



---

# European practices of Research-Business Cooperation: RBC

*Ricardo Goncalves, UNINOVA-Portugal: rg@uninova.pt*

The European Day of the Entrepreneur

*Fostering economic growth through innovations and technology transfer*

*30 October 2008, Sofia - Bulgaria*

UNINOVA

INSTITUTO DE DESENVOLVIMENTO DE NOVAS TECNOLOGIAS



*“To pursue scientific research, technical development, high-level training and the creation of new technological innovation centres and small size industries.”*

# UNINOVA

---

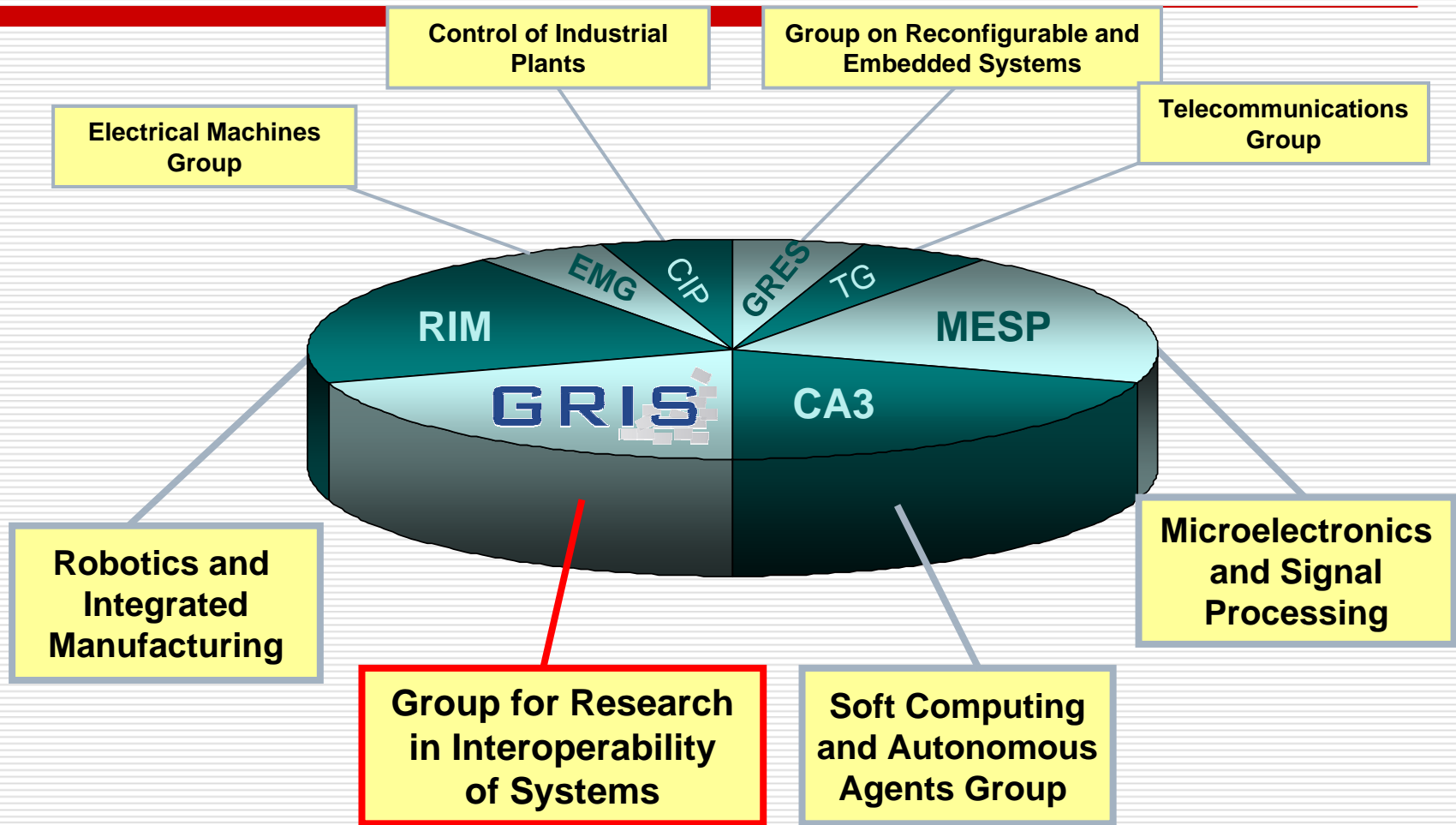
- UNINOVA is a **private multidisciplinary, independent, non-profit research institute** born of a partnership between academia (public) and private institutions.
- UNINOVA's motto is to **pursue scientific research, technical development and provide high-level training.**
- UNINOVA composed of several Centres of Excellence focused on specific scientific areas related to their core competencies, e.g.
  - **Center for Technology and Systems (CTS/CRI)**, Centre of Excellence in Microelectronics Optoelectronics and Processes (CEMOP), etc

# UNINOVA - Raison d'être

---

- ❑ Promote scientific and technological development in the many areas of expertise exploited by the organization;
- ❑ Promote collaboration with researchers of national and international institutions through long-term partnerships;
- ❑ Promote young researchers advanced education and research experience through PhD, MSc theses and participation in the research group's activities;
- ❑ Promote technology transfer to industry and services segments either directly or by creating spin-offs;
- ❑ Promote dissemination of scientific results through a sustainable and active policy of publications, organization of scientific events, etc;
- ❑ Promote internal cross-cooperation in research groups through joint activities (projects, co-supervising).

# UNINOVA-CTS/CRI Research Groups



The UNINOVA-GRIS experience

---

# European practices of Research-Business Cooperation: RBC

The European Day of the Entrepreneur

*Fostering economic growth through innovations and technology transfer*

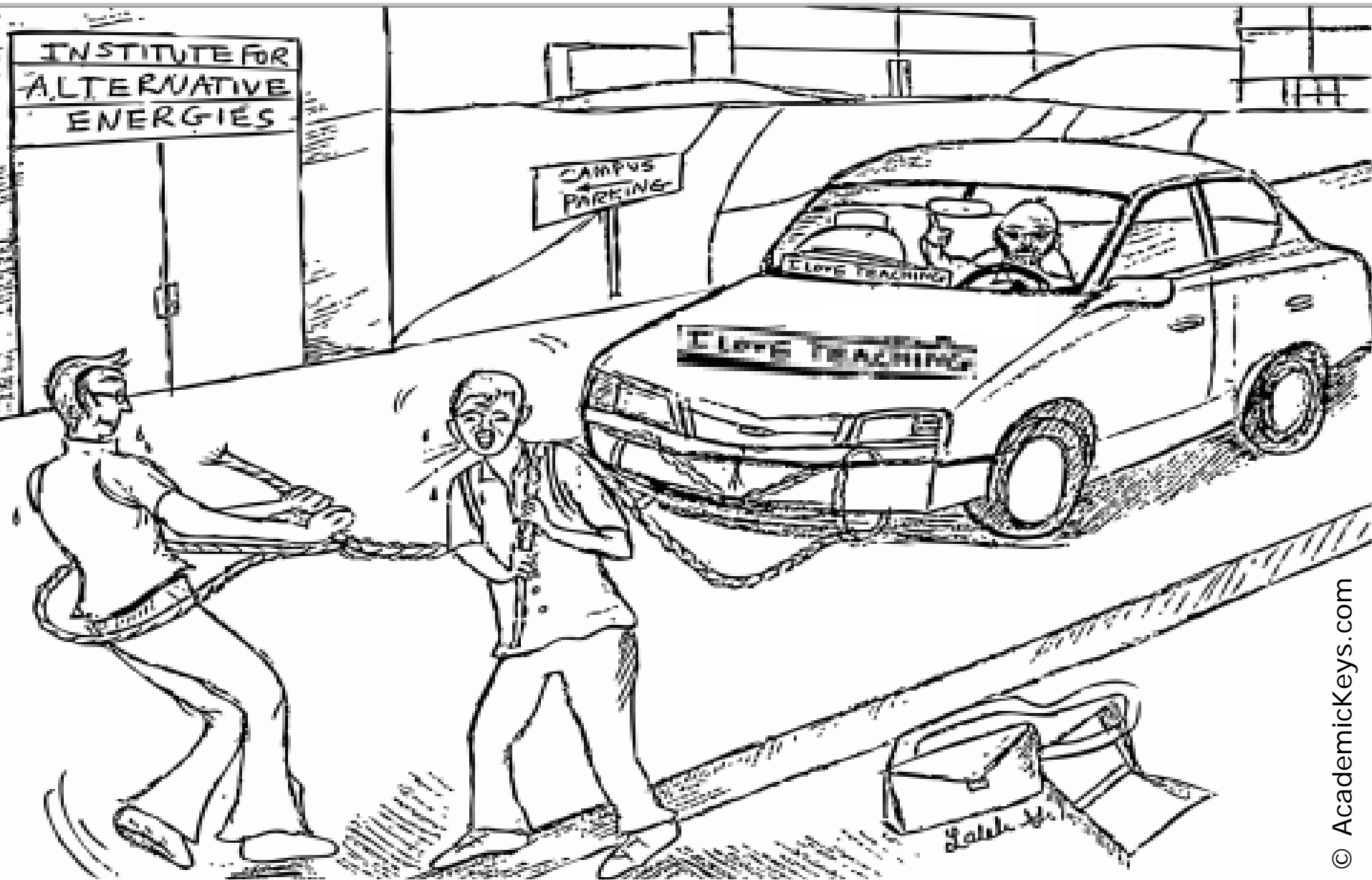
# European practices of research-business cooperation

---

---

"Graduate students are trained for careers in alternative energies"

# European practices of research-business cooperation



"Graduate students are trained for careers in alternative energies"



# Foundation for our research

---

## Mission:

Contribute to enterprises seamlessly interoperate with others

- throughout research development of focal areas
- Remove barriers to interoperability, fostering a new networked business culture
- Transfer and apply the research results in industrial sectors

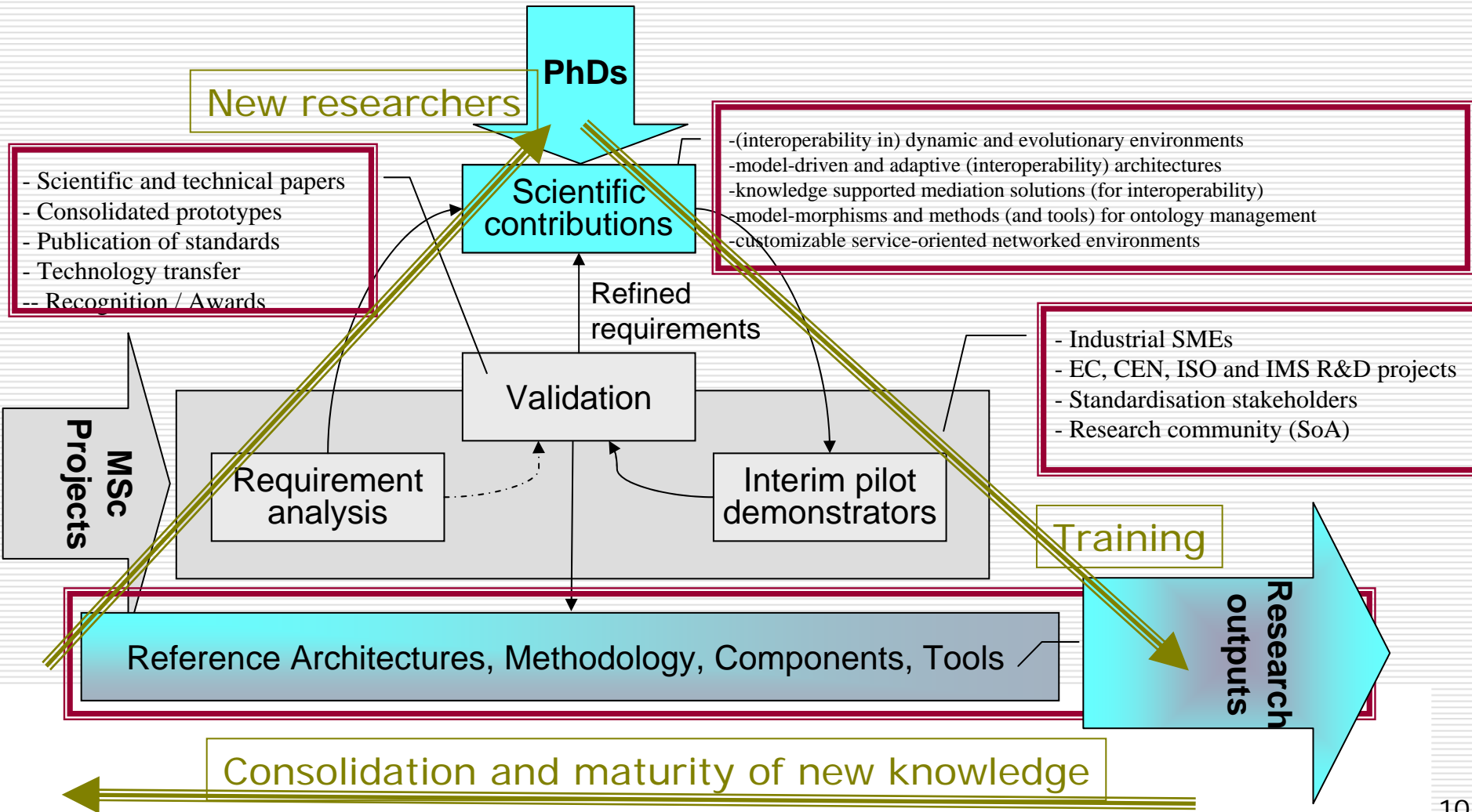
## Motto:

*Sustained by a proper (scientific-based) methodology as a strategy towards flawlessly industrial networked environments, the reorganization of existent standard application protocols, knowledge representation and open platforms in modular meta-levels shall permit enterprises to seamlessly interoperate with others*

## Vision:

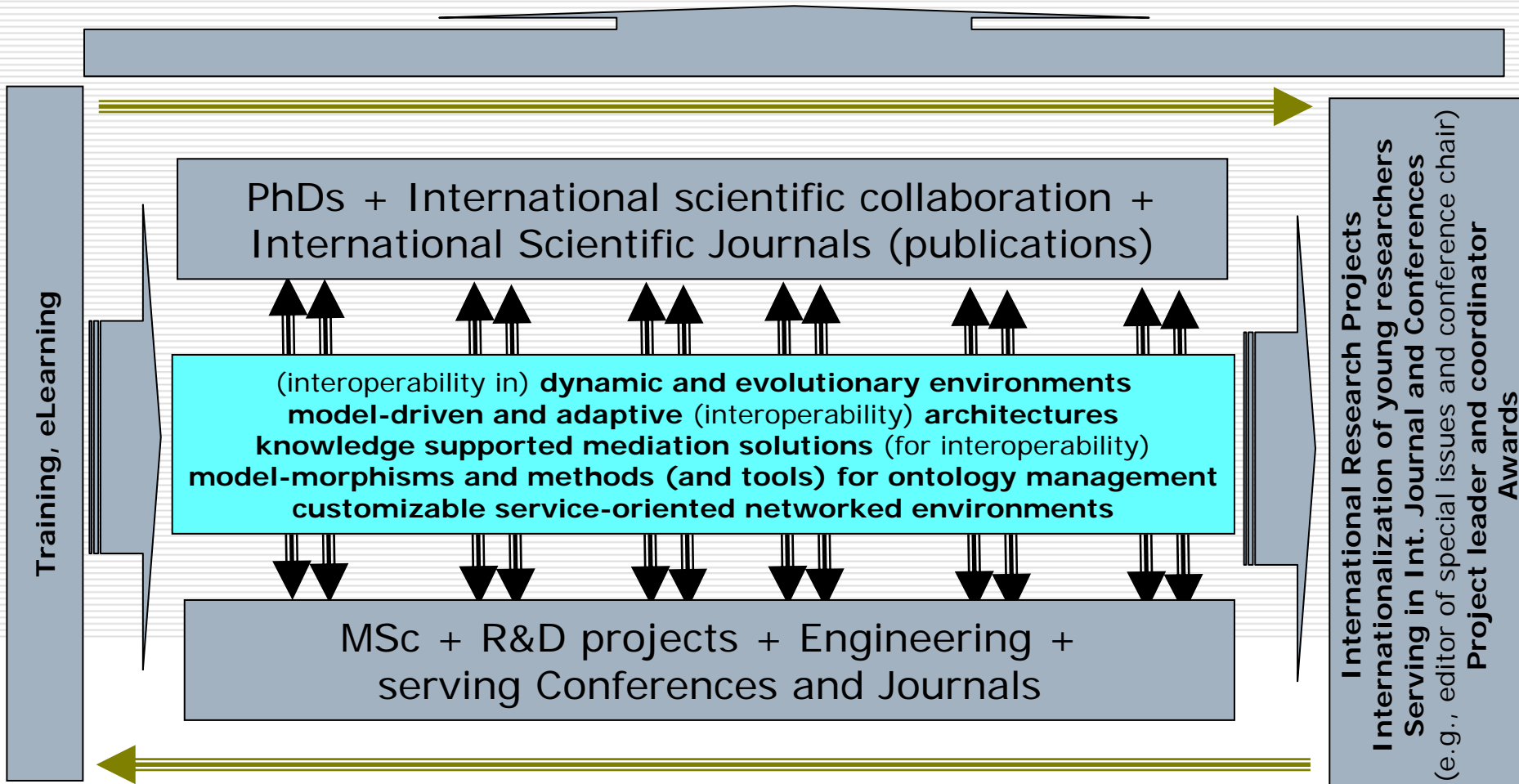
Enterprises will be able to seamlessly interoperate with others

# Roadmap for research and assessment



# Sustainability of contributions

Open Access: [oa.uninova.pt](http://oa.uninova.pt)



# Research choice in view of current trends at the international scene

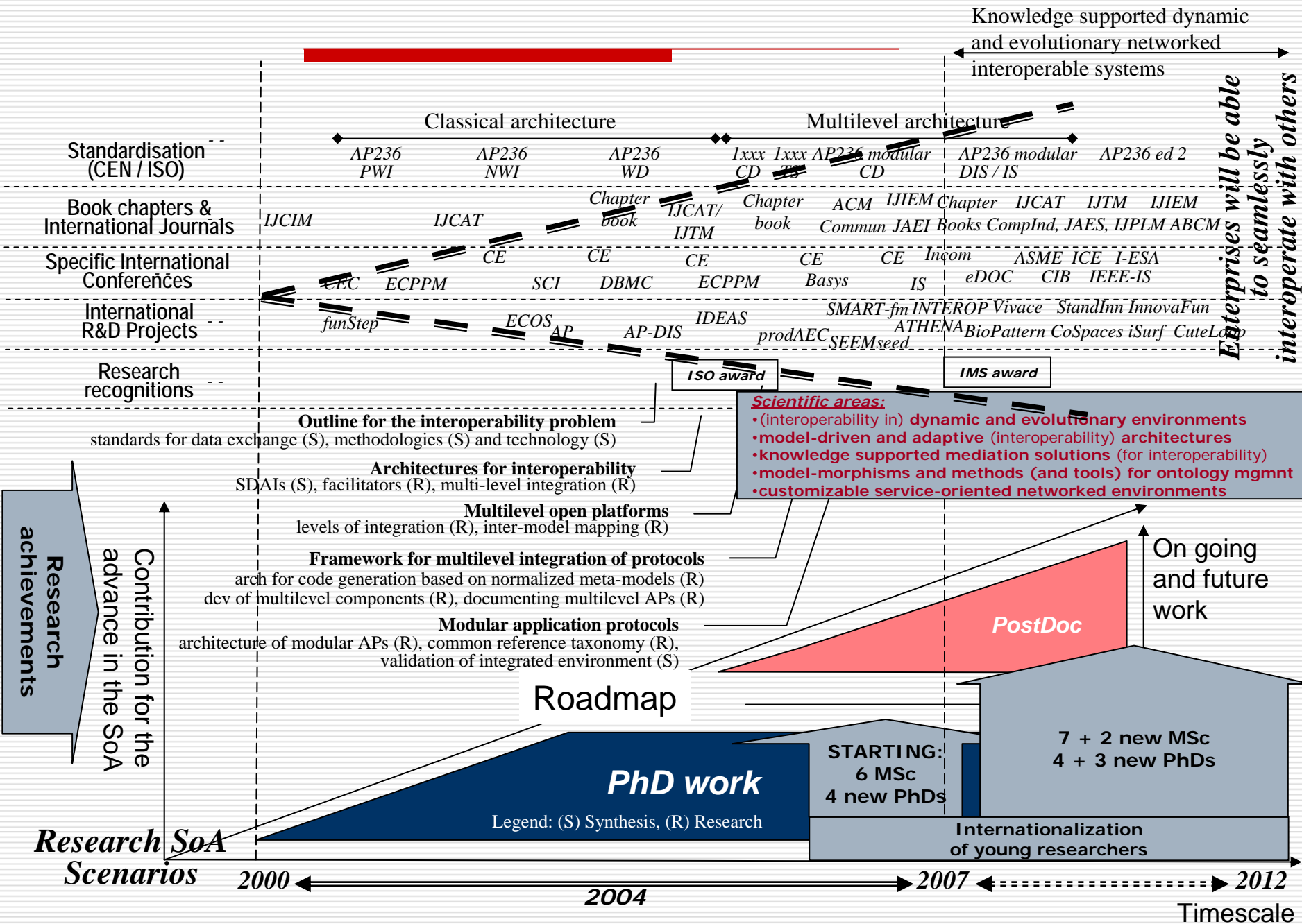
---

- Systems complexity
  - (interoperability in) **dynamic and evolutionary environments**
  - **knowledge supported mediation solutions** (for interoperability)
  
- Networking and modelling
  - **model-driven and adaptive** (interoperability) **architectures**
  - **model-morphisms and methods** (and tools) **for ontology management**
  
- Web-based services
  - **customizable service-oriented networked environments**

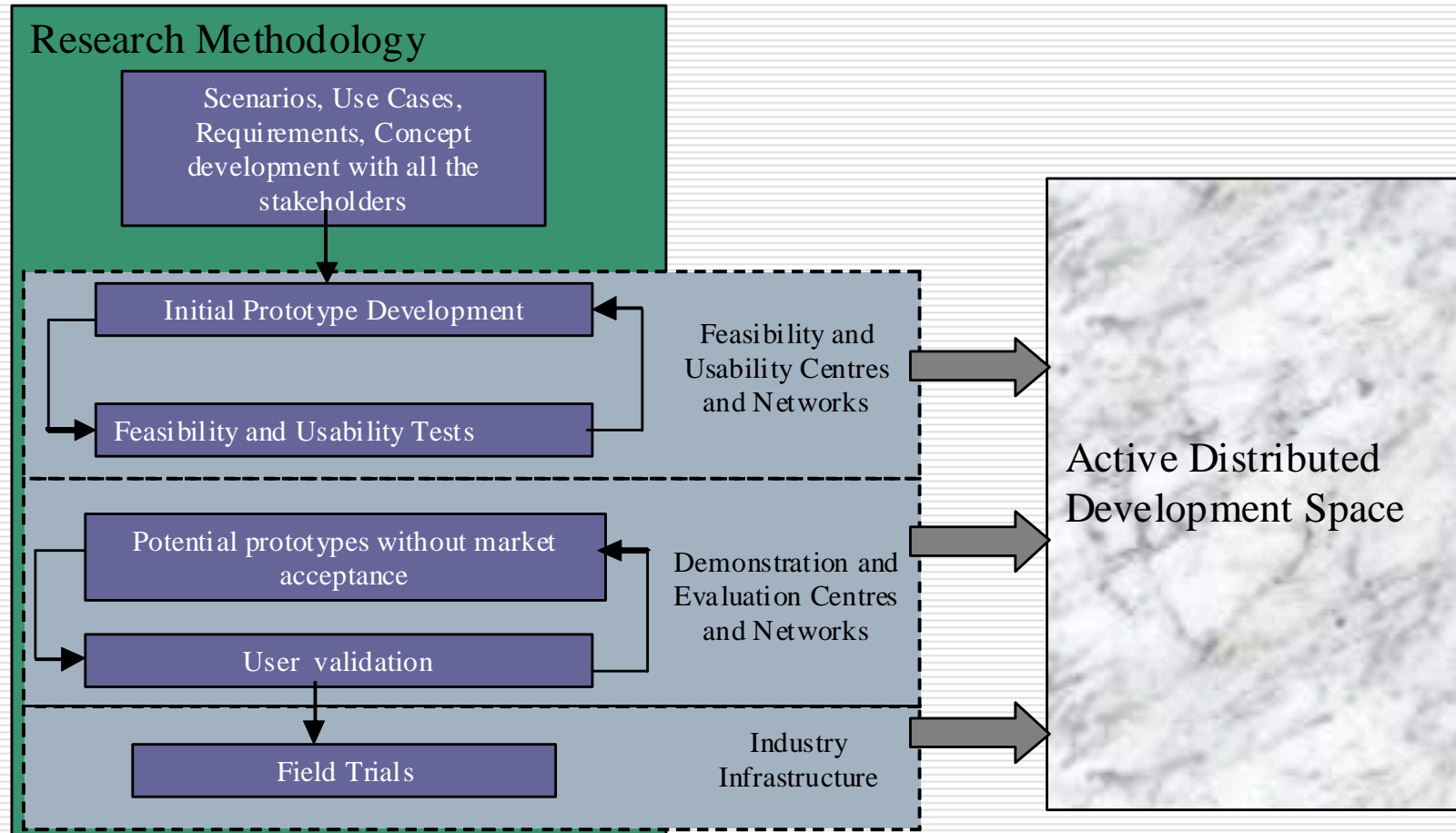
# Training of young researchers

---

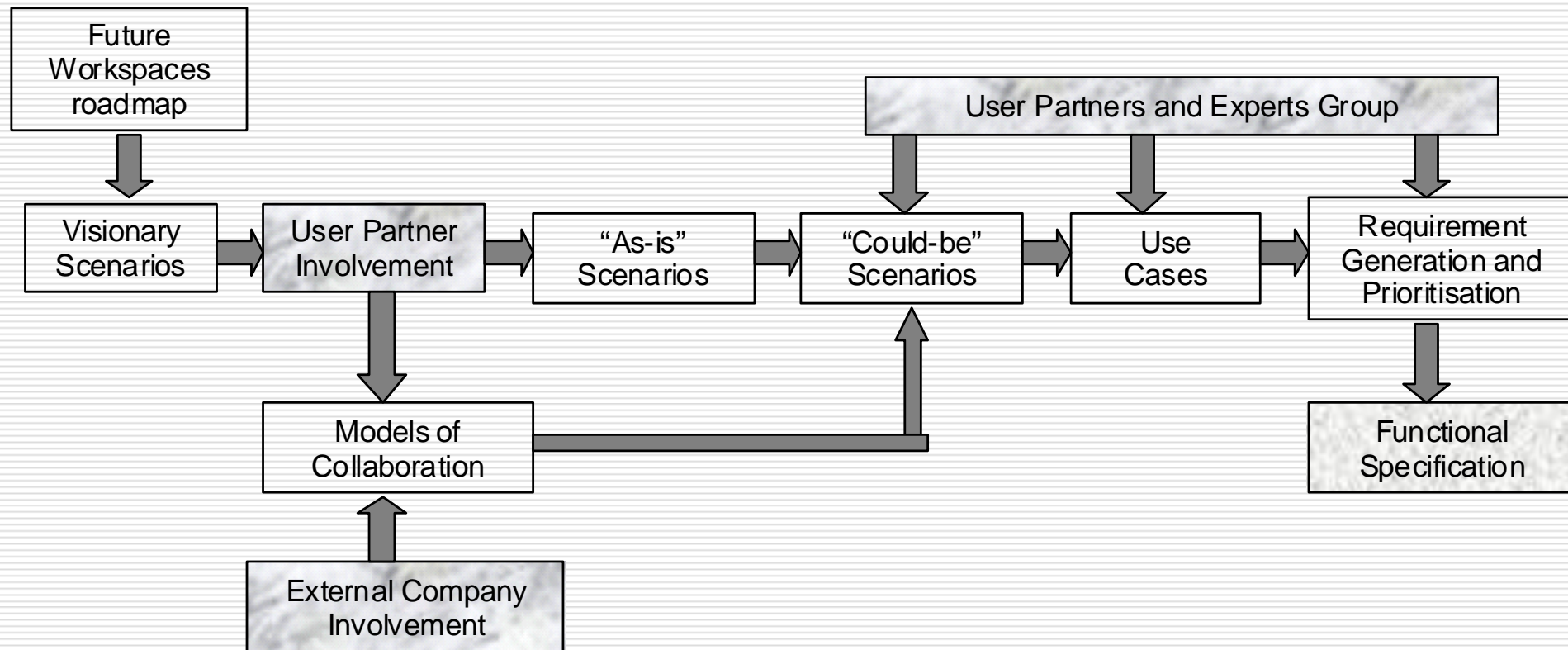
- PhDs and MSc students
  - PhDs students and MSc students
  - Collaborators/post-graduation students
  
- Involvement of young researchers
  - Project meetings, travelling, deliverables, international meetings, contributing to research papers, scholarships, training of young researchers
  - Founding focused on training young researchers (scholarships, travelling, equipment, etc.)
  
- Participation in graduate and post-graduate programmes
  - International School on Interoperability, Doctoral conferences
    - 60 international students enrolled, 30 national students enrolled
  - Interoperability training curriculum
  - European MSc in IT for construction, European MSc/PhD for Interoperability
    - eLearning, virtual classroom based
  
- Development of traditional and eLearning courses (Moodle, Blackboard)



# Living Lab Infrastructure within engineering sectors



# Methods for capturing UR (UserRequirements)





# Stages to move forward

---

- **Stage 1**
  - Raising enthusiasm and creativity through use of visionary scenarios and stories
- **Stage 2**
  - User Partner Involvement
- **Stage 3**
  - Development of structured “as-is” scenarios for current (and desired) collaborative engineering
- **Stage 4**
  - Adaptation of “as-is” into “could-be” scenarios
- **Stage 5**
  - Generation of Use Cases
- **Stage 6**
  - Detailed User Requirements Production and Prioritisation
- **Stage 7**
  - System Specification
- **Stage 8**
  - initiation of CoSpaces Living Lab Infrastructure

# A case study

---

# SMEs: a challenge

---

- SME present a major economic driving force.
- However each SME cannot compete with large enterprises on equal basis.
  - Alone SMEs find it difficult to exploit market opportunities that exceed their production capacity or ability of some sort.
  - In an global networked business environment, organizations need to be able to dynamically adapt in order to take advantage of market opportunities.
- In particular, SMEs need to be able to establish (intelligent) collaborative activities
  - Principally with others, i.e., externaly
  - Willing to be able to compete with big enterprises.
- Challenge is on presenting SMEs with a framework that solves integration issues while facing the major concerns of SMEs when taking emerging technologies!

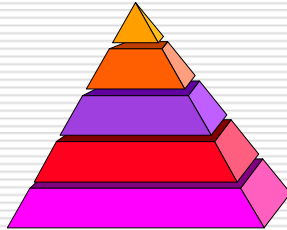
# SMEs: motivation on this research area

---

- ❑ Reduction of processes' error rate thus costs
- ❑ Optimize processes from internal integration
- ❑ Better customer service and support
- ❑ Homogenize business methods and services
- ❑ Total control of own product and business data
- ❑ Explore new markets through global integration
- ❑ Widen collaboration for exploring opportunities
- ❑ "Implement once, conduct business with all!"

# Automotive / Aircraft industry

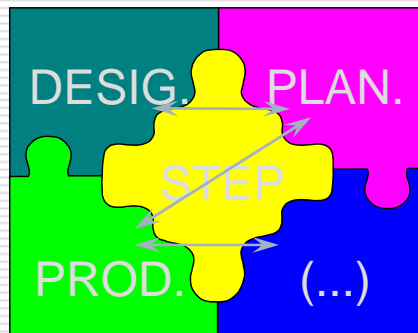
PRODUCT RANGE



PARTS RANGE

SOME COMPANIES, WITH THOUSANDS OF EMPLOYEES EACH ONE

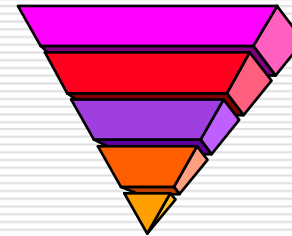
PRIORITARY PROBLEM:



INTERNAL INTEGRATION  
DATA SHARING

# Furniture industry

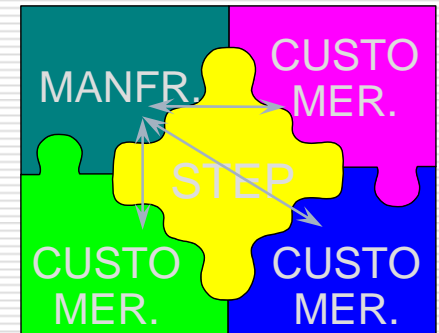
PRODUCT RANGE



PARTS RANGE

THOUSANDS OF COMPANIES, WITH SOME EMPLOYEES EACH ONE !

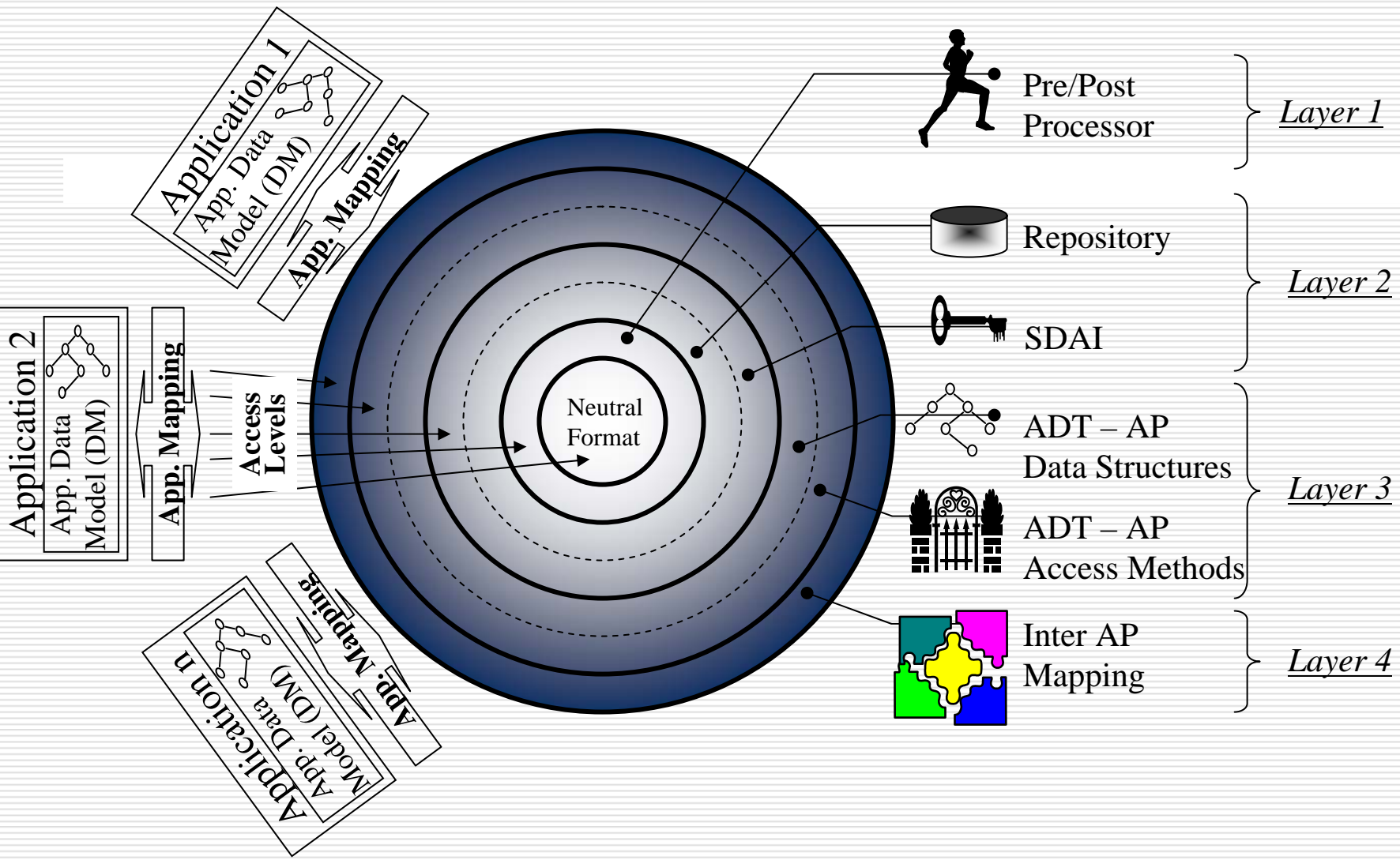
PRIORITARY PROBLEM:



EXTERNAL INTEGRATION  
DATA EXCHANGE

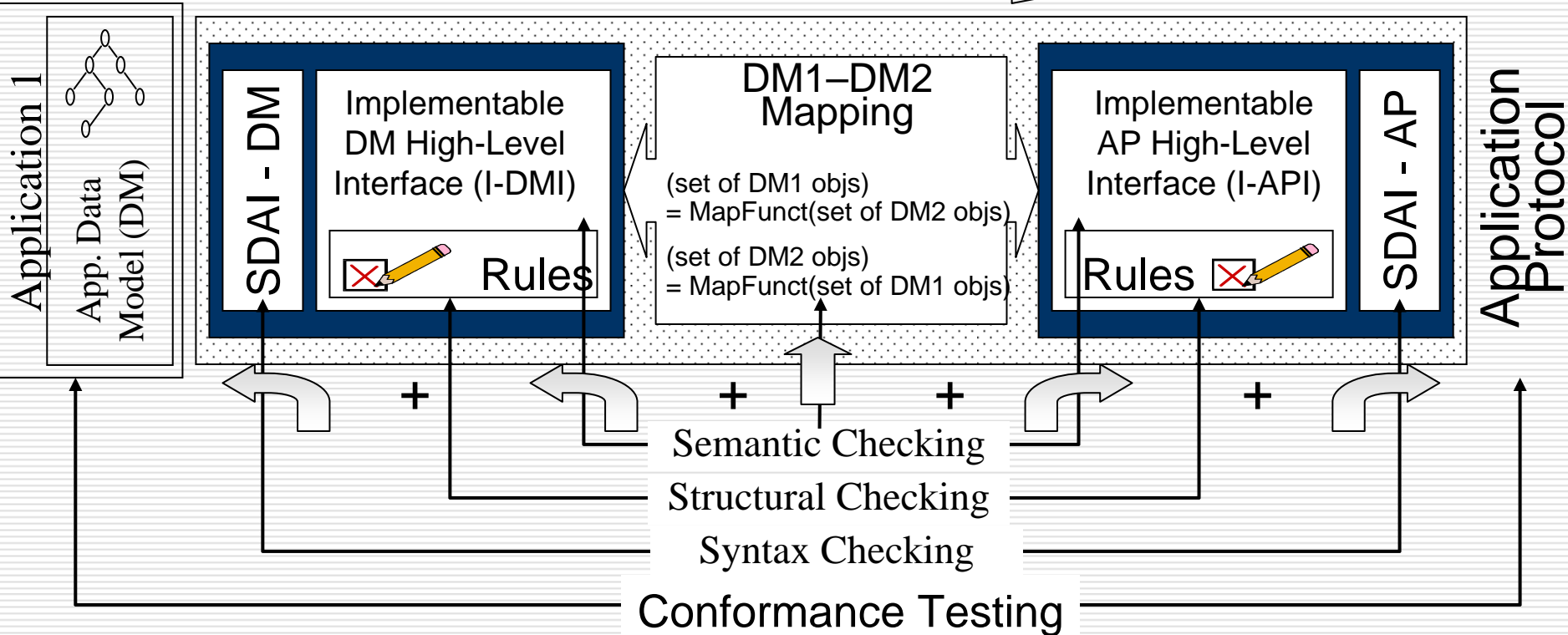
# The problem

---

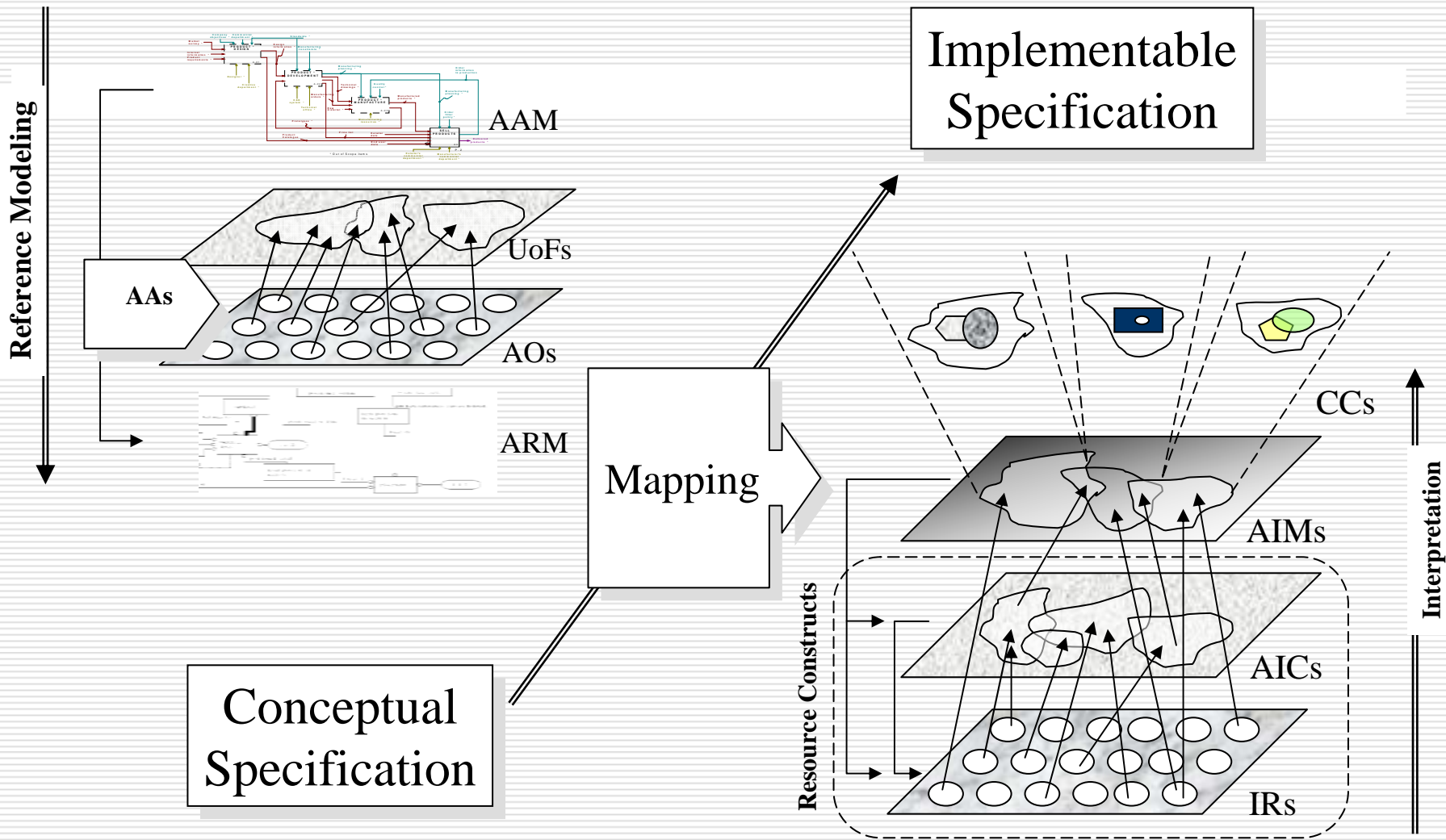


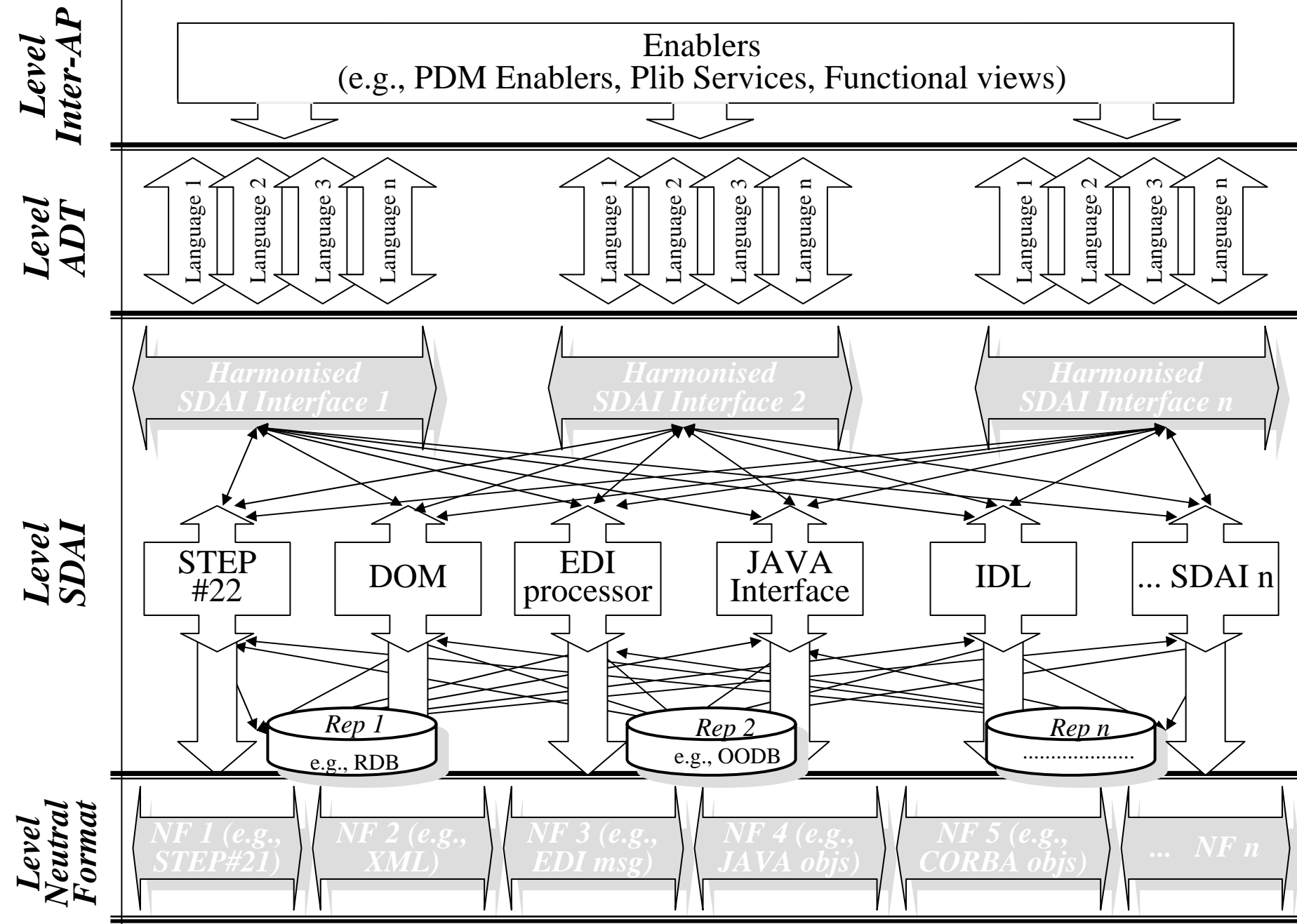
## Layers of a Standard-based Integration Platform

# Translator







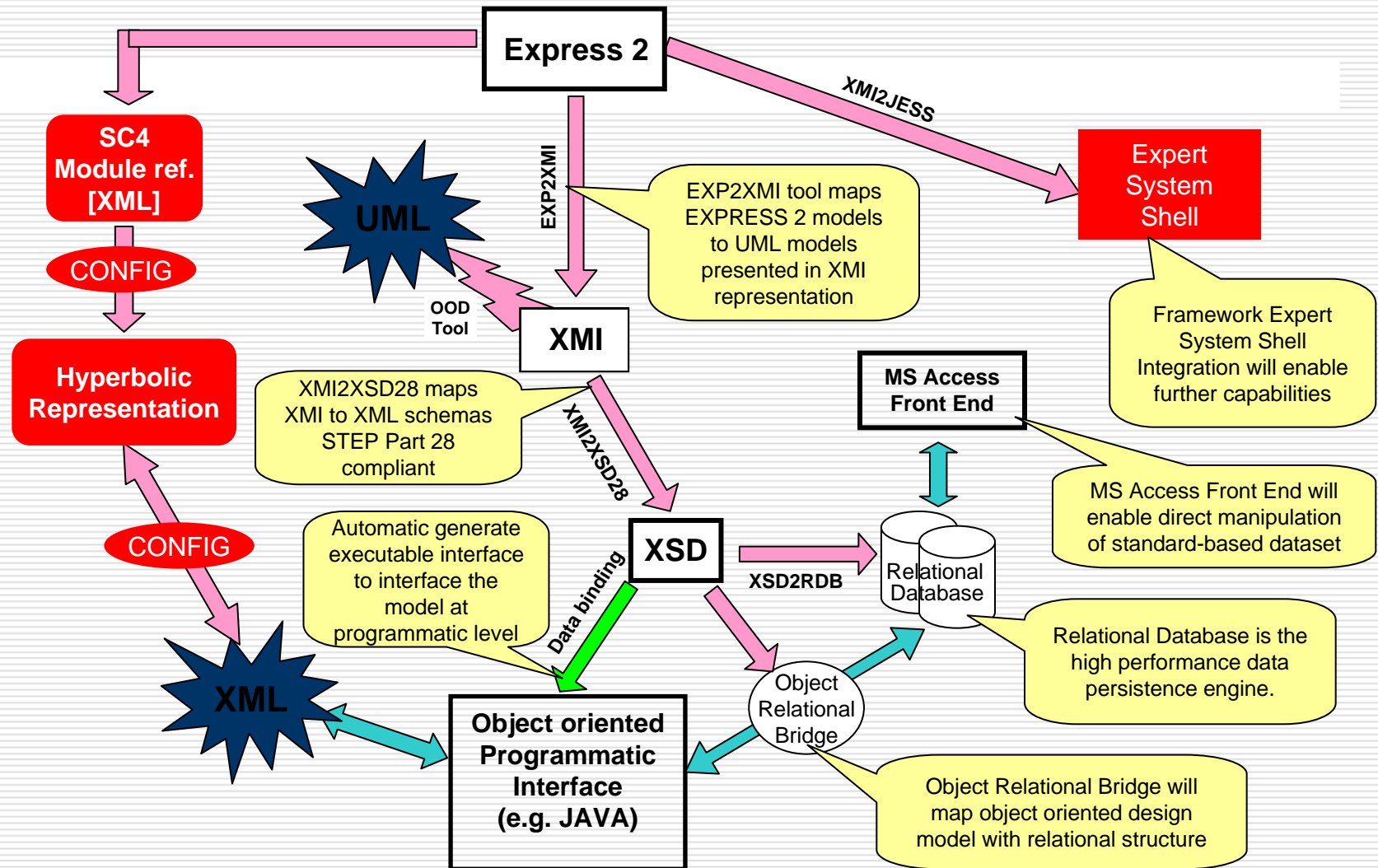


---

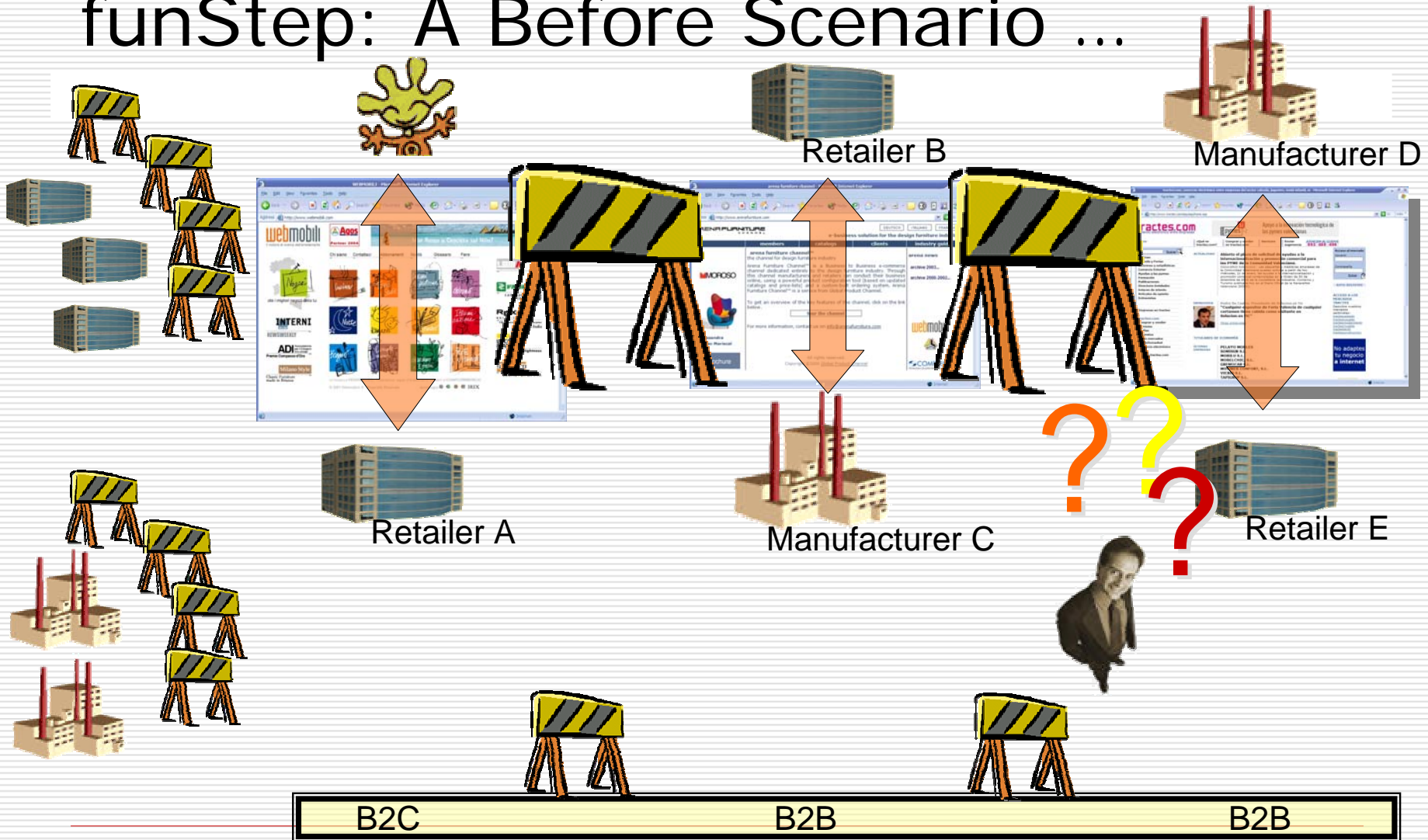
So...



# Standard Base Technological Framework to Sustain Interoperability



# funStep: A Before Scenario ...



# funStep: ... and Future Scenario!

ISU: Internet  
Services Utility

B2C

B2B

B2B

# funStep: Facts (quantified by users)

---

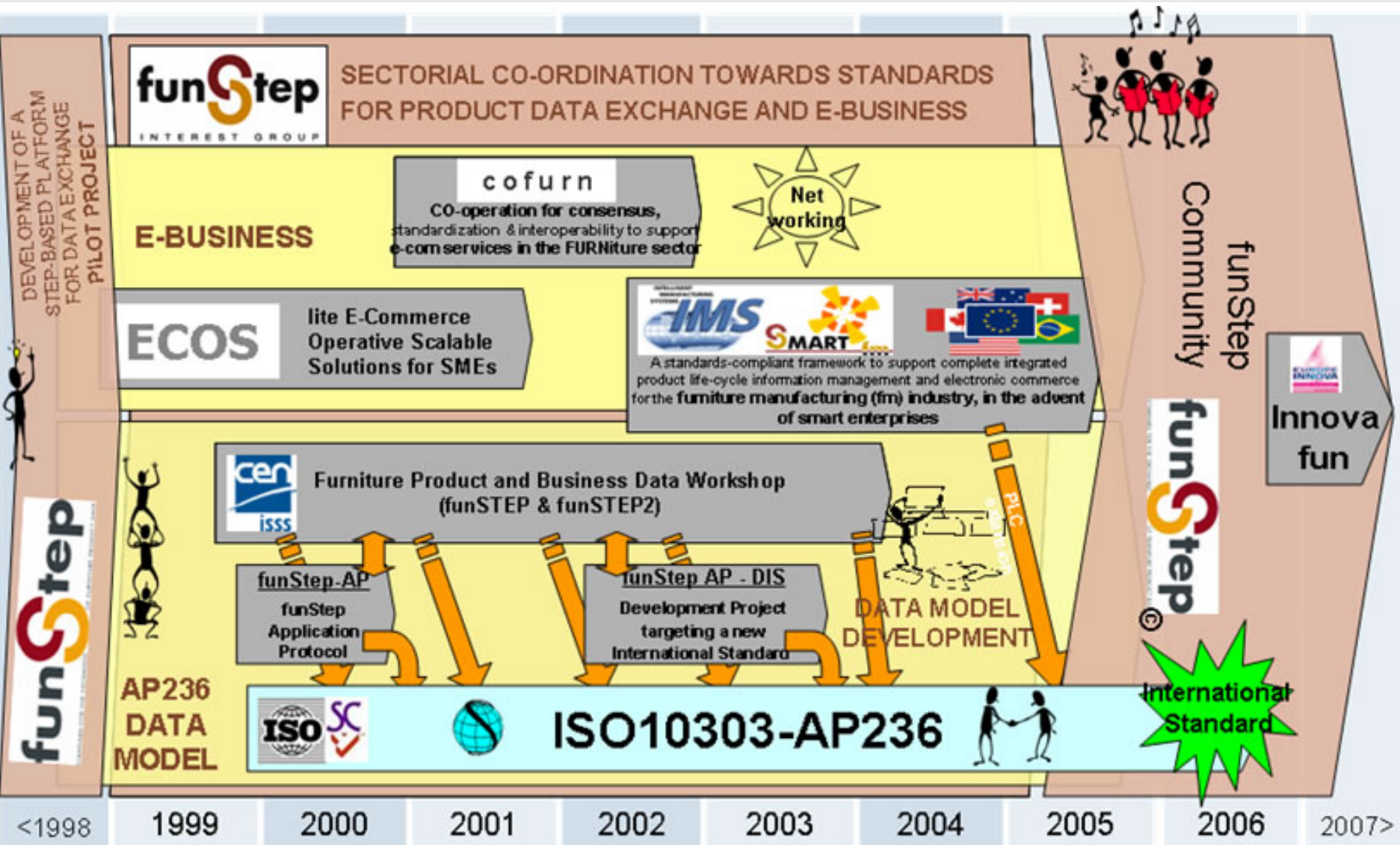
- 25% to 50% resources reduction in the customer-provider communications
- 50% to 80% reduction on error rate
- Error reduction rate generates savings between 30K€ and 150K€ for a medium-sized company
- Timetable for integration
  - 0.5 person-days for simple (no integration at all)
  - 3-10 person-days for complete integration

---

# funStep: The timeline



# Past, present and future of funStep



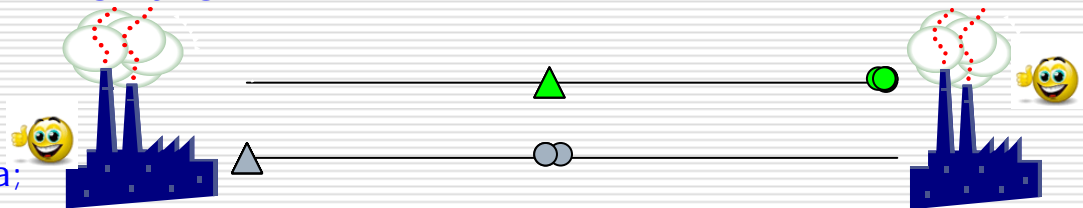
# Industry concerns and demands

Most industrial data is generated and stored on computers and other electronical devices. This is causing that:

- many companies are obliged to maintain the hardware and software that has generated that data because it cannot be interpreted by modern systems.

The information society is developing very fast and a system becomes obsolete after a few months:

- different computer systems;
- different software applications;
- different programming languages;
- different representation of the data;
- different structure of the data.



**Industry is requiring that their information, besides being perpetual, becomes also independent of software systems**

**Systems need to “understand” each other!**

# Past, present and future of funStep

*In December 2006 AP236 achieved the final Status 60.60 → International Standard!*

**ISO Standards**

Browse by

- ICS fields
- Technical committees**
  - TC 184**  
Industrial automation systems and integration
  - TC 184/SC 4**  
Industrial data
  - ▶ **ISO/TS 10303-436:2006**

Items to show

- ▶ **Published standards**
- Standards under development
- Both

[View shopping basket](#)

**ISO/TS 10303-436:2006**

**Industrial automation systems and integration -- Product data representation and exchange -- Part 436: Application module: AP236 furniture catalog and interior design**

**(available in English only)**

Edition:	1 (Monolingual)
Number of pages:	83
Technical committee / subcommittee:	<a href="#">TC 184/SC 4; ISO Standards</a>
ICS:	<a href="#">25.040.40</a>
Status:	Published standard
Current stage:	<a href="#">60.60</a>
Stage date:	2006-12-12
Revision information:	None

**Add to shopping basket**

<a href="#">ISO 10303-236 Application modules CD-ROM</a>	<b>Size</b>	<b>Price</b>
		CHF 352,00

# What´s the problem in this industrial sector?

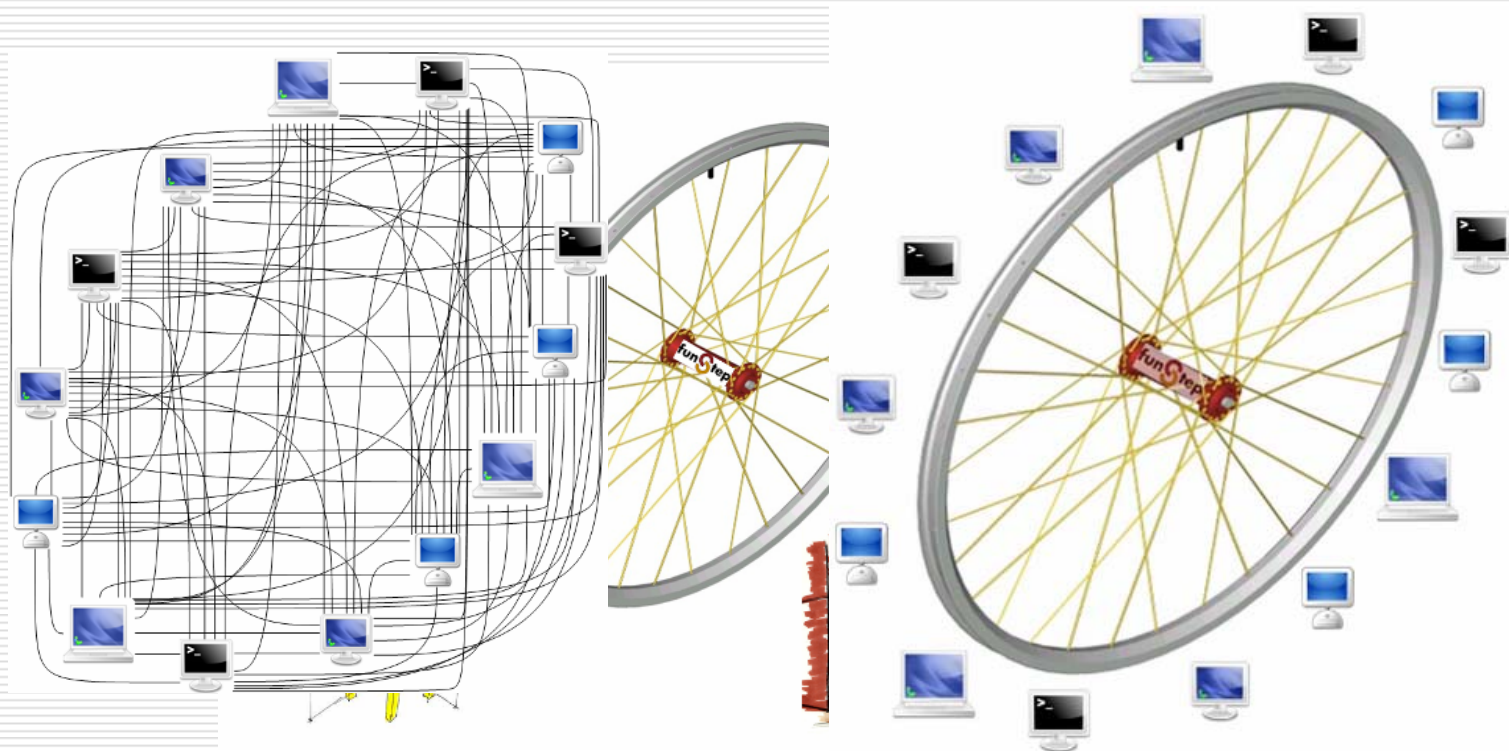
---

**Manufacturer should buy all Software Applications for interior decoration any Retailer has in order to “decorate” the rooms with their products**

**Retailer wants all 3D models and catalogue data to give a Just In Time answer to the final consumer  
(ALL OF US ARE END USERS)**

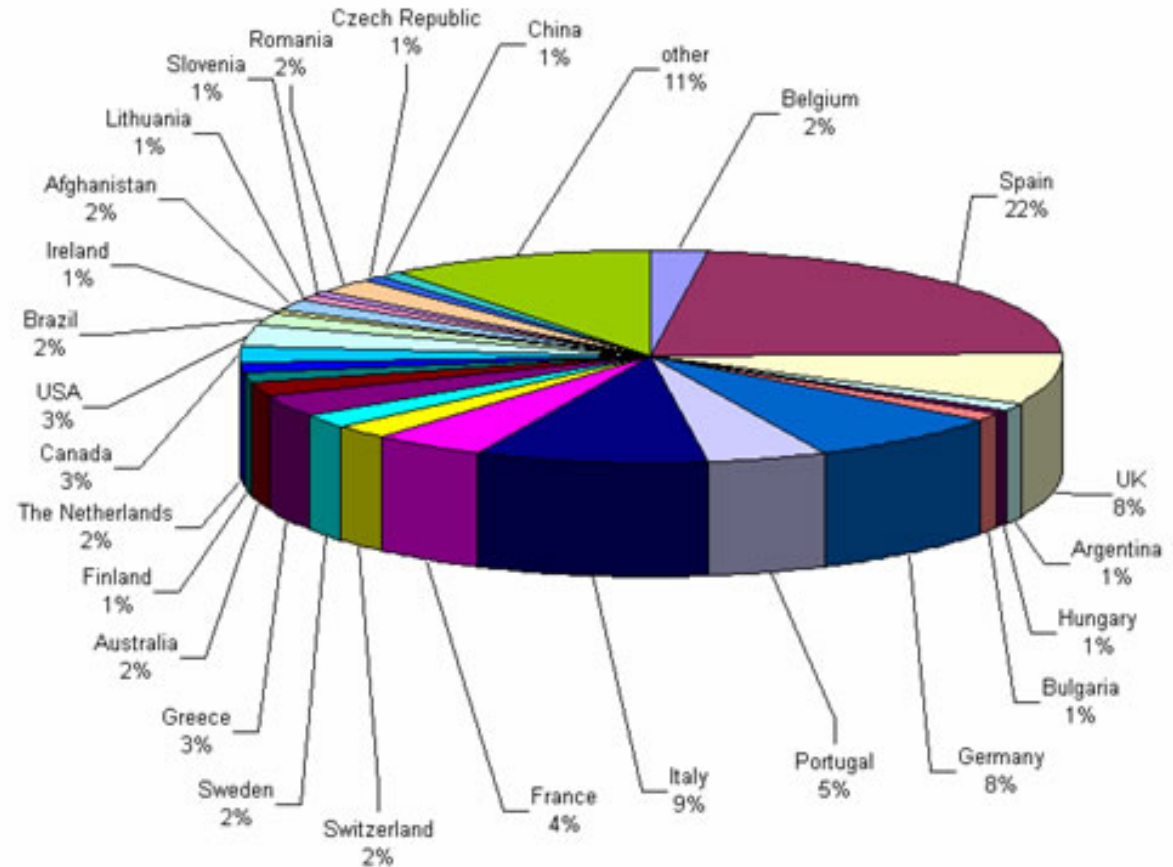
# By means of

- funStep solutions to be applied to all agents involved in the furniture value chain



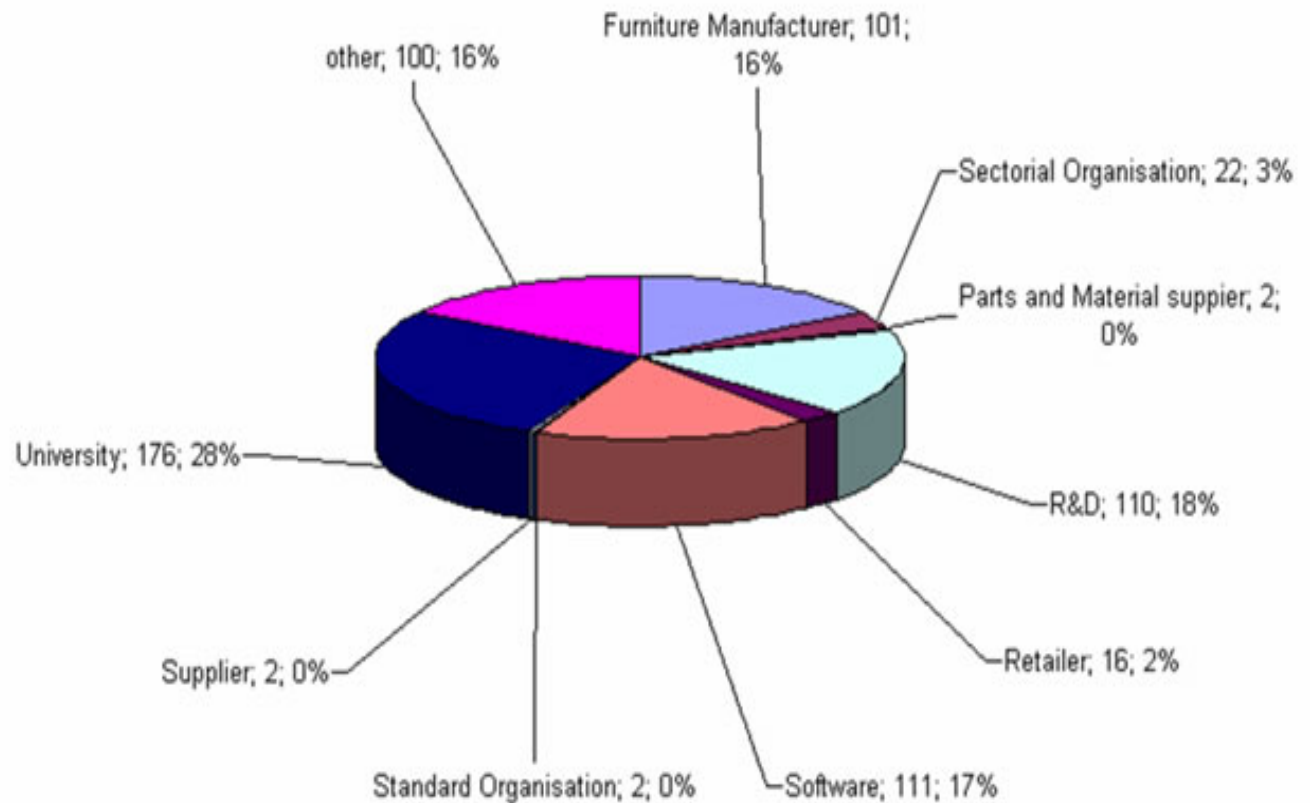
# FSIG (I)

- More than 750 members
- By country:



# FSIG (II)

□ By profile:



# Target Audience

---

- ❑ National/International **furniture trade associations**
- ❑ **Manufacturers**
- ❑ **Retailers** able to feedback consumer needs & trends (showrooms, eRetailers, Mail Order Company, ...)
- ❑ **Suppliers** (for new materials, technology, ...)
- ❑ **Software Houses** (specialized CAD systems and interior decoration projects)
- ❑ **Designers**, product developers, architects, interior designers, decorators, ...



# What is INNOVAFUN?

[Innovation Watch](#) [Innovation Panels](#) [Cluster Mapping](#) [Cluster Networks](#) [Financing Networks](#) [Standards Networks](#) [Innovation Management](#) [Innovation & Services](#) [Sectors](#) [Related Initiatives](#)

[Home](#) » [about Standards Networks](#)

## About Standards Networks

### Standards for higher innovation performance [print](#)

Standards play a crucial role in the definition of market conditions in many industry sectors, not only high-technology ones. They influence technological advances and determine innovation performance. They influence the innovation process through "path dependency"; in other words, when (technical) specifications are defined, the options for future technological developments are by definition narrowed, since alternatives are ruled out through a combination of technical and market choices.

The merit of applying standards lies in the possibility of reducing the transaction costs involved in the development and application of (new) technologies and of generating positive network externalities through economies of scale. Standards can play a major role in promoting innovative products and services by providing legal security for innovative companies, creating large scale markets and building confidence among consumers. Hence, standards can be considered to be an important driver of innovation in Europe.


Within this framework, the European Commission will establish pan-European Networks to bring together consumer associations, market experts, companies and policy makers to achieve more successful exploitation of existing standards in Europe. It is important to note that these networks are not meant to be the basis for development of new standards, but will serve to facilitate the exchange and compilation of good practice to enable the integration of open standards into the design of new products, services and business practices, and stimulate innovation through reference to standards in public procurement.

The Innovation Standards Networks will explore existing standards and identify market failures and potential public interventions for the improvement of innovation performance in the design of new products and services. In addition, the use of standards in European Union public procurement processes and by large multinational companies will be assessed with a view to enabling bidding companies to be more innovative in their product and service designs and offerings. In addition, policy recommendations will be formulated to promote the integration of open and proprietary standards into the development of new business solutions.

The achievements of the Innovation Standards Networks will inform the Europe INNOVA initiative in its effort to address the challenges to innovation within specific sectors.

Contract negotiations with the Europe INNOVA Standards Networks are ongoing. More information will be available in October 2006.

#### Discussion Forum



#### Extranet Login

User Name:

Password:

[Log In](#)

[Forgot your password?](#)

[Register](#)

---

# funStep Impact

**Proveedor**



SUPPLIER

**Fabricante**

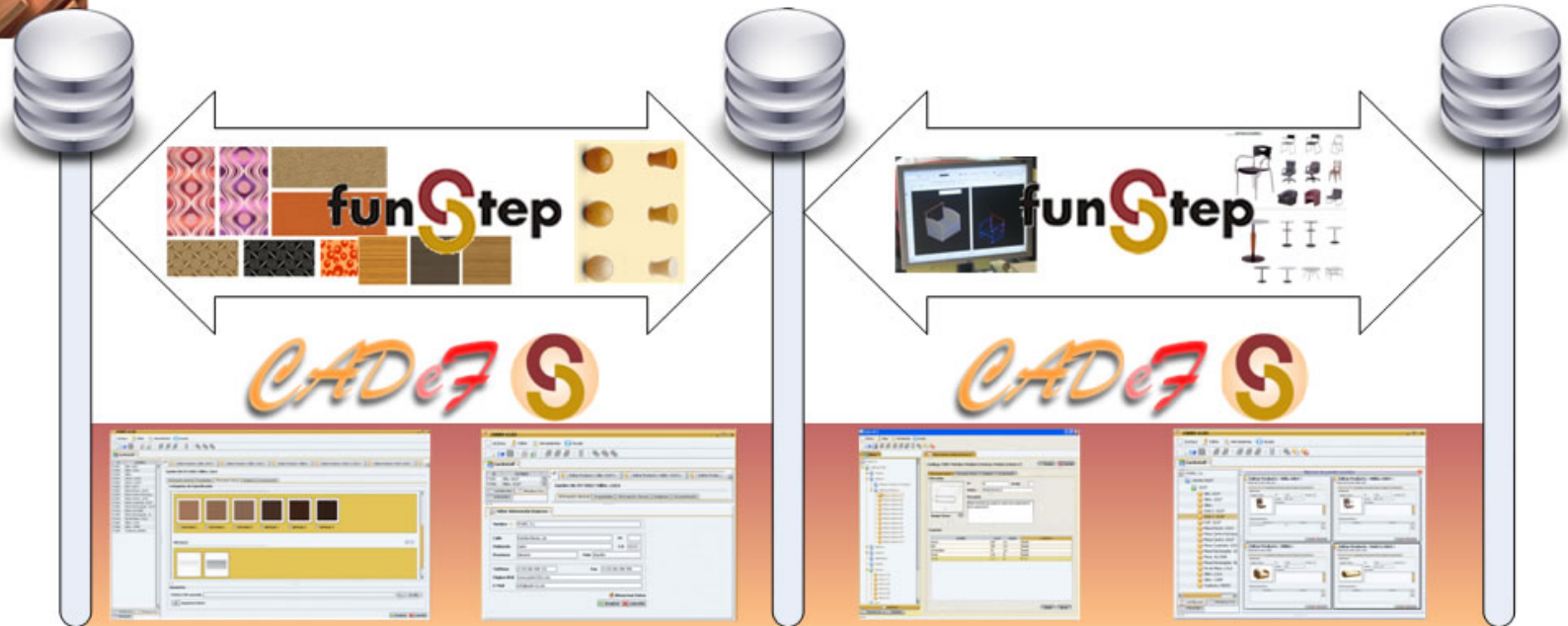


MANUFACTURER

**Comercio**



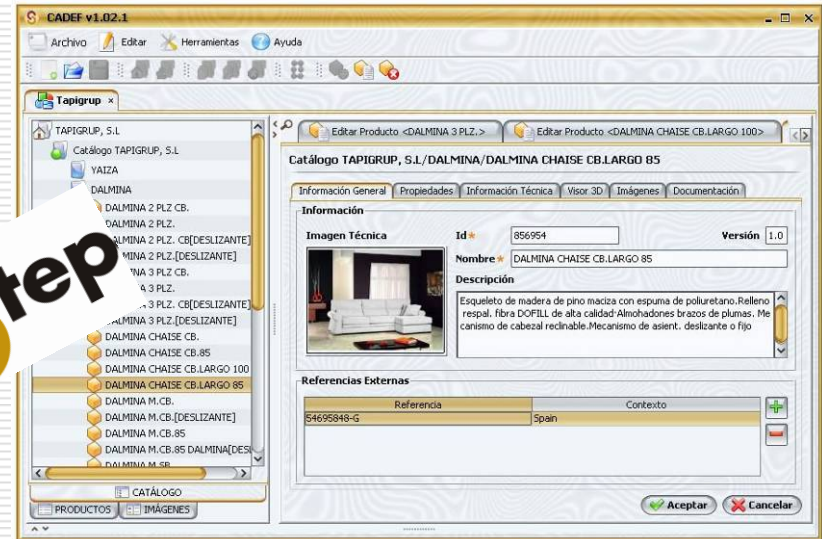
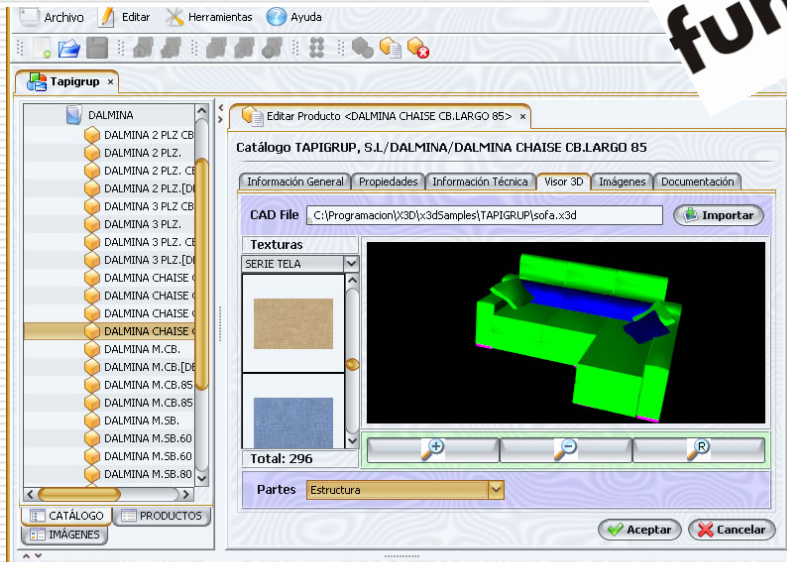
RETAILER



# Example

## ☒ Catalogue information

- Product data information
- Properties
- Documents
- Bill of materials



## ☒ Geometry information

- CAD information
- Visualization of the textures



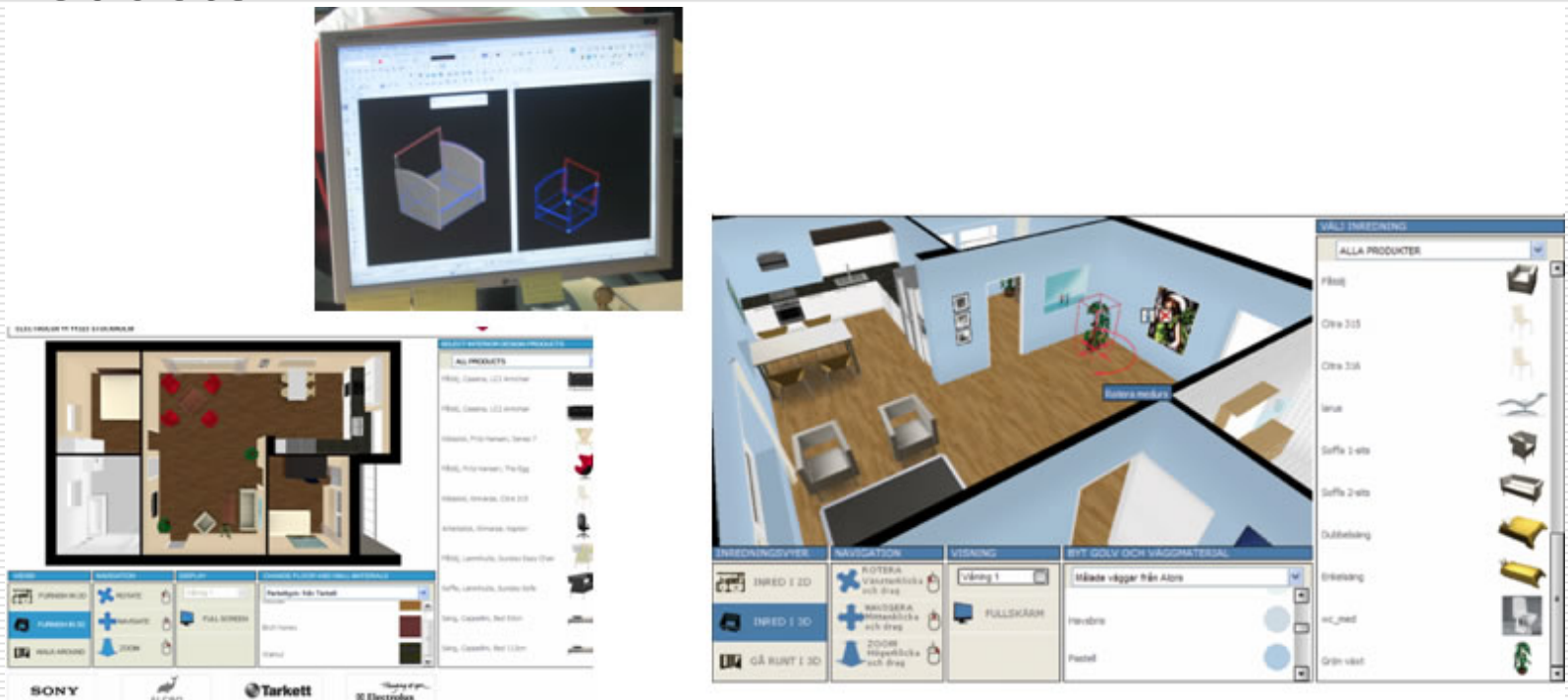
# Impact with funStep (I)

- ❑ *More than just paper catalogues*
- ❑ *To know exactly the opinion of the final customer*
- ❑ *JIT answer*



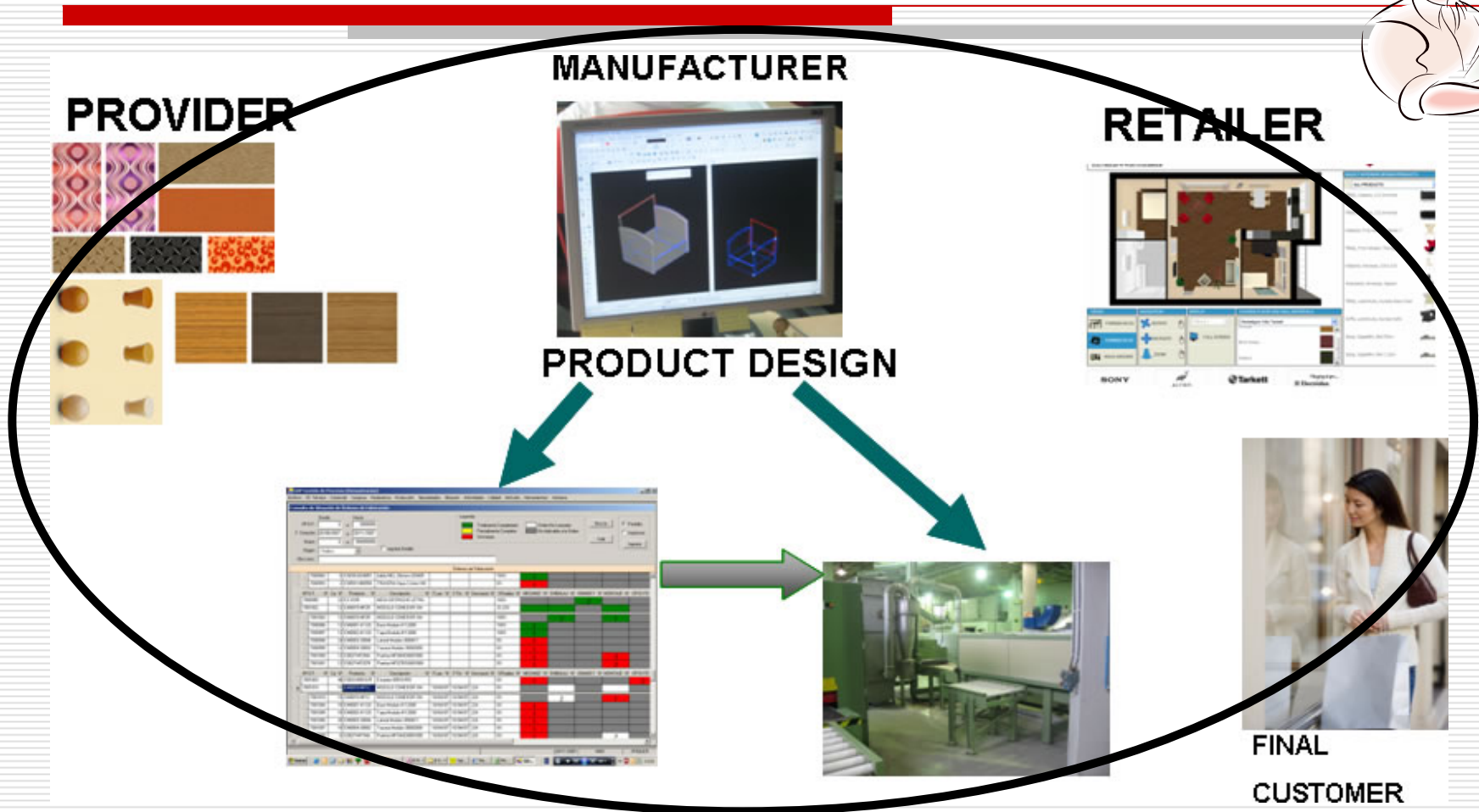
# Impact with funStep (II)

- **Design interior decoration projects streamlining the process to “tailor” customized furniture products**



# Impact with funStep (III)

**CONTRACT**





---

# Barriers

# Barriers

---

- Software vendors reluctant to implement
- SMEs have other priorities
- Harmonisation with other national standards
  - After 2 years of analysing how to interoperate with a German standard (IWOfurn) we are starting now
  - It is possible but it takes a long time. Clue: to find German producers having Spanish retailers and viceversa. In this way to harmonise is critical (positive) as the manufacturer can be in both markets in a very rapid way with the requirements that applied those standards

# funStep Solution:

---

- Development of very *“easy to use”* IT solutions
- Easy tools and libraries for adopting funStep in their business for **industrial SMEs**
- Ad-hoc Training, Tutorials, ... for industrial SMEs and Software Vendors SMEs
- Time for implementation for a SV estimated/verified: 1 technical person during 20 days

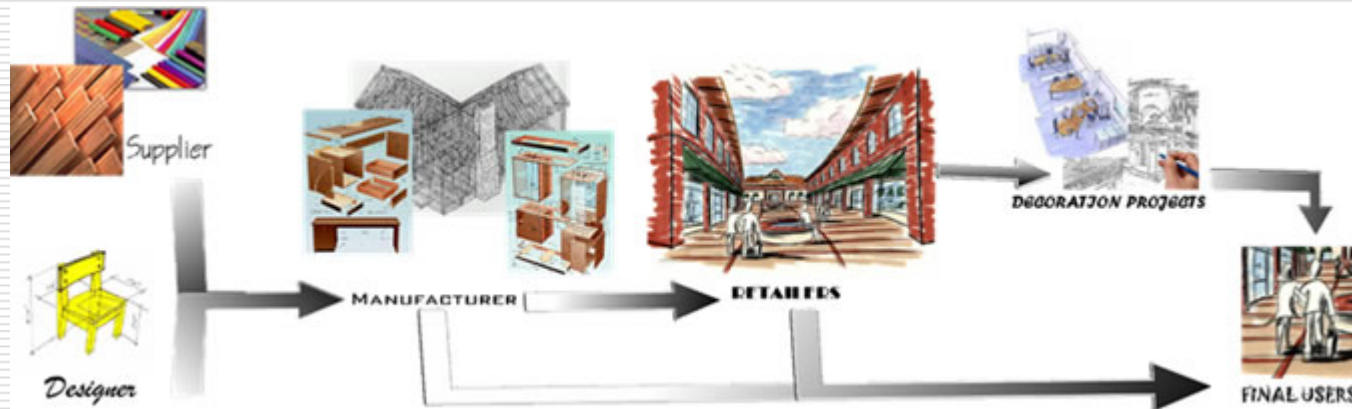
# Achievements when adopting funStep solutions

---

- Reduction in manual errors*
- Reduction in response time*
- Reduction in delivery time*
- Better client service*
- Consumer satisfaction*
- Increment on sales*
- New markets*
- Better position among competitors*
- Standard way of doing business. Adopting an ISO standard*
- Implement once and improve business with your providers and clients for a better service*
- => improvement in competitiveness*

# Impact with funStep (IV)

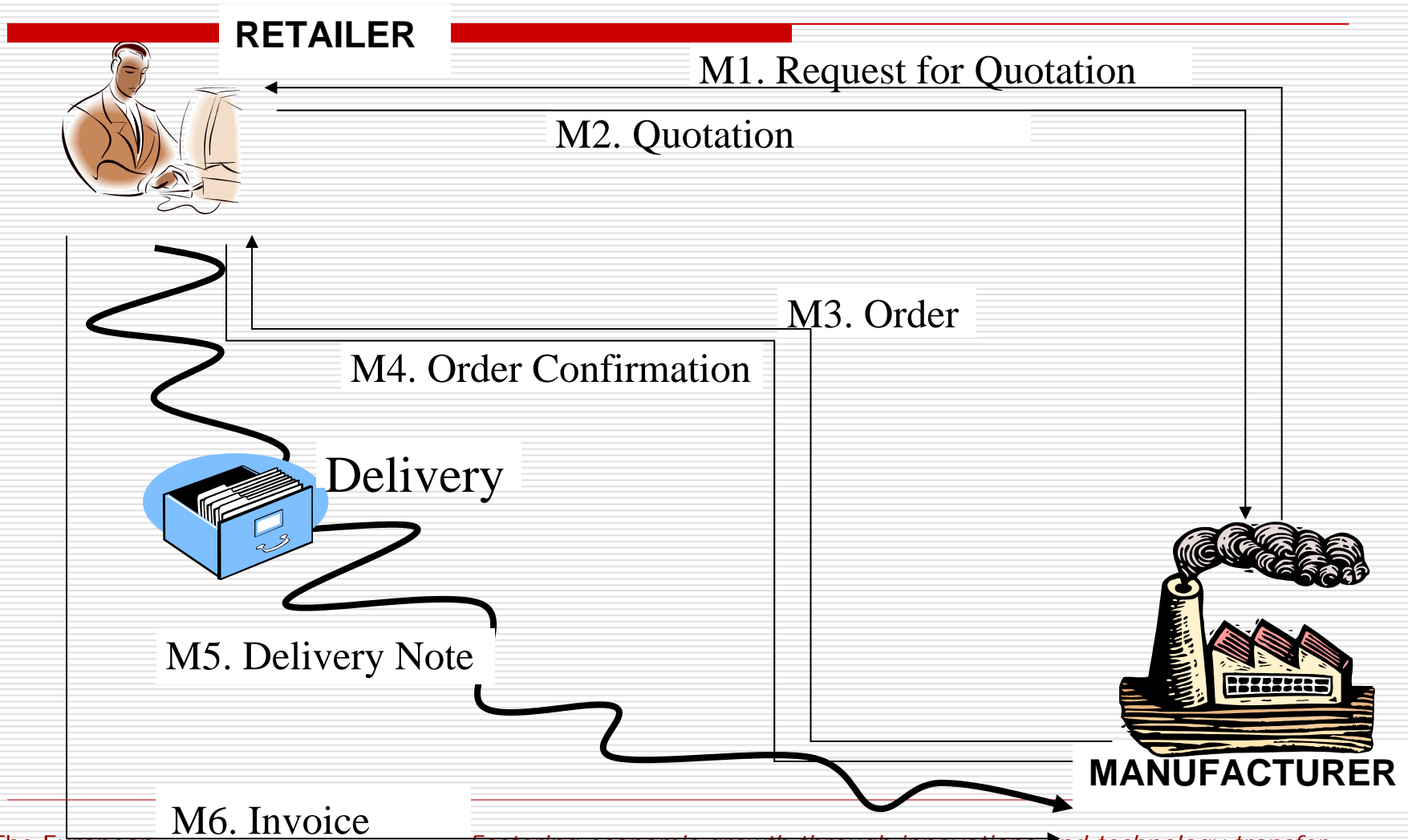
□ **Through funStep: INTEGRATION, INNOVATION and STANDARDISATION**



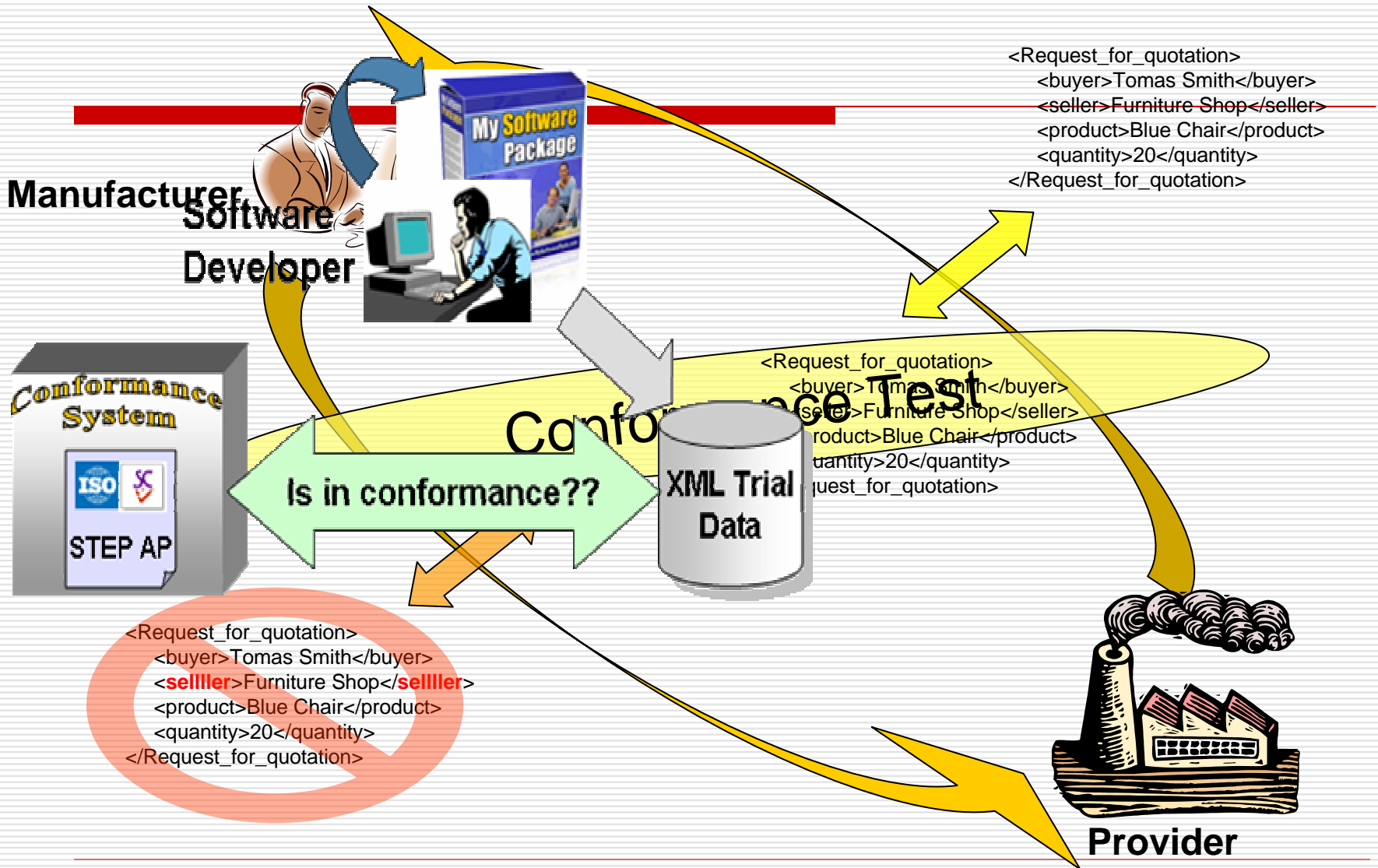
---

# Examples of funStep Services and Tools

# e-Business funStep Open Architecture (ebfSOA)

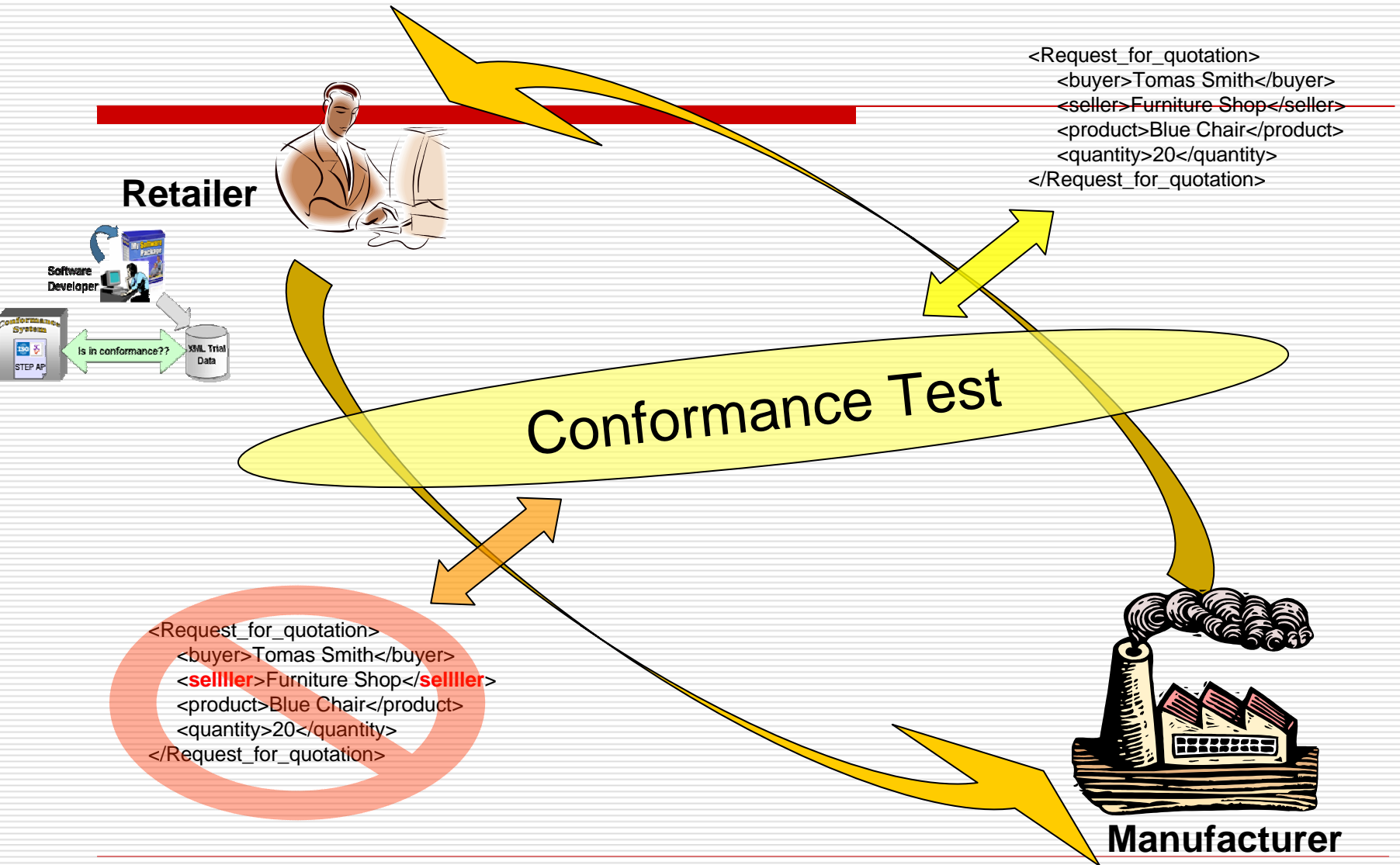


# Conformance Testing Utilities





# Conformance Testing Utilities



---

# Semantic Enrichment of Product Catalogue

# Semantic Annotations

- Example of a semantic annotation of catalogue terms (in AP236)
  - Term: "Raw"
  - "Raw" is related with finishing

```
<Specification_category id="id_sc_01">
  <id>finishing</id>
  <description>the finishing of a product</description>
  <implicit_exclusive_condition>true</implicit_exclusive_condition>
</Specification_category>
<Class_category_association id="id_cca_01">
  <associated_product_class ref="id_pc_02"/>
  <mandatory>true</mandatory>
  <associated_category ref="id_sc_01"/>
</Class_category_association>
<Specification id="id_s_01">
  <id>id_for_raw</id>
  <name>Raw</name>
  <description>no finishing is provided</description>
  <category ref="id_sc_01"/>
  <package>false</package>
```

```
<External_class_library id="id_ecl_01">
  <id>http://www.funstep.org/knowledge/owl</id>
  <description>funStep Ontology</description>
</External_class_library>
<External_class id="id_eca_01">
  <id>http://www.funstep.org/knowledge/owl#CrudeMaterial</id>
  <name>Crude Material</name>
  <description>Raw finishing</description>
  <external_source ref="id_ecl_01"/>
</External_class>
<Classification_assignment id="id_cwa_01">
  <assigned_class ref="id_eca_01"/>
  <items ref="id_s_01"/>
</Classification_assignment>
```

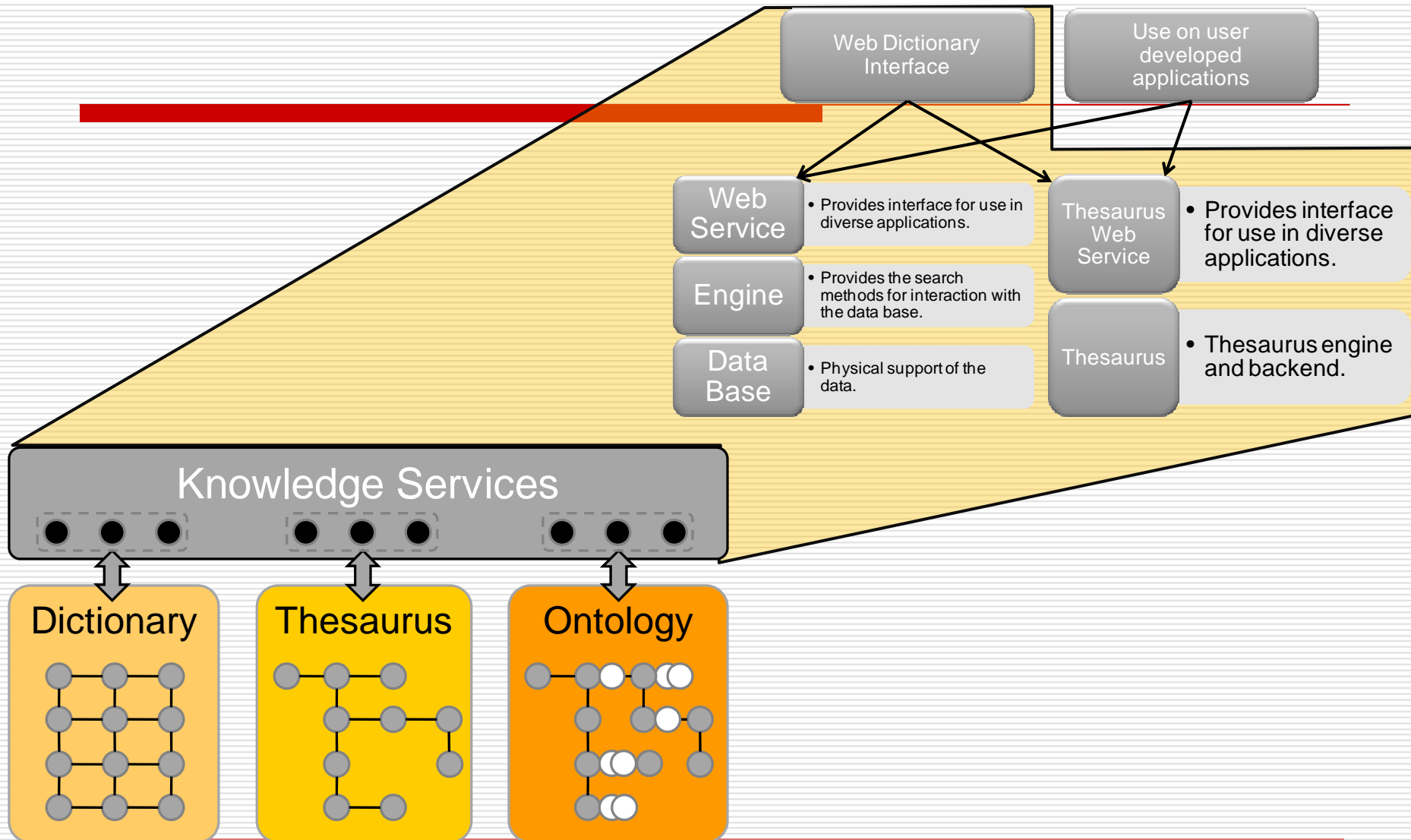
# Mapping Tool

The screenshot displays the 'Mapping Application v1.0 Beta' interface, which is used for mapping between two taxonomies. The interface is divided into several sections:

- Taxonomy A:** A tree view on the left showing a hierarchy starting with 'wood', which includes sub-categories like 'Region', 'Chemical', 'Cell', 'Finishing', 'Bleaching', 'Staining', 'Oil\_Stain', 'Water\_Stain', 'Spirit\_Stain', 'Sealing', 'Standard finish', and 'Natural thing'. A large letter 'a)' is overlaid on this section.
- Reference:** A tree view in the center showing a hierarchy starting with 'smartfm\_final', which includes sub-categories like 'Catalog', 'Segment', 'Building\_and\_U...', 'Electrical\_Syst...', 'Furniture\_and\_U...', 'Accessorie...', 'Beds', 'Partition\_U...', 'Plant Conta...', 'Seats', 'Storage, Ca...', 'Tables', 'Waste, Rec...', 'Vertical Boa...', 'Other', 'Minerals and T...', 'Sports and Rec...', and 'Street Furnit...'. A large letter 'c)' is overlaid on this section.
- Taxonomy B:** A large empty area on the right, intended for the second taxonomy.
- Mapping Controls:** On the right side, there are two 'Mapping' buttons, each with a corresponding 'Reference' text box and a 'Taxonomy B' text box.
- Class Information:** At the bottom, there are three panels for 'Class Name' and 'Description'. The first panel shows 'wood' and an empty description. The second panel shows 'Beds' and 'The bed unit class'. The third panel is empty. A large letter 'b)' is overlaid on the first two panels.
- Dictionary and Translation:** On the right side, there is a 'Get Dictionary' section with a 'Term' field containing 'bed' and a 'Language' dropdown set to 'English'. Below it, the 'Meaning' is displayed: 'Set of pieces with a framework and mattress, cushions and coverings to sleep or rest on. Wood or metal framework that supports the rest of the pieces of the set'. A large letter 'd)' is overlaid on this section. Below the meaning is a 'Translation to Portuguese' field containing 'Cama'.

At the bottom of the window, there are three 'Open Project' buttons and a status bar that reads 'Opening a Protégé-2000 Project...'.

# Knowledge Services



---

# funStep Product Knowledge

# The funStep Product Knowledge

## Knowledge

- Explicit knowledge is knowledge that has been or can be articulated, codified, and stored in certain media.
- Tacit knowledge is knowledge that people carry in their minds, which provides context for people, places, ideas, and experiences

## Dictionary

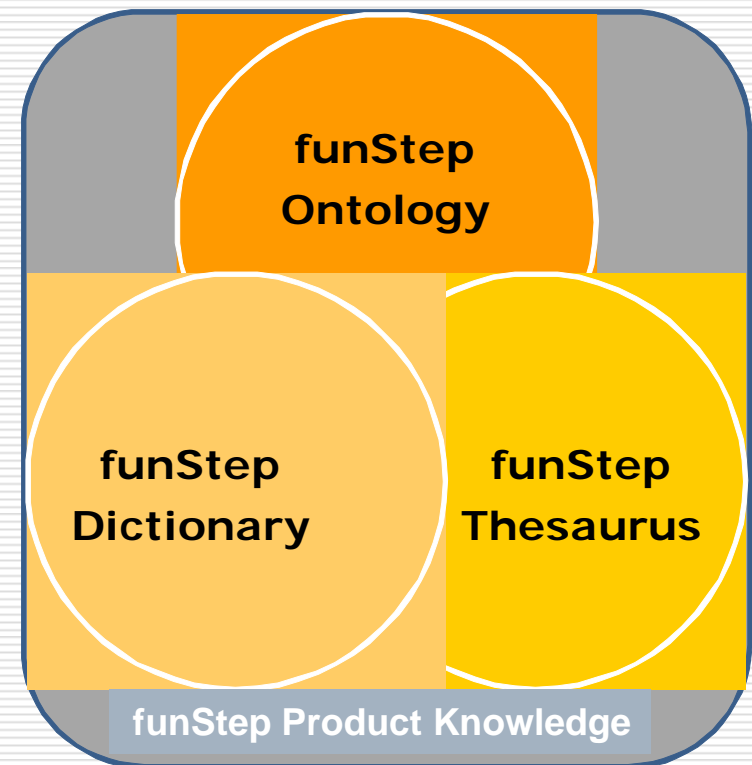
- A dictionary is a book of alphabetically listed words in a specific language, with definitions, etymologies, pronunciations, and other information; [1] or a book of alphabetically listed words in one language with their equivalents in another, also known as a lexicon.

## Thesaurus

- The thesaurus can represent such words structure of associated meanings, then should be built in order to establish the lexicon of a specific domain.
- Objective: to have domain reference terms and definitions about a domain.

## Ontology

- "An ontology is an explicit specification of a conceptualization"
- Objective: Products Classification



# Conclusions

---



# Conclusion

---

- SMEs high “perception of risk” on investment
  - Investments must be strongly “guaranteed”
  - Wrong decision can put in risk survival
- SME strongly motivated for integration
  - Improve processes, reduce costs, homogenize procedures, new markets, widen collaboration links
- Appropriate framework to push SMEs to develop and implement open data exchange standards
  - Based on totally interoperable solutions
  - Open-standards integration
  - Integration facilitators and Automatic code generators
  - Integrated non-functional aspects (e.g. Security)

# Indicators: International research projects (1/2)

---

## 15 research projects - > several millions of Euros in the period

- ❑ **1. ATHENA** (507849) - Advanced Technologies for Interoperability of Heterogeneous Enterprise Networks and their Applications - Dates: 01-02-2004/31-03-2007(36 months ); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 14.399.999,00€ (564.400,00€)
- ❑ **2. AVOEC** (POSI/SRI/32546/99) - Agentes para Comércio Electrónico e Formação de Organizações Virtuais - Dates: 01-01-2000/01-12-2003(); Type: RTD; Role: Partner; Sponsor: FCT; Programme: POSI/SRI; Funding: 19.951,92€ (4.987,98€)
- ❑ **3. BIOPATTERN** (508803 ) - Computational Intelligence for Biopattern Analysis to Support eHealth - Dates: 01-01-2004/31-12-2007(48 months ); Type: Network; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 2.666.666,67€ (133.289,58€)
- ❑ **4. CIT-EU** (60869a-IC-1-2003-1-SI-ERASMUS-DISSUC) - European Master Course in Construction IT - Dates: 01-10-2004/30-09-2005(12 months); Type: RTD; Role: Partner; Sponsor: EC; Programme: SOCRATES/ISOC; Funding: 0,00€ (0,00€)
- ❑ **5. COFURN** (IST-2000-25183) - CO-operation for consensus, standardisation and interoperability to support e-com services in the FURNiture sector - Dates: 15-12-2000/14-12-2002(24 months ); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 737.163,00€ (72.434,00€)
- ❑ **6. CoSpaces** (IST-5-034245) - Innovative collaborative work environments for individuals and teams in design and engineering - Dates: 21-05-2006/31-10-2009(42 months ); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 8.000.000,00€ (365.080,00€)
- ❑ **7. FUNSIEC** (42059) - Feasibility for a Unified Semantic Infrastructure for the European Sector - Dates: 01-03-2004/28-02-2005(12 months); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/eContent; Funding: 307.008,00€ (48.289,00€)

# Indicators: International research projects (2/2)

---

- ❑ **8. IDEAS** (IST-2001-37368) - Interoperability Development for Enterprise Application and Software – Roadmaps - Dates: 01-06-2002/31-05-2003(12 months ); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 399.993,00€ (30.242,00€)
- ❑ **9. INNOVAFUN** (31139) - Apply open standards to innovate furniture business processes - Dates: 01-11-2006/31-10-2008(24 months); Type: RTD; Role: Technical Coordination; Sponsor: EC; Programme: FP6/INNOVA; Funding: 799.996,00€ (250.439,00€)
- ❑ **10. INTEROP** (508011) - Interoperability Research for Networked Enterprises Applications and Software - Dates: 01-11-2003/31-10-2006(36 months ); Type: Network; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 6.500.000,00€ (226.160,00€)
- ❑ **11. prodAEC** (IST-2001-32035) - European Network for Product and Project Data Exchange, E-Work and E-Business in Architecture, Engineering and Construction - Dates: 01-02-2002/30-04-2004(27 months); Type: RTD; Role: Technical Coordination; Sponsor: EC; Programme: FP5/IST; Funding: 381.584,00€ (147.241,00€)
- ❑ **12. SEEMSEED** (502515) - Study, Evaluate, and Explore in the Domain of the Single Electronic European Market - Dates: 23-12-2003/30-06-2006(30 months); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/IST; Funding: 1.499.393,00€ (176.968,00€)
- ❑ **13. SMART-FM** (IST-2001-52224) - A Standards compliant framework to support complete integrated product life-cycle information Management And electronic commerce foR the furniture manufacturing (FM) industry, in THE advent of the smart enterprises - Dates: 01-06-2002/31-05-2005(36 months); Type: RTD; Role: Technical Coordination; Sponsor: EC; Programme: FP5/IST; Funding: 1.770.854,00€ (295.201,00€)
- ❑ **14. STAND-INN** (31133) - Integration of performance based building standards into business processes using IFC standards to enhance innovation and sustainable development - Dates: 01-09-2006/30-09-2008(); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/INNOVA; Funding: 987.405,00€ (28.503,00€)
- ❑ **15. VIVACE** (502917) - Value Improvement through a Virtual Aeronautical Collaborative Enterprise - Dates: 01-01-2004/31-12-2007(48 months); Type: RTD; Role: Partner; Sponsor: EC; Programme: FP6/AERO; Funding: 43.299.803,00€ (266.746,60€)



---

# European practices of Research-Business Cooperation: RBC

*Ricardo Goncalves, UNINOVA-Portugal: rg@uninova.pt*

## Thank you