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 Enterpise Interop

It is a science blend, that includes:

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

And, wrrapping 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

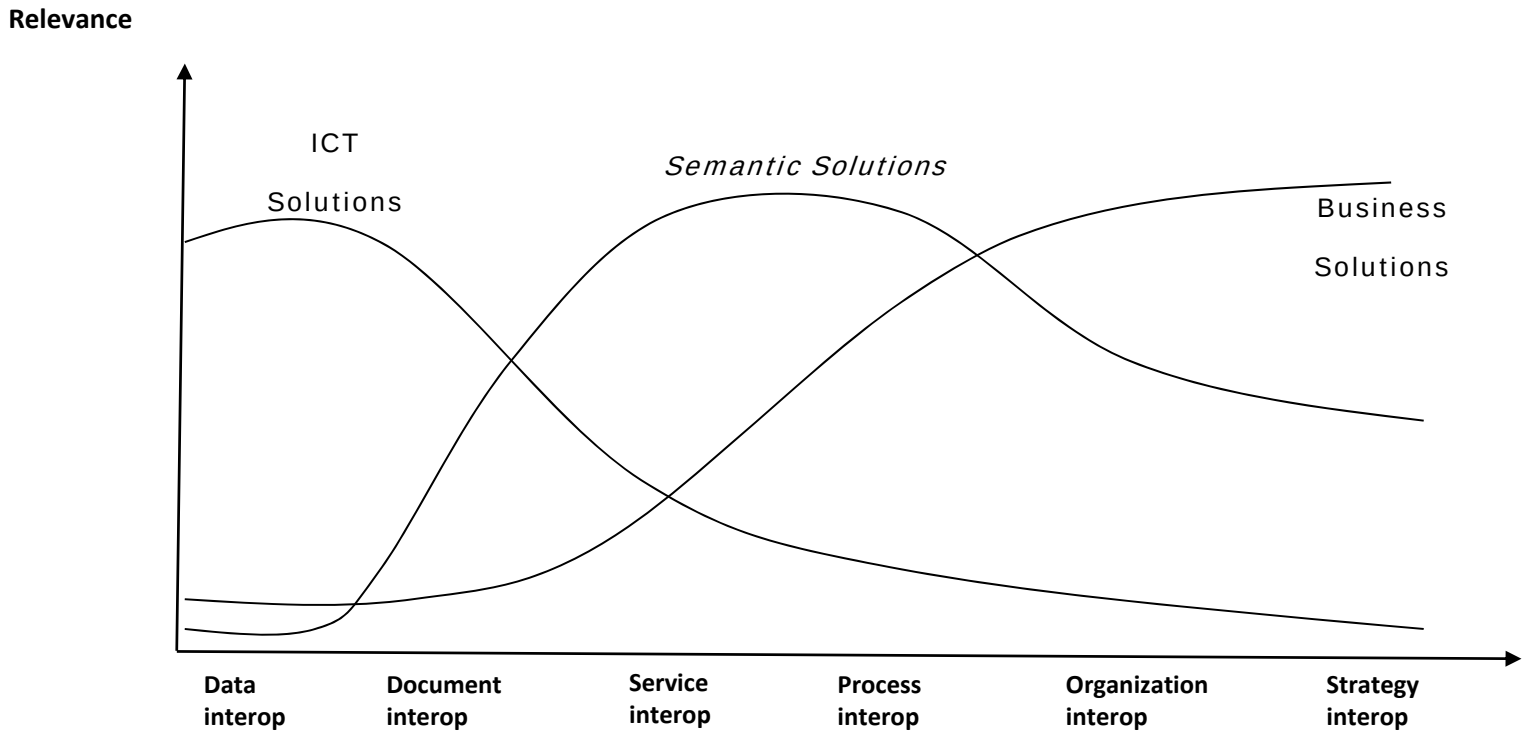

Figure 1 - Interoperability levels and scope

A layered design framework

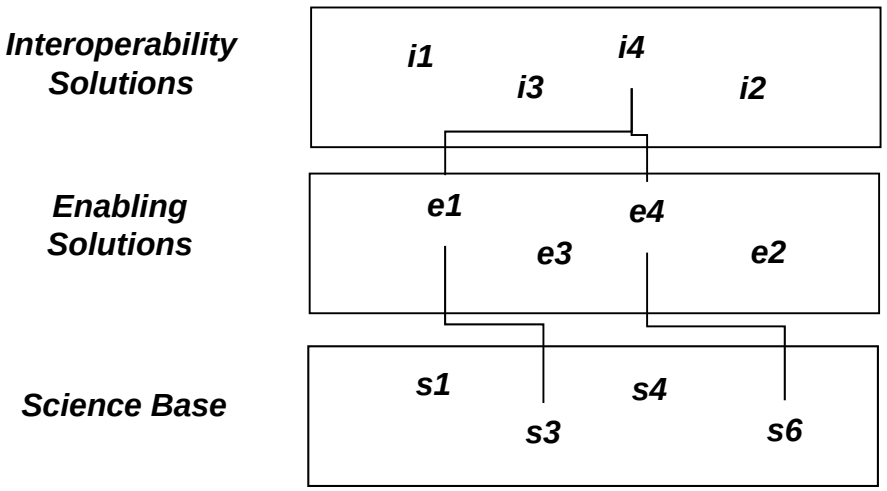

Figura 2 – Stratified dependency graph of scientific support

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!