Introducing SysML WF & IF

05.10.2021, INCOSE DEIX WG meeting Oct 5th 2021

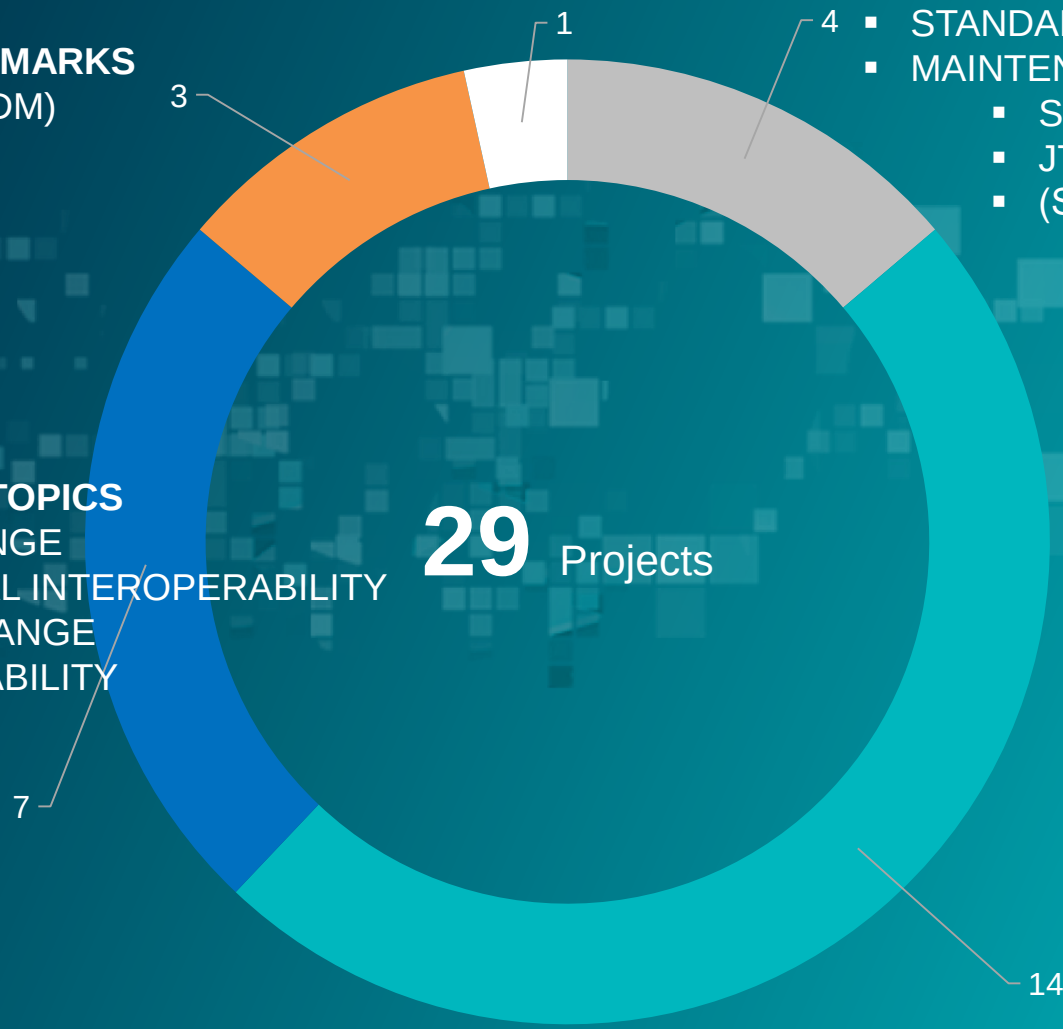
Dr. Sven Kleiner
c/o :em AG

prostep ivip – Technical Program

COMMUNICATION / PR

APPLICATION BENCHMARKS
- STEP AP242 BM (PDM)
- JT
- REQIF

STANDARDIZATION TOPICS
- OPENNESS OF IT SYSTEMS (CPO)
- STANDARDIZATION STRATEGY
- MAINTENANCE OF INTL STANDARDS
  - STEP AP242
  - JT
  - (SYSML, REQIF, …)



IMPLEMENTATION SUPPORT TOPICS
- MEASUREMENT DATA EXCHANGE
- MECHANICAL AND ELECTRICAL INTEROPERABILITY
- PDM STRUCTURE DATA EXCHANGE
- REQUIREMENTS INTEROPERABILITY

USER-DRIVEN TOPICS
- SYSTEMS ENGINEERING
- REQUIREMENTS MANAGEMENT
- PROJECT SCHEDULE MANAGEMENT
- ADDITIVE MANUFACTURING INTERFACES
- 3D MEASUREMENT (METROLOGY)
- VIRTUAL PRODUCT REPRESENTATION
- LONG-TERM DATA RETENTION
- PRODUCTION ENGINEERING
- ARTIFICIAL INTELLIGENCE

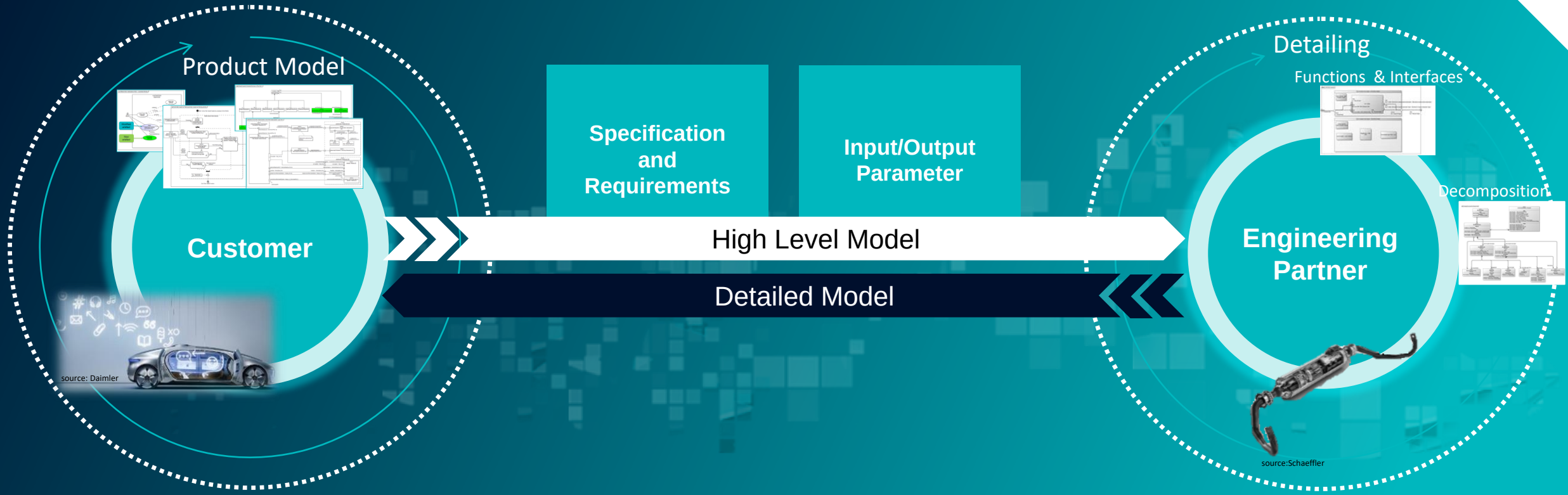
AGENDA INTRODUCING SYSML WF & IF

- Introduction/Motivation
- Overview SysML-WF
- Overview SysML-IF

SysML as central structure of the smart product

SysML Workflow Forum

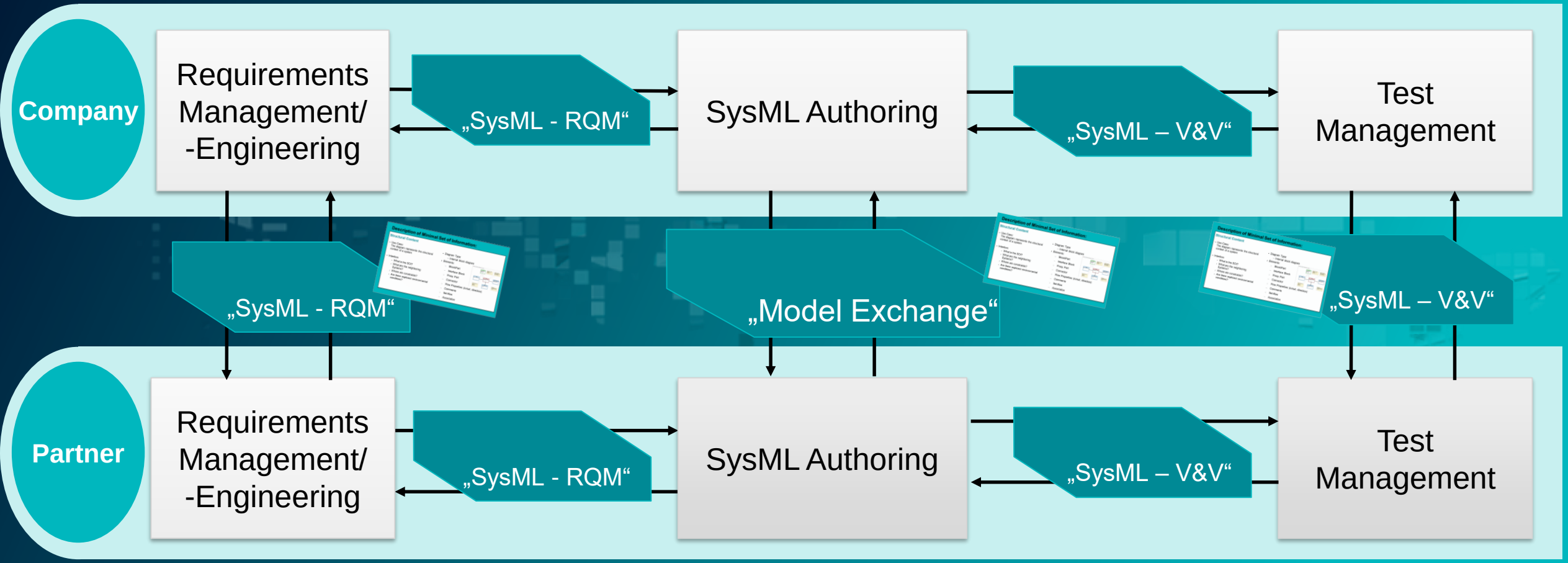
SysML as central Element of the Product Architecture



SysML WF Forum: *Establish seamless Industrial-Level Collaboration using model-based Systems Engineering to support handling of Complexity*

Focus on High Prioritized Use Cases

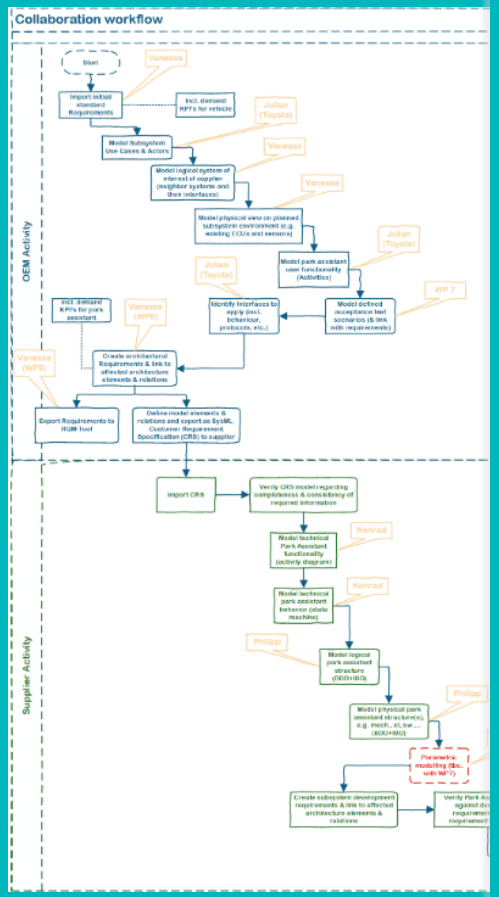
Including internal and external Collaboration
Tool and Method focused



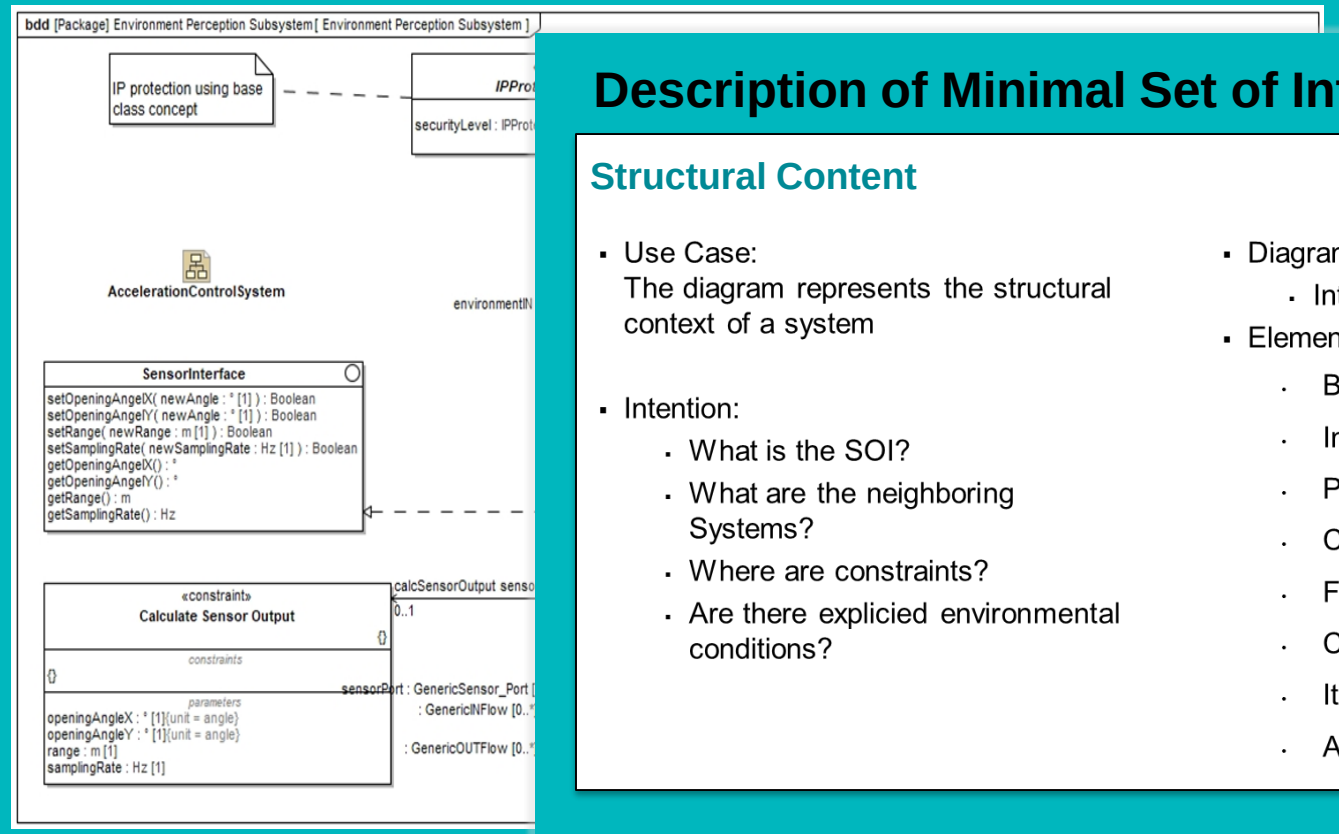
Base: Model Exchange

Use Cases and Requirements regarding technical solutions (Results of WP4)

Reference Process / Workflow:



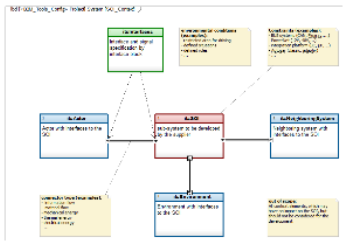
Exchange of real model data (Use Case):



Description of Minimal Set of Information:

Structural Content

- Use Case:
  The diagram represents the structural context of a system
- Intention:
  - What is the SOI?
  - What are the neighboring Systems?
  - Where are constraints?
  - Are there explicied environmental conditions?
- Diagram Type:
  - Internal block diagram
- Elements:
  - Block/Part
  - Interface Block
  - Proxy Port
  - Connector
  - Flow Properties (in/out; direction)
  - Comments
  - Itemflow
  - Association



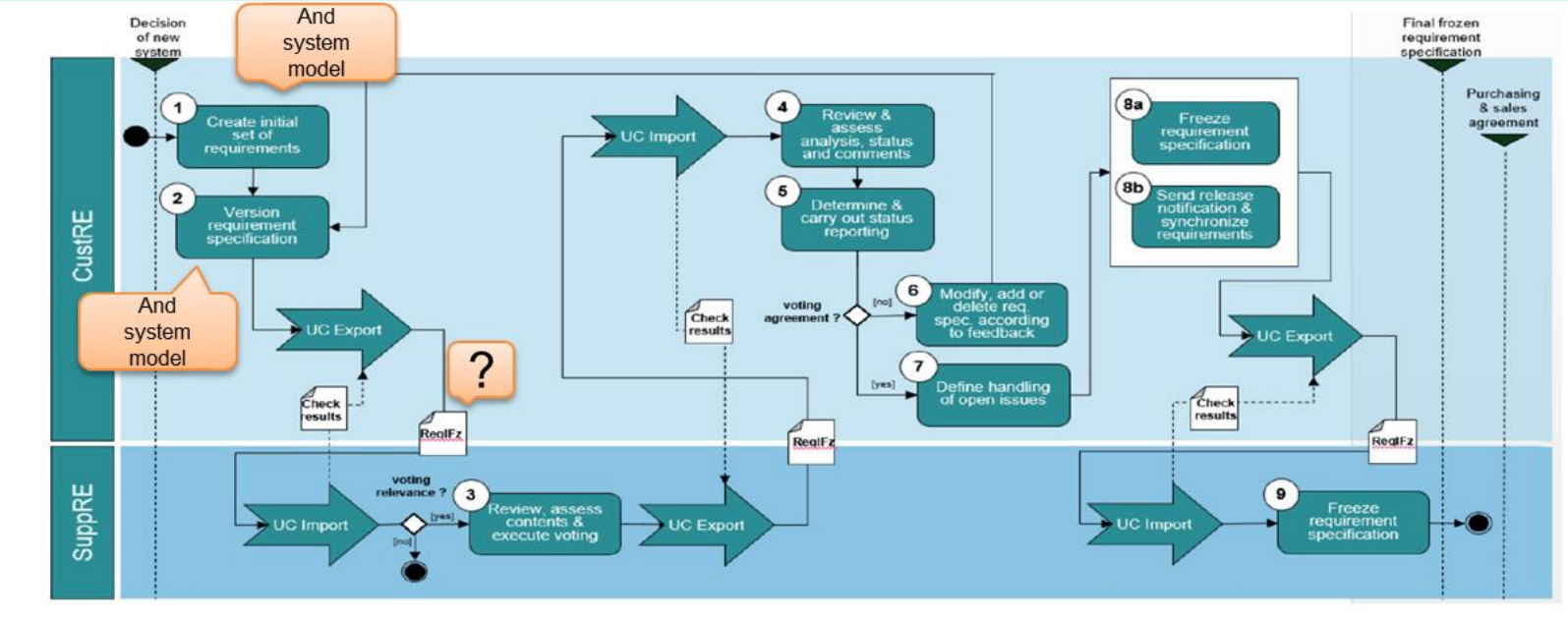
Requirements Management supported by SysML

Use Cases and Requirements regarding technical solutions (Result of WP6)

Reference Process / Workflow:

Linking- and exchange process

In collaboration with ReqIF Workflow Forum



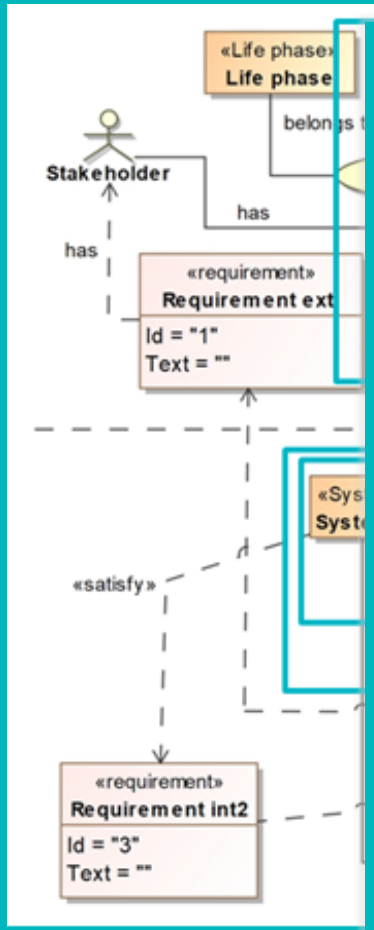
In Work

- Description of Minimal Set of Information for Model- and Link Exchange
- Configuration and Release Management

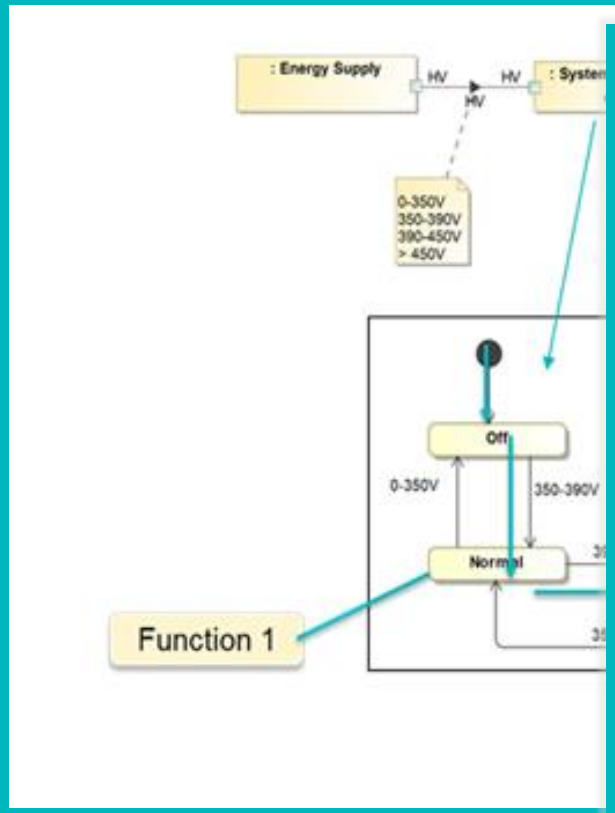
SysML Models and Verification & Validation

Requirements regarding technical solutions (Results of WP7)

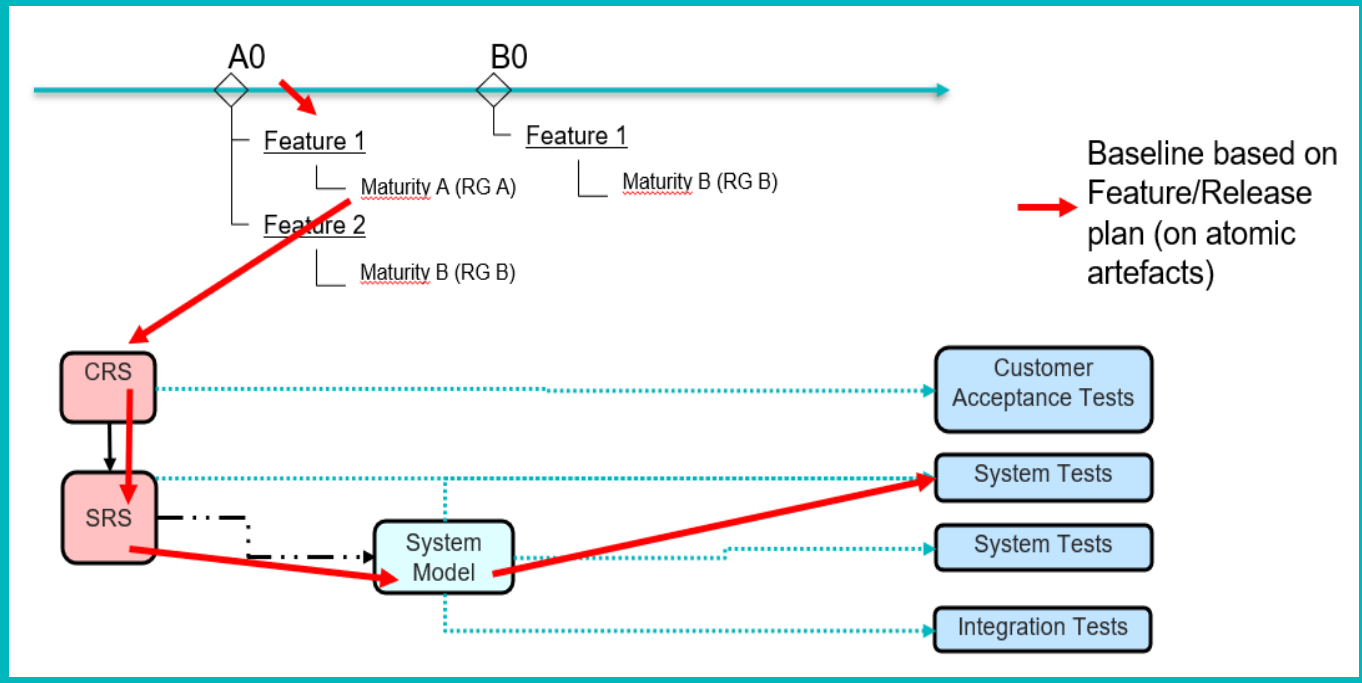
Integrated Model and Exchange Workflow



Description of Minimal Set of Information

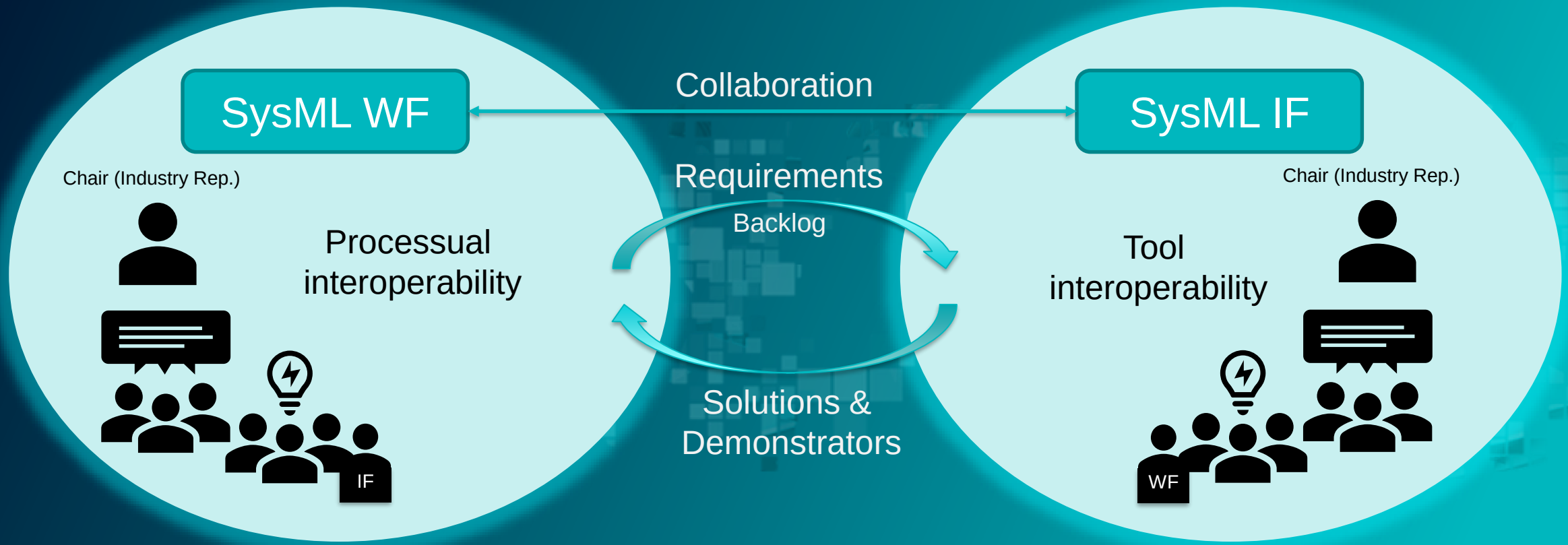


Config, Release and Change Management



From Documentation to Practise

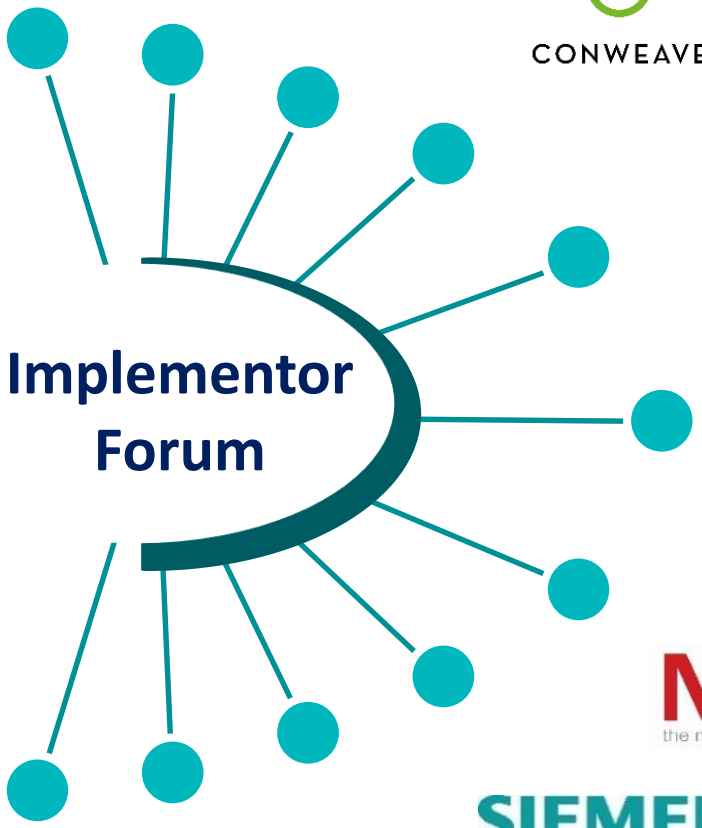
Establish SysML Implementor Forum January 2021



Definition of reference process, requirements and test cases

Evaluation of alternative solutions implementation of a demonstrator

Project Partners



Project Chair

Project Chair

Project Chair

Project Chair

* participation pending

SysML as central structure of the smart product

SysML Implementor Forum

Characteristics of an Implementor Forum (IF)

An Implementor Forum (IF) is

- an accepted instrument for ensuring interoperability
- a closed, competitive-free project group (no publication of explicit test results)
- a neutral platform for vendors and tool-providers for testing and exchange of experiences in an atmosphere of trust

SysML IF

Chairs

Dirk Denger
(AVL)

Daniel Siegl
(LieberLieber)

Coordinator

Dr. Sven Kleiner
(:em AG)

Participants

AVL List
CONTACT Software
Conweaver
:em engineering methods
Dassault Systems
IBM UK
LieberLieber Software
MID
T-Systems
Siemens Industry Software

Motivation

Focus on tooling discussions

Problem:

- many topic blocks
- Mixture of methodical-process-related and tooling discussions

Goal:

- Separation of methodical-processual and tooling topics
- Targeted, productive discussions with regards to seamless data integration
- Work order for "demonstrators”
- Parallelization of subject areas

Solution: Implementor Forum

Mission and Activities

What we want to achieve

Mission

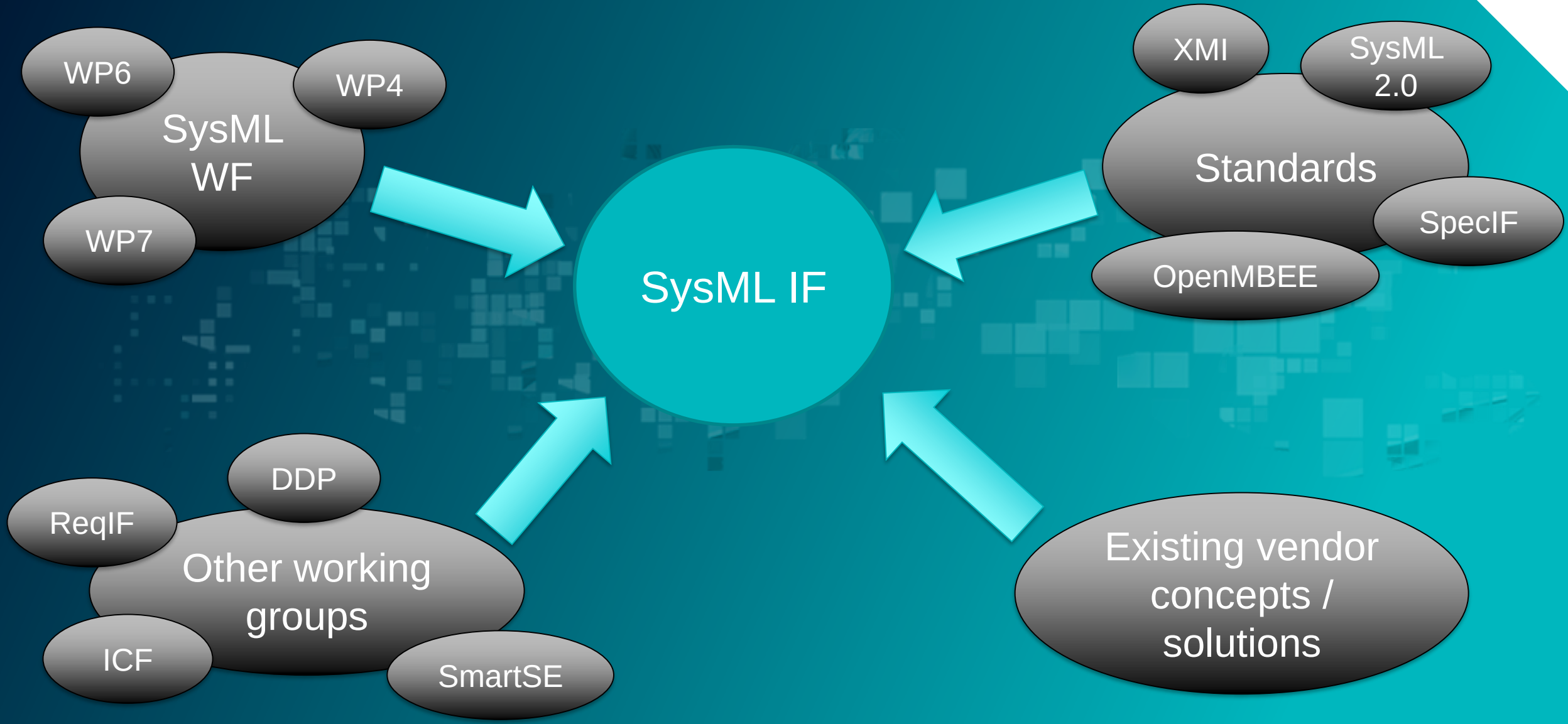
Demonstrating and testing capabilities with regards to SysML Model Exchange (ME), Requirements Engineering (RE) and Verification & Validation (V&V)

Activities

- Define Test Cases
- Test Model Creation and Preparation
- Run Tests and Test Result Evaluation
- Test Documentation
- Best Practice Recommendation

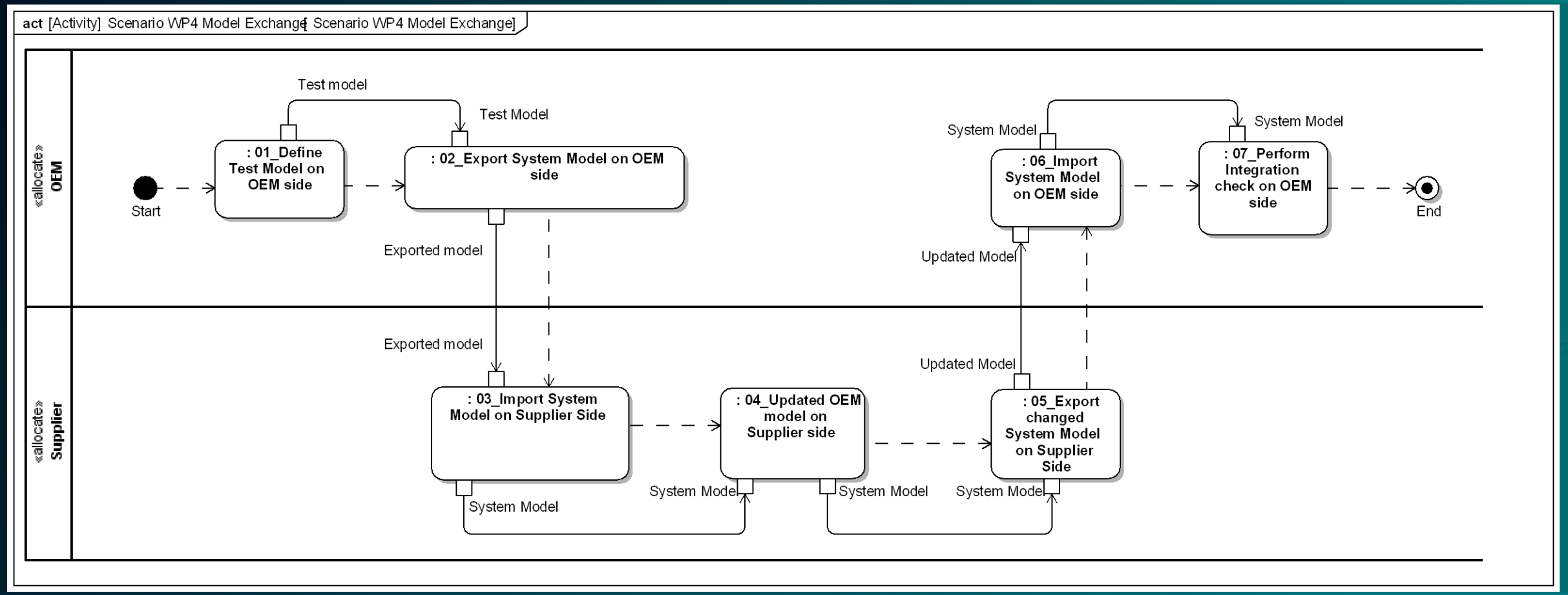
Inputs SysML Implementer Forum

What we consider



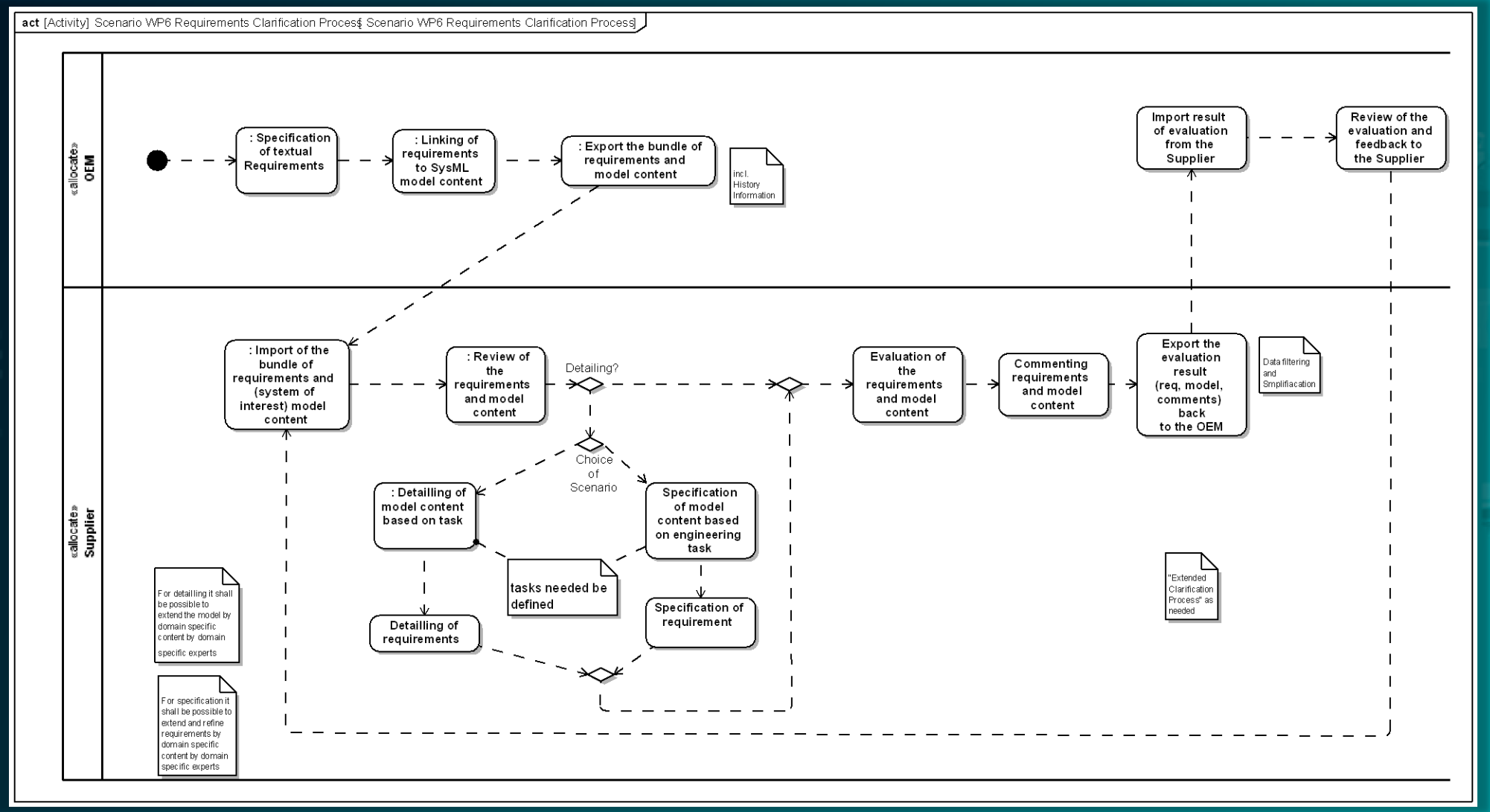
Main test scenario WP4

Model Exchange



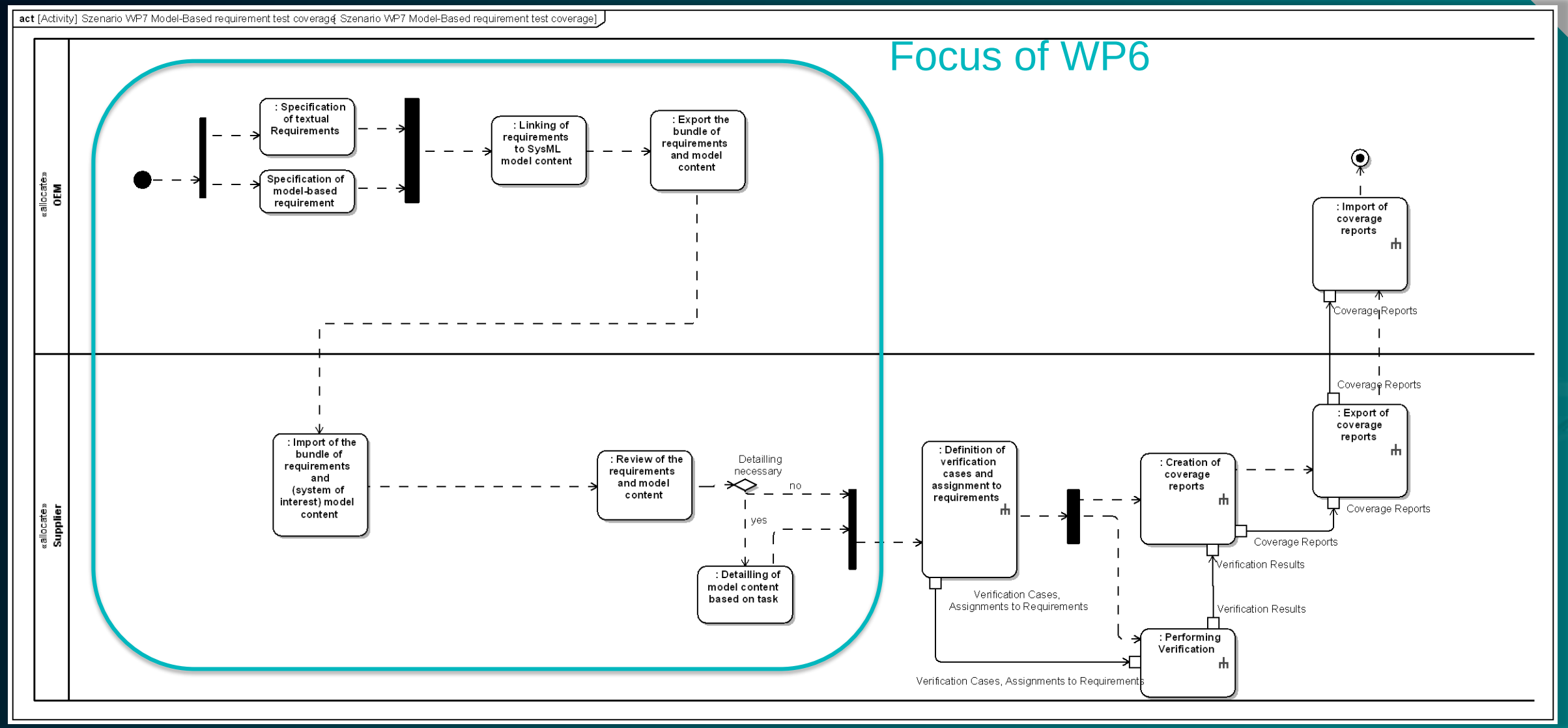
Main test scenario WP6

Requirements Engineering



Main test scenario WP7

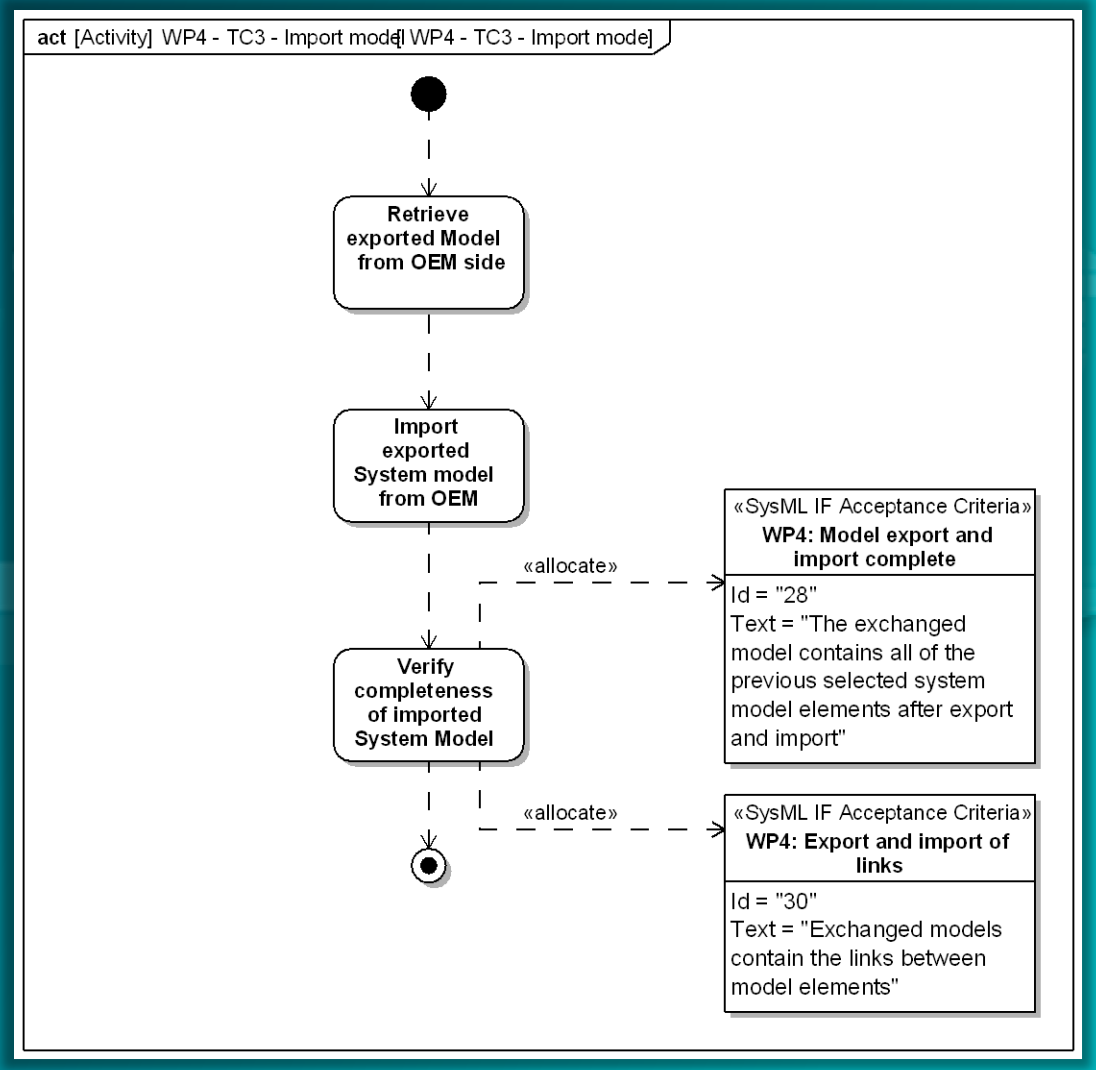
V&V



Test Cases & Acceptance Criteria

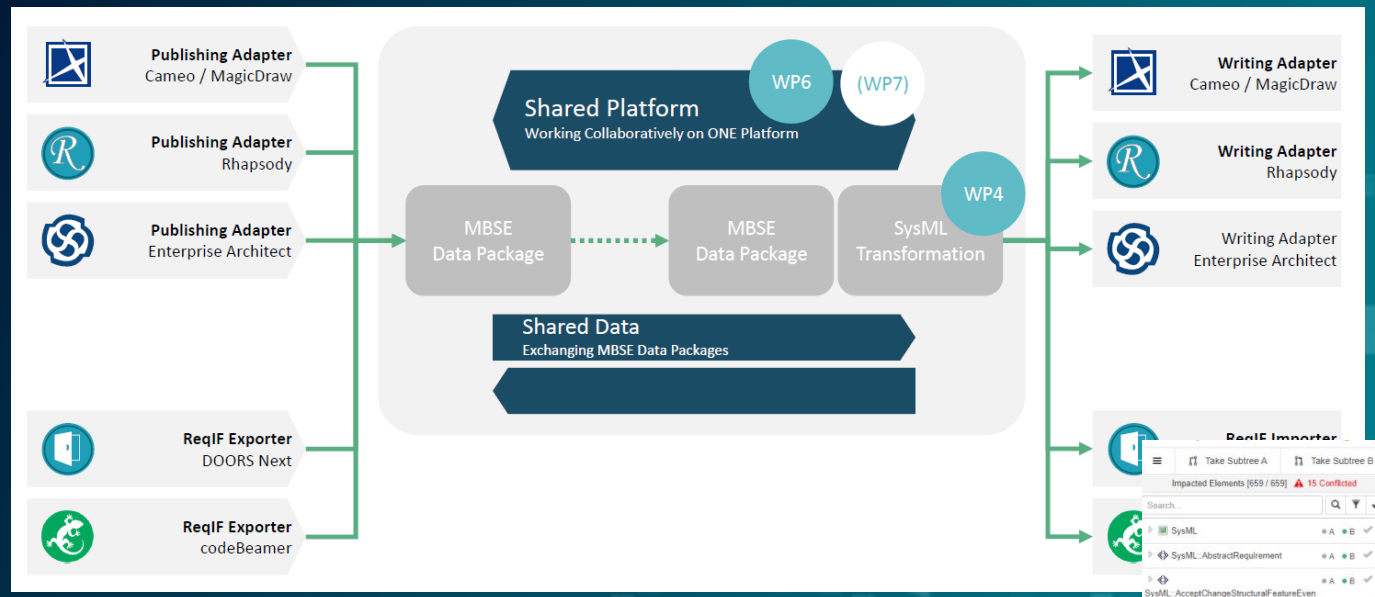
Example: WP 4 – Model Import

- Collection of requirements of WF
- Definition of Test Cases and review together with WG
- Deriving acceptance criteria
- Allocation of Acceptance Criteria to specific Test Case steps



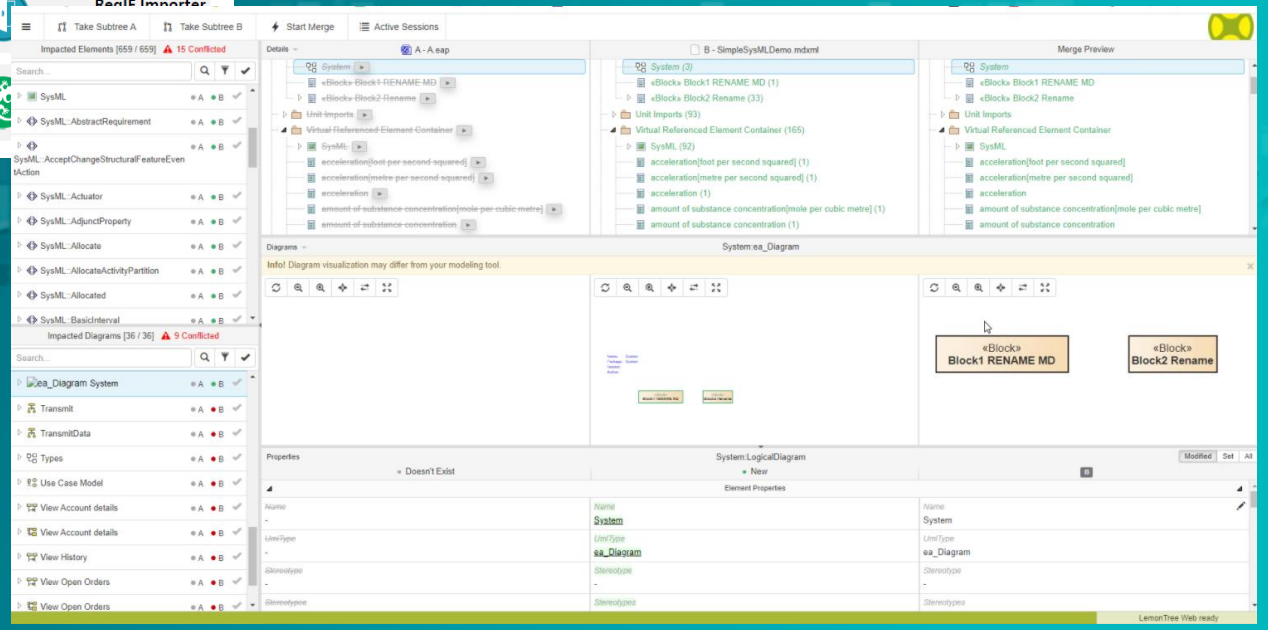
Vendor presentations

WP4 – Model Exchange



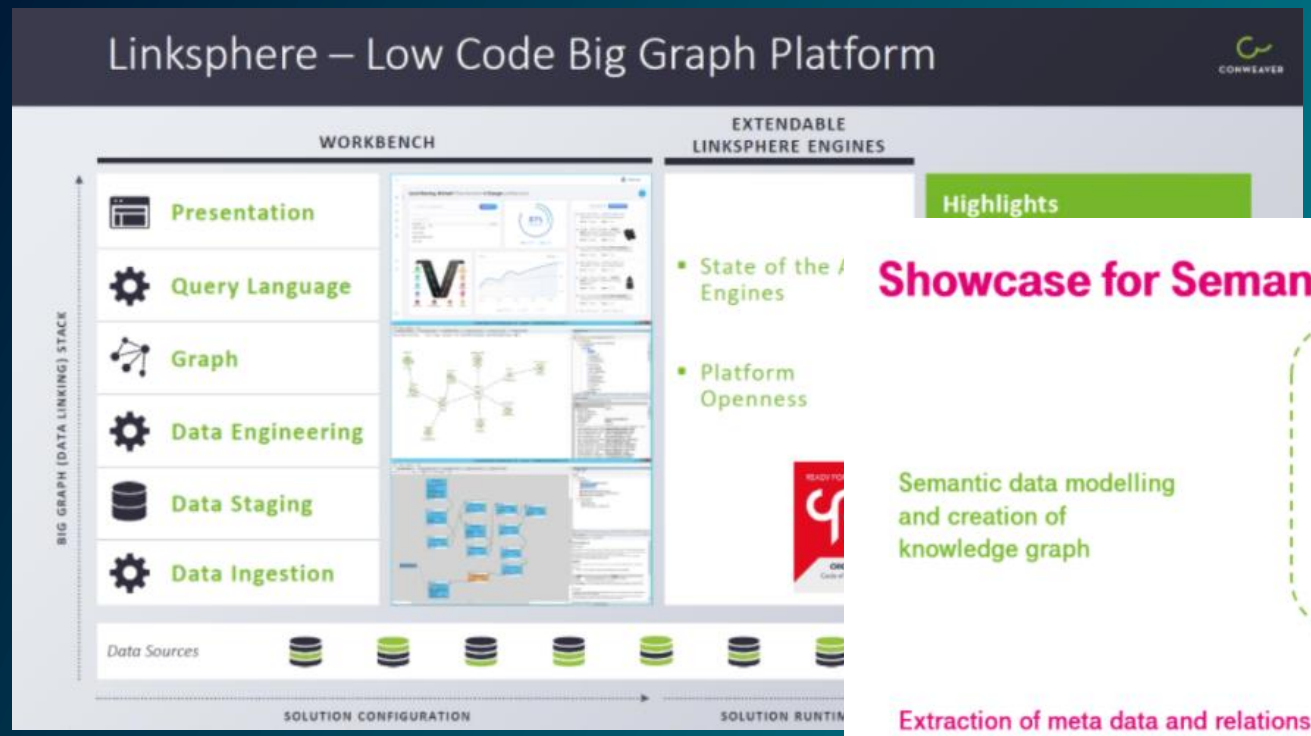
MID: Concept of a
MBSE Data Package

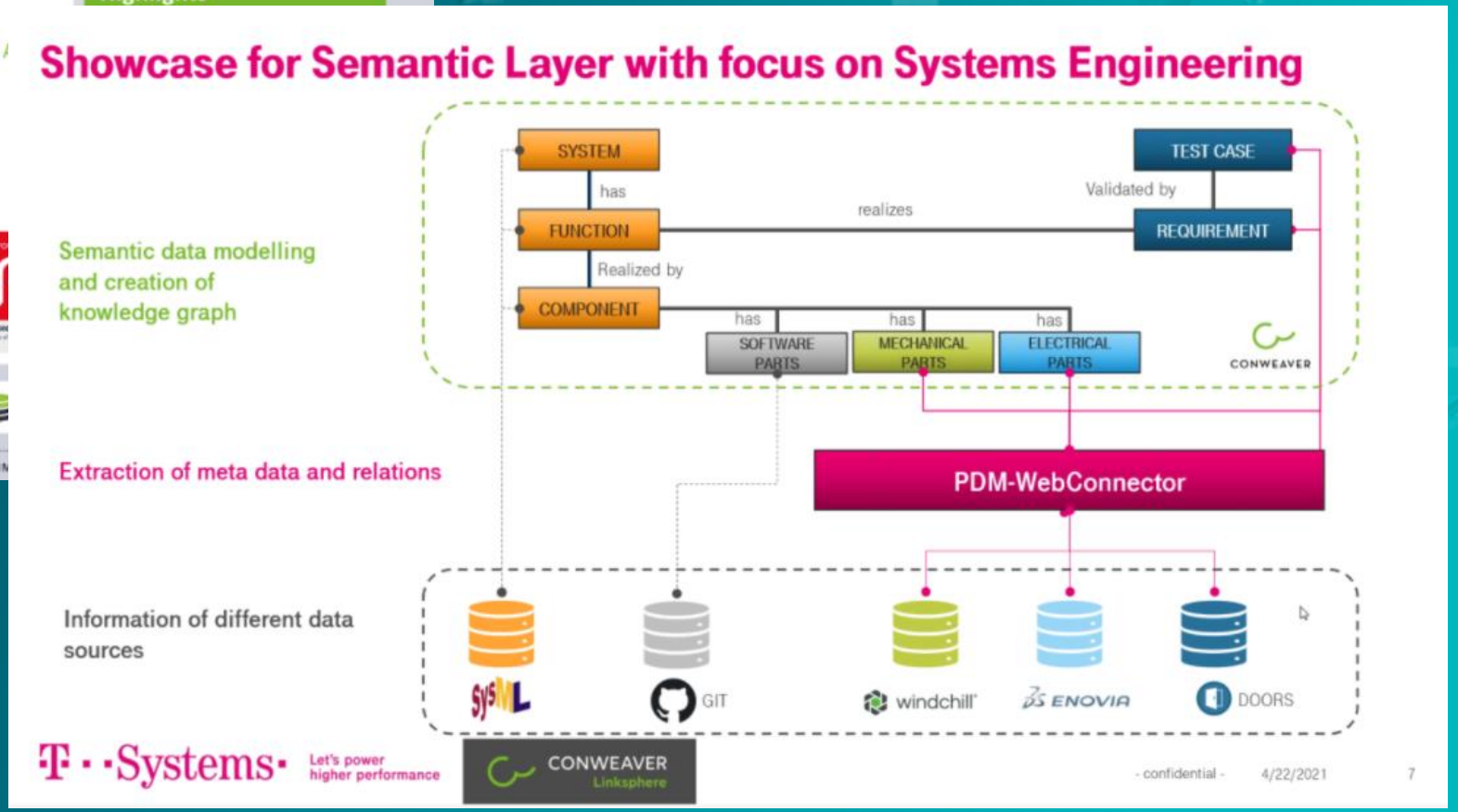
LieberLieber:
Merge Concept



Vendor presentations

WP6 – Requirements Engineering





Collaboration between Conweaver and T-Systems

Vendor presentations

WP7 – V&V

AVL: Integration of SysML and co-simulation

MBSE
SysML authoring tools

CAMEO SYSTEMS MODELER
ENTERPRISE ARCHITECT
ptc Windchill
SysML

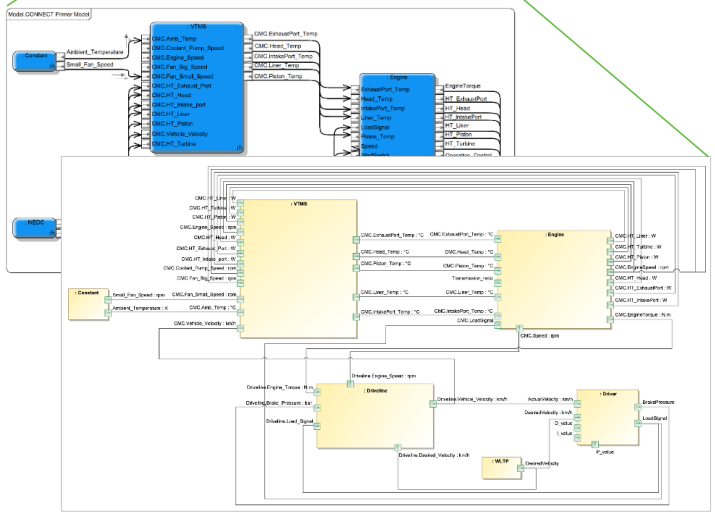
XMI

XML transformation & simulation model embedding

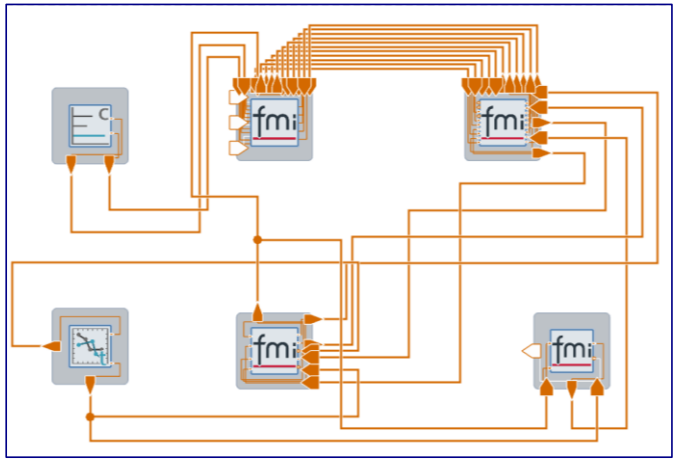
fmi Functional Mock-Up Interface

SSP

Co-Simulation
Model.CONNECT™



- Based on data exchange standards (XMI, SSP)
- Co-simulation derived from SysML architecture
- Conversion XMI to SSP currently works for:
  - Activities, Parameters
  - Call Behaviour Actions, Pins
  - Blocks, Parts, Ports



Current status & Outlook

2021

- Kick-Off for the SysML IF
- Several IF workshops and workshops together with the WF during this year
  - Synchronization of Test Cases and Requirements with WF
  - Aligned Acceptance Criteria
  - Collection of solution approaches from participating vendors
  - Demo presentation of existing solutions to WF

2022

- Demonstration of Tool Interoperability with focus on use cases
- Document best practices for implementation
- Test/Benchmark - tbd

prostep ivip SysML Workflow/Implementor Forum

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