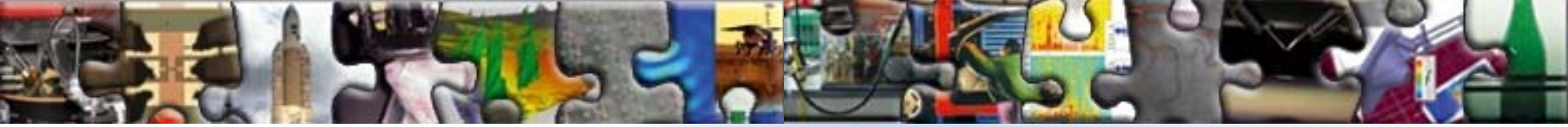

System Theory to support Enterprise Interoperability Science Base

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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.

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Contribution to Sciences Base in EI

✓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 non-interoperability and explain why systems are not interoperable
- Science of artificial: elaborate repeatable and verifiable solutions to solve interoperability problems

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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

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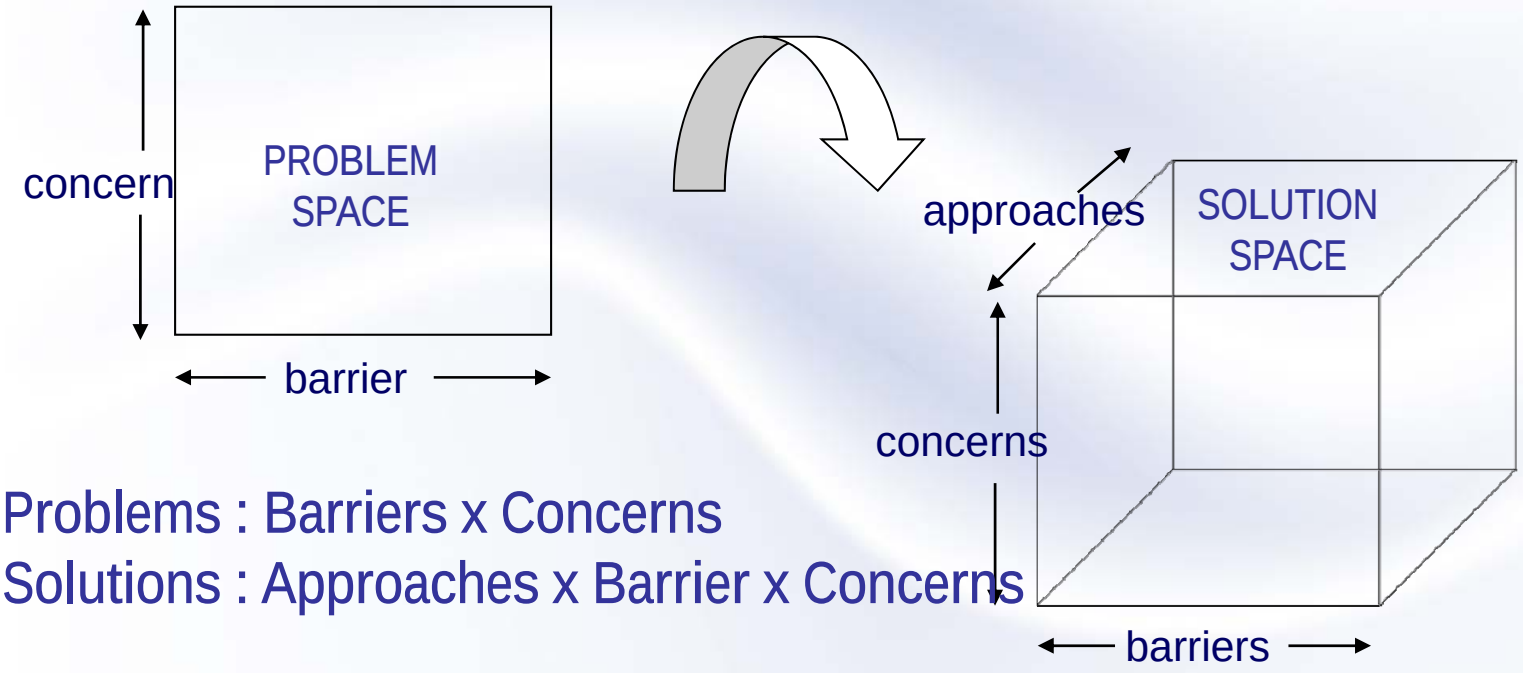
A Framework for solving EI problems



Problems : Barriers x Concerns

Solutions : Approaches x Barrier x Concerns

Results of INTEROP-NoE

Proposed to Standardization

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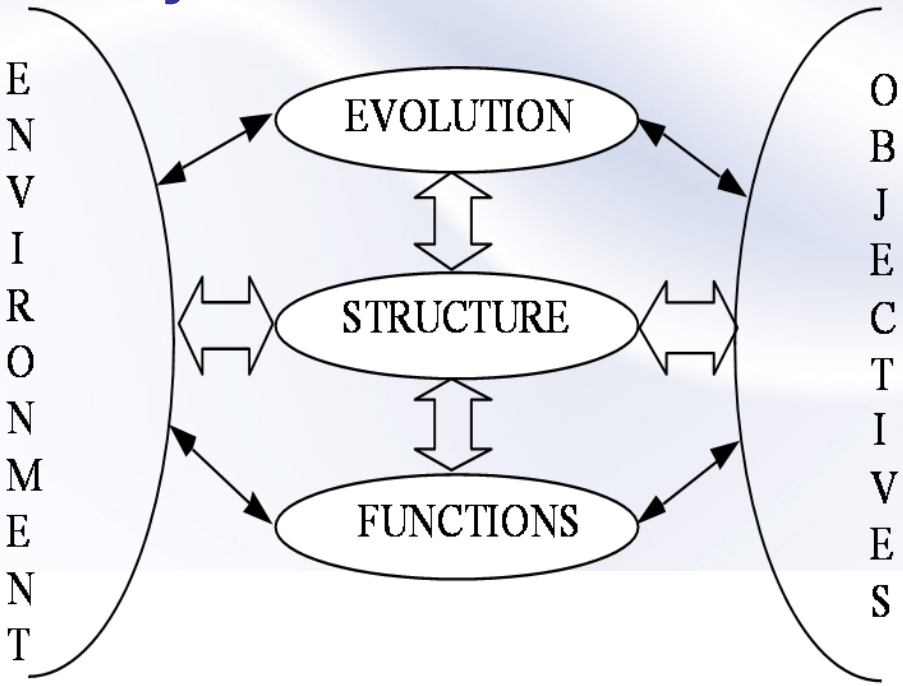
System Theory (on Artificial Science)

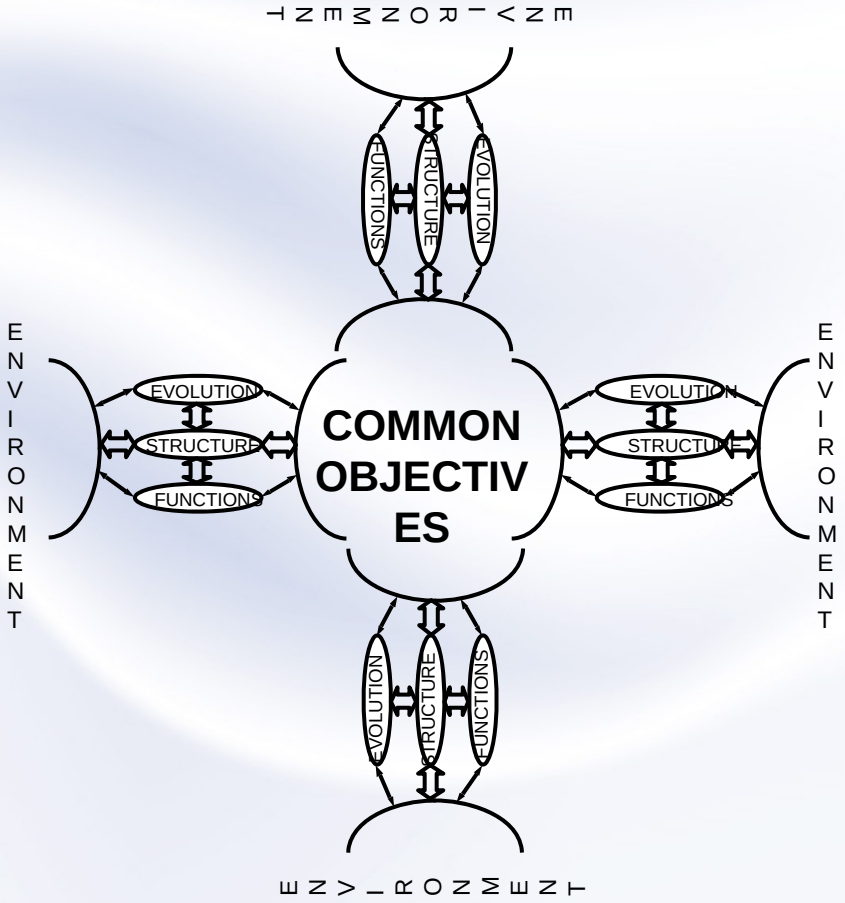
- ✓ System Theory : Herbert Simon
- ✓ System Theory: application in various disciplines: biology, physics, economy, organisation, computer sciences, cybernetics…..
- ✓ **Definition of a system**: a set of elements in relation



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

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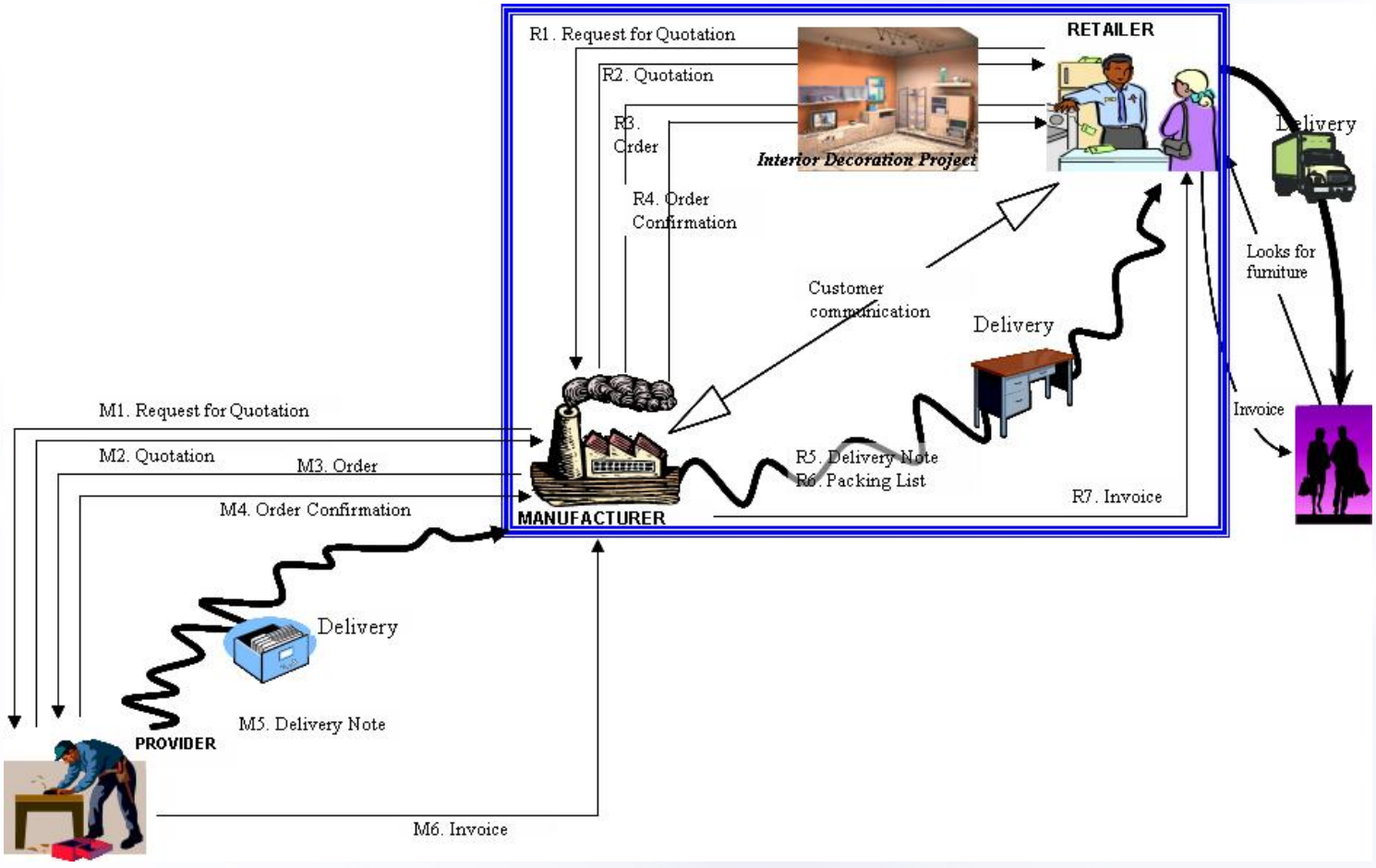
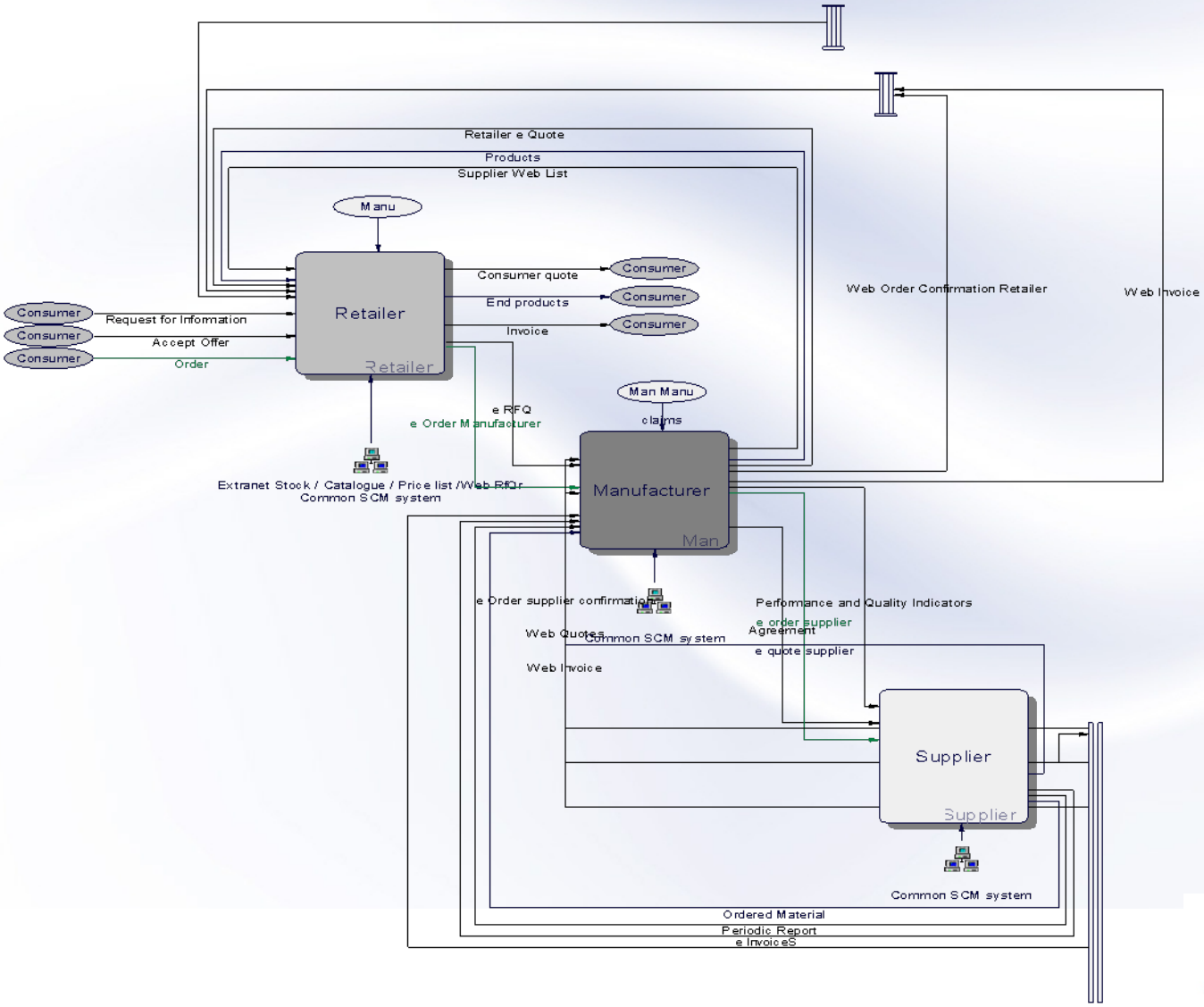
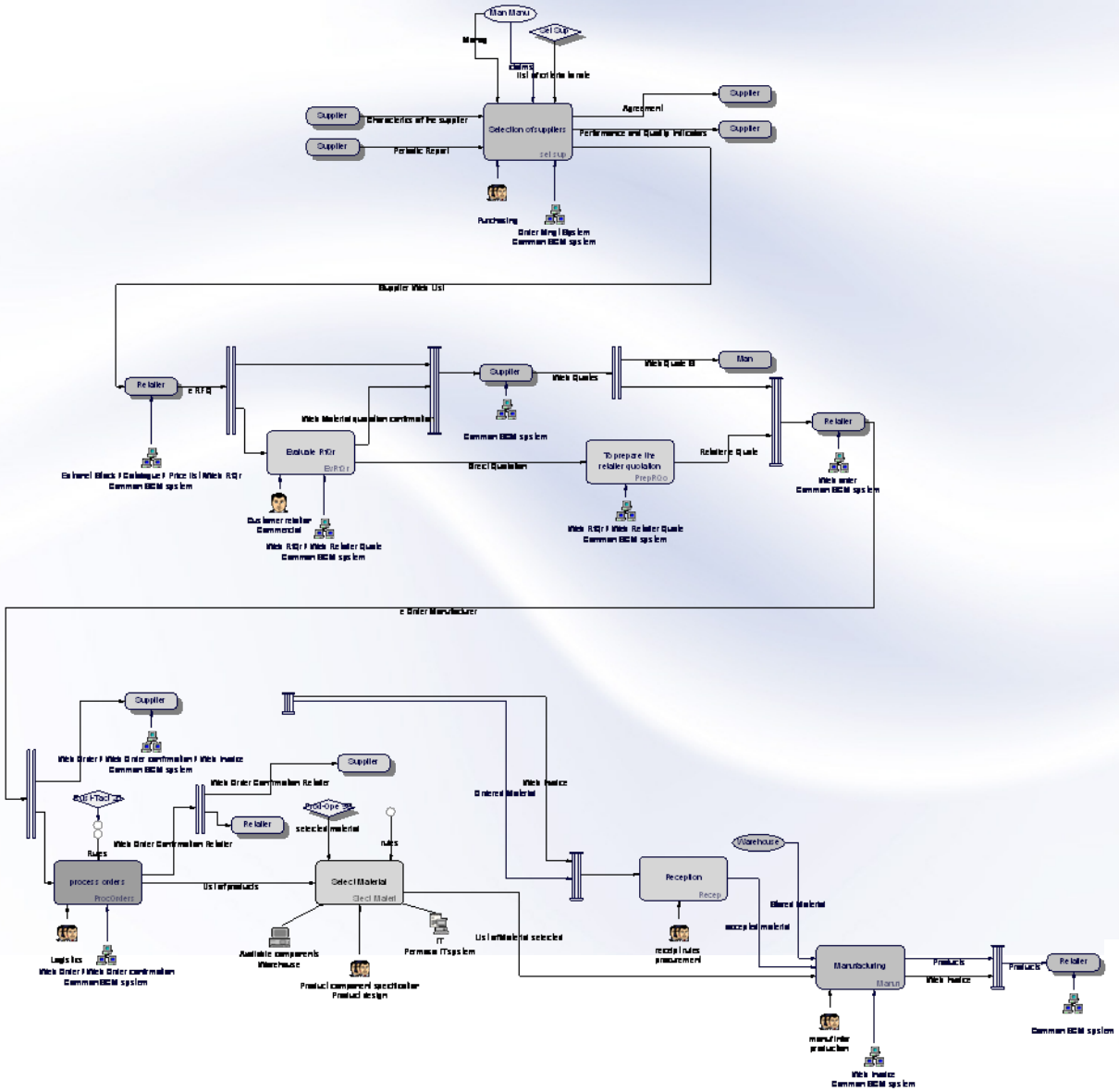
Application: ATHENA project



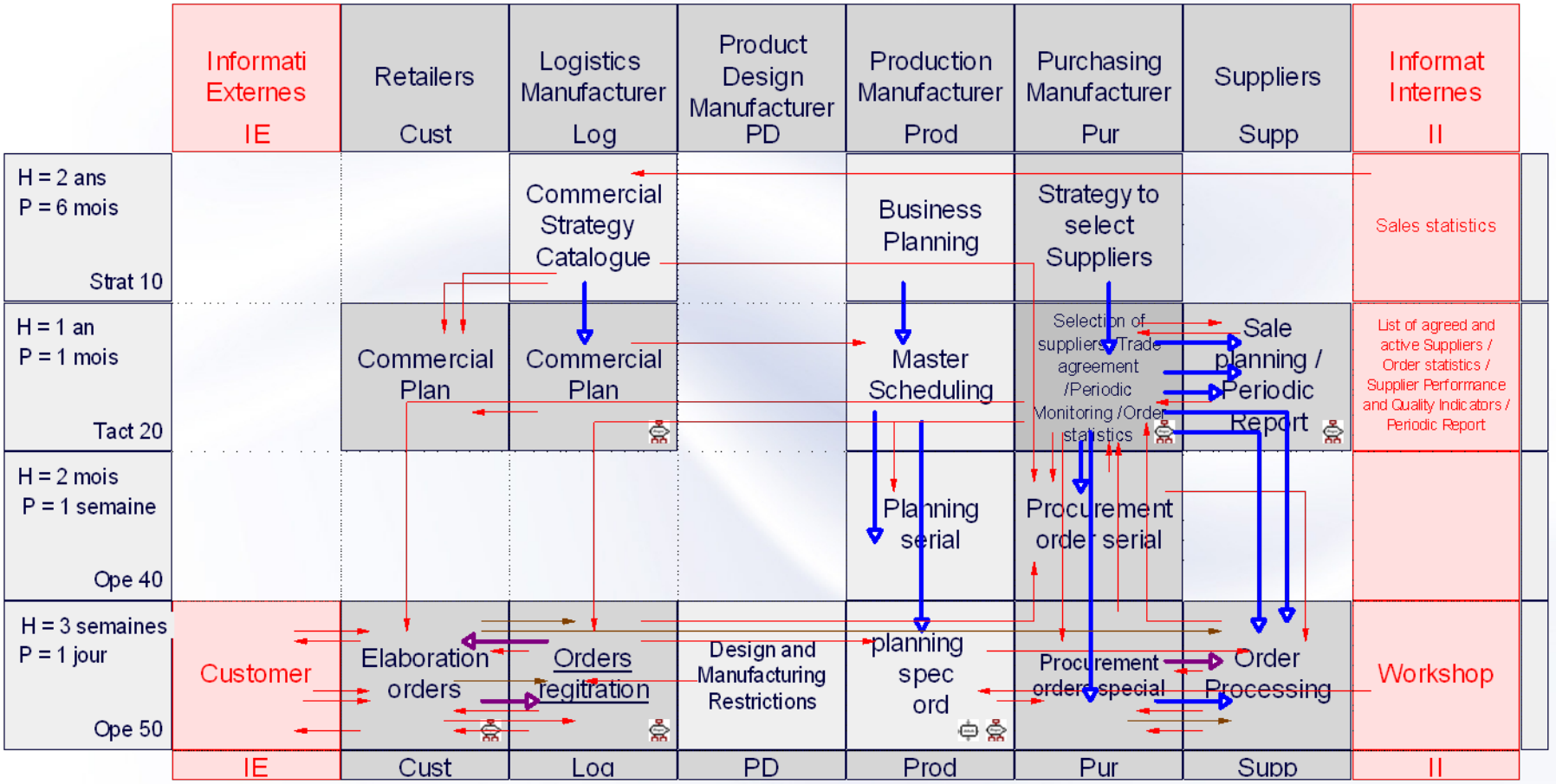
GRAI Modellin Process (Global view)



GRAI Process modelling (detailed view)



GRAI decision model



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

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