On the Scientific Basis of Enterprise Interoperability

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Evolution of human knowledge: from Science to Engineering

- Philosophy
- Science
- Engineering
- Technique (Tékhne)

How do we recognise Science?

- Scientific Method
- Scientific Artefact
**Model** as the key product of Science

- **understand** more thoroughly the system, and therefore to
- **improve** the characteristics of the system, but also to
- **predict** its future evolution, i.e., how the system will behave under some initial conditions, or react to changes in the context.
GMT – General Model Theory

- Mimetism
- Reductionism
- Pragmatism
On the benefits of Science Base

- **performance**, how well the infrastructure operates
- **flexibility**, how easy the infrastructure can cope with changes
- **scalability**, how easily the infrastructure can support an increasing workload
- **adoptability**, concerning the initial costs to start operating and using the infrastructure
- **consistency**, ability of the infrastructure to guarantee semantic preserving transformations and the absence of contradictions or, where not achievable, that exceptions are treated consistently to predefined strategies
On EISB Benefits (2)

- **maintainability**, showing supportive features when fixing flaws, but also when it is necessary to upgrade the infrastructure when new (technological) solutions need to be adopted
- **evolvability**, ability of being easily transformed when new business objectives or operational conditions require consistent transformations
- **availability**, capacity of running without interruption. Or, when a failure occurs, easiness in reinstating the structural and operational capabilities
- **affordability**, concerns the costs of using the infrastructure, which should be consistent, predictable and proportional to the produced value.
- **effectiveness**, ability to respond to business need
On EISB Benefits (3)

- **recoverability**, ability to fully restart after a failure
- **traceability**, ability to give accounts of the performed operations
- **auditability**, being compliant with existing laws and regulations
- **timeliness**, to guarantee that the required operations are performed without introducing unnecessary delay, delivering the right value to the destination
- **precision**, avoid dropping or introducing unnecessary details (info) when operating the required interoperability mappings (statically) and/or transformations (dynamically)
Science Base for Enterprise Interop

It is a science blend, that includes:

- **Application Software Engineering (ICT)**,
- **Enterprise Engineering (Business)**,
- **Knowledge Engineering (Semantics)**,

And, wrapping the above;

- **Enterprise Interoperability Engineering**, 
Levels of the Enterprise Interoperability

Stratified, non exclusive levels

• Simple data items
• Structured documents
• e-Services
• Processes
• Organizations
A Synoptic view

Figure 1 - Interoperability levels and scope
A layered design framework

Figura 2 – Stratified dependency graph of scientific support
An Example

Interoperability solution
- Semantic transformation of exchanged messages

Enabling solutions
- Semantic annotation
- Semantic matchmaking
- Rule-based inference engine

Basic Scientific Methods and Theories
- Description logics, Taxonomic reasoning, Rule-based Knowledge representation and reasoning
Conclusions

In the afternoon!