Standardization and Research Issues
Arts & Métiers ParisTech
June, 5th 2013
The research at Arts & Métiers

Arts & Métiers ParisTech

- mechanical engineering, power engineering and industrial engineering.
- 6,200 students
- 1,100 Arts et Métiers engineering degrees awarded every year
- partnerships with over 100 schools and universities worldwide.

Research topics at LOGIL laboratory (Head Pr. Lamouri)

- LEAN Manufacturing, Production/Logistics, Design and Manufacturing Interface, **Data Models** for the industry, PLM, ERP.
- Many standards: XML, UML, SysML, OWL, RDF, HTTP, TCP, IP, SOAP, WSDL, SOA, REST, MANDATE, STEP, IGES, STL, VRML, X3D, HTML, WebGL, ISO 15926, PLIB 13584, BIM, IFC, OCL, ATL, SWRL, SPARQL, etc.
- Recently invited to join the french TC184SC4 mirror. We accepted!

Which motivations? Benefits? Goals? Any scientific interest?
Agenda

How to efficiently bring scientists to make scientists and academic Standardization and Research Issues

- Fundamental issue: why do we need each other?

- Scientific Issues: what are we looking for?
  - Granularity / Genericity
  - Coverage / Standards interoperability
  - Standard usage issues: how can we improve standards usability / Transpose best practices to other domains
  - Ontologies, inference, business rules
  - Modeling methodology for ISO 15926
  - 3D data model for the nuclear power plants
  - From models to alive models through smart models

- Organisational Issues: how could we efficiently collaborate?
Research and standardization differ by nature

- Standardization process = agreement on a consensus. Keywords: diplomacy, politics + focus on mature work
- Research process = results come from a cartesian thinking (one can be right against the entire world). Keywords: hypothesis, facts, reasoning + focus on exploratory work.

But they also share common points …

- Time scale: endless processes
- Both require high scientific/technical skills and tough work
- Both researchers and standard specialists don’t have many people to talk to.
- Researchers look for industrial partners with strong business skills and use cases
- Industrial partners need some higher level point of view

… and mutual interest

- Industry: benefit from high skilled people with different way of thinking
- Academic researchers: produce public knowledge, promote their national industry
- Get understood by softwares vendors
Standards coverage / standards interoperability

Standards Map [Rachuri et al., 2008]

Blanks

Overlaps
Genericity / Granularity Issues

Should one standardize the model and/or the modeling process?

Very generic
lead to disjoint semantics subsets

Very granular
too specific to fit anyone’s need

Generic

ISO 15926-2

ISO 15926-4

Data exchanged with 15926-4

Specific

Thing

PLCS

PLCS Reference Data

STEP AP 203 instances

STEP AP 203

PLCS instances

MUDU occurrences

MUDU without occurrence

OpenCat

Data exchanged with 15926-4

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Who will standards “How To”? 

- ISO, AFNOR etc. produce standards only
- Consortia defend the interest of their members
- Consulting companies defend their business
- Software vendors promote their product

Researchers can help providing best practices, methodologies, trainings

- Researchers can work on best practices and methodologies that don’t come with the standard
- They can publish scientific papers to share their results
- They can train students
- They can help spreading the standard over the industry thanks to multiple collaborations
Virginie Fortineau Doctoral Research – Ontologies, knowledge modeling and inferences

- Enrich models semantics
- Enable dynamic information exchange
- Share knowledge

Applications

- Business rules modeling and checking automation (SWRL, OCL, SPARQL, SPIN etc.)
- Upper ontology construction for models federation
Ongoing work: Towards a rich 15926 RDL for the nuclear industry
Ongoing work: 3D data model for nuclear power plant representations

- A Macro Procedural approach
- Based upon a set of CSG primitives, boolean operations, transformations
- Measure functions
- Connects to the PDM
In the long term: let’s make models live

Rich semantics but static models

- Data models = data structure.
- Resulting model can embed a rich semantics and knowledge.
- What about the model lifecycle? Changes, transformations etc.

Bring IA into the model – model behavior

- Model the model behavior – Transformation rules.
- Deterministic laws, Genetics Algorithms, Neural Networks, fuzzy logics, ant colonies. Enable self transformations.

Recursive System Engineering

- Consider the model itself as a system, part of the supersystem it represents.
Organisational issues

Where are the skills?

- The french academic community is splitted over many small research teams
- Specific collaborations between research teams according to call for projects
- A lack of visibility for industrial partners – skills map

Need for a driver?

- US have NIST, Korea has KIST. What about France ? Europe ?
Thank you


