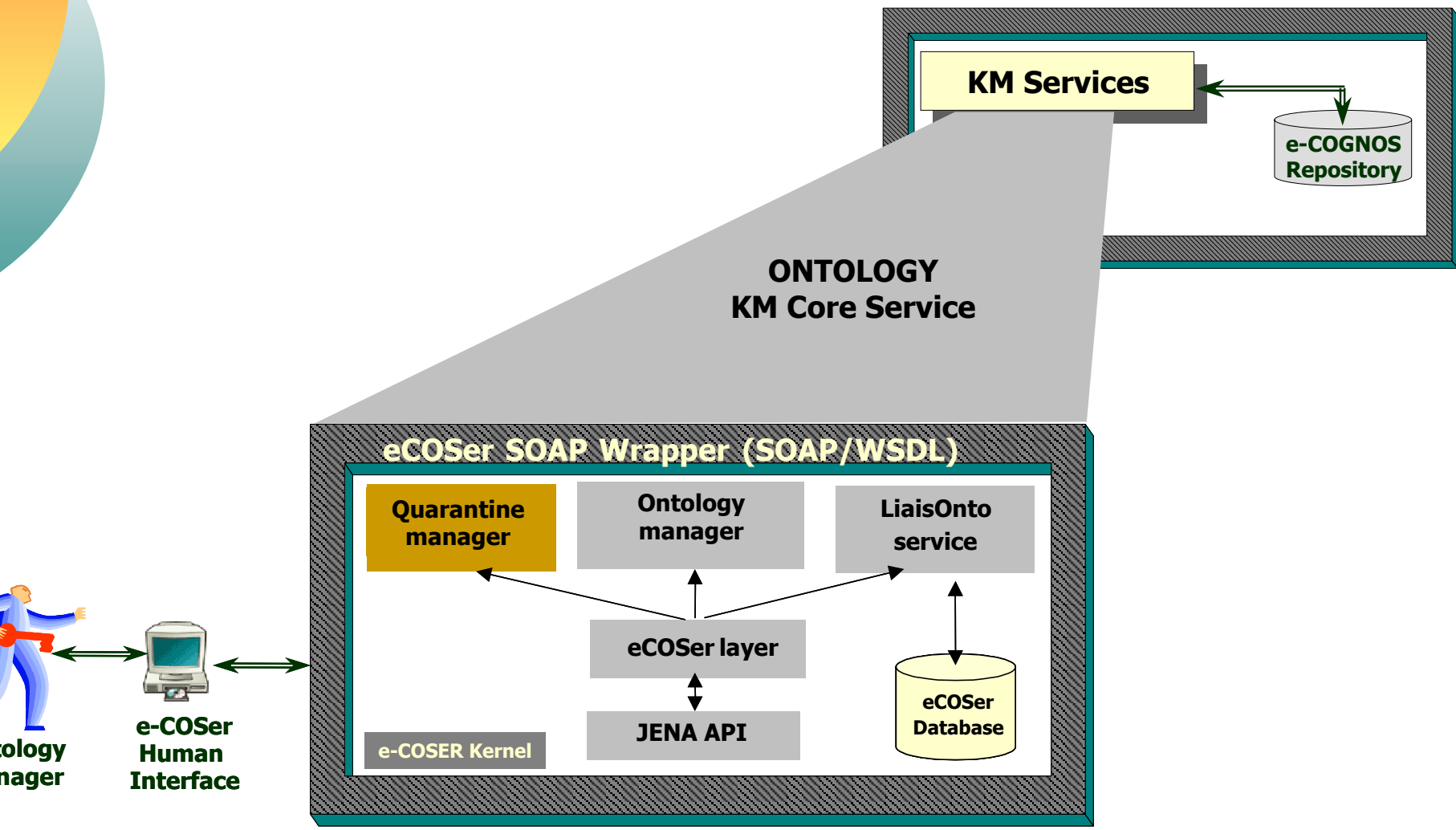


The e-COGNOS Ontology

- Sources of inspiration: IFC, bcXML, W3C, …
- Development process: iterative approach
- Current status: ± 15000 concepts
- Growing mechanism: bcXML based



The e-COSer Architecture

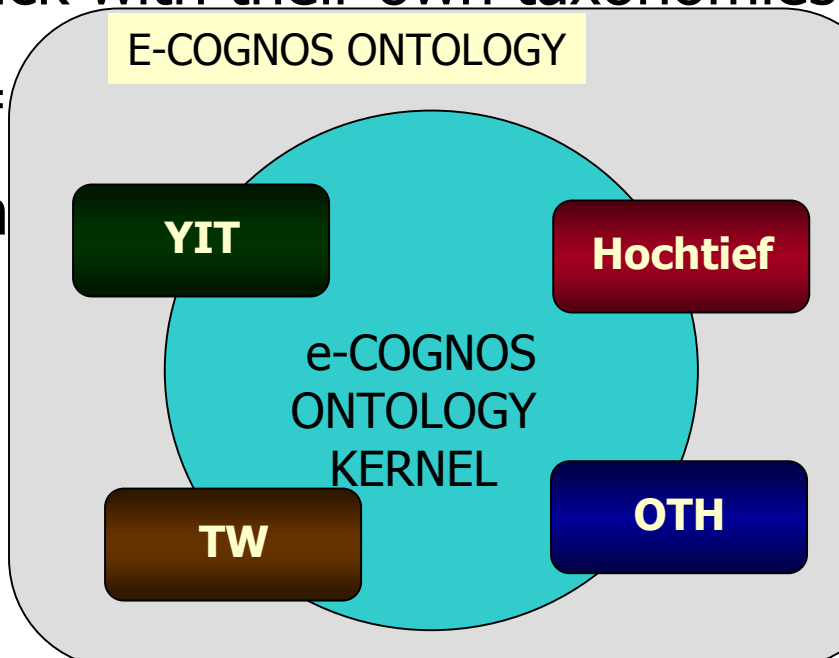


Lessons Learned - e-CKMI (1/3)

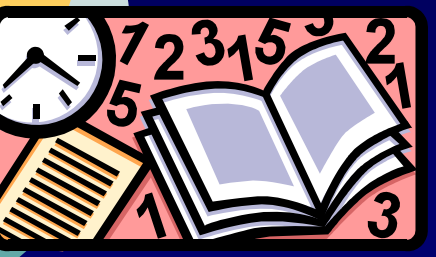
- Prototype as early as possible – exposure to new functionalities generates new requirements
- User Interface: not really required in the context of e-COGNOS but necessary to promote the e-CKMI functionalities
- Innovative visualization methods are required – very difficult to display the spectrum of knowledge in an accessible, meanningful way
- While organizations desire the benefits of KM, they remain protective of their knowledge assets – all end users have prototyped the e-CKMI within their corporate firewalls
- Must remain flexible and adaptable – the KM world is a rapidly changing environment

Lessons Learned - Ontology (2/3)

- Ontology Editor DAML+OIL compliant
- Bigger ontology = better ontology
- Standards: good idea, interesting approach, but ...
- End users prefere to stick with their own taxonomies
- Ontological indexes >=
- The real challenge: con
- Current approach



Lessons Learned - Ontology (3/3)



- Ordinary users
  - Ontology: they don't want to hear about it! However ...
  - It would be great to have richer indexes
  - They have to be convinced that the ontology can really help them
- Advanced users: willing to do more in order to get more
- The "poor" Ontology manager

Open Points

- Visualisation will allow the development of new KM possibilities
- Knowledge sharing culture – have organizations the confidence to open their knowledge 'doors'?
  - Forge tighter links with the Semantic Web initiative
- Extend the e-COSer functionalties to support
  - Capture of implicitly defined knowledge: Inference Rules, semantically structured KRs
  - Ontology: Migrate to OWL

FUNSIEC

Feasibility study for an **UN**ified

Semantic **I**nfrastructure in the

European **C**onstruction sector

Content

Outline

1. **Objectives**
2. **Results & Organisation**
3. **Framework**
4. **Deliverables**
5. **General Information**

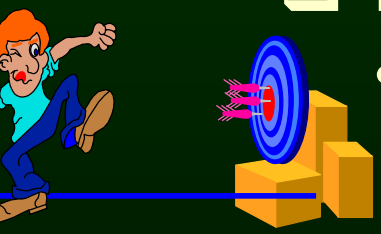
1. Objectives (1/2)

Study the feasibility to build an **O**pen **S**emantic **I**nfrastructure for **E**uropean **C**onstruction **S**ector (**OSIECS**) to support the development of **e-services**

OSIECS

- Semantic and linguistic e-resources devoted to the construction sector
- Exploit public results produced by international initiatives and European projects

1. Objectives (2/2)

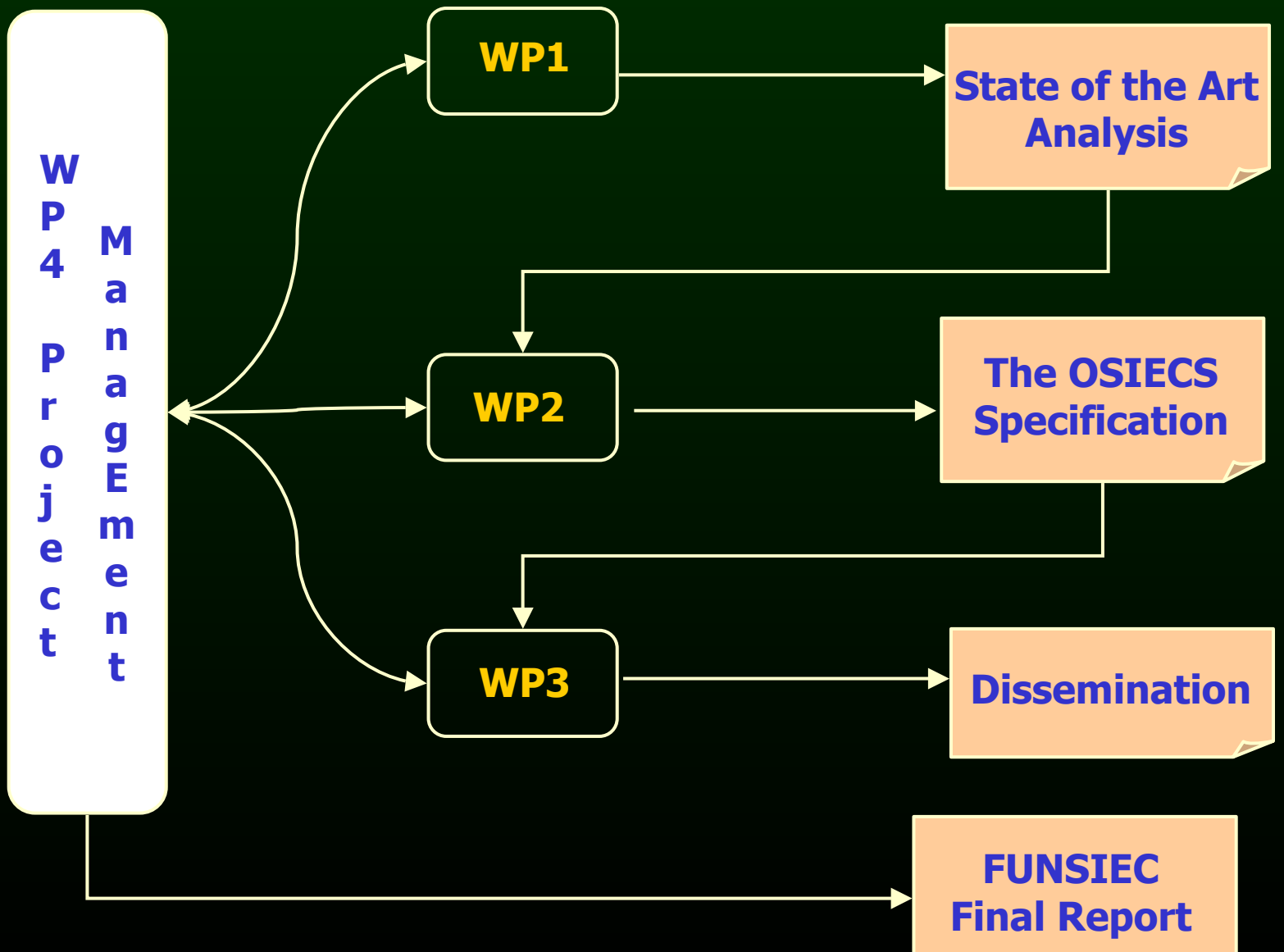


FUNSIEC specific goals

- Establish a technical framework that allows to gather **semantic and linguistic e-resources** to be used by **e-content providers** and **e-service suppliers** operating in the construction sector
- Define guidelines for **partnerships** that allow the creation, evolution and maintenance of OSIECS and the semantic resources
- Propose an **implementation plan** to help the adoption of OSIECS within the European construction sector
- Contribute to the establishment of European standards (including reference linguistic resources) for construction while allowing the preservation of language diversity in Europe
- Identify and characterize the **e-services** to be developed by e-service providers aiming at to capitalise the benefits of the OSIECS

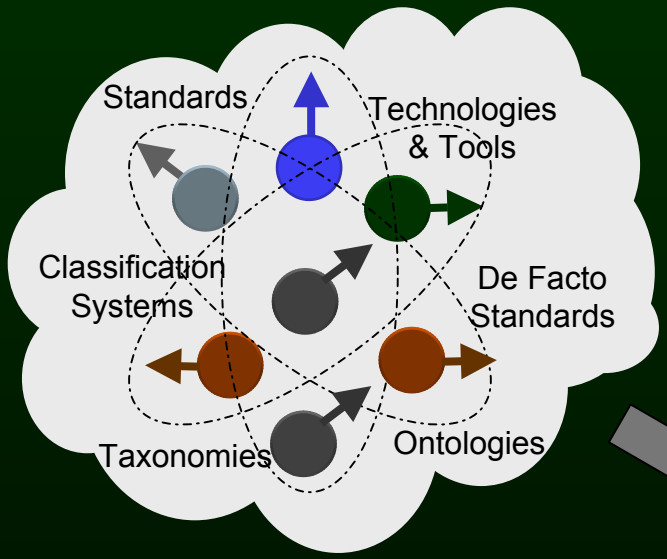
Content

2. Results & Organisation



Content

3. FUNSIEC Framework (1/2)



FUNSIEC

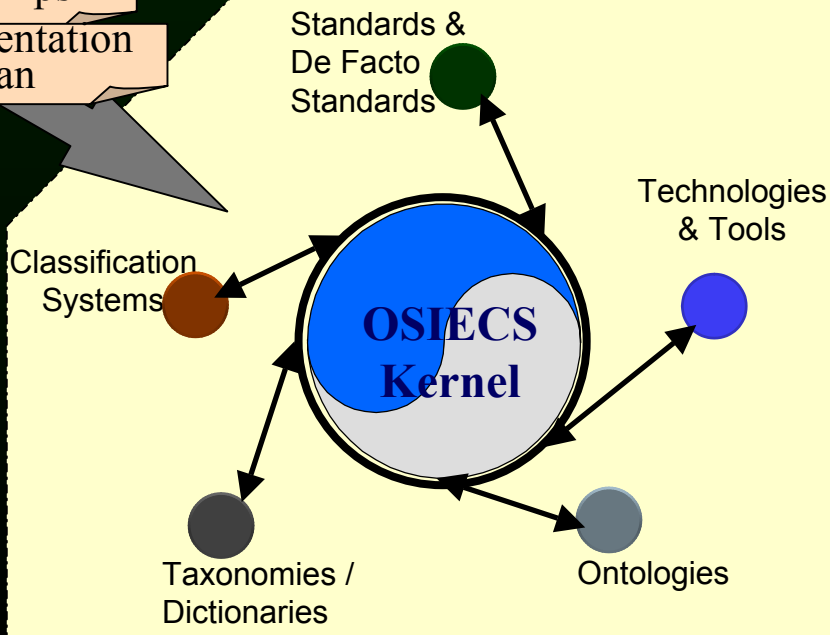
State of the art

E-services

Partnerships

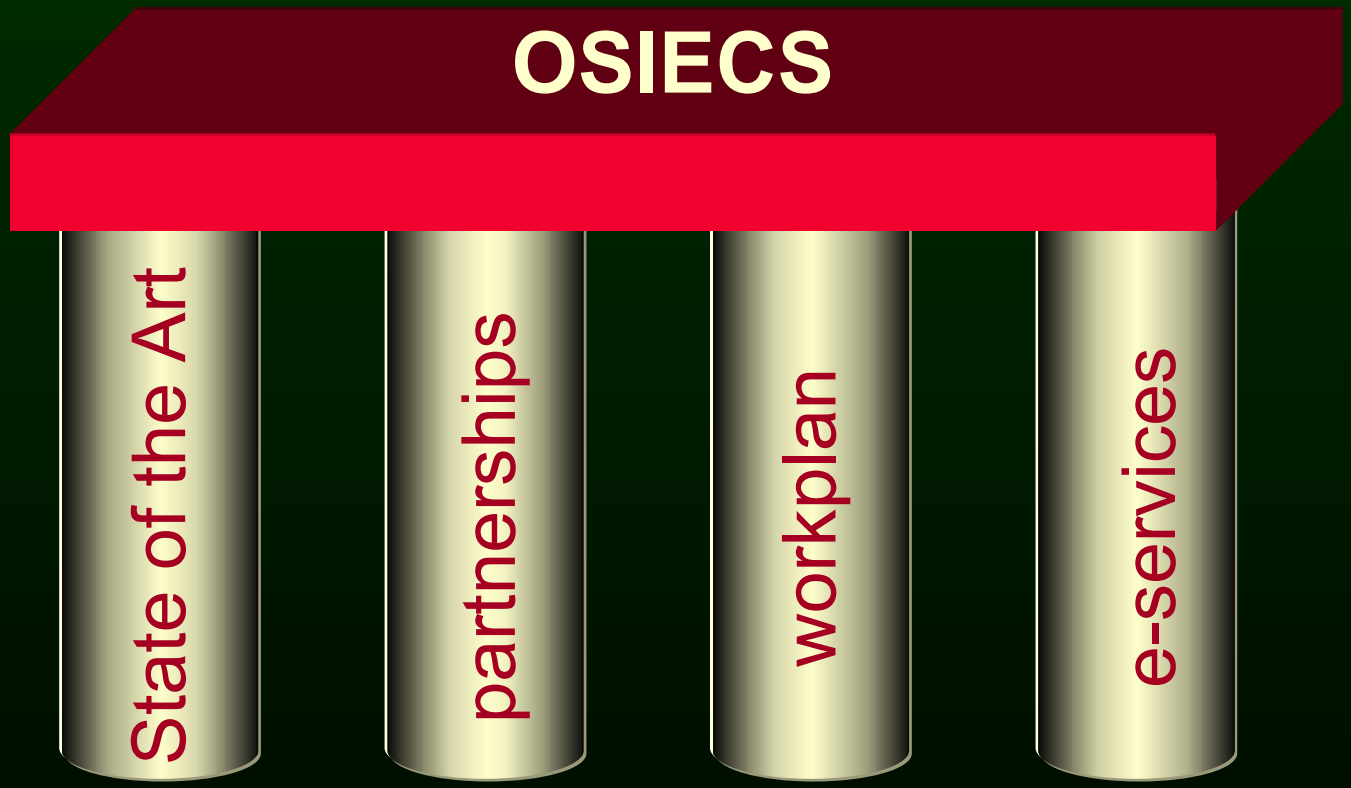
Implementation Plan

OSIECS



Content

3. FUNSIEC Framework (2/2)



Partnerships: identification of the more representative organisations in Europe (skills / complementarity) that should work together in order to produce and deploy OSIECS

Workplan: the definition of the various actions required to foment the cooperation among key institutions from Europe

E-services: offered by the existing or to be developed (preferable freeware)

Content

4. Deliverables

	Deliverable title	Milestone	Dissemination level
D1.1	State of the art analysis	M4	Public
D2.1	The OSIECS Infrastructure	M8, M12	Public
D2.2	OSIECS Infrastructure – Assessment and validation	M12	Public
D3.1	FUNSIEC Web Site	M3	Public
D3.2	Dissemination, Exploitation and Business Strategy Plan	M12	Public
D4.1	Project Presentation	M3	Public
D4.2	Periodic Progress reports (PPR)	M6	Public
D4.3	Final Report	M12	Public
D4.4	Public Annual Report	M12	Public

Content

5. General Information

- Consortium

- Associated Partner: Fraunhofer Information Centre for Regional Planning and BuildingConstruction (IRB)
  - Information about market & semantic resources contruction-oriented in Germany
- Project Duration: 12 months
- Budget: 199 781€
- Focus: Semantic Resources web-based, Construction-oriented
- Contact
  - Dr. Celson Lima, project coordinator
  - Email: celson.lima@cstb.fr