

System Theory to support Enterprise Interoperability Science Base

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INTRODUCTION

✓ Definition of Enterprise Interoperability

"the ability of an Enterprise to interact with other Enterprises not only on an Information Technology point of view but also on organisational and semantic point of views. This interaction must be flexible and developed at the lower cost". INTEROP-VLab (http://www.interop-vlab.eu/)

- The research at European level has started in 2000:"creation of an ad-hoc group", then.....
- Today: concepts , domain, problematic, some solutions .are proposed
- ✓ The scientific domain must be developed
- Analogy with Enterprise Modelling (EM) in 80ies: creation of a Science Base based on System Theory in which IMS/LAPS/GRAI has strongly contributed.



Contribution to Sciences Base in El

Two main scientific approaches:

- Natural science: observe the real world phenomena in order to explain and understand
- Artificial Science : engineering science to elaborate solutions to achieve a pre-defined engineering goal (control, design,...)
- ✓ Contribution to EI:
- Natural science: observing the phenomena of noninteroperability and explain why systems are not interoperable
- Science of artificial: elaborate repeatable and verifiable solutions to solve interoperability problems



WHY non-interoperability? (on Natural Science)

- Because incompatibilities of various kinds
- Three kinds of barriers (dimension of interoperability)
- conceptual, technological, organizational
- in four interoperability aspects (dimensions of interoperability concerns):
- data, service, process, business.
- with three various 'Interoperability Approaches' : basic ways to remove barriers:
- integrated, unified, federated Results of INTEROP NoE project



A Framework for solving El problems



Proposed to Standardization



System Theory (on Artificial Science)

- ✓ System Theory : Herbert Simon
- System Theory: application in various disciplines: biology, physics, economy, organisation, computer sciences, cybernetics.....
- ✓ **Definition of a system**: a set of elements in relation





System of Systems

- System theory aims to represent (to model) the realities of a, concretes or abstract system,
- describing the global
 (top down) and the
 local (bottom up)
 structure
 and their relations





Contribution of System Theory

- build rigorous scientific foundation to interoperability development
- Allow to model the organisational interoperability
- To support the search of coherent solutions



Application: ATHENA project





GRAI Modellin Process (Global view)





GRAI Process modelling (detailed view)







GRAI decision model

	Informati Externes IE	Retailers Cust	Logistics Manufacturer Log	Product Design Manufacturer PD	Production Manufacturer Prod	Purchasing Manufacturer Pur	Suppliers Supp	Informat Internes II
H = 2 ans P = 6 mois Strat 10			Commercial Strategy Catalogue		Business Planning	Strategy to select Suppliers		Sales statistics
H = 1 an P = 1 mois Tact 20		Commercial Plan	Commercial Plan		Master Scheduling	Selection of suppliers Trade agreement /Periodic Monitoring /Order	Sale planning / ■Periodic Report ਨੂੰ	List of agreed and active Suppliers / Order statistics / Supplier Performance and Quality Indicators / Periodic Report
H = 2 mois P = 1 semaine Ope 40					Planning ▼ serial	Procurement orderserial		
H = 3 semaines P = 1 jour Ope 50	Customer	Elaboration orders	Orders regitration	Design and _Manufacturing Restrictions	planning spec ord	Procurement order special	Order Processing	_Workshop
	IE	Cust	Loa	PD	Prod	Pur	aduS	



Conclusions

- Science Base for Enterprise
 Interoperability is not a dream
- Natural Science contributes to define Solutions Space
- Artificial Science (System Theory) contributes to the search of solutions
- ✓ Education problem
- Cultural aspect in Industry

