



Decrypting the Innovation Process and Corporate Memory

via a MBSE and Architecture

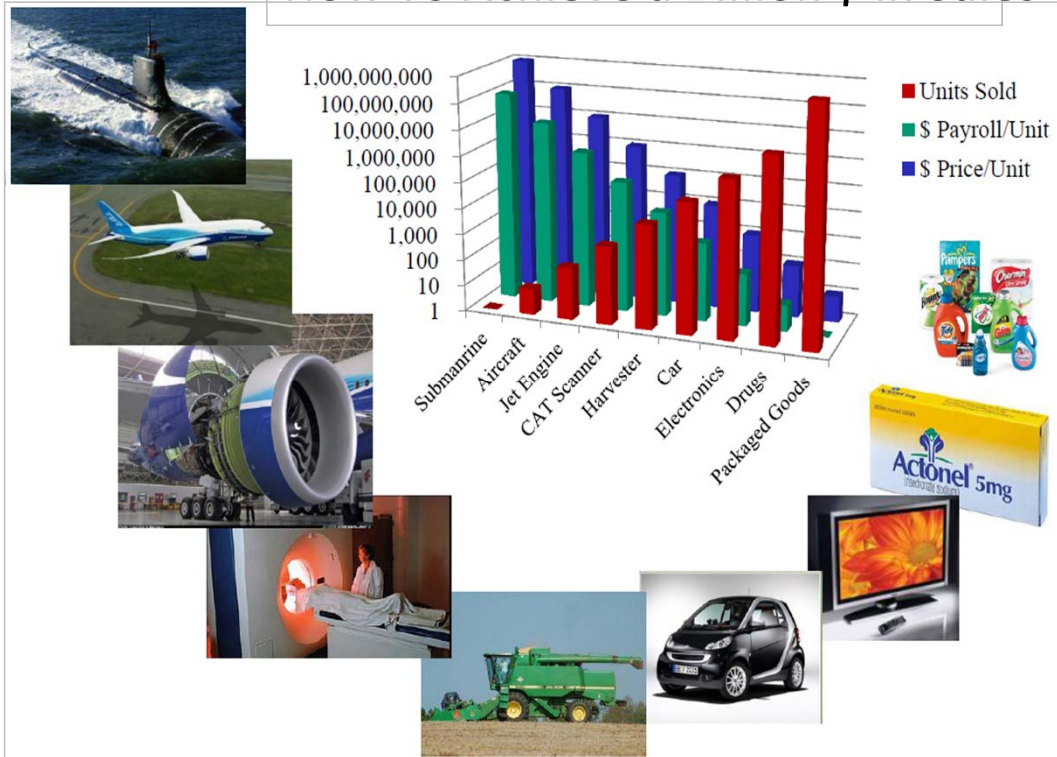
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Agenda:

- Introduce P&G
- Problem
- Solution Strategy
 - Canonical systems model
 - IT architecture
- Strategy Realization
 - P&G prototype solution
 - “Knowledge Based Systems Engineering” (KBSE) consortium

What does CPG and Aero, Auto, Mil Have in Common?

How To Achieve a Billion \$ in Sales



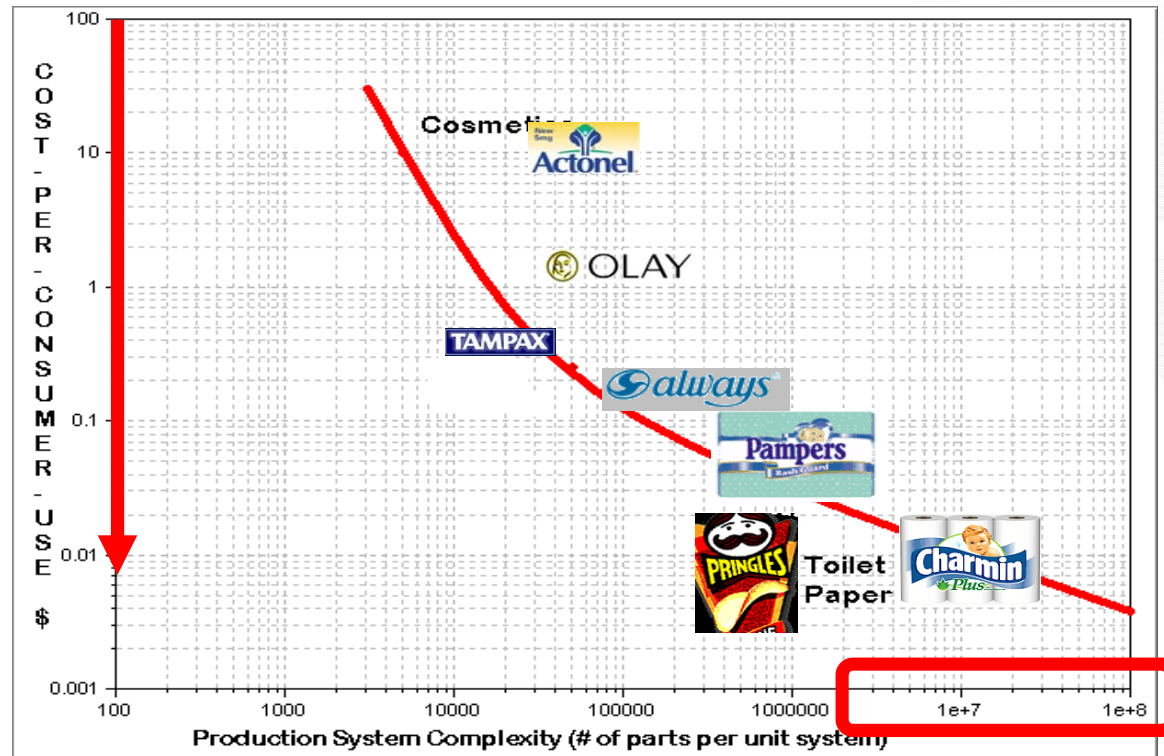
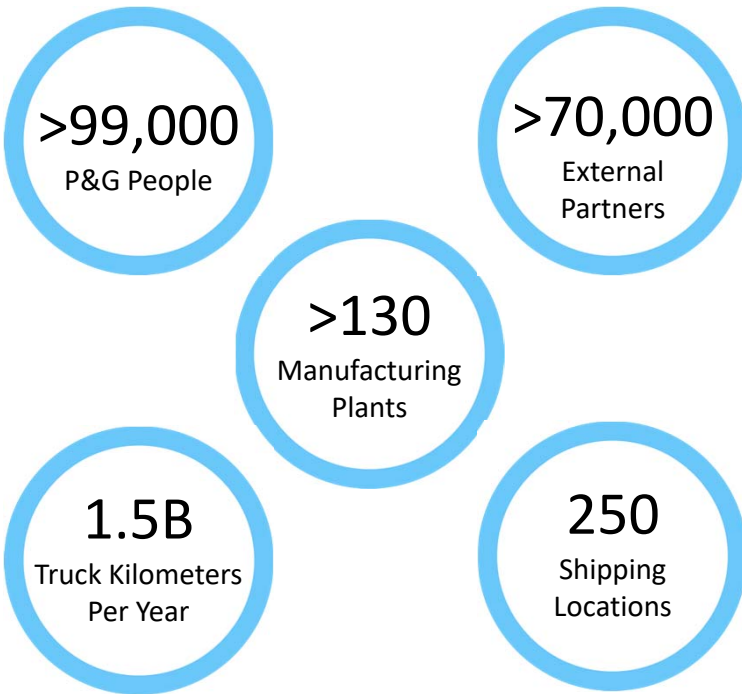
Initiative Differences:

New product lifecycle: <2 years vs 10+ years

Product/Service Similarities:

- Simple goals:
 - Deliver payload
 - Absorb spill
- Complicated delivery
 - Multi-physics (device to molecule)
 - Heavy use of super-computers for simulations
 - Regulatory requirements

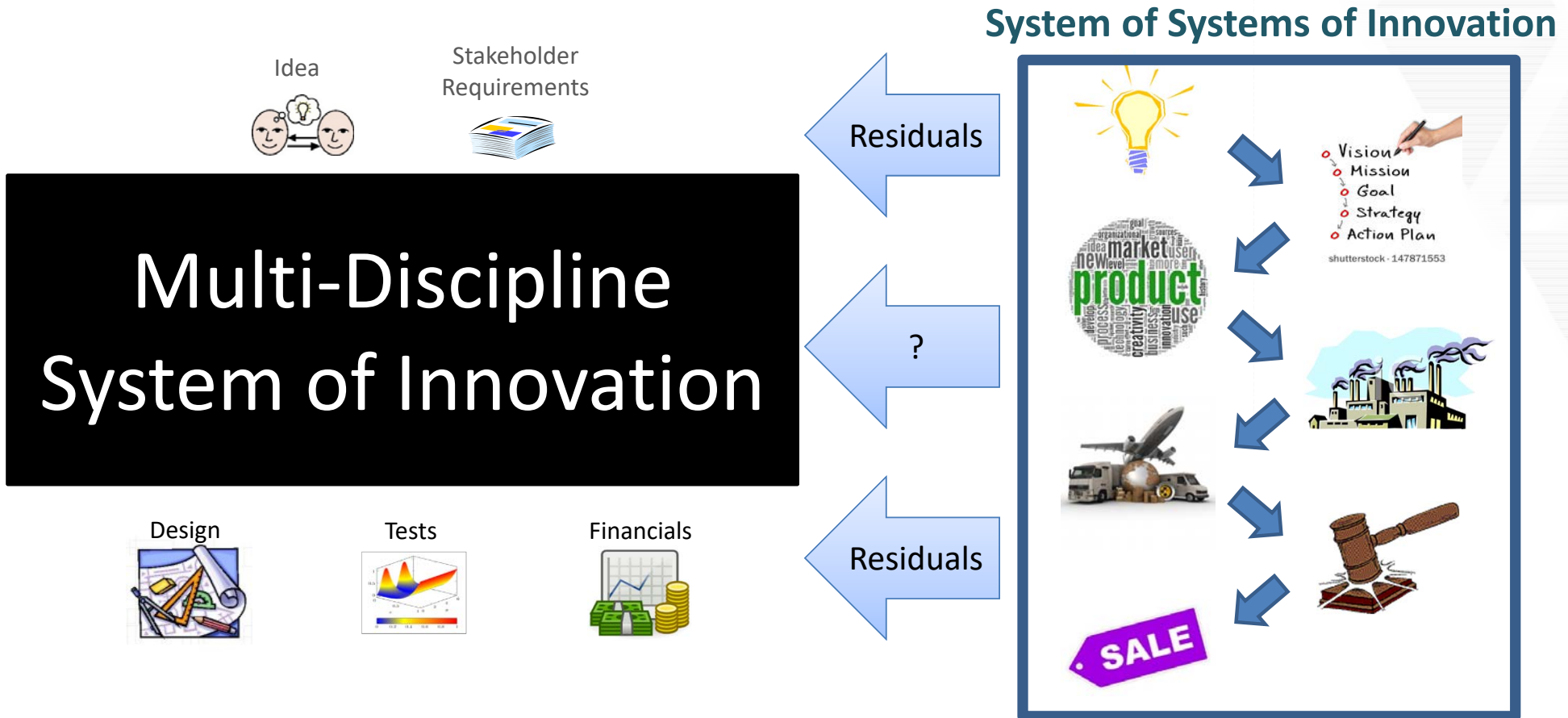
Similar "System of Systems" Complexity



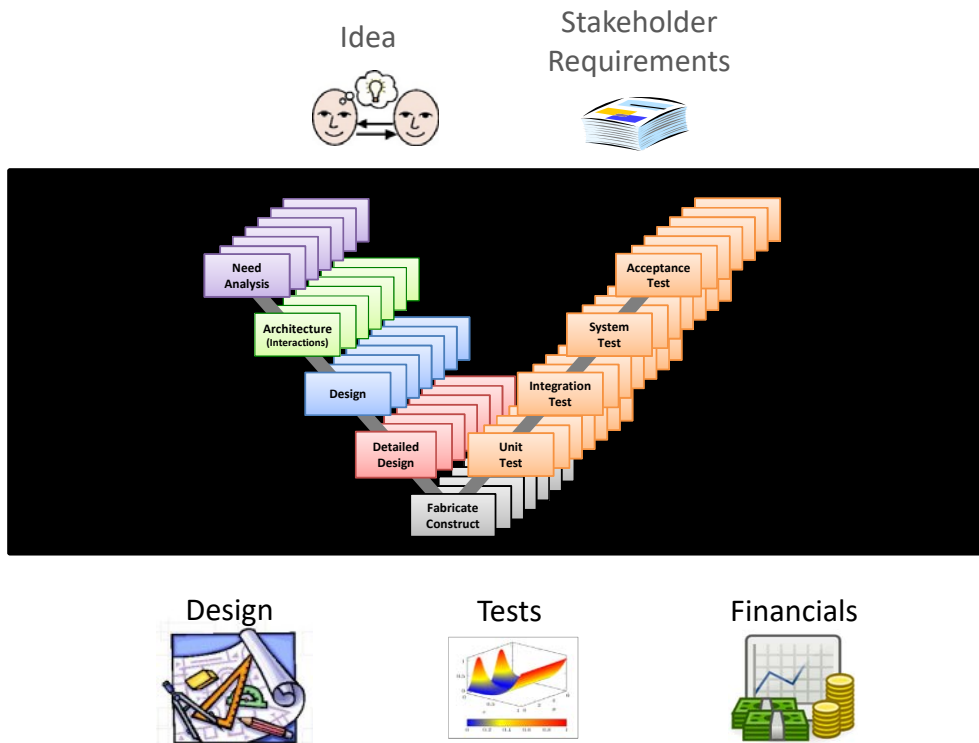
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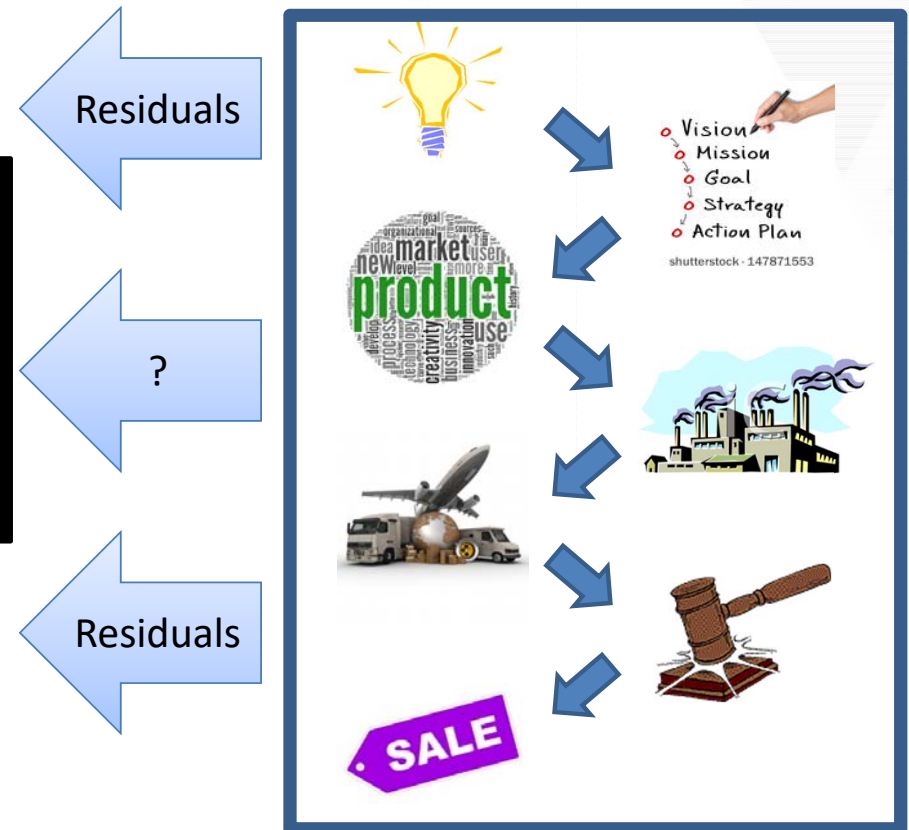
Common Challenge: Innovation Black Box



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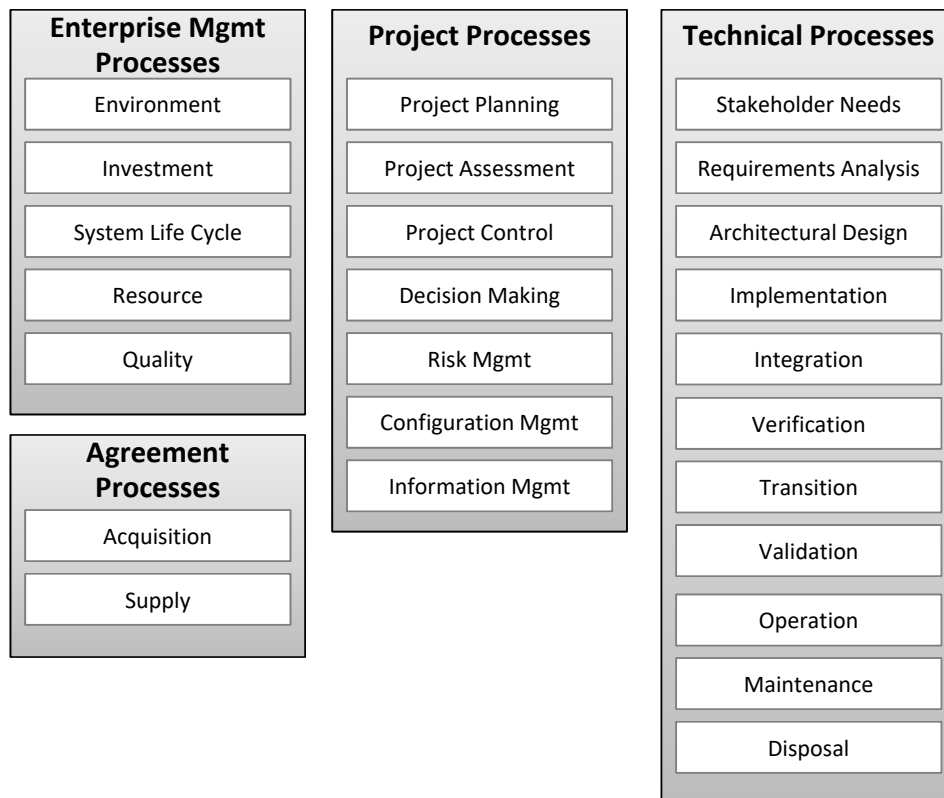


System of Systems of Innovation

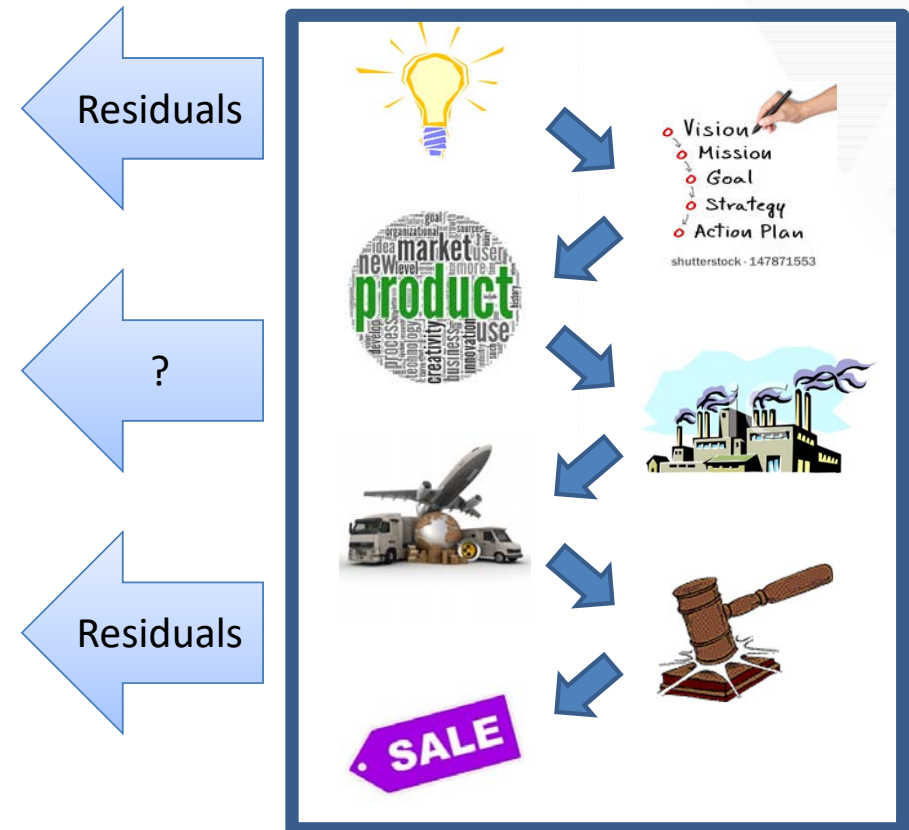


Work Process: for Systems Lifecycle Mgmt

ISO-15288 Industry Standard Process Framework

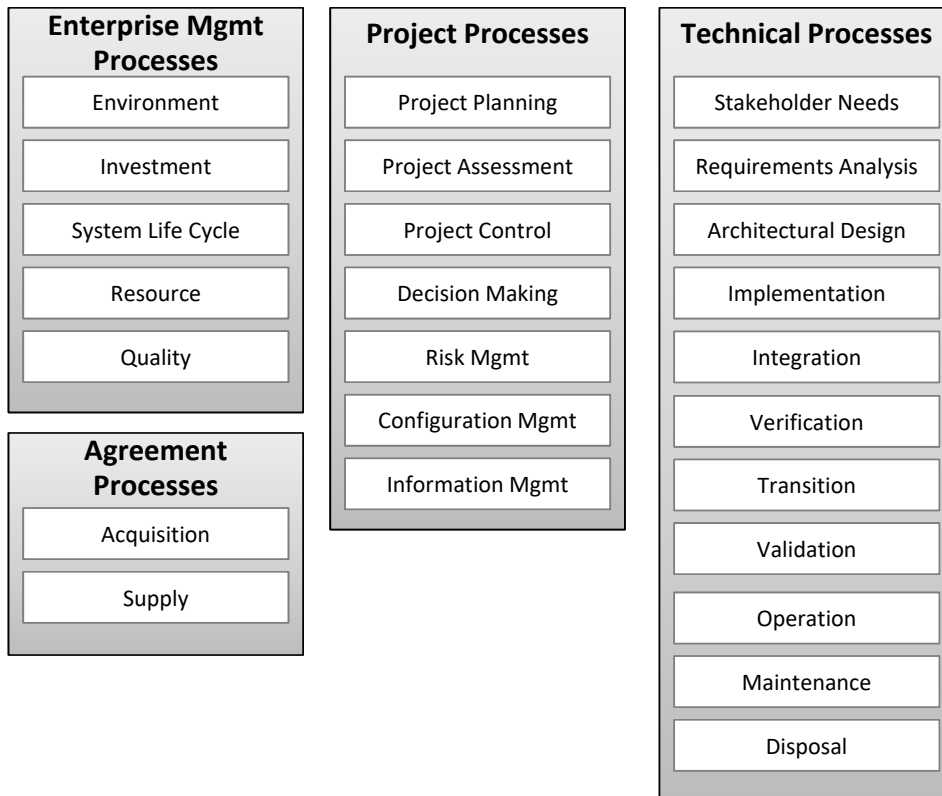


System of Systems of Innovation



Work Process: Carried out in silos

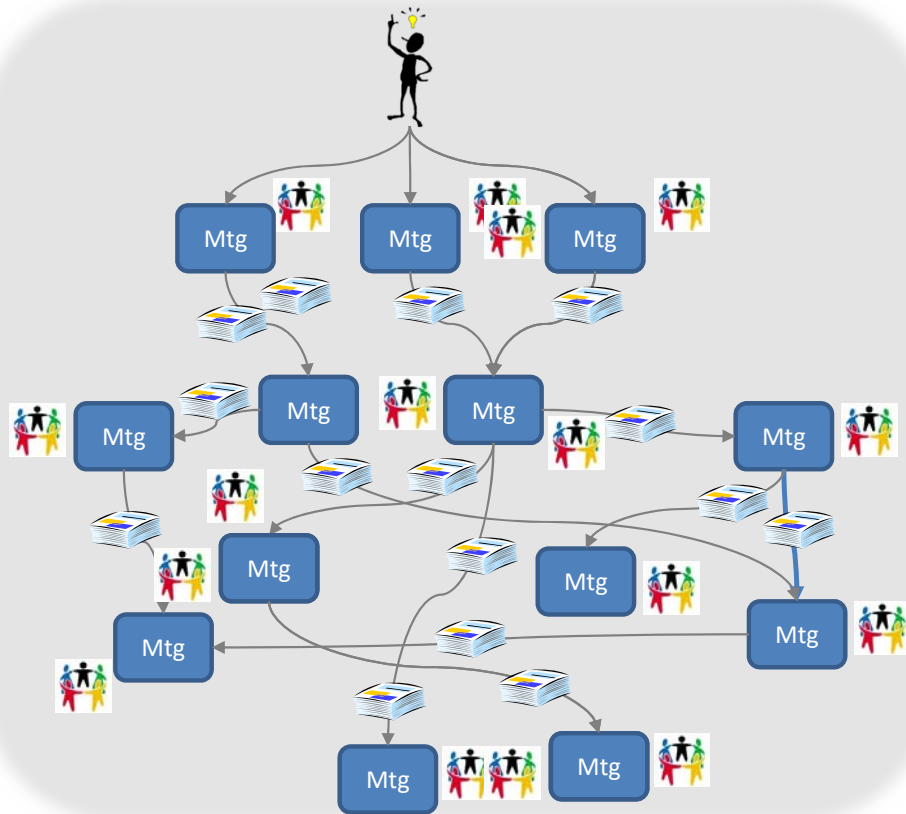
ISO-15288 Industry Standard Process Framework



Discipline Based Governance



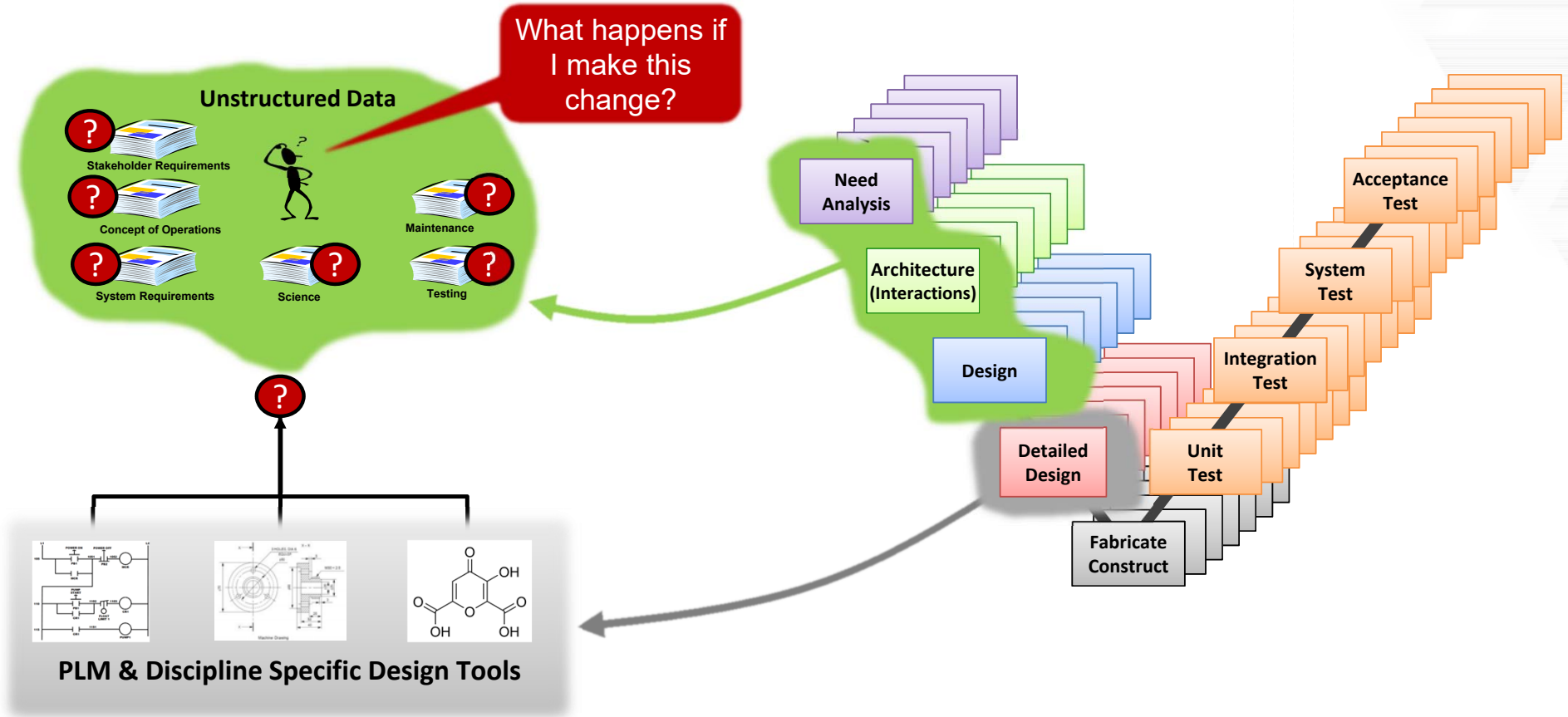
Innovation White Box



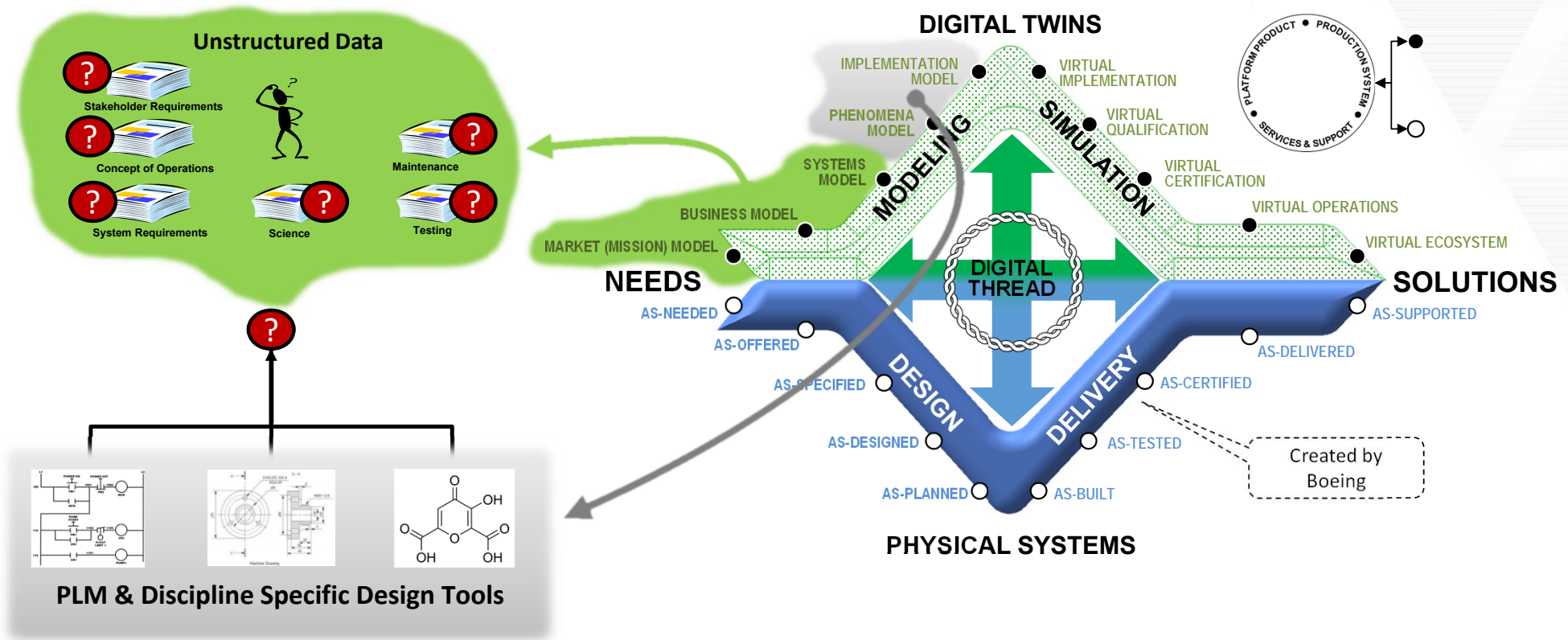
Discipline Based Governance



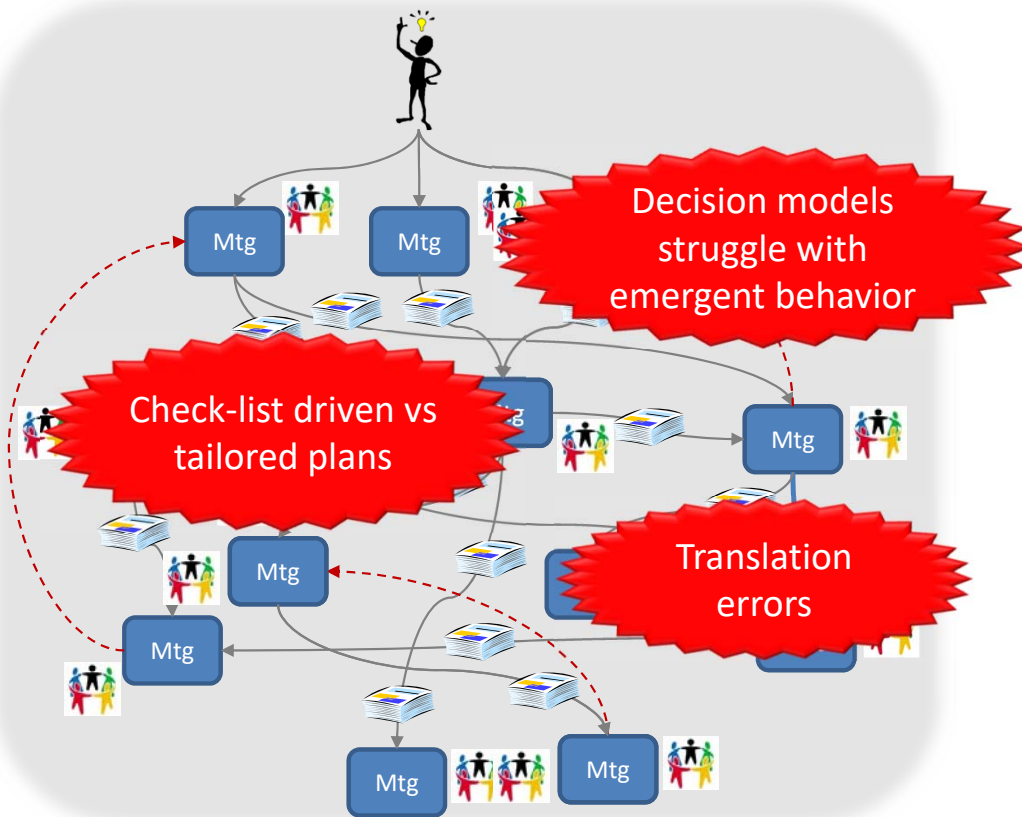
V-Model: Unstructured == Encrypted



Diamond Model: Unstructured == Encrypted



Costs of Lack of Structure & Traceability

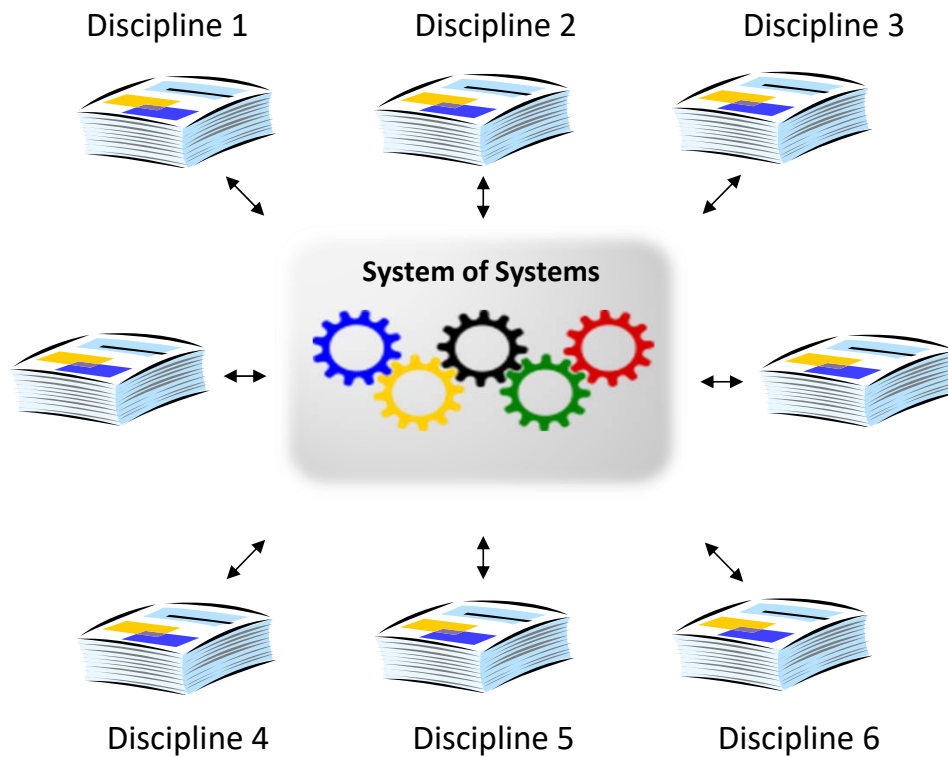


- Requirements Mgmt
 - awareness trade spaces
 - incorrect requirements
 - overlooked requirements
 - overly constrained requirements
 - pre-mature convergence on solution
- Knowledge Re-Use
 - "why" knowledge
 - "how to" knowledge

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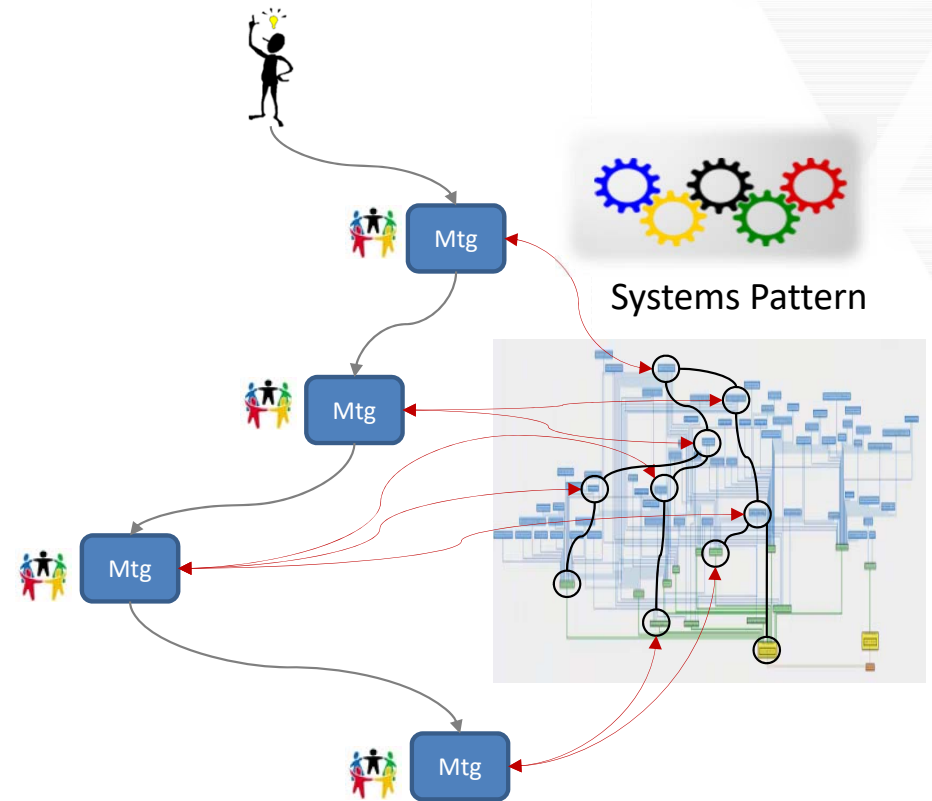
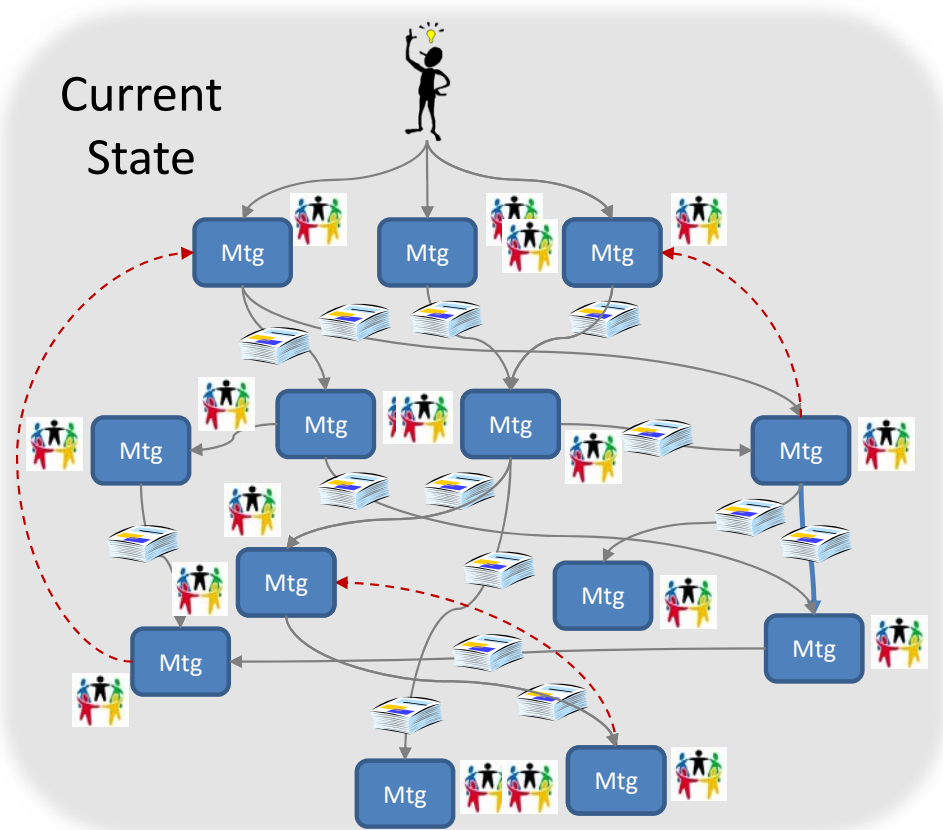
Each discipline re-inventing system description schema to provide requirements context



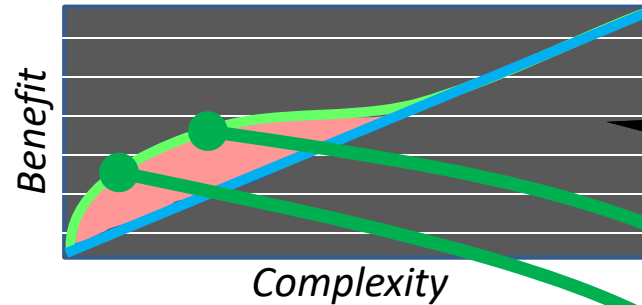
Discipline Based Governance



System Driven Initiative Plans



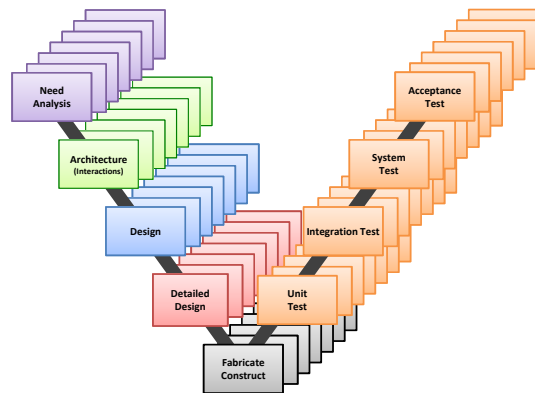
Structured Data Options?



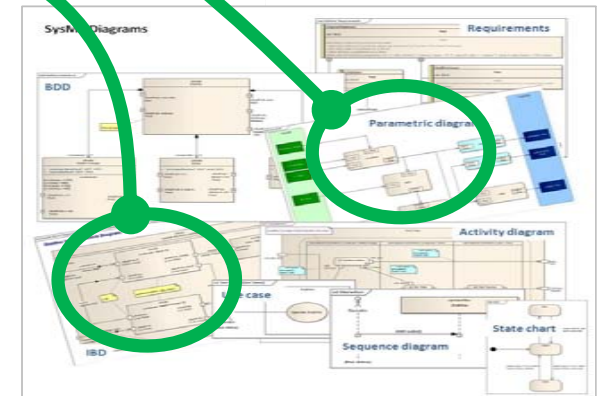
Reality
VS
What People Want

Triple Store for "Linked Data"

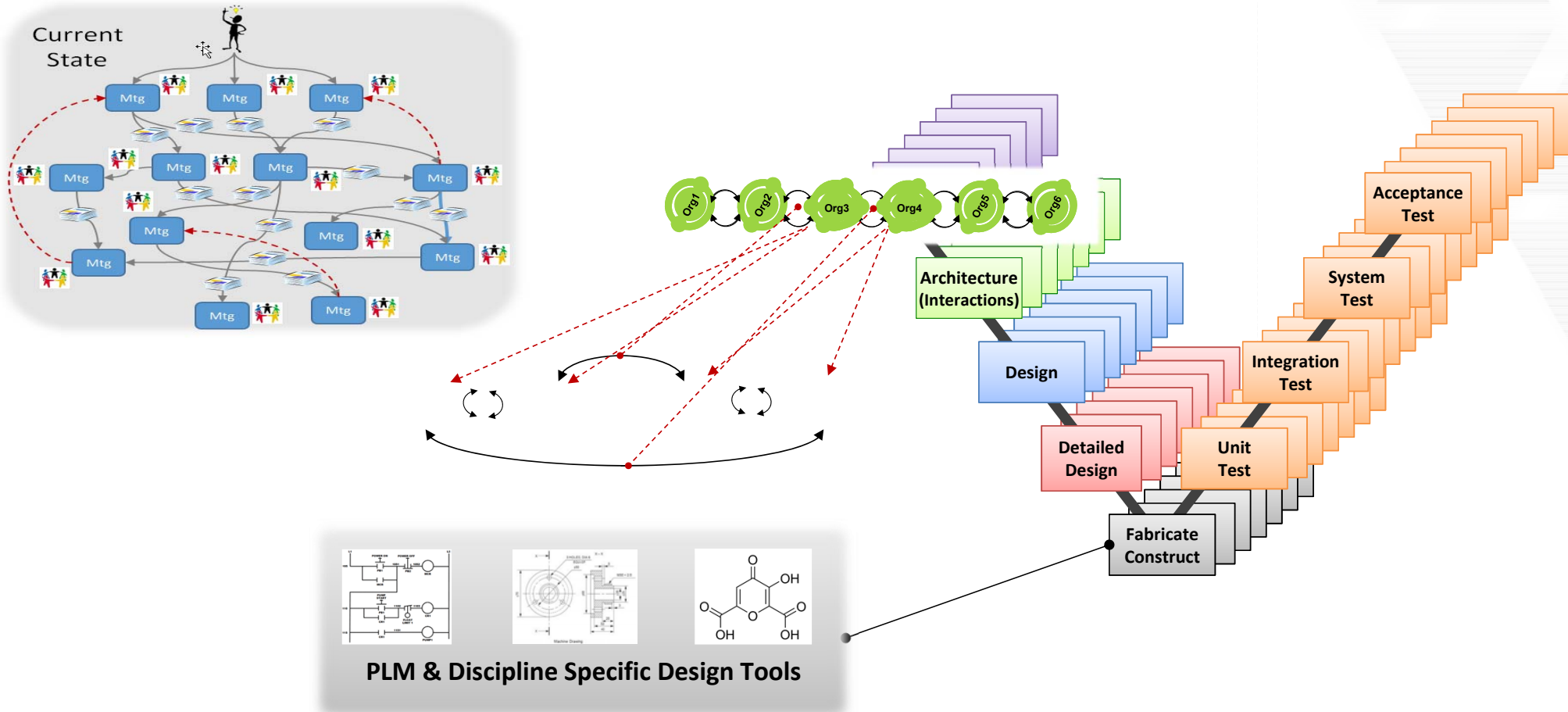
Subject	Predicate	Object
Requirement	Assigned To	Design Component
Requirement	Verified By	Test
etc	etc	etc



SysML



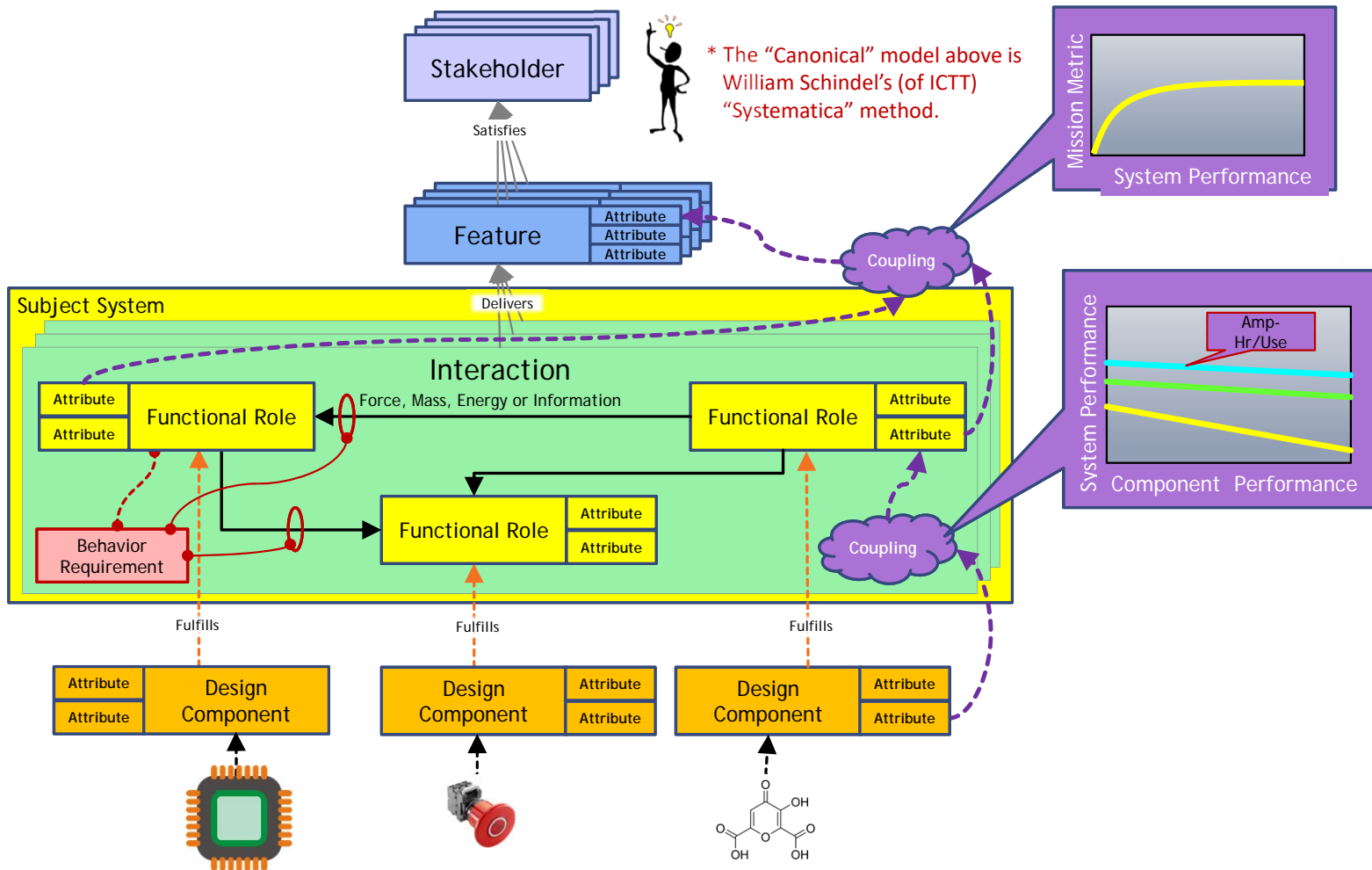
Requirement: Cross Discipline, Concurrent



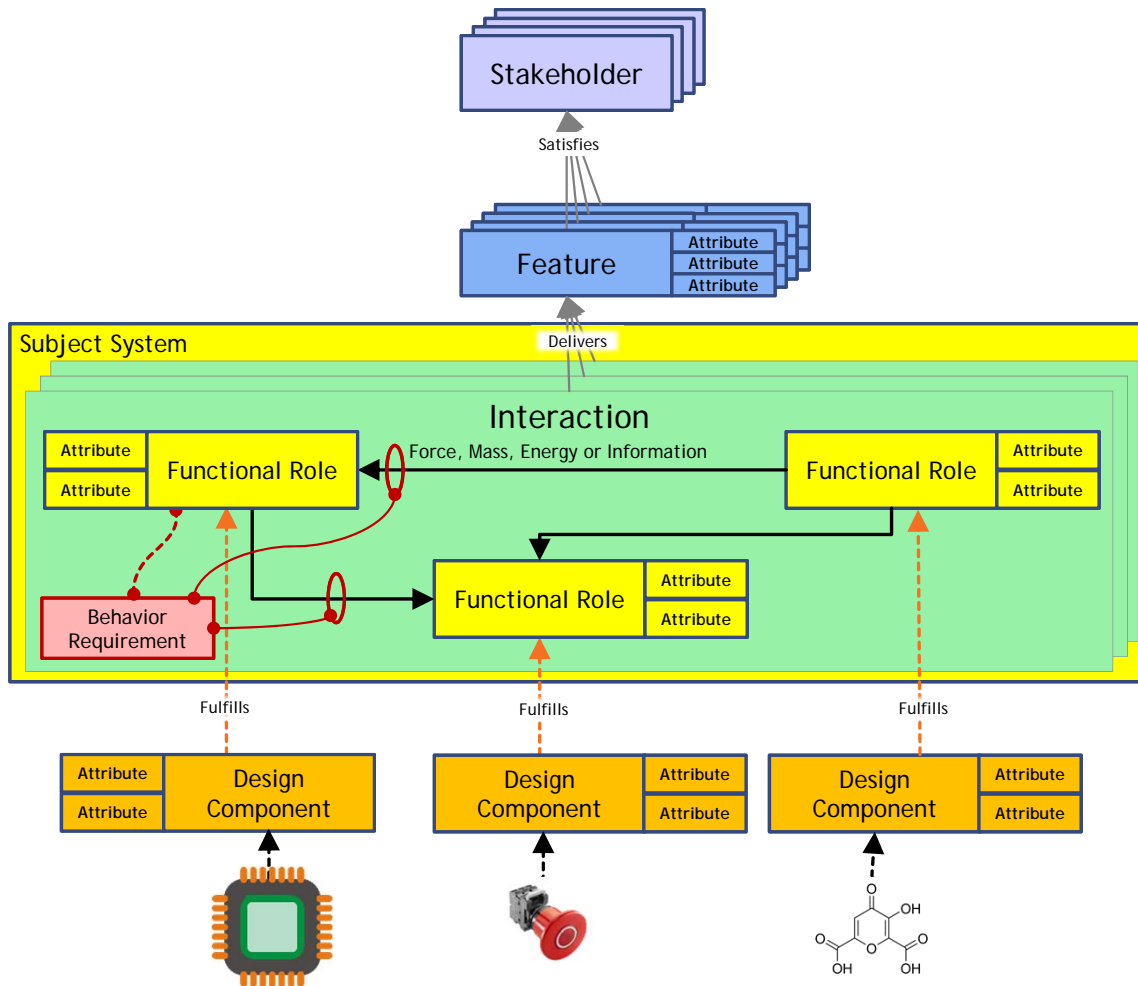
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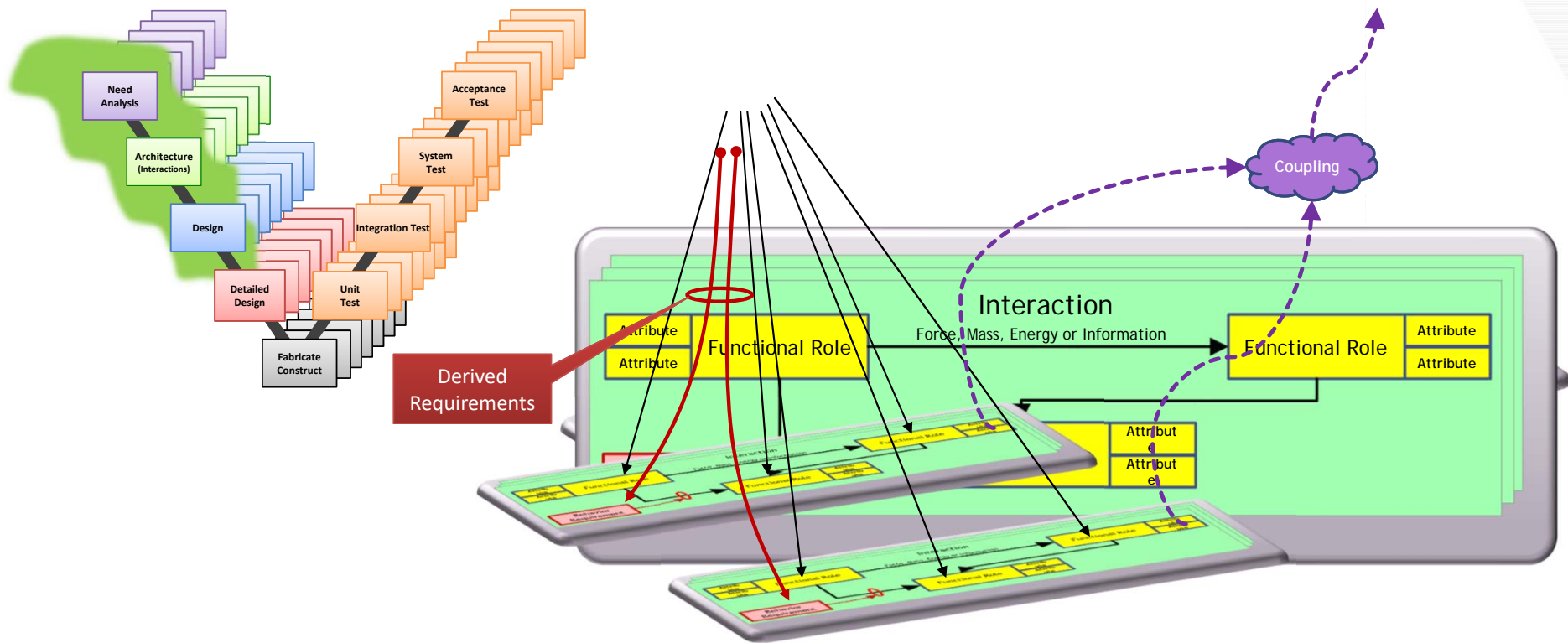
Canonical Systems Knowledge Model



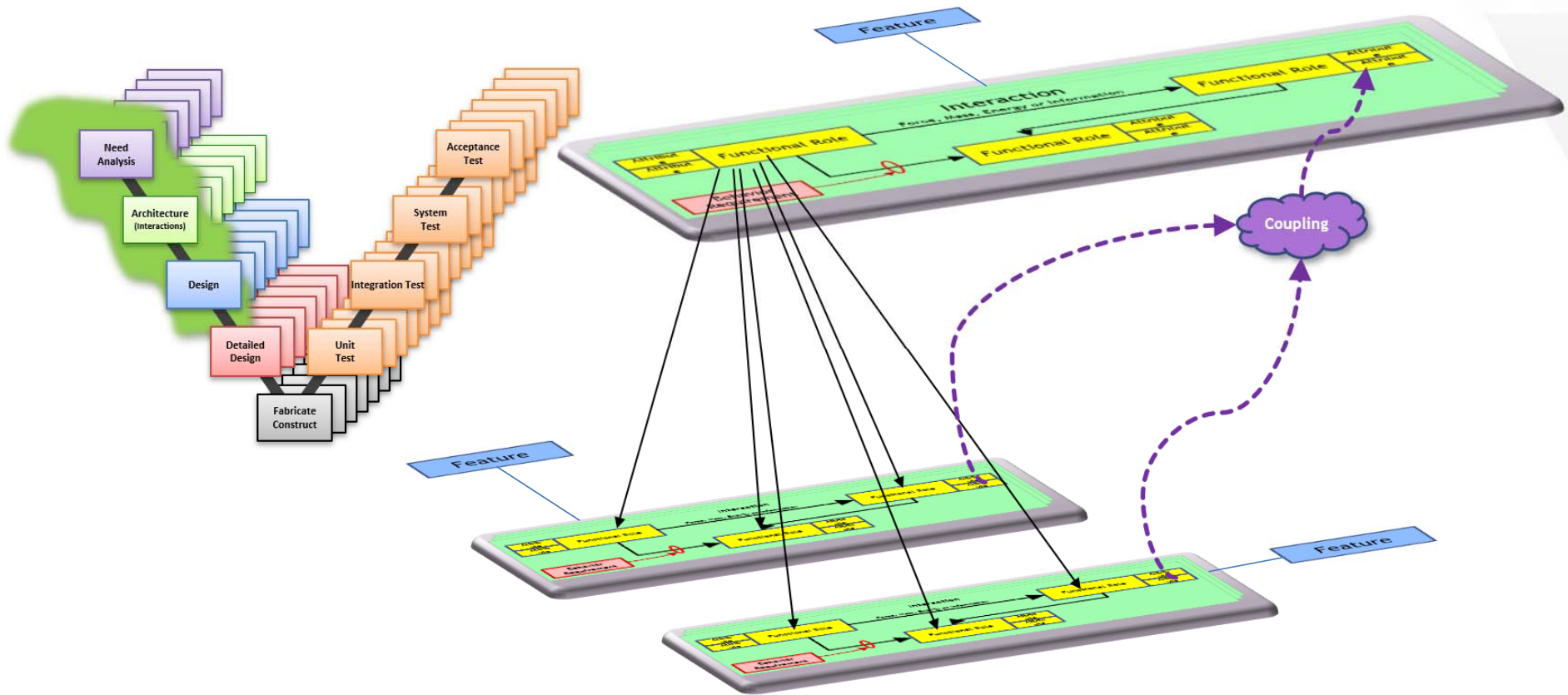
Canonical Systems Knowledge Model



Canonical Systems Model: Fractal



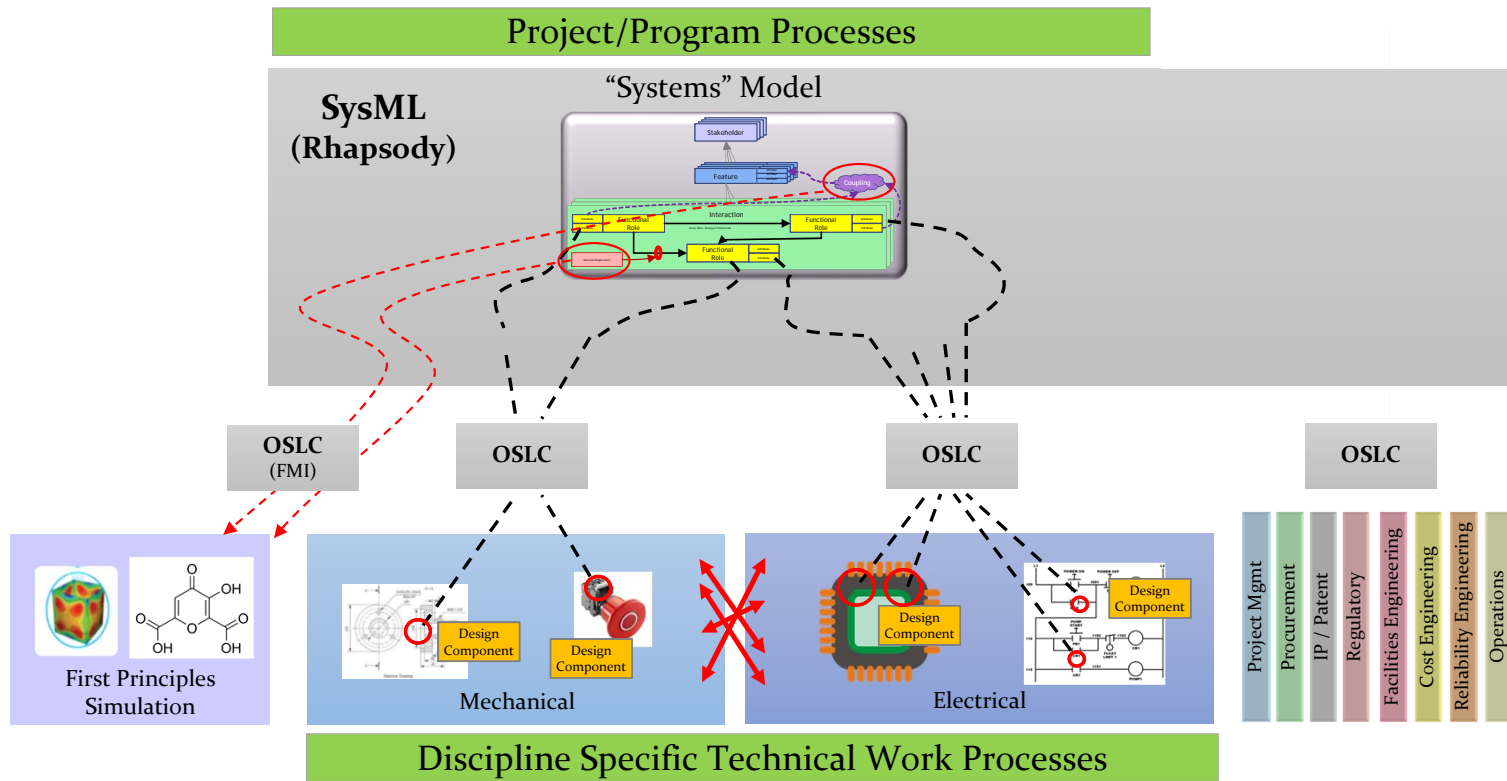
Canonical Systems Model: Fractal



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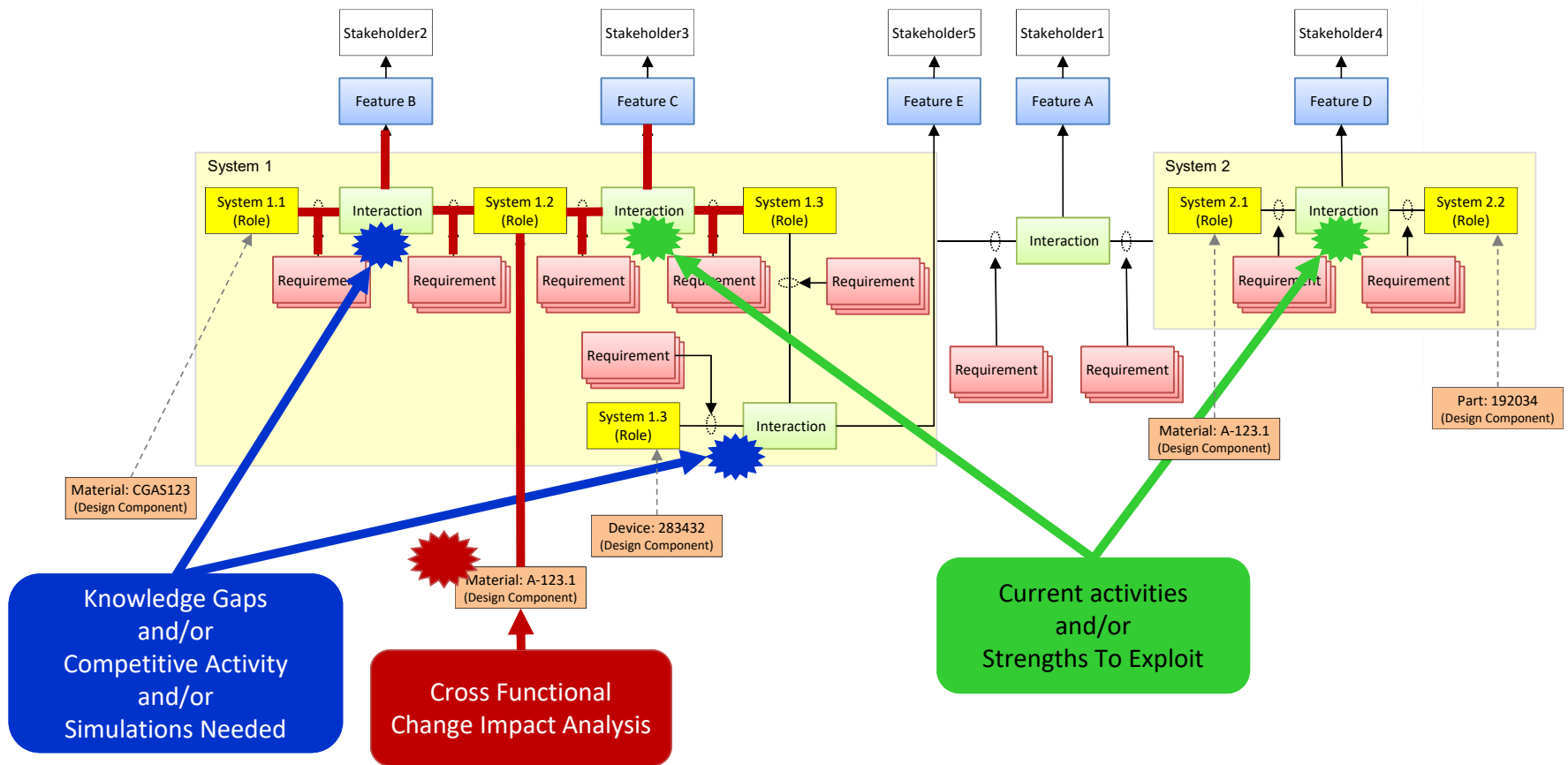
IT Architecture Implications



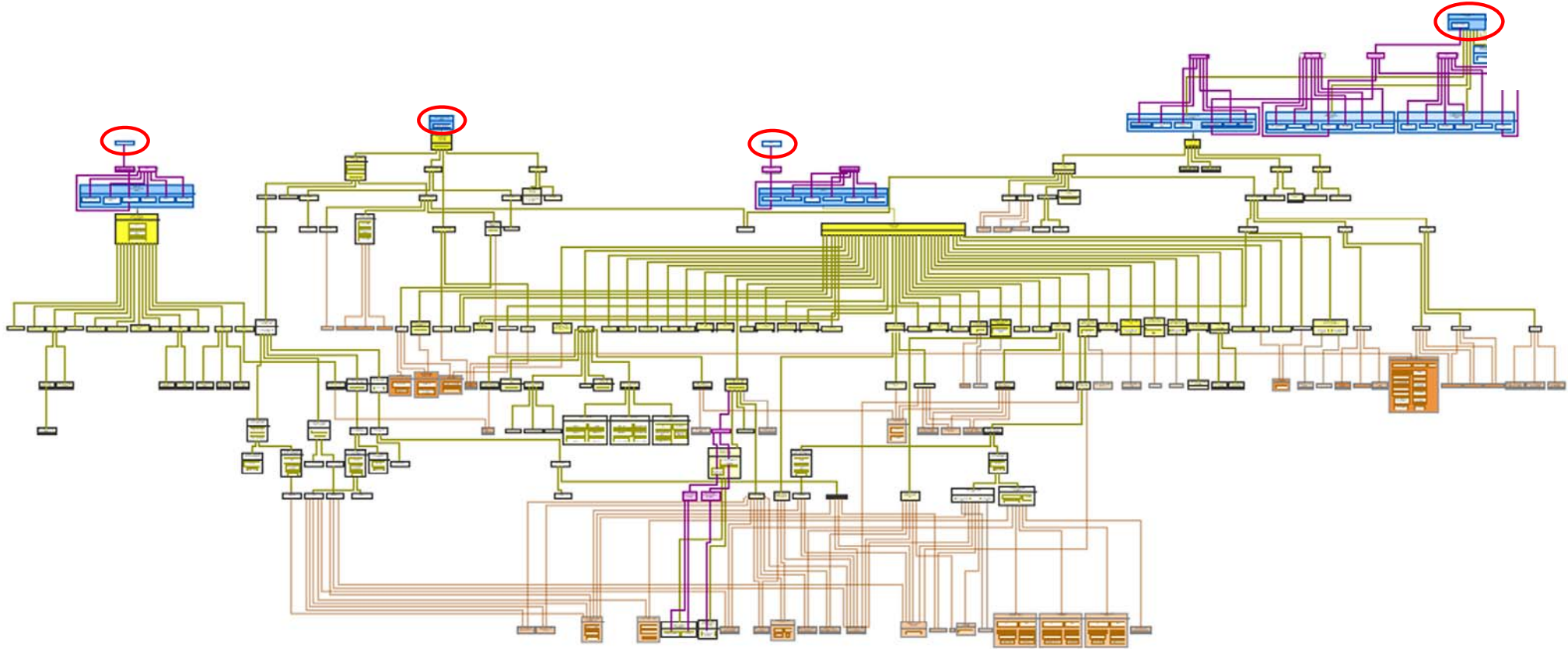
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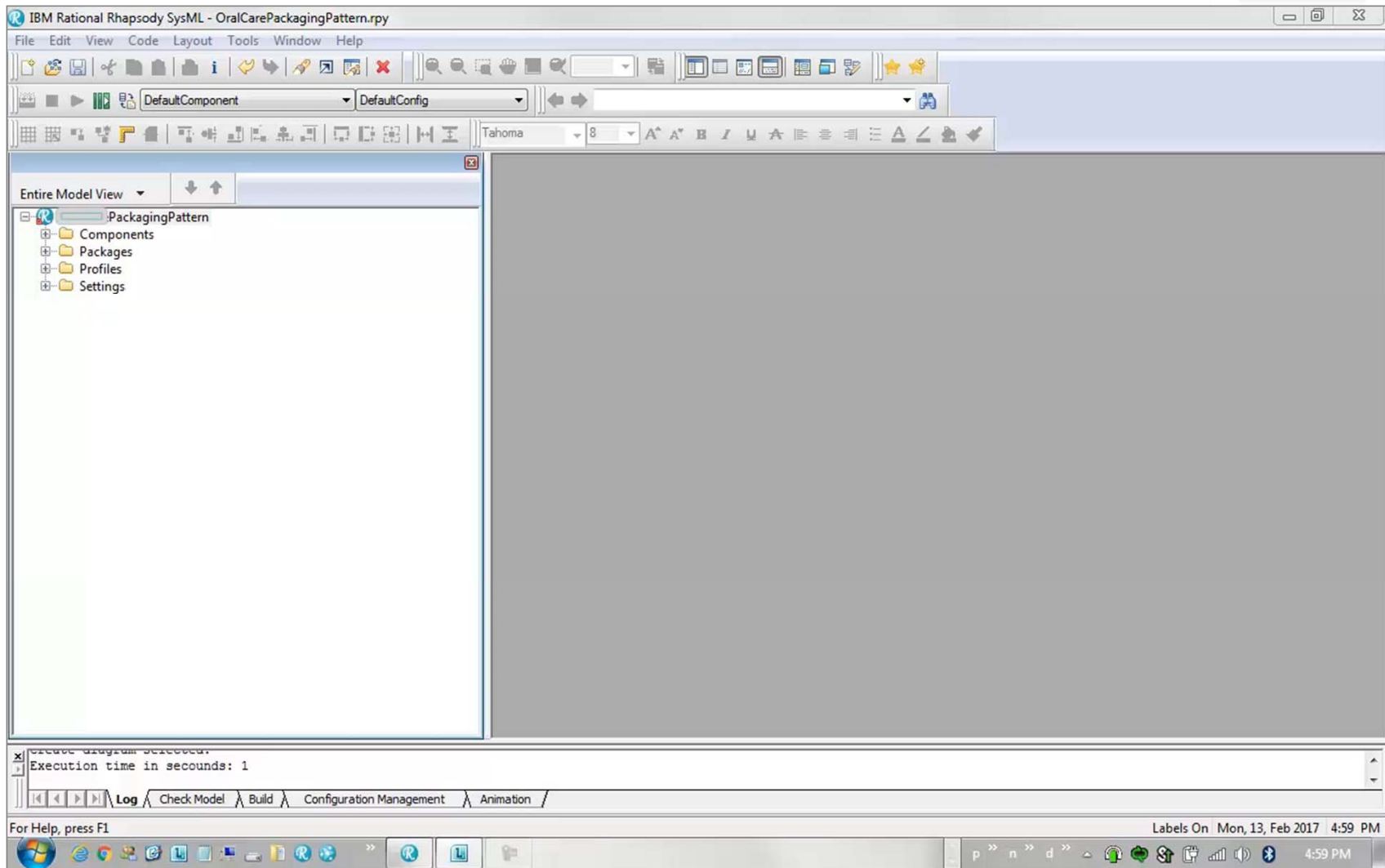
Systems of Systems Context for Planning



A Real Model: Four System Features Decomposed



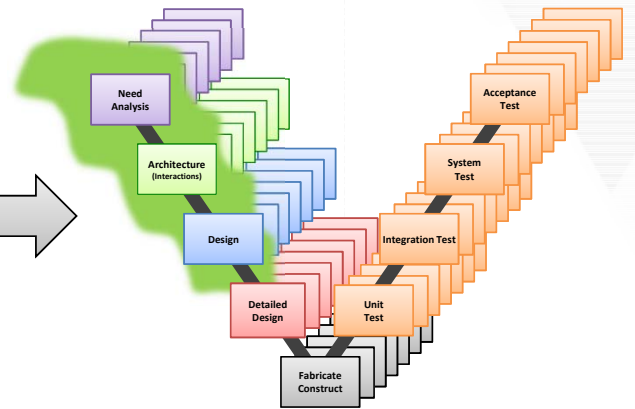
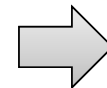
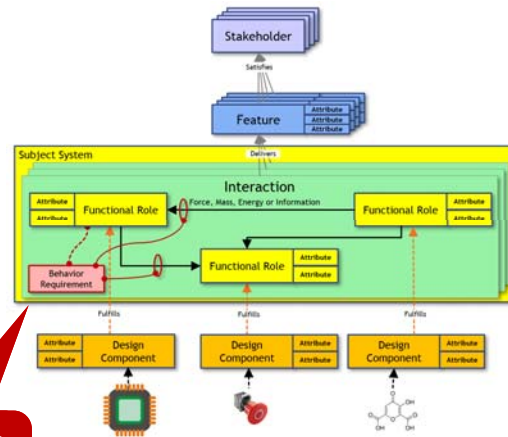
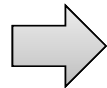
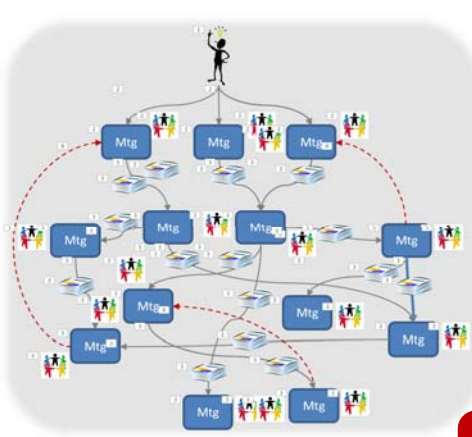
Model Interaction Demo



Agenda

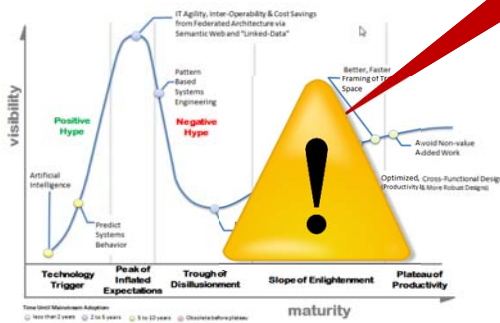
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So systems knowledge modeling it's easy... right?



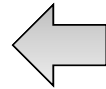
What should we avoid?

Gartner Hype Cycle?

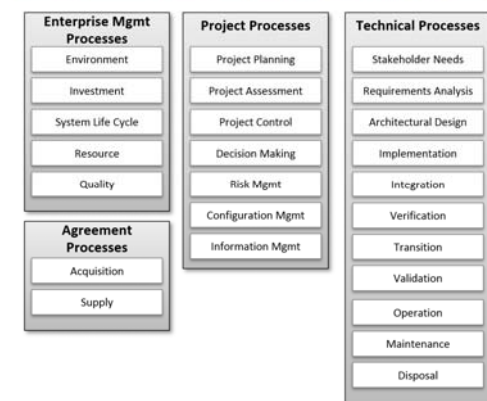


P&G internal review of work processes indicates >400 document types produced by a large initiative.

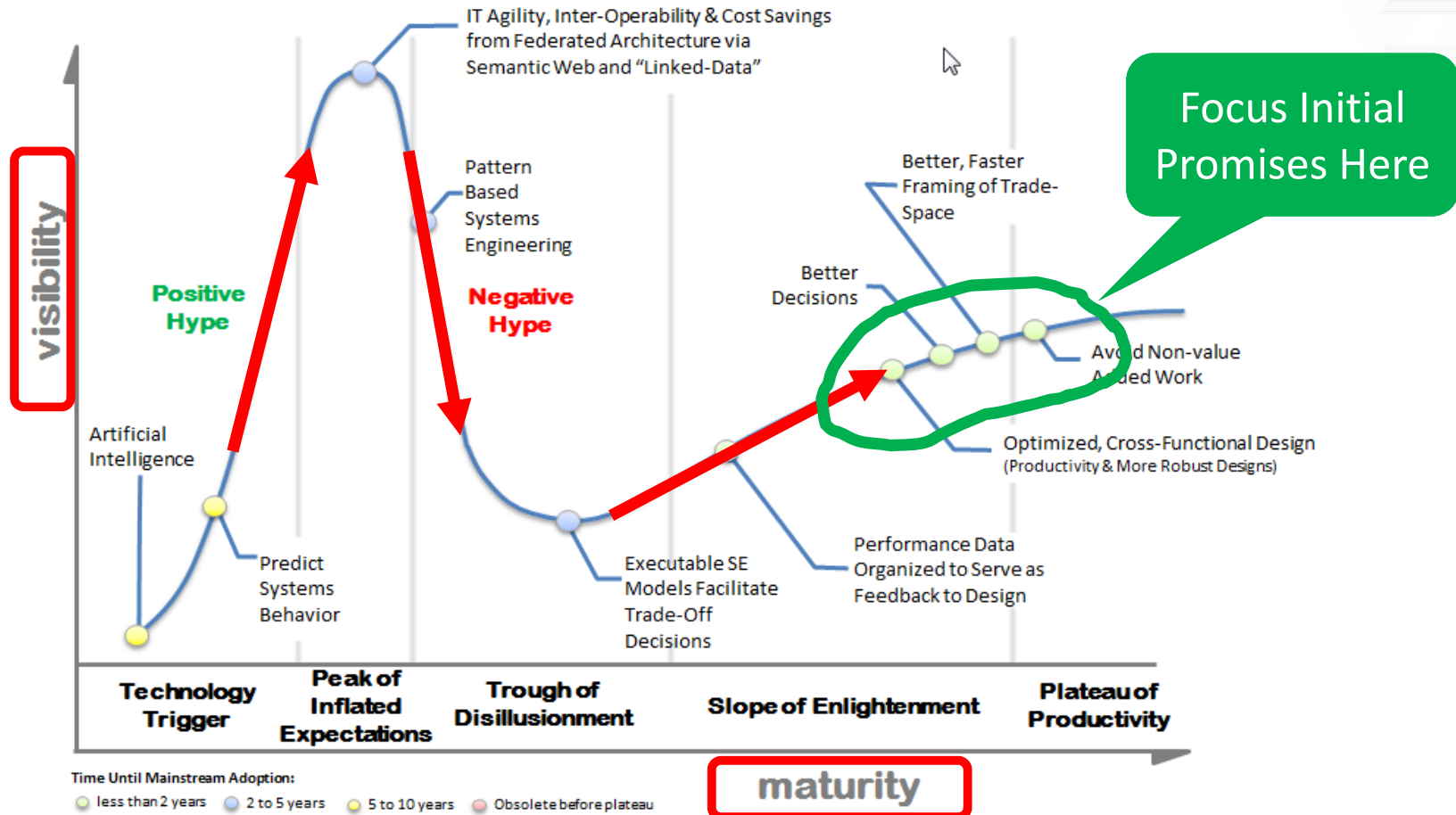
SAIC estimates >400 types of artifacts are intimidated by ISO15288 "activities"



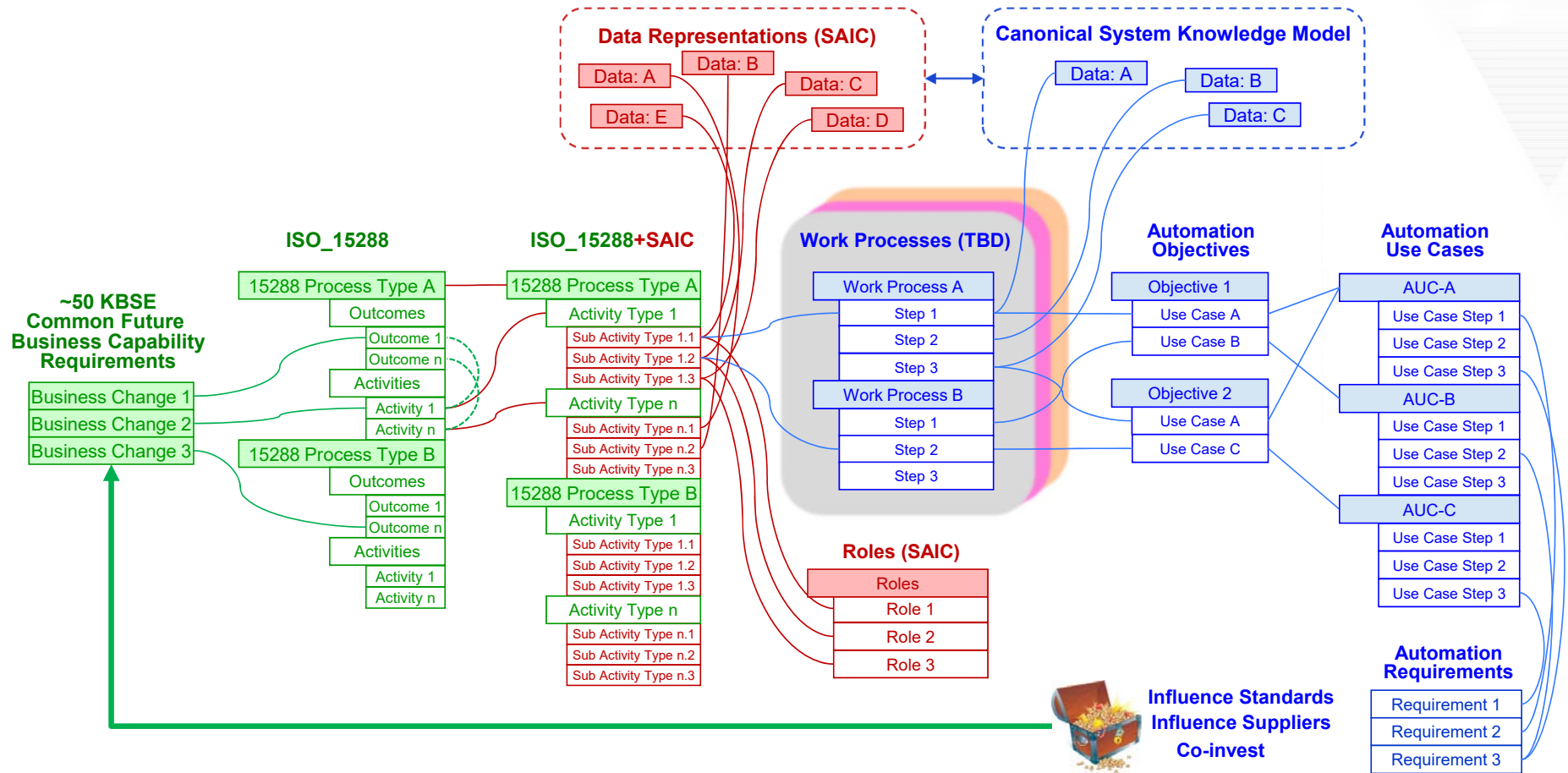
ISO-15288 Industry Standard Process Framework



Systems Engineering Hype Cycle



KBSE Consortium Analysis



**Please reach out to collaborate
if you have similar needs/plans**

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