



WEBINARS 2019

Burn the Boats...

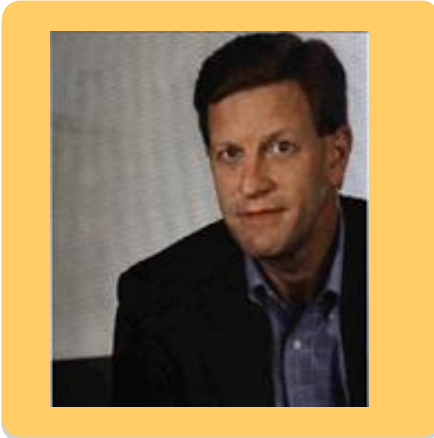
Truly Integrating Requirements and Systems Models



Thursday, 20 June 2019

Presenters' profile

- ▶ Bob Sherman
 - ▶ Enterprise Architect for SE, Procter & Gamble



Bob Sherman
sherman.rf@pg.com

- ▶ Cecilia Karlsson
 - ▶ Marketing & Communication, The REUSE Company



Cecilia Karlsson
cecilia.karlsson@reusecompany.com

Introduction: Webinar rules

- Webinar rules:
 - The Webinar will start in few minutes
 - You'll be muted all along the Webinar
 - There's a chatting box to ask your questions or send your comments when you want
 - Please address these comments and questions to the user "The REUSE Company" and not to the presenter directly
 - If you have any technical issue please use this chatting box, or mail us at: support@reusecompany.com
 - The Webinar will be recorded. A link to the recording will be sent to you in few days

Agenda

- › Description of The REUSE Company
- › Presentation by Bob Sherman
- › Q&A



The REUSE Company – TRC Worldwide

- Local partners: France, Germany, Italy, Spain and Japan
- Customers in different countries along United States, Europe and Asia
- TRC Headquarters is based in Madrid (Spain)
- United Kingdom TRC office
- Scandinavian TRC office (Sweden)



TRC WEBINARS 2019

The REUSE Company (TRC)

Tools and solutions for knowledge Traceability, Reuse and Quality management

Specialized in the application of **Semantic Analysis Technologies** to a wide range of industries (Aerospace, Defense, Automotive, Railway, Energy...)

Focus: System/Software **Reuse, Traceability and Quality**. The integration of tools and technology from **The REUSE Company** facilitates the representation, analysis and exploitation of knowledge and enables a knowledge-centric systems engineering approach.

Mission: promoting system/software and knowledge reuse within any organization, by offering **processes, methods, tools** and **services**. Technology fully integrated within the organization production chain.



NewControl



REVaMP²



AMASS
Assurance and Certification of CPS

Innovative technologies applied to
Knowledge Reuse

Bob Sherman



- Formal education: B.S. Chemical Engineering from University of South Florida
- 15 years of Process/Machine Design and Controls Engineering
- 20 years of Enterprise Architect positions in the areas of:
 - Manufacturing Process Design
 - Factory Floor Operations
 - Product Lifecycle Management
- Current Position: Enterprise Architect for Systems Engineering

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 TRC WEBINARS 2019

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Burn the Boats...

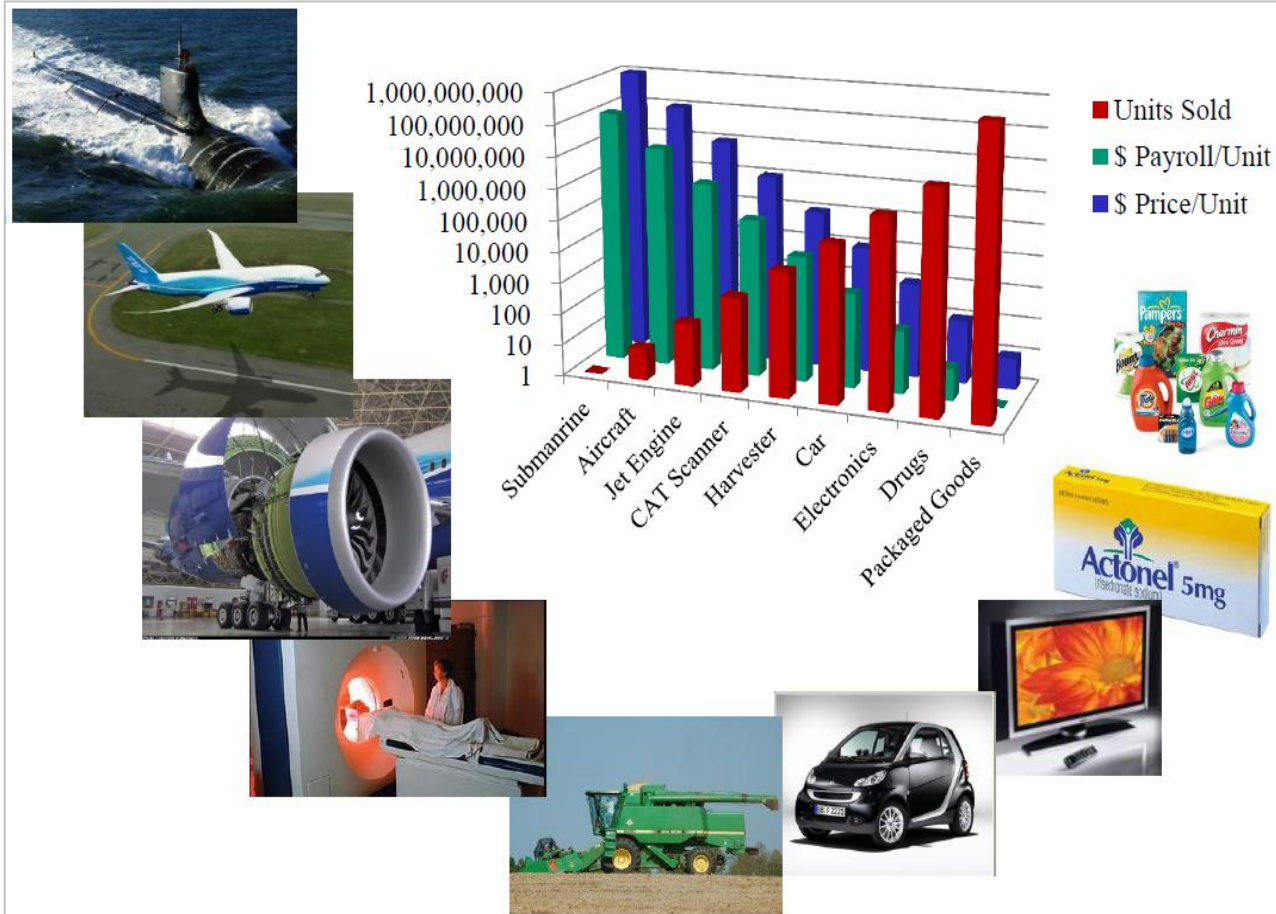
Truly Integrating Requirements and Systems Models



Thursday, 20 June 2019

CPG vs. Aero, Auto, Mil

How To Achieve a Billion \$ in Sales



Initiative Differences:

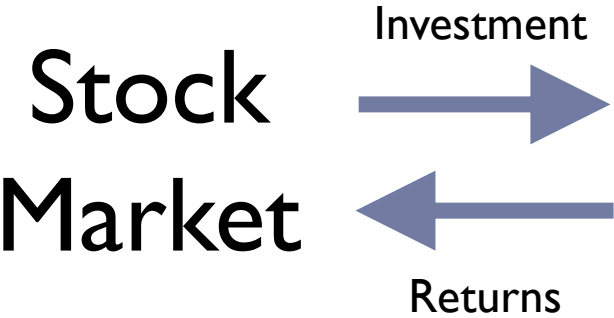
New product lifecycle: <2 years vs 10+ years

Product/Service Similarities:

- Simple goals:
 - Transport payload
 - Absorb spill
- Complicated delivery
 - # of parts paper machine = # parts on 747
 - Multi-physics
 - Information intensive operations
 - Global Manufacture & Operations

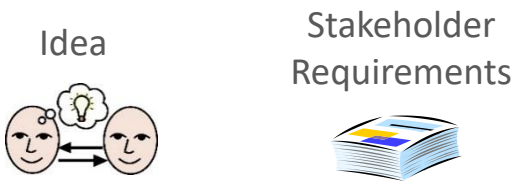
What is the goal?

Innovation System of Systems

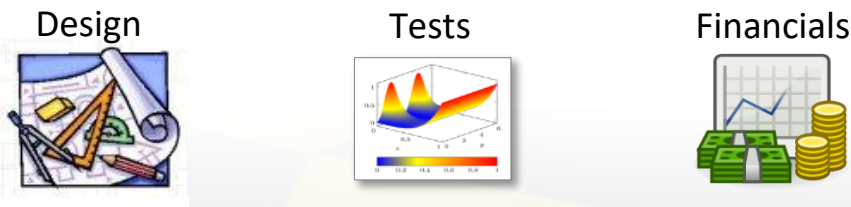
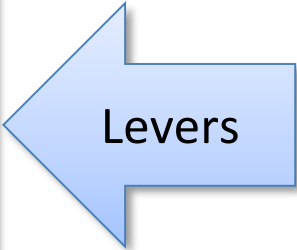


How to we achieve the goal?

Innovation System of Systems

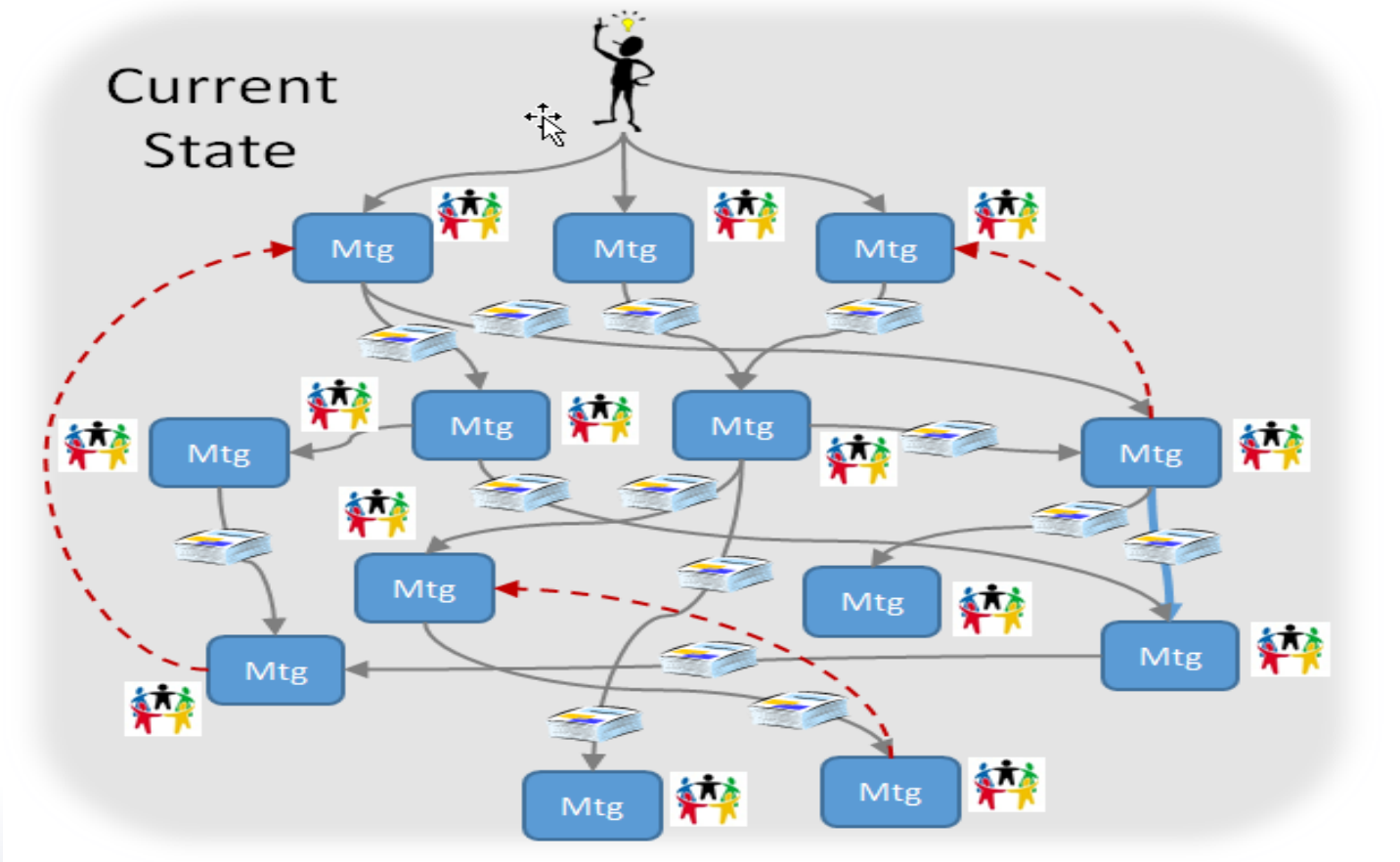


Multi-Discipline
System of Innovation

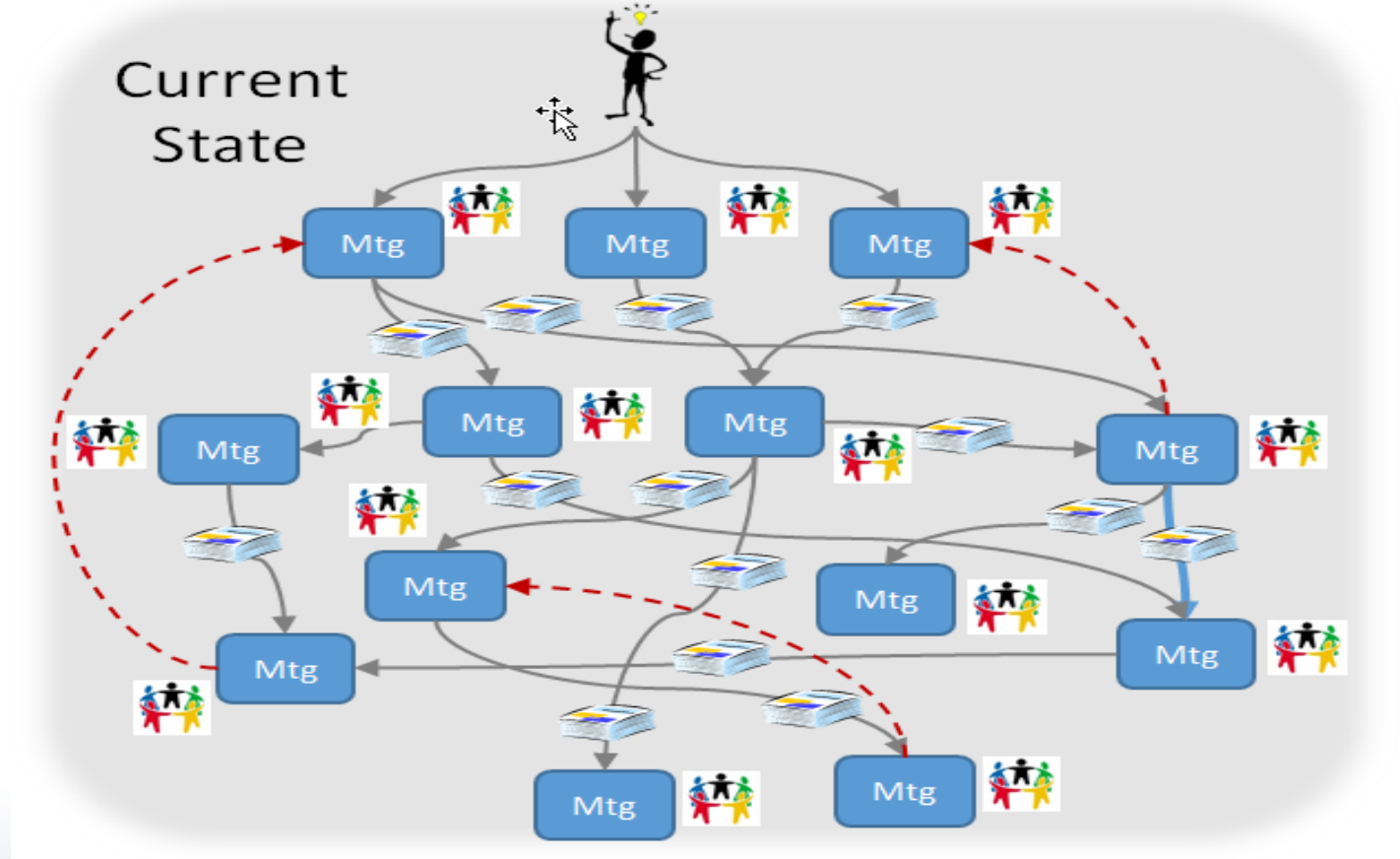


Orchestrated Complex System of Systems

Innovation System of Systems

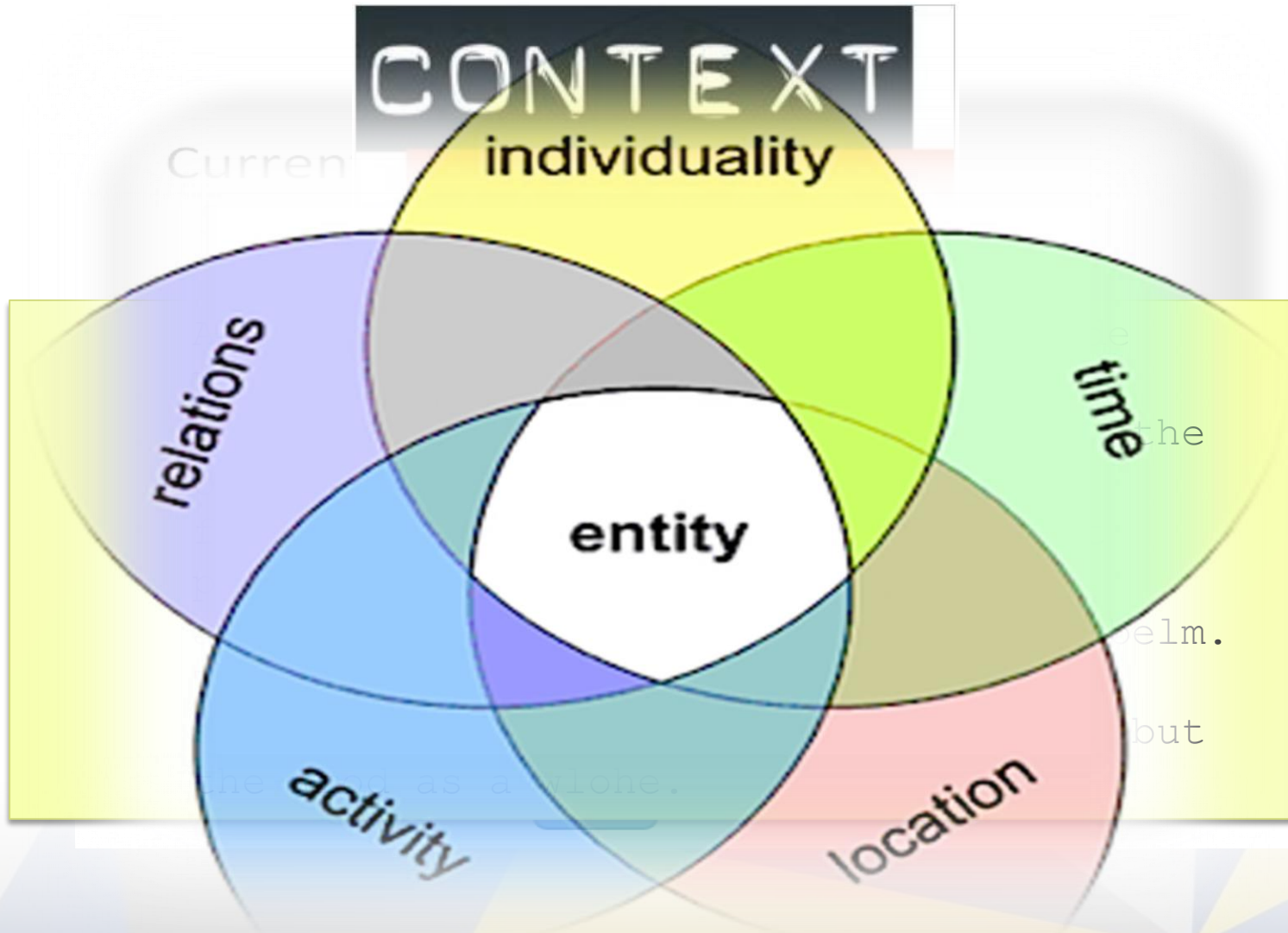


Requirements Challenges



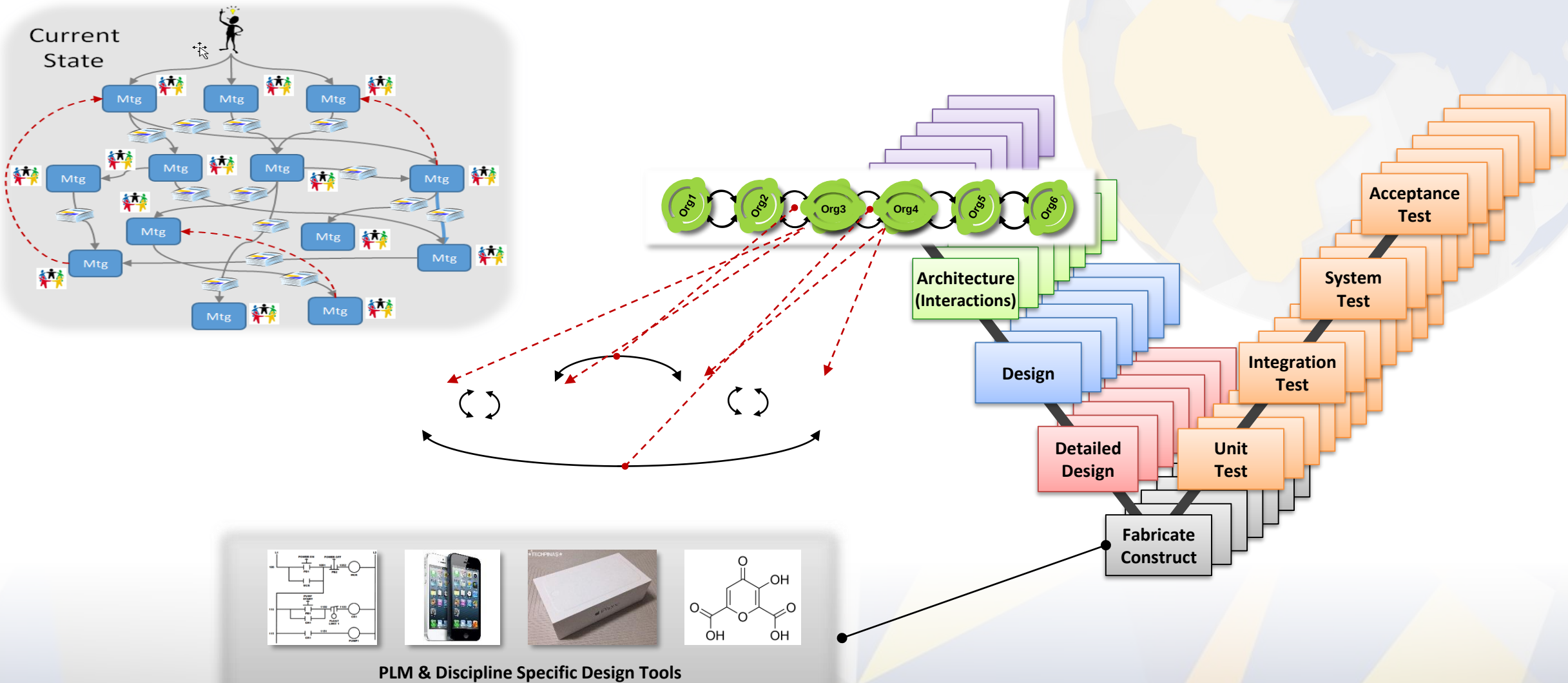
- Requirements Mgmt
 - improved awareness & visibility of requirements trade space
 - avoid incorrect and/or overlooked requirements
 - avoid overly constrained requirements
 - pre-mature convergence on solution

Requirements Challenges

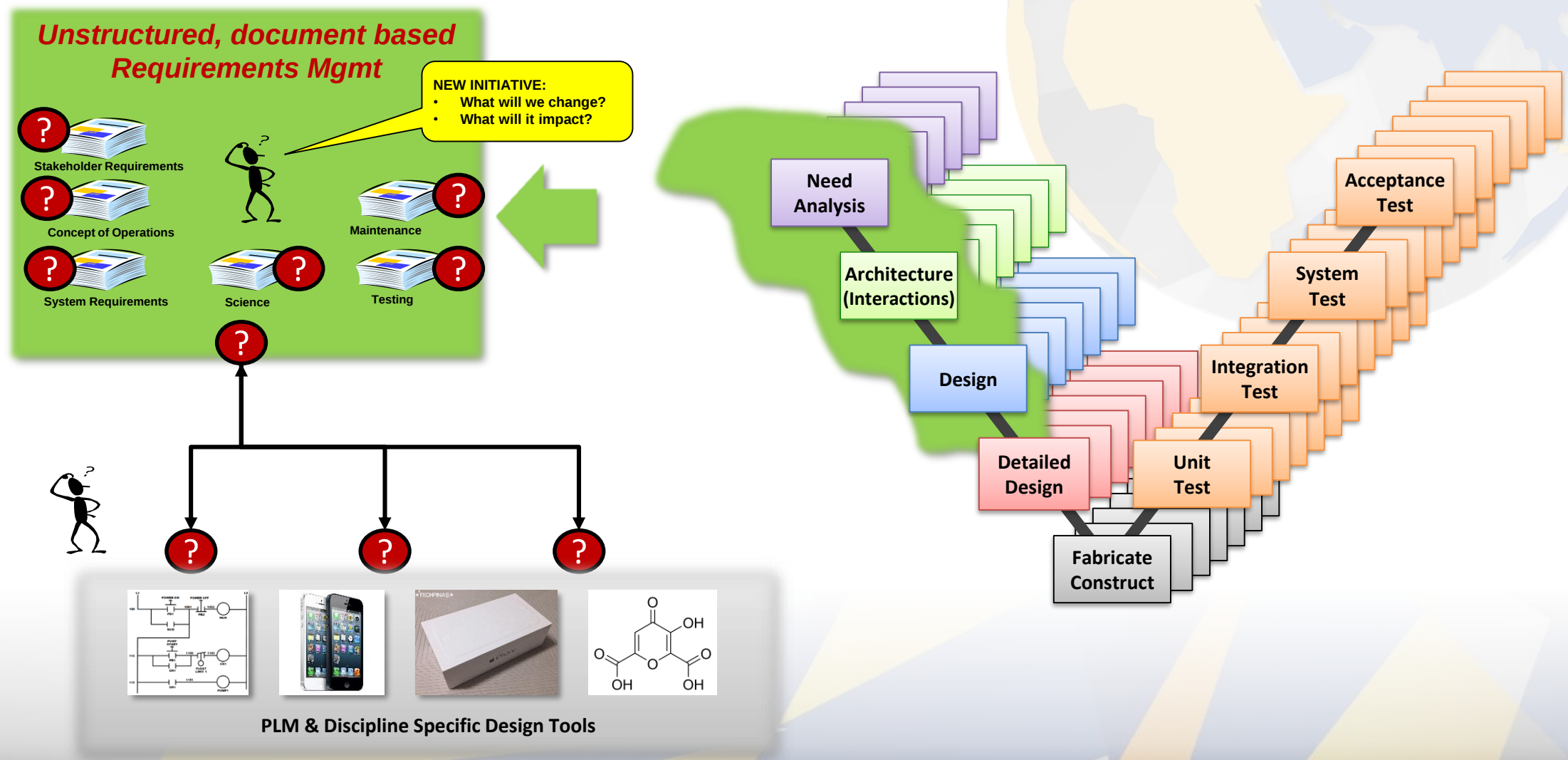


- Requirements Mgmt
 - improved awareness & visibility of requirements trade space
 - avoid incorrect, excessive and/or overlooked requirements
 - avoid overly constrained requirements
 - pre-mature convergence on solution

Context of Requirements



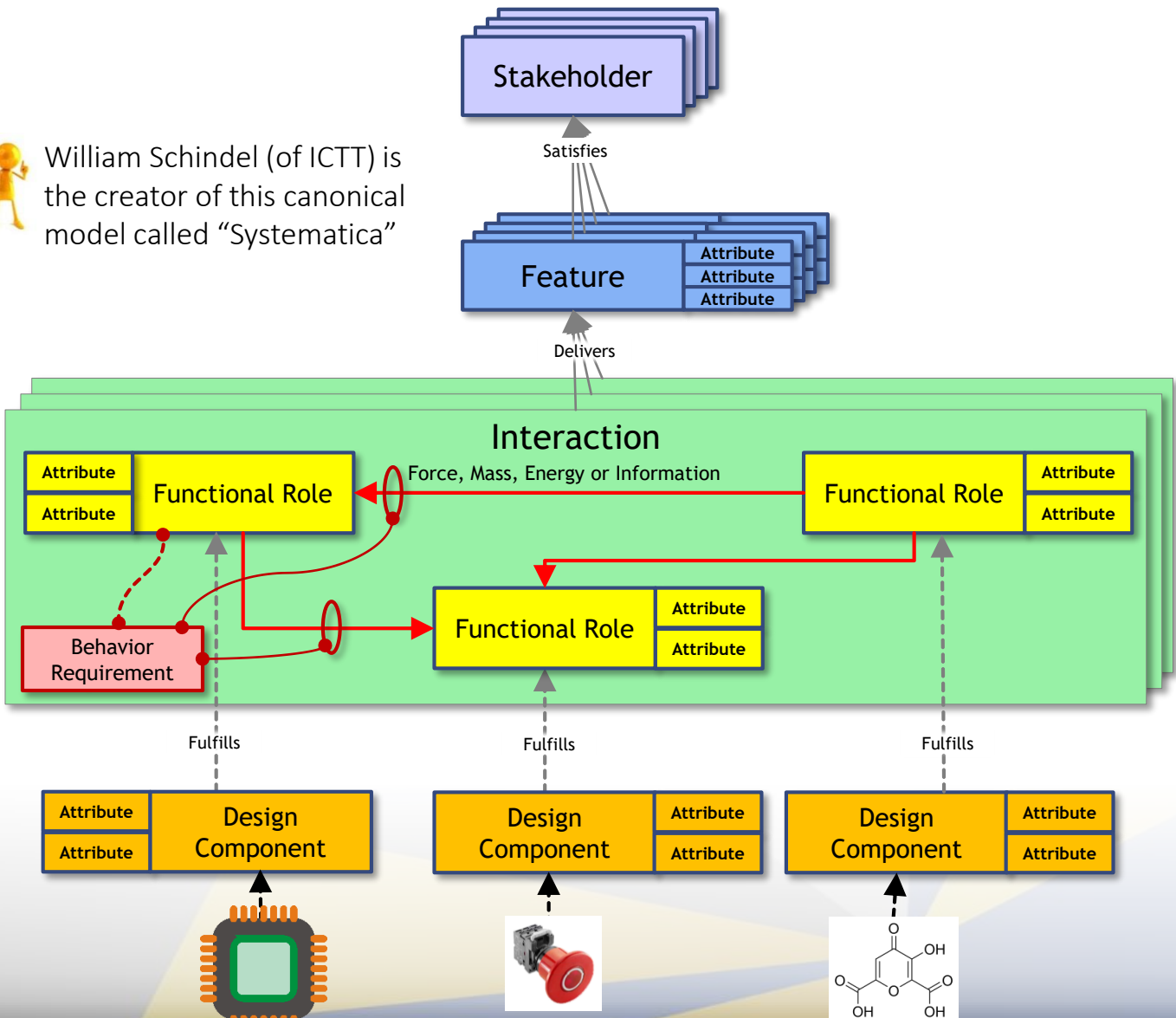
What's Holding Back Better Requirements Mgmt



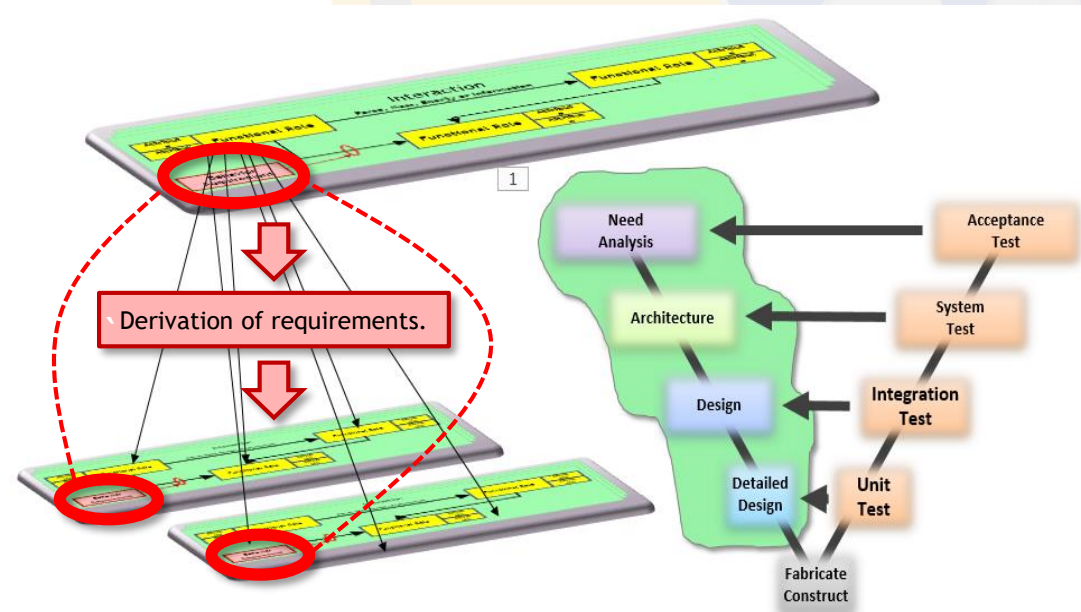
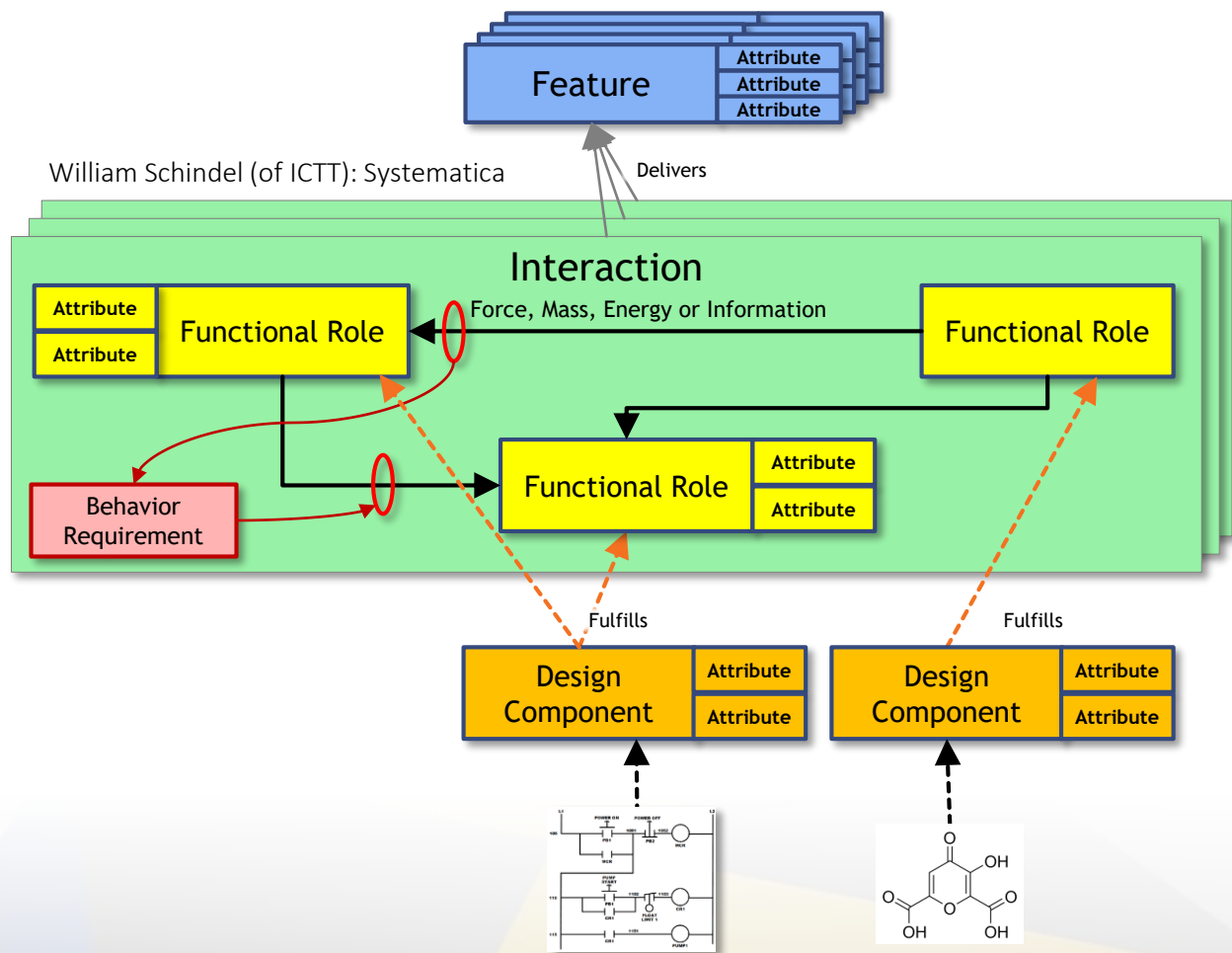
Systems Model Context for Requirements



William Schindel (of ICTT) is the creator of this canonical model called "Systematica"

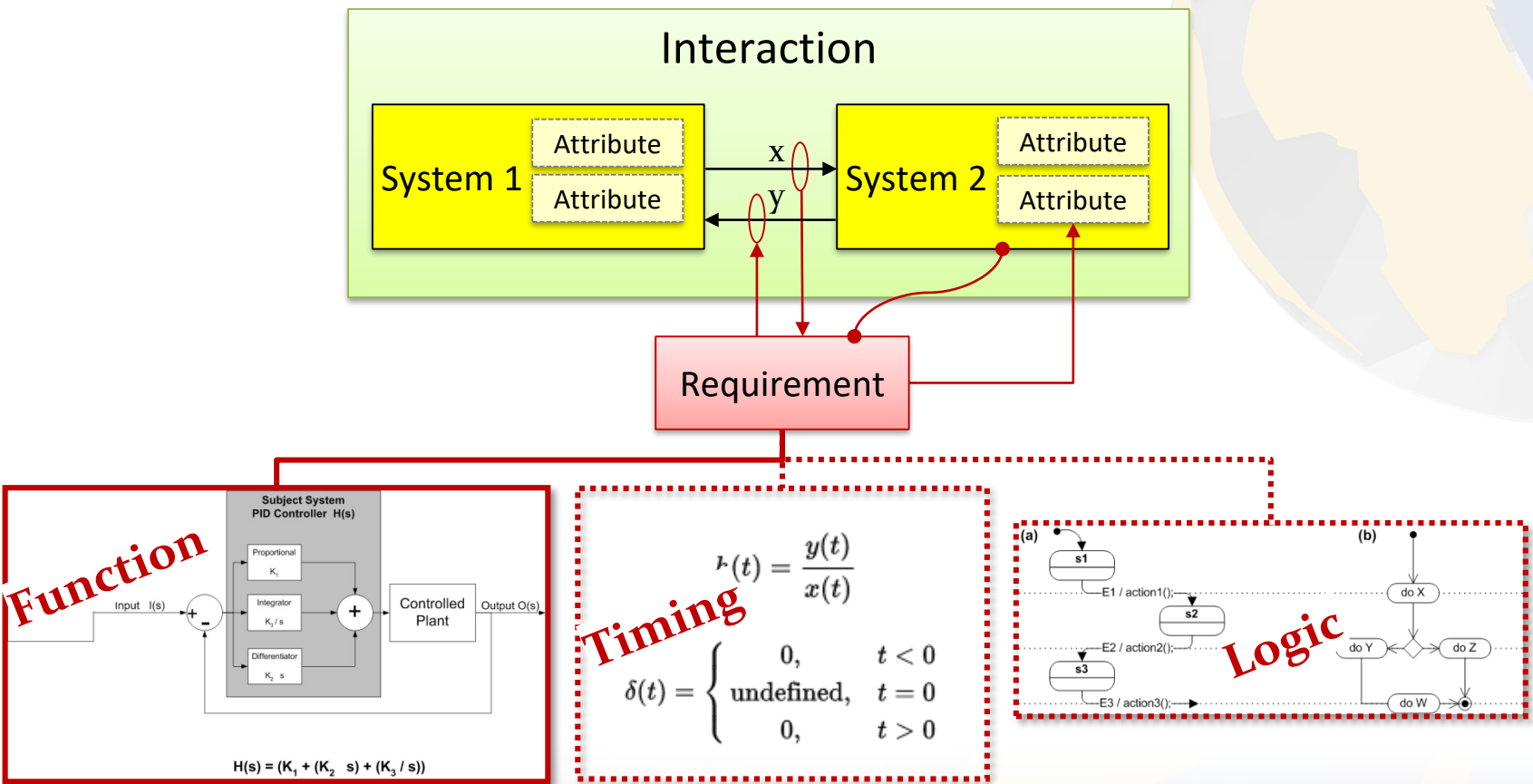


Systems Fractal Supports Derived Requirements



Requirements Are Transfer Functions

INCOSE 2005 “Best Paper”: Bill Schindel (of ICTT): “Requirements are Transfer Functions”



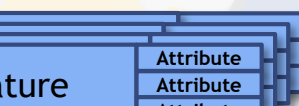
Example System Requirement



Behavior failure leads to...

Waterfall Failure

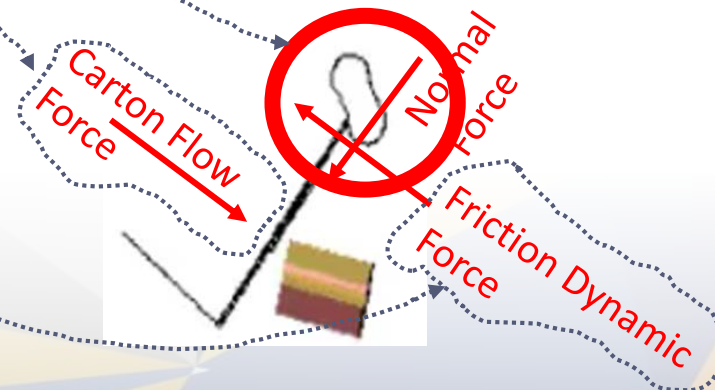
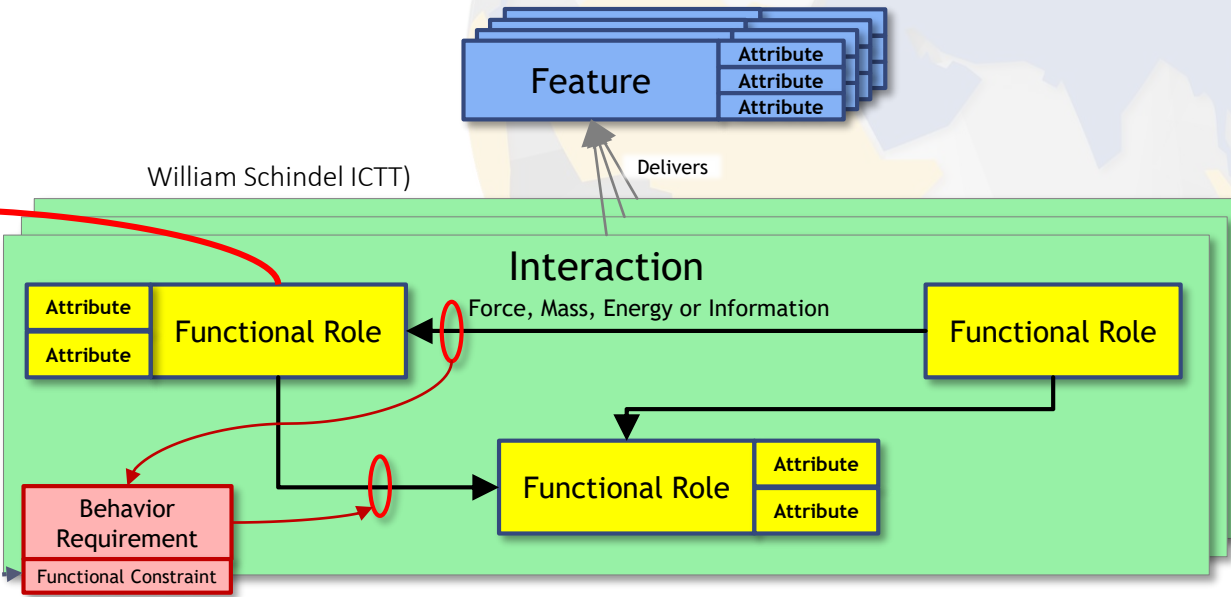
Transfer Function”



The diagram shows a stack of four blue rectangular blocks. The front-most block is labeled 'Feature' on the left and 'Attribute' on the right. Behind it are three more identical blocks, each also labeled 'Attribute' on the right. An arrow points from the bottom left towards the 'Feature' block.

When subject to a **Carton_Flow_Force** force $> 5Nm$ **Carton_Escapement_Top**, shall provide a minimum **Friction_Dynamic** force in accordance with the **Dynamic_Friction_Resistance** constraint.

“When subject to a” <flow> |condition| “,”
 “the/The” <system> “shall” <key word> “a”
 <flow or attribute> “in accordance with the”
 <constraint> “constraint”.



Canonical Statement Variants

| "When subject to a" <flow> | condition | ", " | "the/The" <system> "shall" <key word> "a" <flow or attribute>
| "in accordance with the" <constraint> "constraint." |

| "When subject to the following conditions, " | "the/The" <system> "shall" <key word> "a" <flow or attribute>
"in accordance with the" <constraint> "constraint."

- <flow> | condition |
- <flow> | condition |

Multiple Input Conditions

| "When subject to a" <flow> | condition | ", " | "the/The" <system> "shall" <key word> "a" <flow or attribute>
| adjective | "in accordance with the following constraints:"

- <constraint>
- <constraint>

Multiple Constraints

| "When subject to the following conditions, |

- <flow> | condition |
- <flow> | condition |

Multiple Inputs & Constraints

"the/The" <system> "shall" <key word> "a" <flow or attribute> | adjective | "in accordance with the following constraints:"

- <constraint>
- <constraint>

Boeing Agrees...

- ▶ Ronald Carson, The Boeing Company - INCOSE-IS2015_paper_4_session_1.2.1

ISO/IEC/IEEE 29148 Requirements Types (5.2.8.2)	Associated Requirement
Interface	Functional/Performance or Design
Process	Design or “statement of work” or other contractual language
Quality, Human Factors, and other Non-Functional Requirements	Suitability
Performance [condition clause]	Environmental

Functional/Performance –

- The **AGENT** shall **FUNCTION** in accordance with **INTERFACE-OUTPUT** with **PERFORMANCE** [and **TIMING** upon **EVENT TRIGGER** in accordance with **INTERFACE-INPUT**] while in **CONDITION**.

Design –

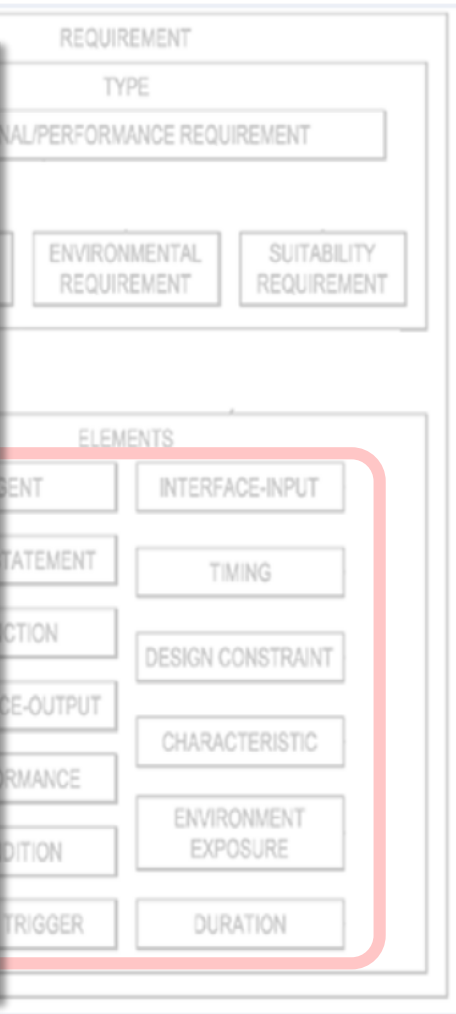
- The **AGENT** shall [exhibit] **DESIGN CONSTRAINTS** [in accordance with **PERFORMANCE** while in **CONDITION**].

Environmental –

- The **AGENT** shall [exhibit] **CHARACTERISTIC** during/after exposure to **ENVIRONMENT** [for **EXPOSURE DURATION**].

Suitability –

- The **AGENT** shall exhibit **CHARACTERISTIC** with **PERFORMANCE** while **CONDITION** [for **CONDITION DURATION**].



Cross Industry Canonical Requirements Statement ?

P&G

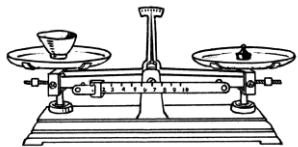
| “When subject to a” <flow> |condition| “,” | “the/The” <system> “shall” <key word> “a” <flow or attribute> | “in accordance with the” <constraint> “constraint.” |



BOEING®

The AGENT shall exhibit DESIGN CONSTRAINTS in accordance with PERFORMANCE while in CONDITION.

The AGENT shall FUNCTION in accordance with INTERFACE-OUTPUT with PERFORMANCE [and TIMING] upon EVENT TRIGGER in accordance with INTERFACE-INPUT] while in CONDITION.



Standard?

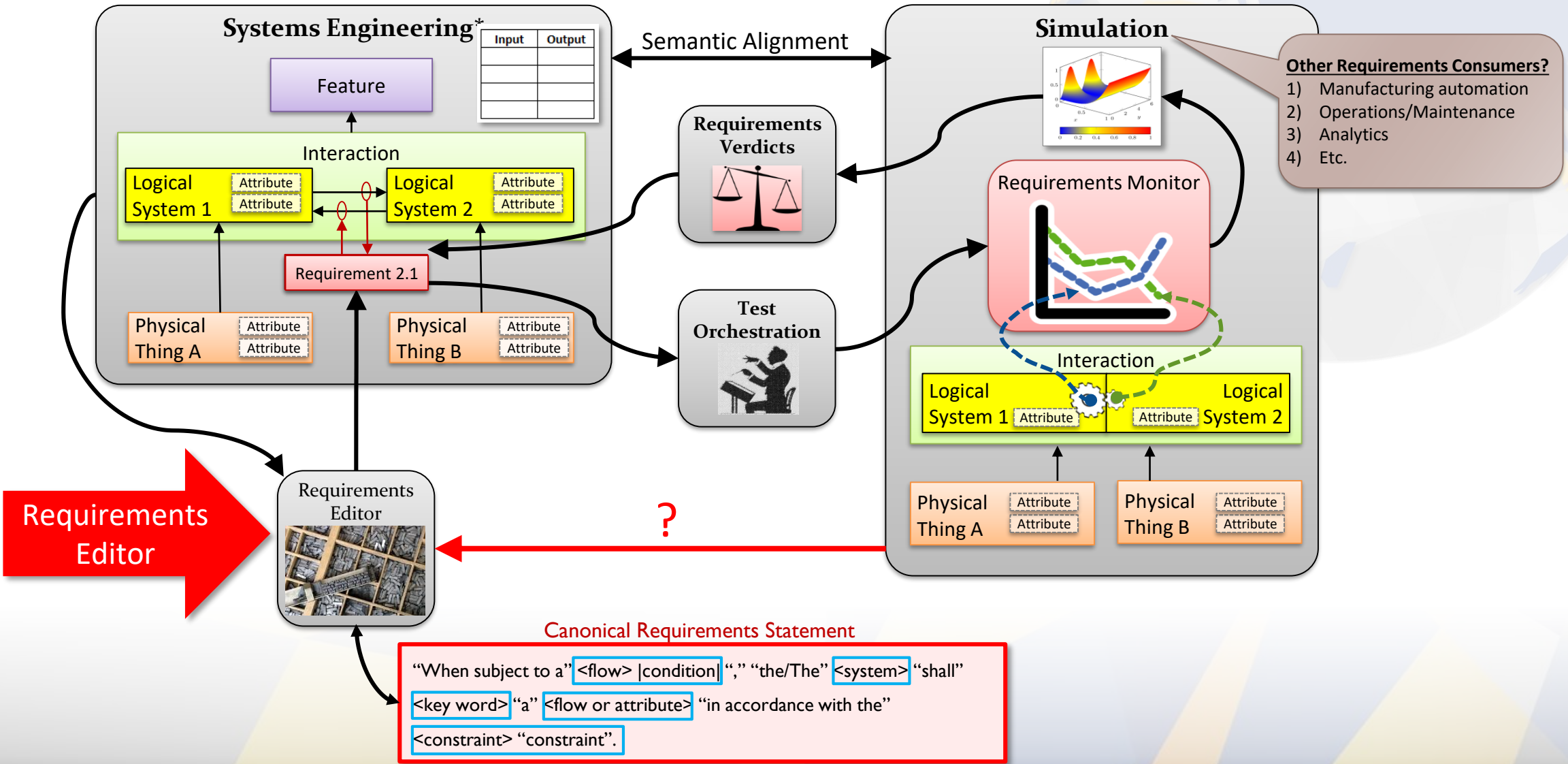
“The” <system> “shall” <action word> “a” |adjective| <flow or attribute> “compliant with the following constraints:”

- <constraint>
- <constraint>

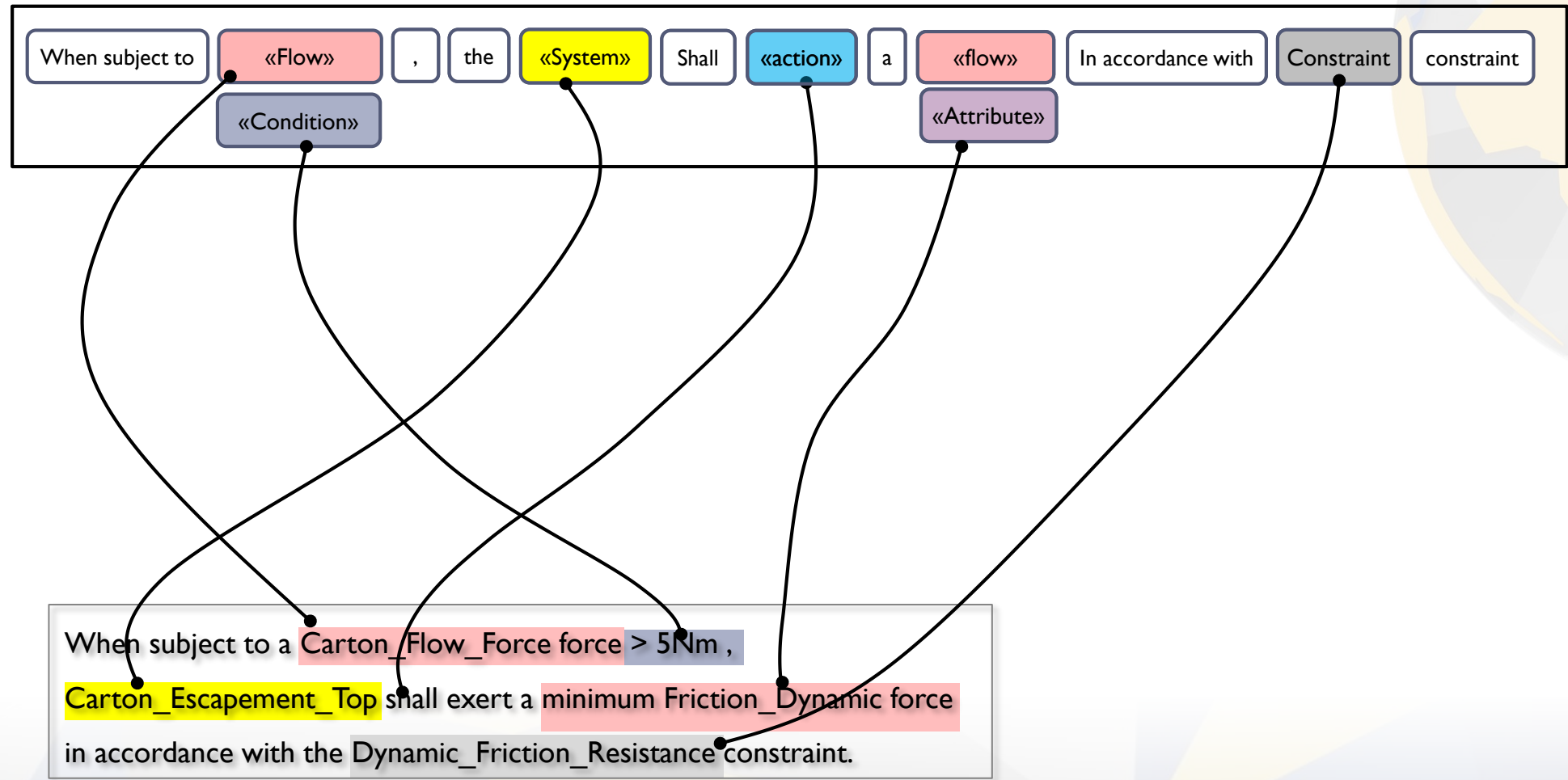
| “when subject to the following conditions:”

- <flow> |condition|
- <flow> |condition| |

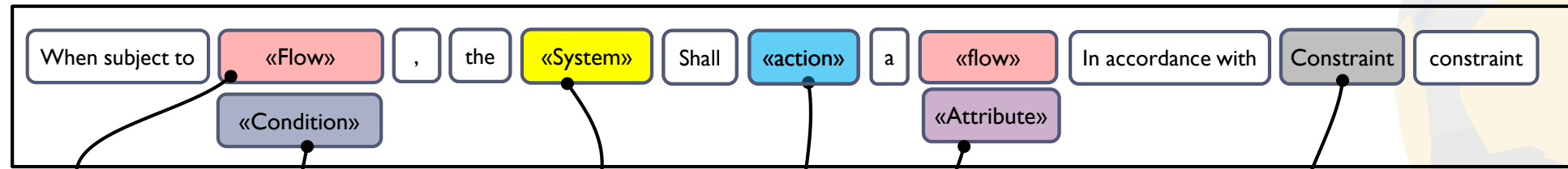
Requirements Technical Lifecycle



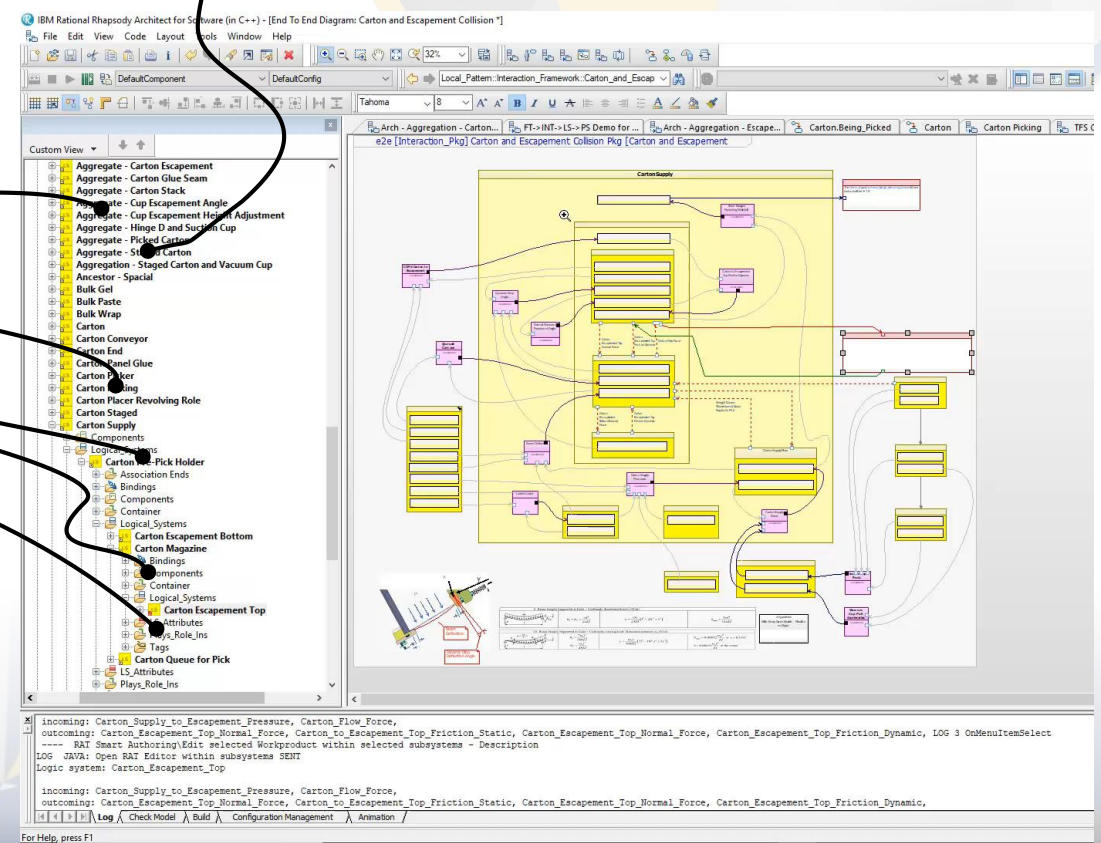
Canonical Statement: Population of Vocabulary

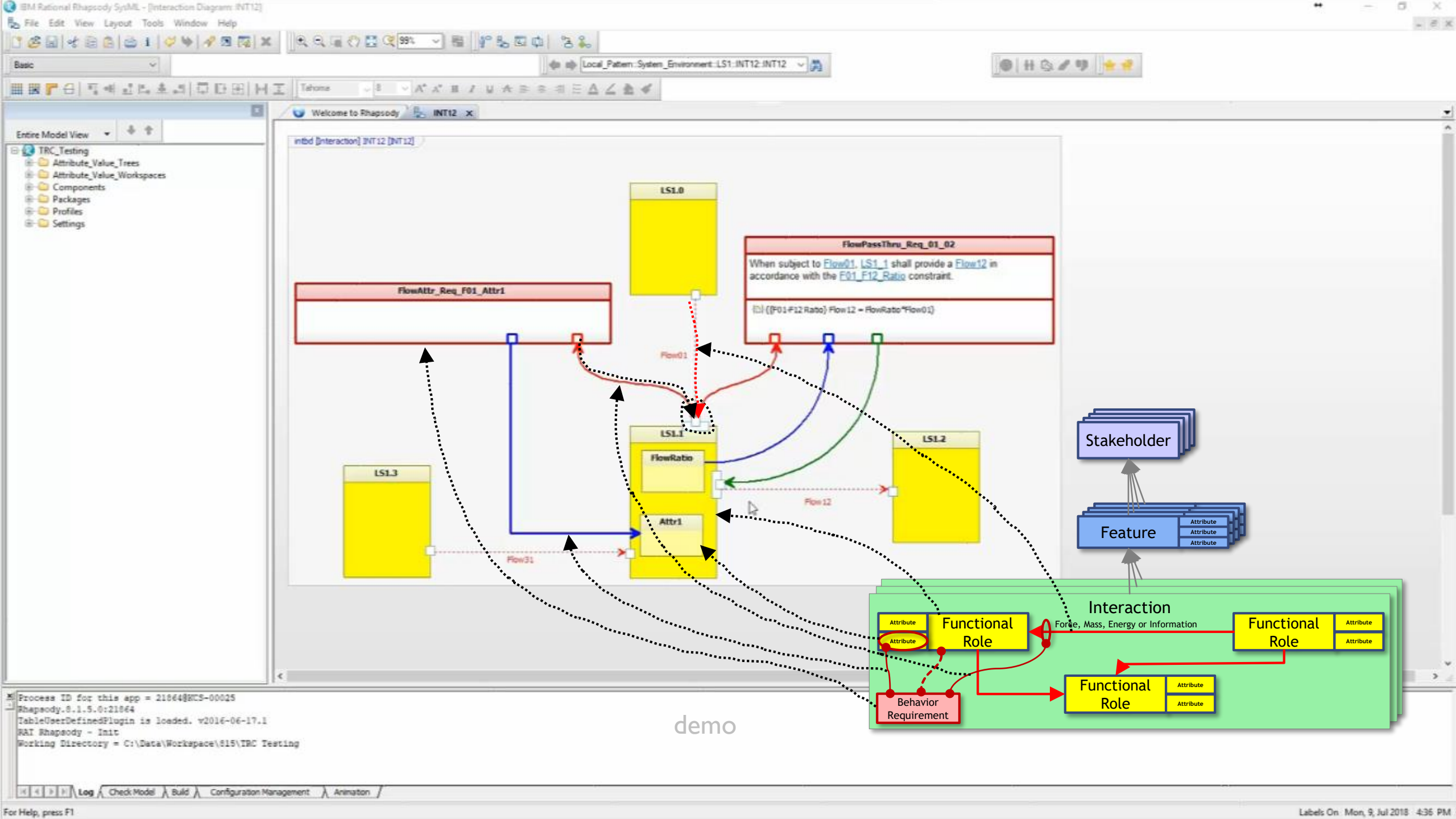


Canonical Statement: Population of Vocabulary



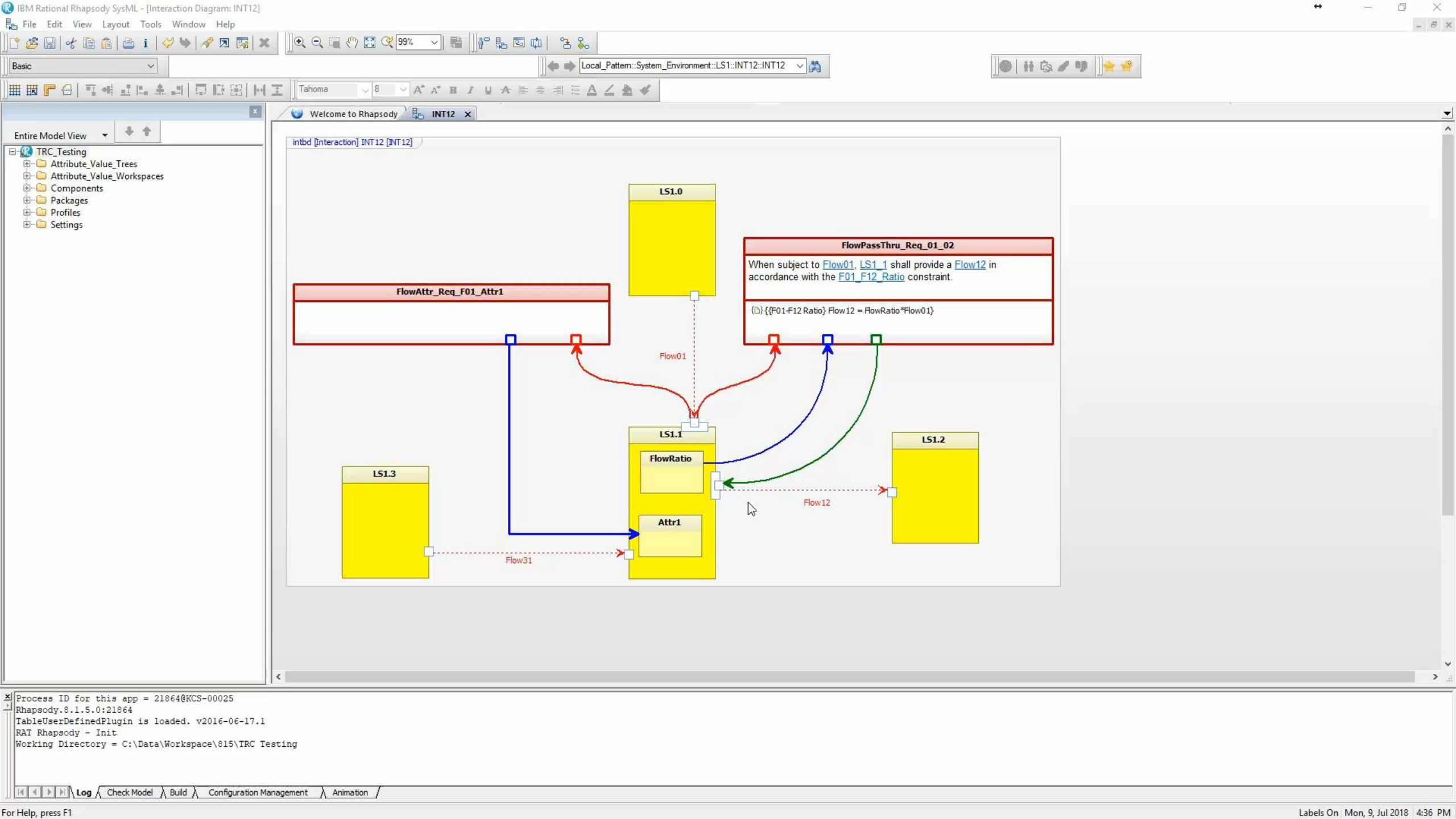
When subject to a Carton_Flow_Force force > 5Nm ,
 Carton_Escapement_Top shall exert a minimum Friction_Dynamic force
 in accordance with the Dynamic_Friction_Resistance constraint.



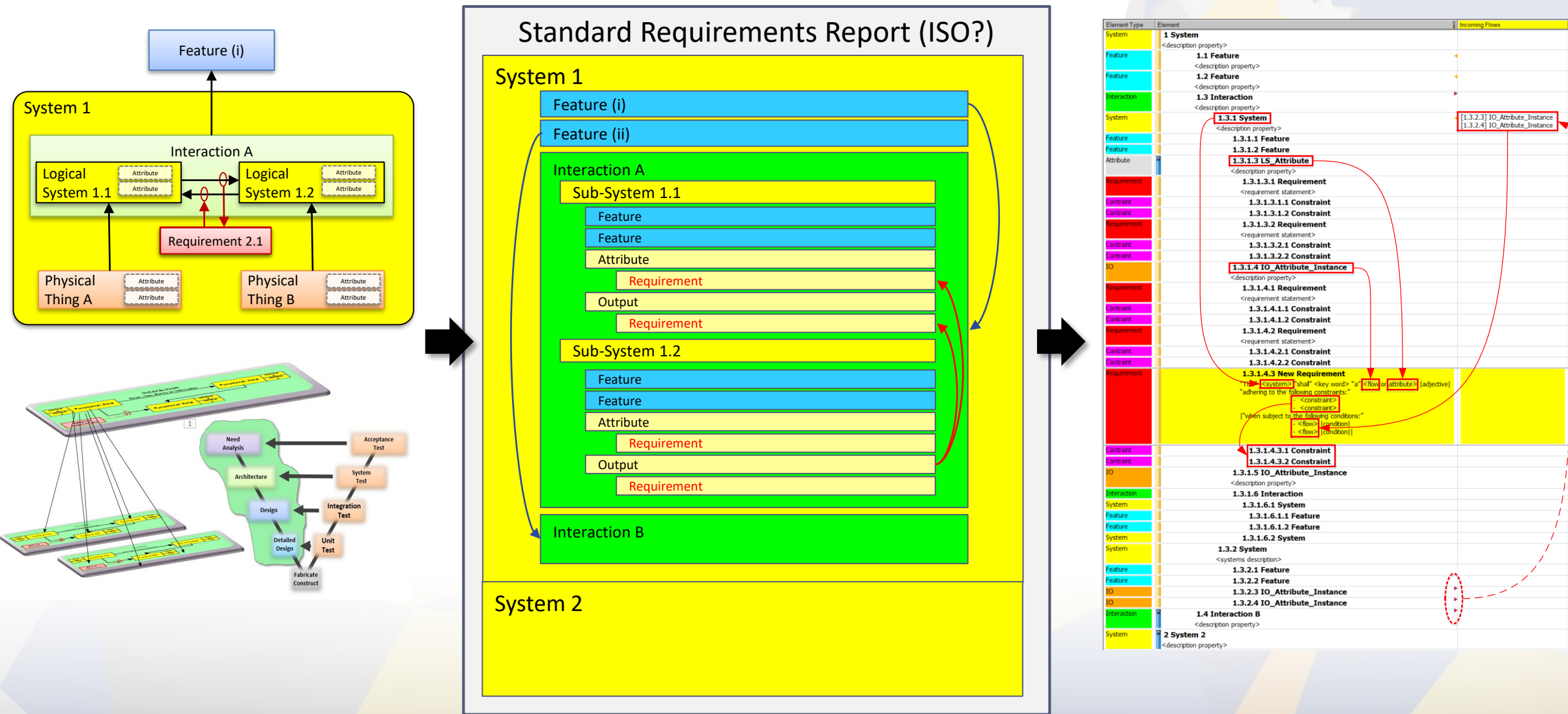




▶ RAT/Rhapsody Integration Demo



Canonical Requirements Specification?





► Rhapsody > TRC > DOORS Integration

IBM Rational Rhapsody SysML - [Interaction Diagram: INT12]

File Edit View Layout Tools Window Help

Basic

Local_Pattern::System_Environment::LS1::INT12::INT12

Tahoma 8

Entire Model View

RC_Testing

Attribute_Value_Trees

Attribute_Value_Workspaces

Components

Packages

Default

Local_Pattern

End To End Diagrams

Package_stms

Attribute_Couplings

Feature_Framework

Impacts_and_Failures

Interaction_Framework

Physical_Architecture

System_Environment

Logical_Systems

LS1

Components

Interactions

INT12

Has_Roles

Input_Outputs

Interaction_Diagrams

IO_Flows

Occurs_During_States

Requirement_Stms

FlowAttr_Req_F01_Attr1

FlowPassThru_Req_01_02

LS1_1_Req_2

Tags

INT23

INT34

Logical_Systems

Offers_Features

State_Diagram_Stm

Tags

Tests

TLP_Items

Transformation_Flows

Tags

RedefinedTuner (REF)

INT12 x

intbd [Interaction] INT12 [INT12]

LS1.0

FlowAttr_Req_F01_Attr1

the LS1_1 shall provide FlowRatio compliant with the following constraints: Attr1_Limit constraint , when subject to the following conditions: FlowRatio .

Flow01

FlowPassThru_Req_01_02

When subject to Flow01, LS1_1 shall provide a Flow12 in accordance with the F01_F12_Ratio constraint.

{D}{(F01-F12 Ratio) Flow 12 = FlowRatio*Flow01}

LS1.1

FlowRatio

Attr1

LS1.2

Flow12

LS1.3

Flow31

LS1_1_Req_2

The LS1_1 shall exhibit FlowRatio compliant with the following constraints: power_cons1 constraint , when subject to the following conditions: Flow01 .

LOG 3 OnMenuItemSelect

---- RAI Smart Authoring for P&G\Edit selected requirement

LOG JAVA: edit Requirement PG SENT

RAI Pluginelement found: LS1.1 - Logical_System, Flow01 - InputFlow, Attr1 - LS_Attribute, FlowRatio - LS_Attribute, Attr1_Limit - Constraint,

LOG 3 OnMenuItemSelect

---- RAI Smart Authoring Synchronization with DOORS\DOORS Configuration

LOG JAVA: DOORS configuration SENT

Log Check Model Build Configuration Management Animation

For Help, press F1

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Labels On Tue, 10, Jul 2018 1:09 PM

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Next webinar

- **Topic: Applying Machine Learning Techniques to the Flexible Assessment of Requirements Quality**
- To obtain quality measurements of requirements it is common to use quantitative quality metrics based on established standards. However, the risk is to build assessment methods and tools that are both arbitrary and rigid in the parameterization and combination of metrics.
- This webinar is focused on the presentation of a flexible method to assess and improve the quality of requirements that can be easily adapted to different contexts, projects, organizations and quality standards, with a high degree of automation.
- **Dates:**
 - September 2019



Contact Information



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