Traceability @ Scale

For Standards, By Standards

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Sodius

- A **product** company, selling directly and through OEM's
  - A **global company** with representation in France, Germany, and the U.S.
    - Specializing in **data integration** solutions with a goal to ease and accelerate collaboration processes
    - Expertise with ALM, MBSE, MBSW artifacts including **requirements**, architecture **models**, engineering models, software **development artifacts**
    - **Solutions Provider** to markets such as Defense, Aerospace & Automotive
    - **Custom Services** to extend and integrate our solutions
    - **Data Integration and OSLC** Experts
  - **Strong integration and partnership with Willert Software Tools Team in Germany (SE and Embedded Software Experts)**

Data Formats

Partners & OEM

Customers

(Some of) Our Standards

INTERNATIONAL STANDARD **ISO 26262-1**

First edition
2011-11-15

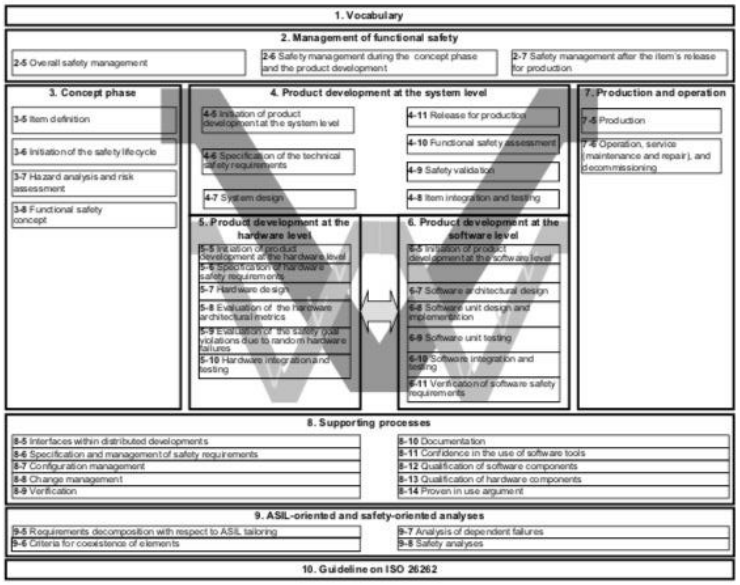
Road vehicles — Functional safety —
Part 1:
Vocabulary

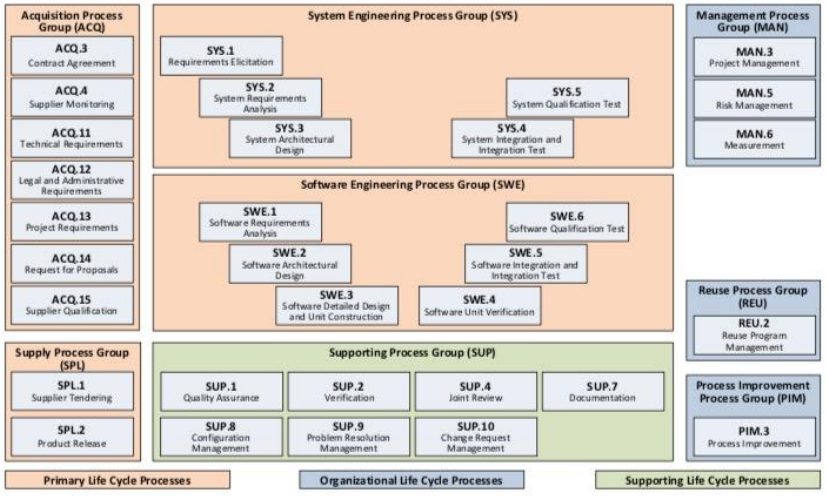
Véhicules routiers — Sécurité fonctionnelle —
Partie 1: Vocabulaire

VDA QMC
Quality Management in the Automotive Industry

Automotive SPICE®
Process Reference Model
Process Assessment Model
Version 3.0

Title:	Automotive SPICE Process Assessment / Reference Model
Author(s):	VDA QMC Working Group 13 / Automotive SIG
Version:	3.0
Date:	2015-07-16





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Traceability in the Standards

"Traceability refers to the existence of references or links between work products thereby further supporting coverage, impact analysis, requirements implementation status tracking etc.”*

Traceability in Practice

- Excel has been the standard for cross-reference index

Test ID		Tst-1	Tst-2	Tst-3	Tst-4	Tst-5	Tst-6	Tst-7
Requirement ID	Covered							
Req-1	TRUE	x						
Req-2	TRUE		x			x		
Req-3	TRUE		x					x
Req-4	TRUE				x			
Req-5	TRUE		x				x	
Req-6	FALSE							
Req-7	TRUE			x				
Req-8	TRUE							x
Req-9	TRUE					x		
Req-10	FALSE							
Req-11	TRUE				x			x
Req-12	FALSE							
Req-13	TRUE		x					
Req-14	FALSE							
Req-15	TRUE			x				
Req-16	TRUE				x	x		
Req-17	TRUE			x				x

- Pros
  - Accessibility
  - Ease
  - Cross-tool
- Cons
  - Tedious & Error Prone
  - Difficult Link to source assets
  - Usefulness
  - Versioning & Scale

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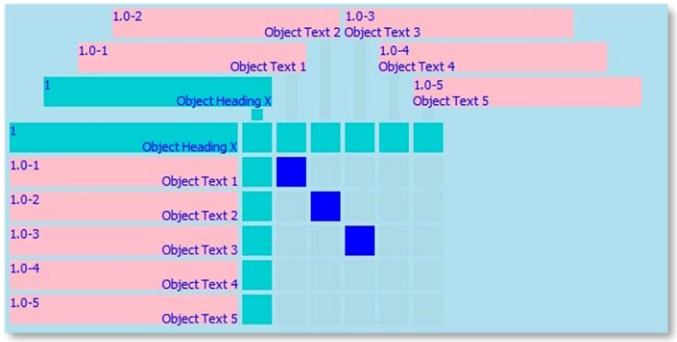
Traceability in Practice

- DOORS has been synonymous with traceability

ID	
MOD_1	**1 Object Heading X**
MOD_2	Object Text 1
MOD_3	Object Text 2
MOD_4	Object Text 3
MOD_5	Object Text 4
MOD_6	Object Text 5



- Pros
  - Built for traceability
  - Unique object identification
  - Common usage
  - Some versioning
- Cons
  - Focus on a single tool
  - Barrier of entry

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When Traceability is Failing

"We do the minimal that is necessary to pass the gate."

"Creating the traceability is easy, maintaining accurate information is difficult."

"We have a special group that just maintains this information."

"The most important part of traceability? That it can be labeled 'done'."

"I never use the index because I can't trust that it's been updated correctly"

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Our Objective

- Make Traceability a First Order Engineering Practice
  - Make it valuable to the engineer and the organization
    - Easier to create
    - Easier to maintain
    - Easier to answer engineering questions
  - Make it visible to the organization
    - As an asset
    - As a metric of quality
    - As a visual to understand
    - As a demonstration of compliance

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Traceability @ Scale

- Simple Definition
  - Assets & Relationship Perform Roles
  - Named Relationship Between Assets
  - Traceability is valid for a configuration

- Success when
  - Unified Environments/Boundary Free
  - Managed Configuration of Assets
  - Accessible to create, leverage, review, and report

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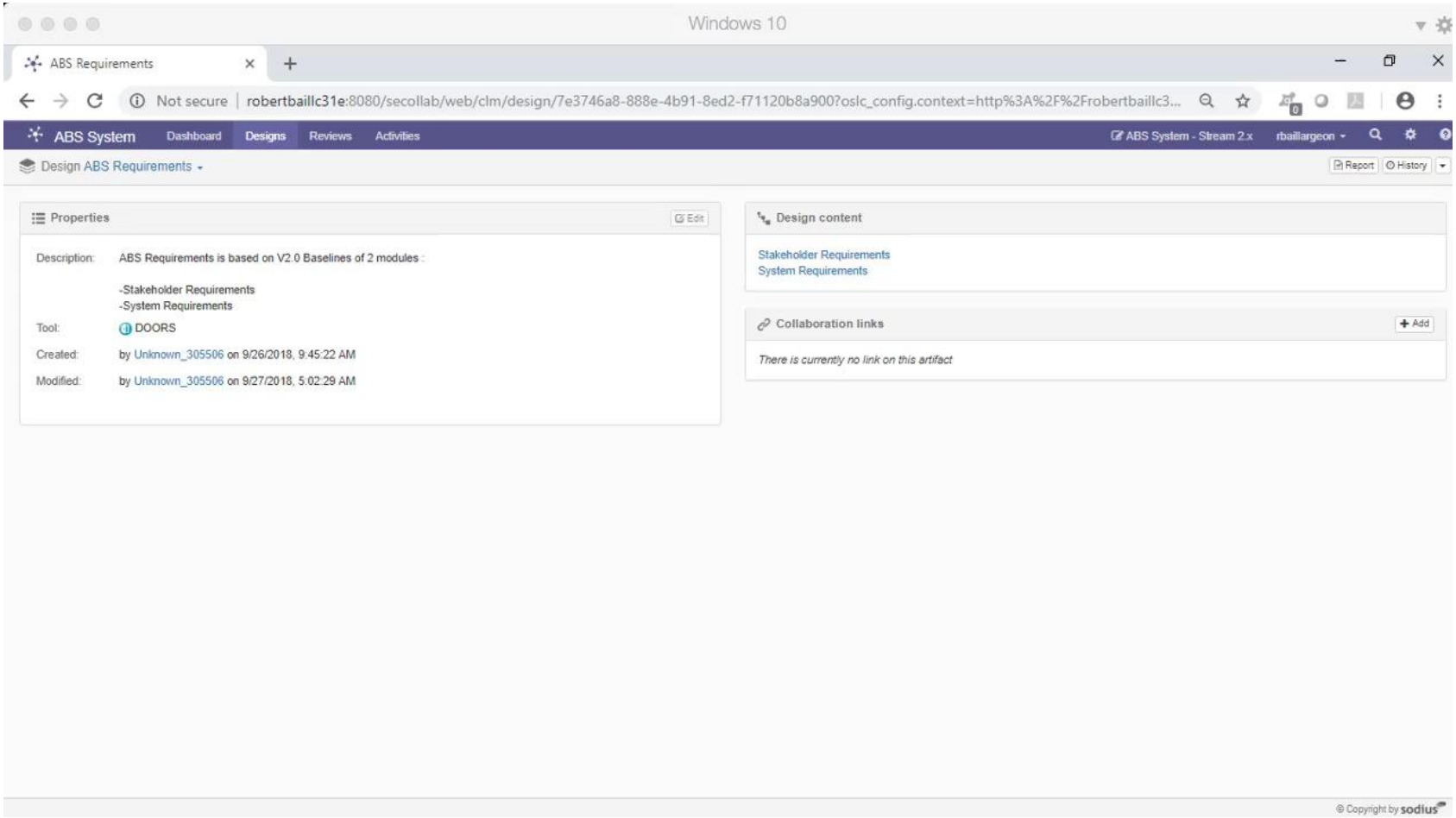
Visualizing Traceability



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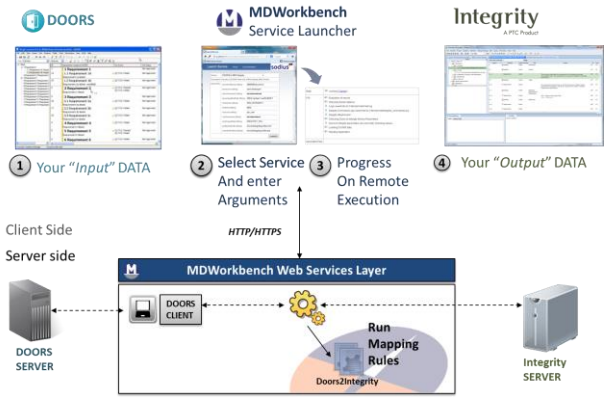
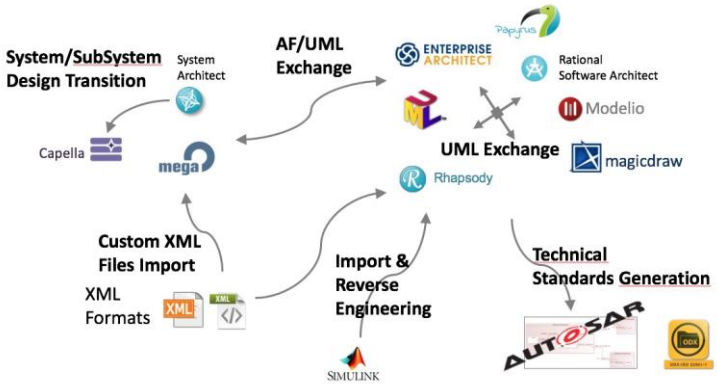
Visibility and Accessibility

Accessing Data

- For nearly 20 years SODIUS has been providing data accessors and converters
  - Providing OEMs products (IBM, NoMagic, Ansys, Jama,etc.)
  - For many large organizations, we support both tool connectors DOORS, UML, SA, MEGA, MATLAB Simulink, RTC, DNG, Jama, PTC Integrity, etc. and custom integrations





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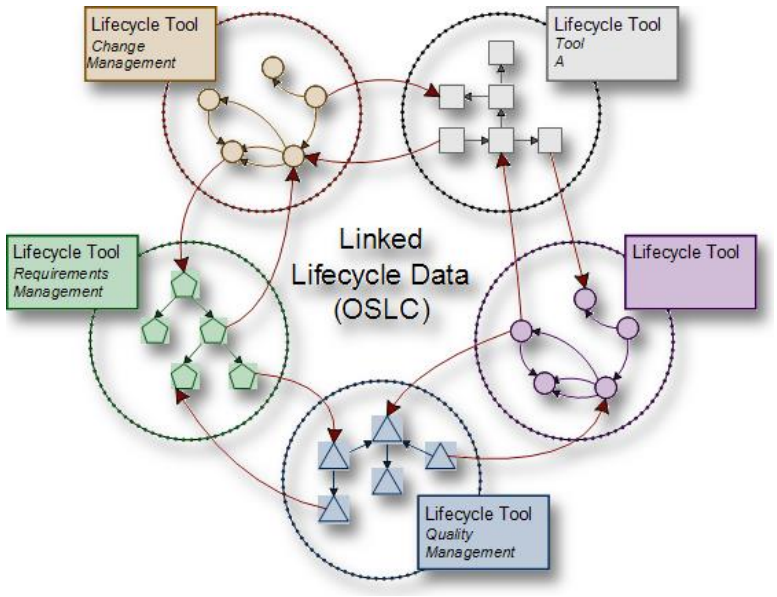
Standard for Integration



OSLC (Open Services for Lifecycle Collaboration)

- Web technologies
- Framework to *link* information between repositories
- Graph of relationships between artifacts
- Industry standard for describing assets

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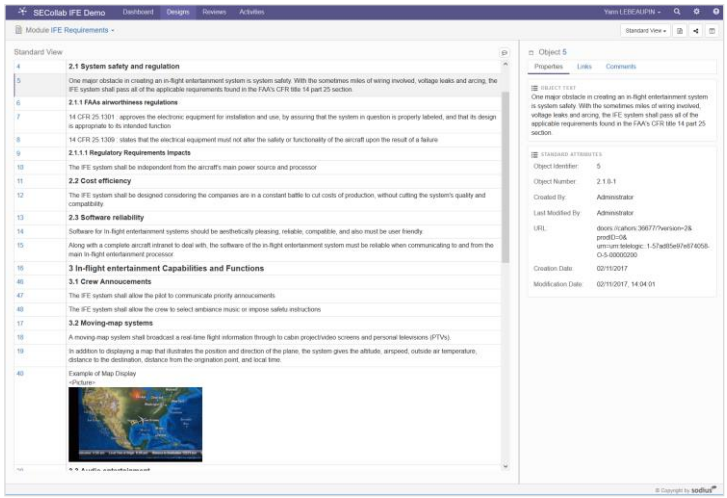
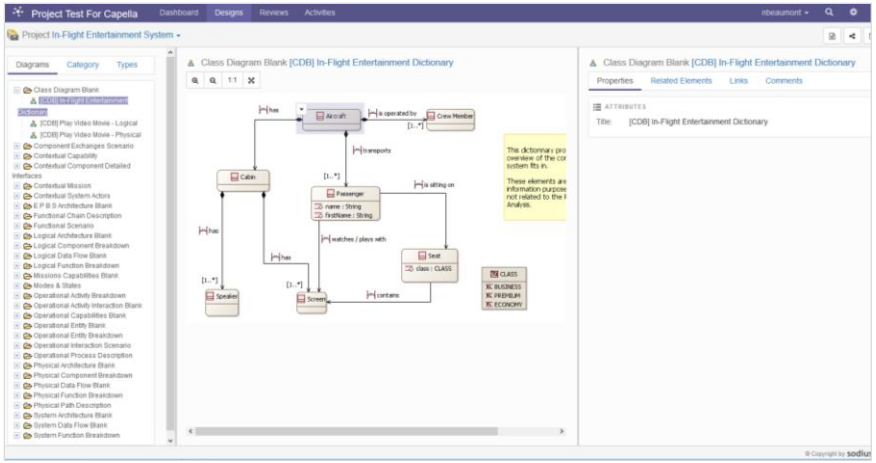
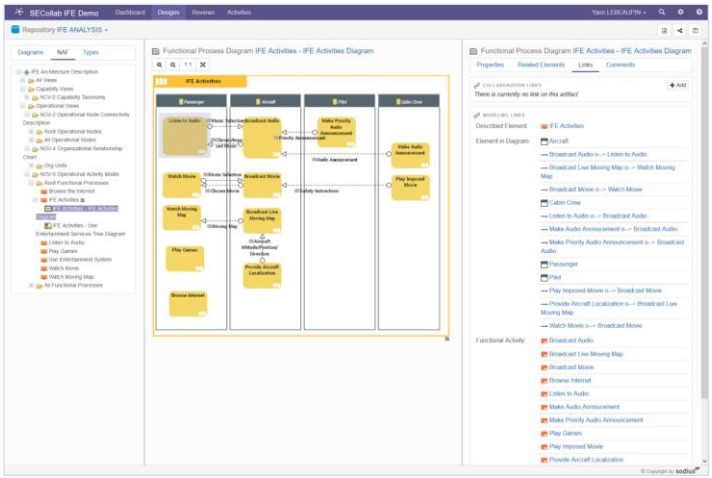
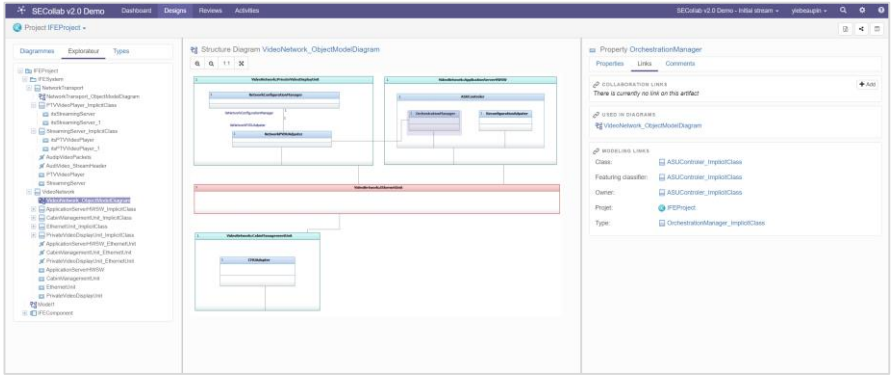
Projecting your Engineering Data

- Eliminating the boundaries to access and visualize your engineering data
- One (web) platform to access your Engineering data









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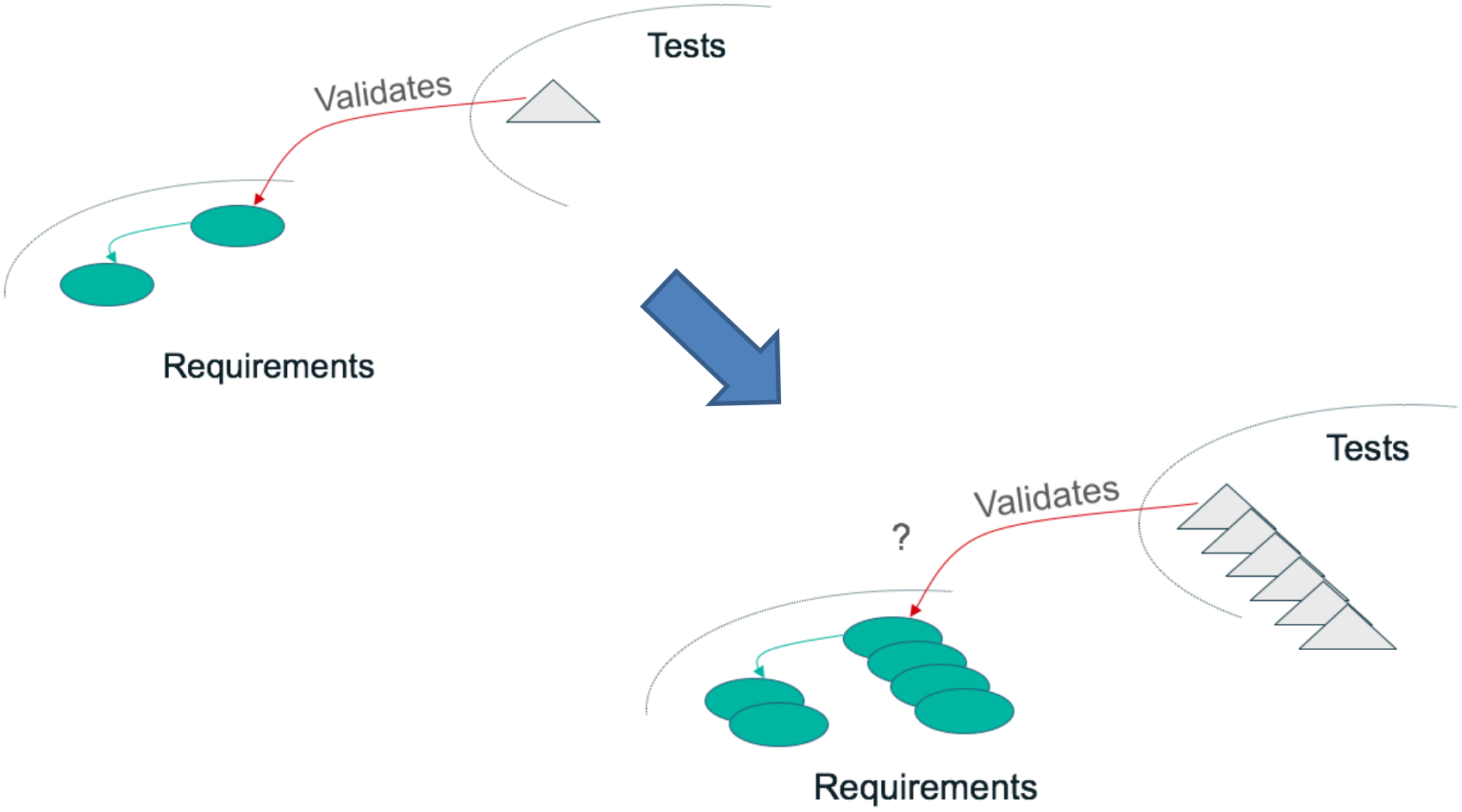
Configurations

Configurations – Context of Engineering

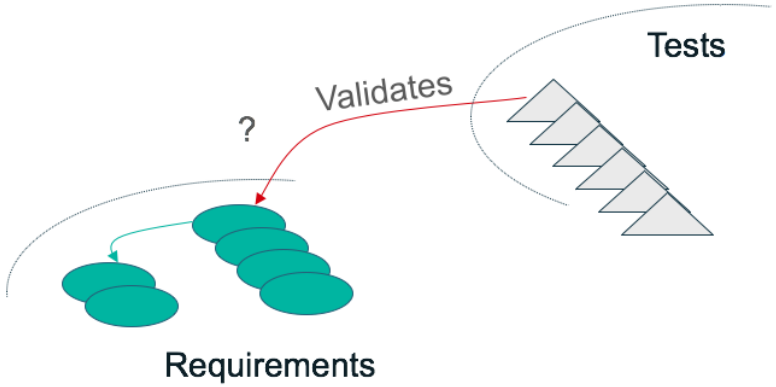
Context is imperative in an engineering process.

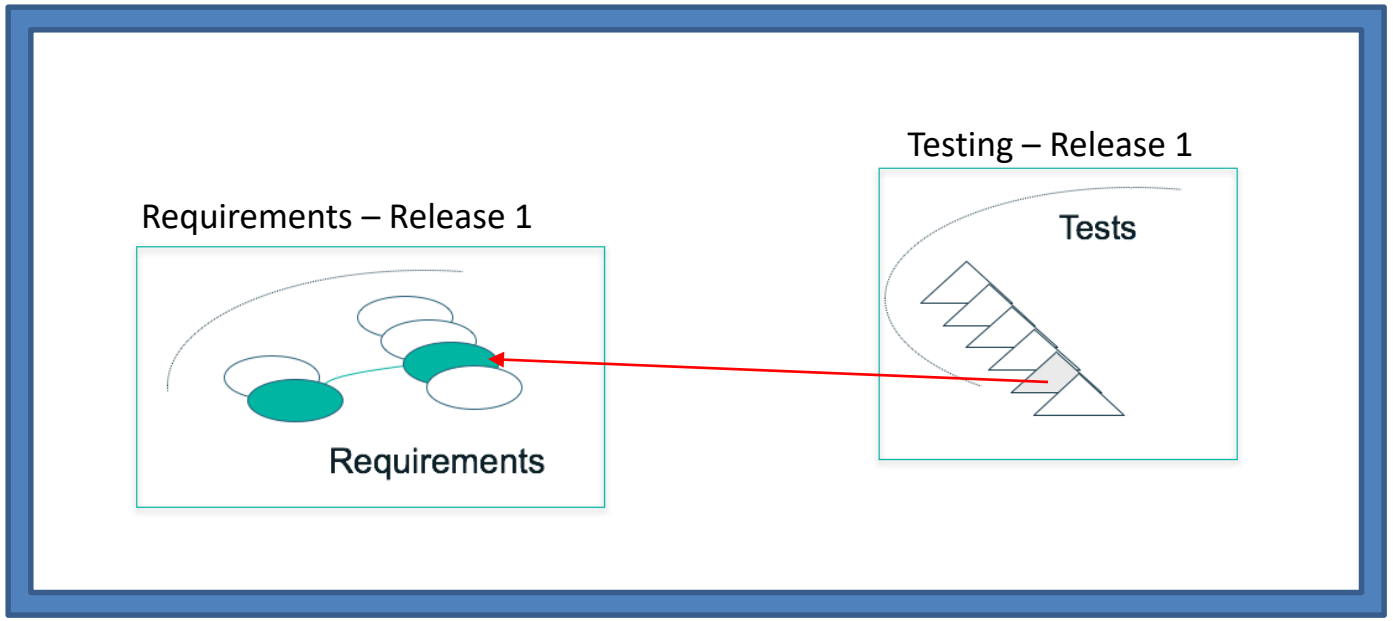
Context is required for reviewing engineering assets.

Linking with Versions



Simplistic View





Release 1

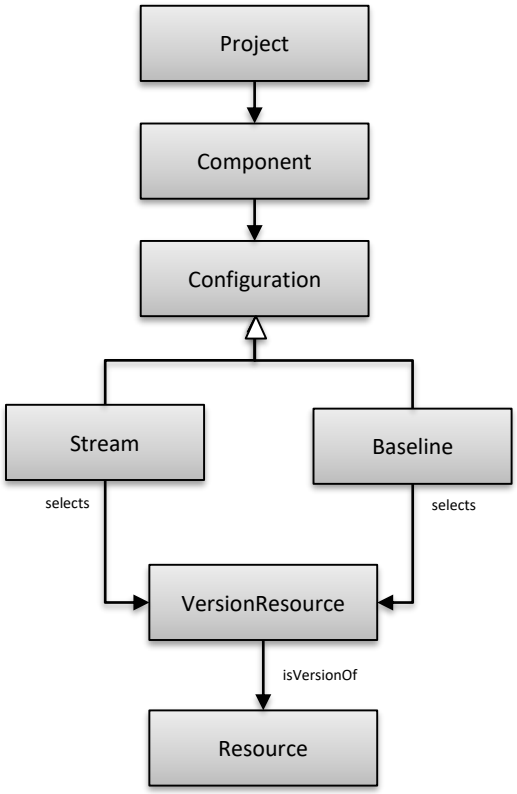
Graphics Courtesy Daniel Moul - IBM

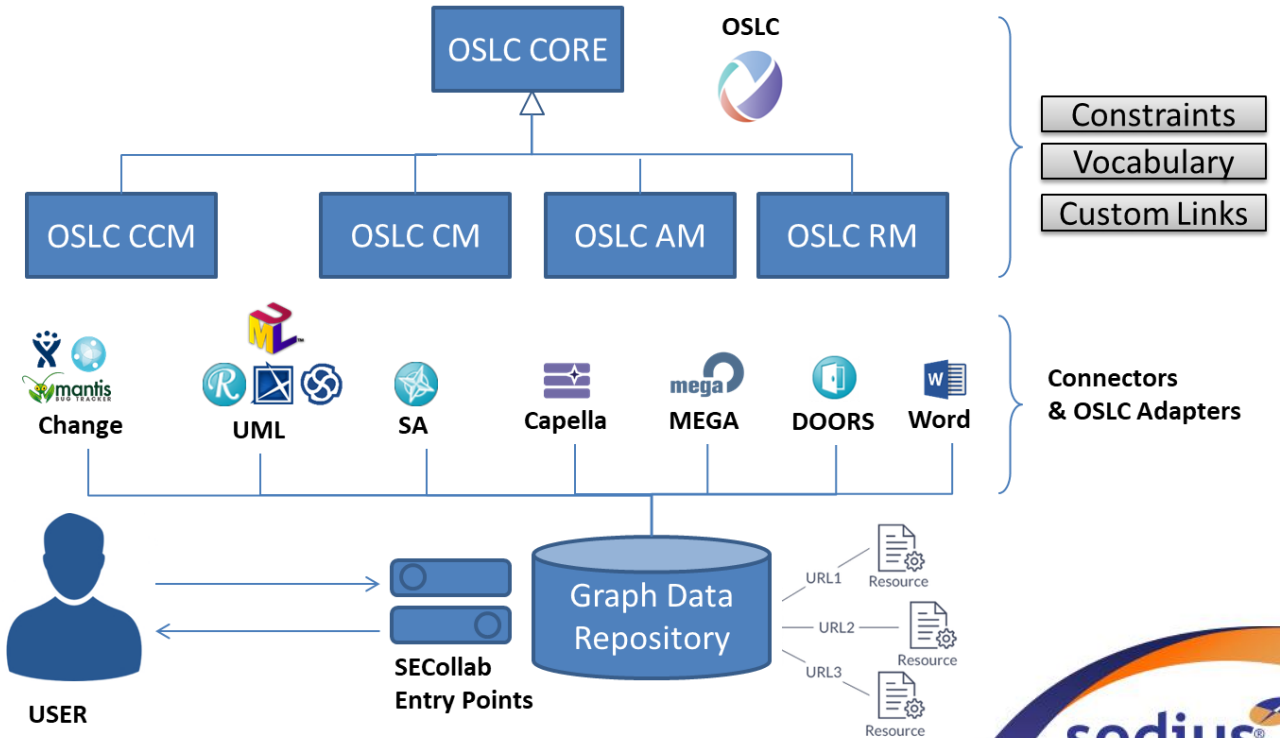
Configurations in Practice

- Allow us to speak to a consistent set of artifacts
  - In a working state (as a stream)
  - In a static state (as a baseline)
  - As a collection across many domains
- Represent the common elements of the engineering process
  - Gate reviews
  - Releases

OSLC & Configuration Management

- A configuration management solution across the set of disconnected engineering tools to manage evolutions of each design artifact in relation to the overall project.
  - Instead of manually mapping and communicating individual artifact versions, the target is a common baseline linking together the individual design artifact versions and OSLC native support (Consumer & Provider).





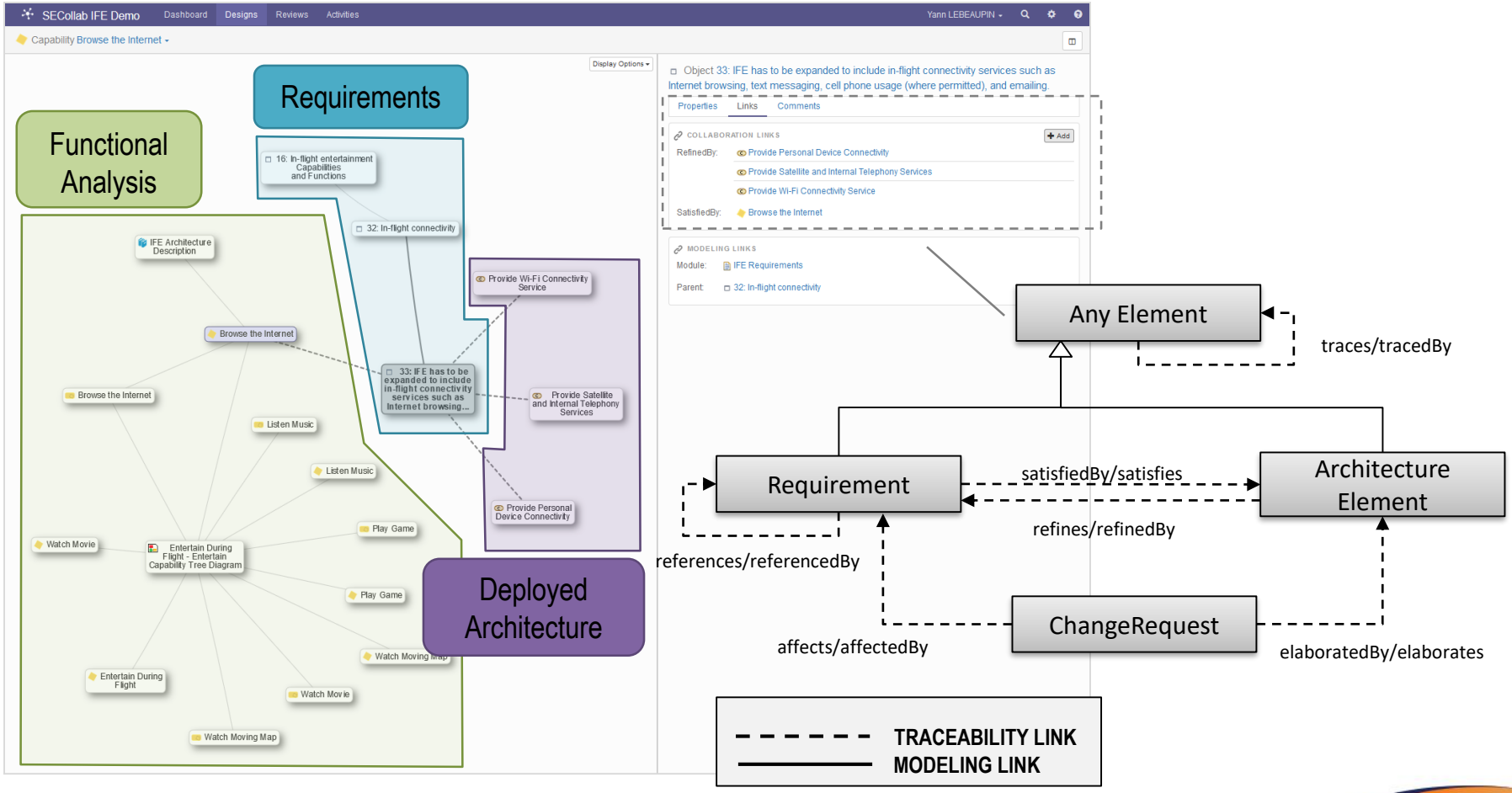
Trace @ Scale

Achieving Traceability

- Traceability shows
  - An impactful relationship between two objects
  - A role description
  - A need to assert consistency/validity across the relationship
- Traceability @ Scale means
  - Support for managing large numbers of relationships
  - Support for classifying allowable relationships
  - Support for navigating these relationships

Transversal Traceability

By using your semantics to describe the information coming from the engineering tools, any version of design or requirement element can be linked to any other element whether or not it is originated in the same application.

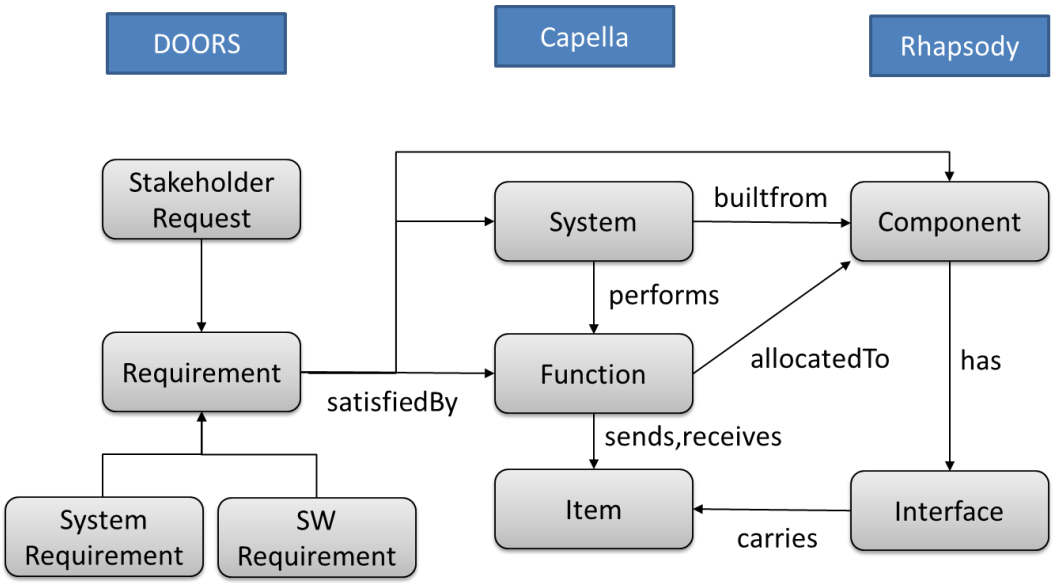


Our Traceability Model

- Evolutions of the traceability model to define a **transversal architecture model** above the various (and heterogenous) data coming from the published tools
  - Type will be define by an Alias Name and a filter request
  - Links will be constrained by those new Types

- For example, a **SystemRequirement** will be defined by :
  - Its generic type = Requirement (OSLC RM)
  - A constraint "**System Requirement Constraint**"
    - TOOL=DOORS
    - METATYPE=OBJECT
    - PROPERTY LIST
      - attrType = "ArchitectureRelevant"

With this mechanism, a same data can be considered under several aspects (architecture, safety,etc…) and a single concept can match data coming from several tools

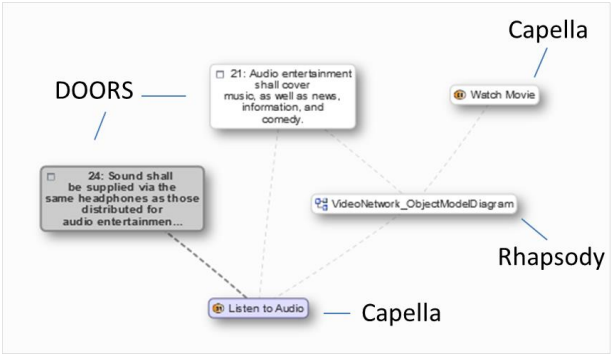


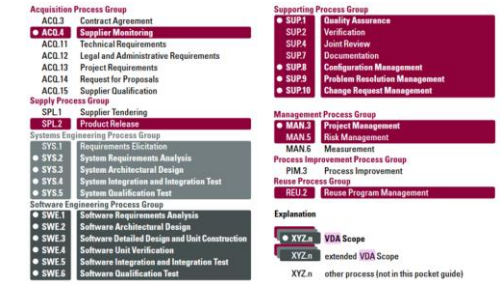
Custom Traceability Model

Application to Standards Traceability

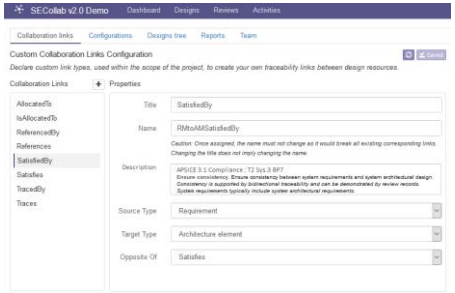
- Once we have the traceability model, it will be possible to documents the link types to trace the Standard links

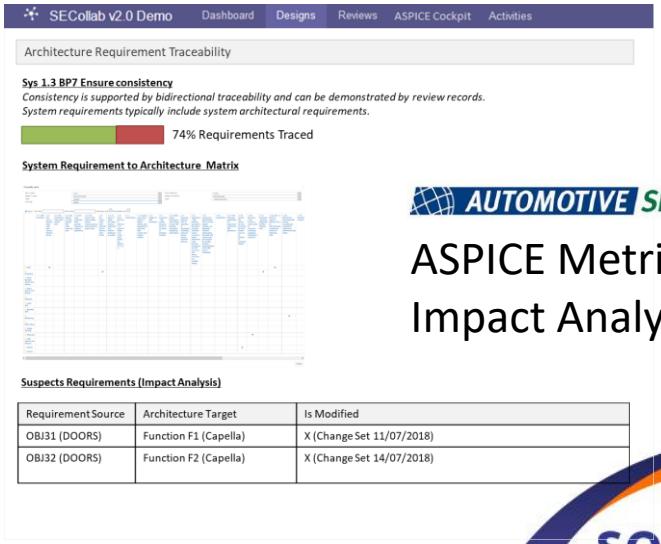
ASPICE Query in Graph Explorer





Compliance Standard





AUTOMOTIVE SPICE®

ASPICE Metrics and Impact Analysis

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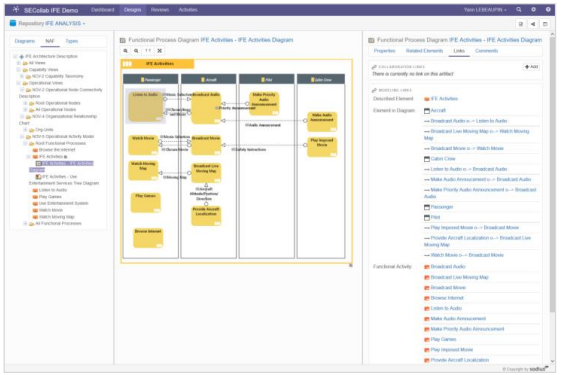
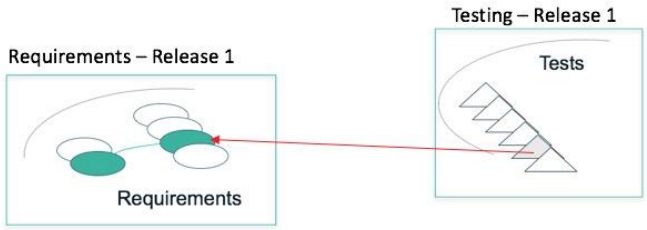
Performing Traceability @ Scale

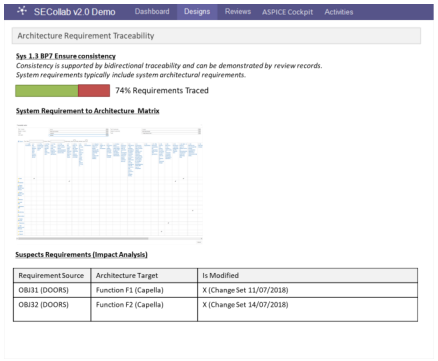
- We need accessibility
  - Provide **visibility to assets**
    - See the project assets without special tooling
    - See attributes and diagrams
  - Enable **navigation of assets**
    - See the native relationships (modeling links)
    - See the cross domain relationships (transversal traceability links



- We need configurations
  - Provides a **unified context**
    - Establish the working (or static) set of elements
    - Provide the selected versions of the assets in the configuration
  - Enables a **logical way to operate**
    - For engineers to assemble work
    - For configuration management to align work
  - While **enabling flow in each domain of work**
    - Managing their own assets
    - Setting their relationships



- We need supports
  - Provide the **relationship constraints**
    - Filter the sources and targets
    - Provide flexible identification
  - Provide the **reports & metrics**
    - Show compliance & coverage status
    - Show trends and progressions



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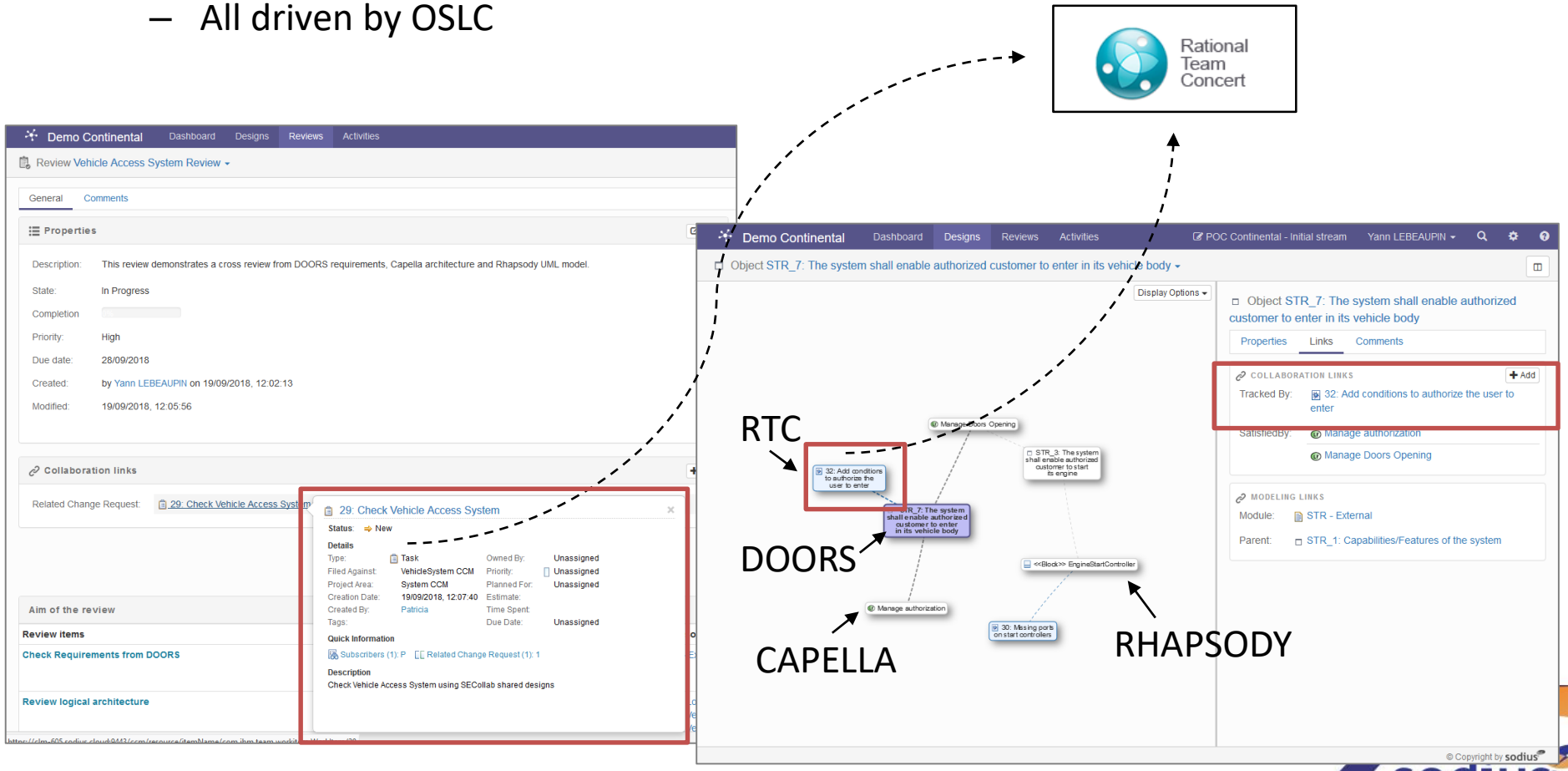
A Quick Review

Collaboration Links

- Collaboration links create connections to the change management workflow
  - Triggers to the modification of assets
  - Connections to the process flow (link back to Stages)
  - All driven by OSLC

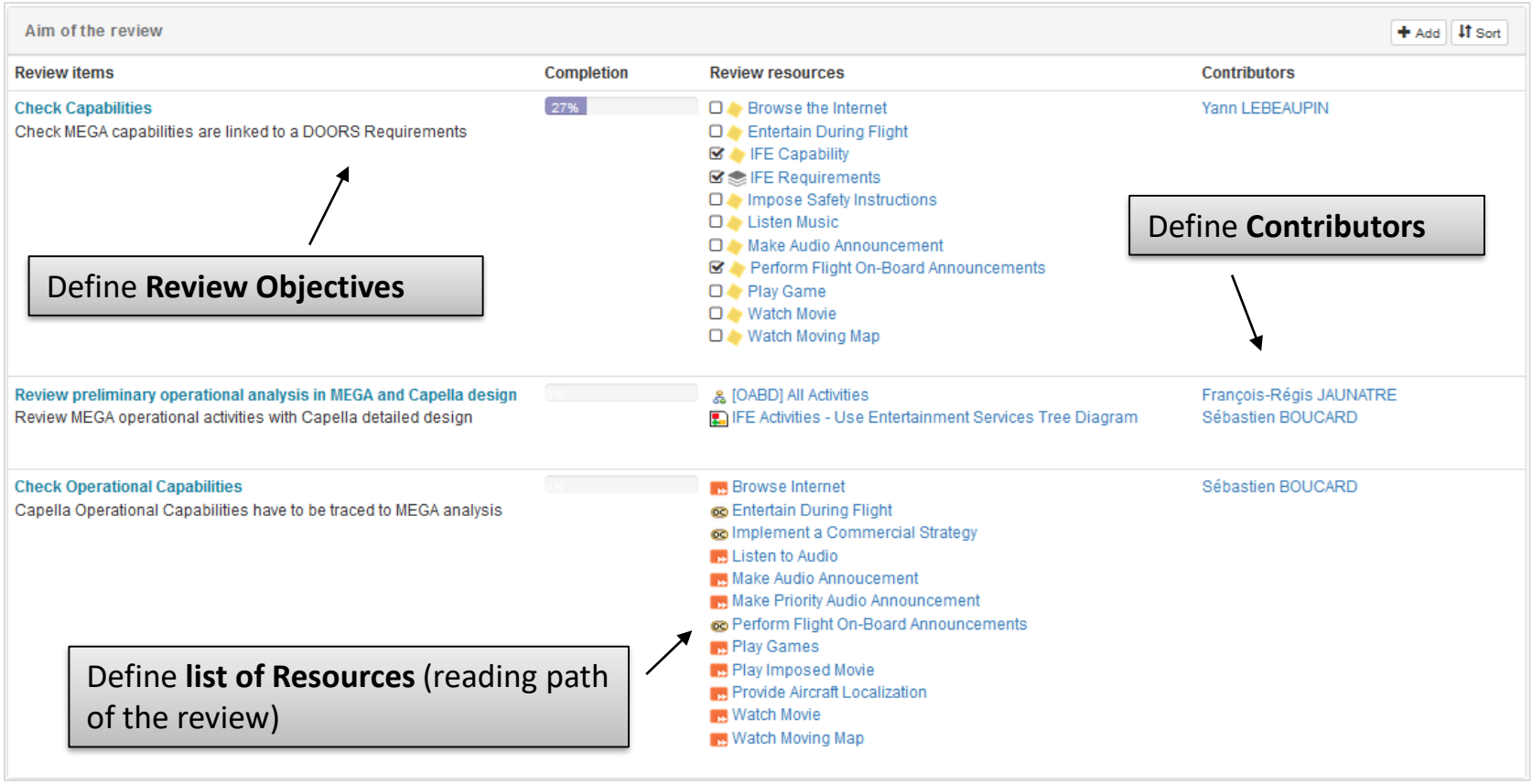


Reviews

- Standards mandate Review of assets
  - Must be done for a set of static assets
  - May span several tools
  - Require capturing findings
  - Must trigger actions
  - Must record results

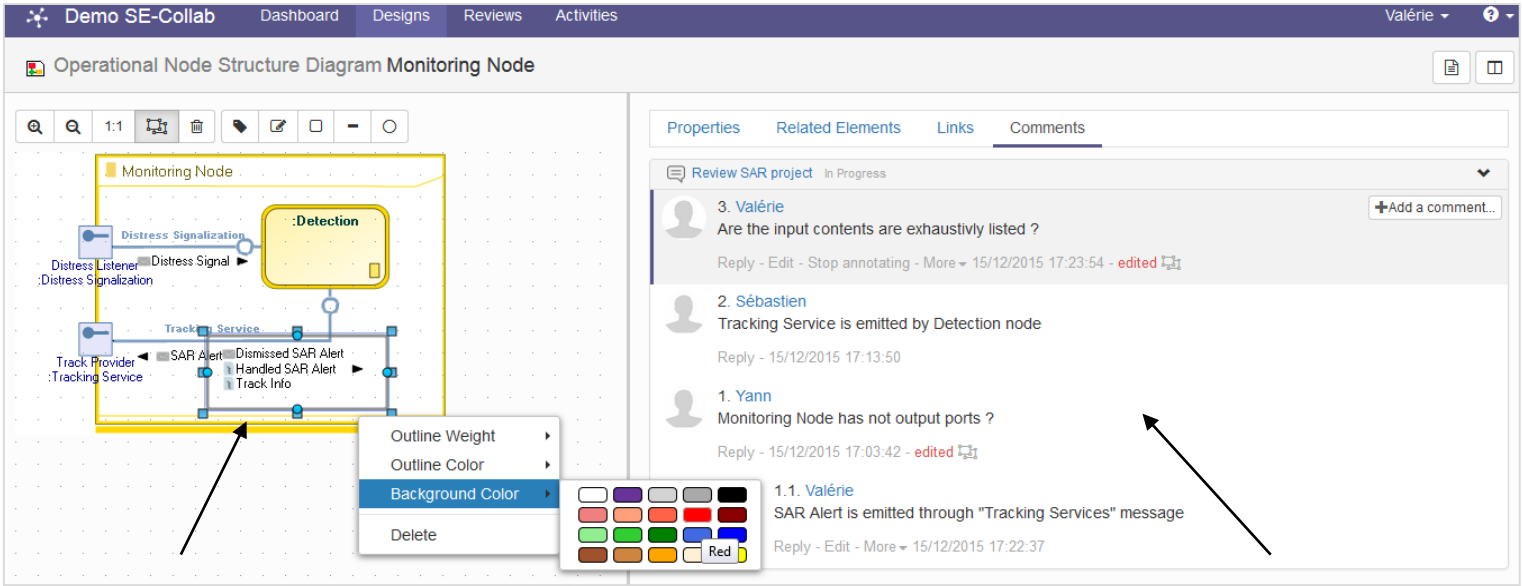
Review & Comment Diagrams and resources

The **review manager** defines the review content with objectives, list of resources and contributors).



Review & Comment Diagrams and resources

The **team can review a set of artifacts at once**, to ensure consistency across the team and across deliverables.



Add **Graphical Annotations** on Diagrams

Comment in context with **Collaborative Discussions** on Design items

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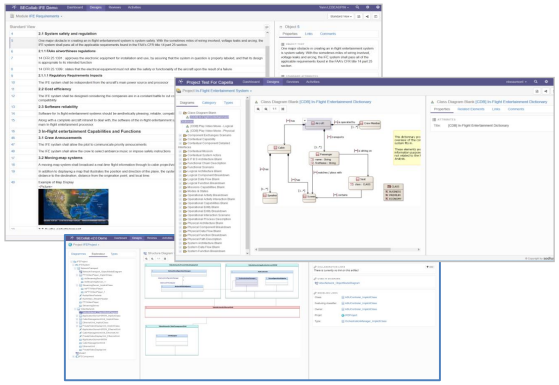
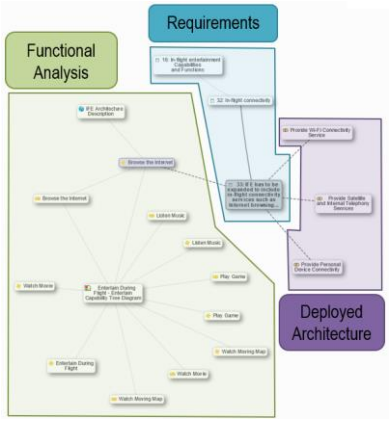
Final Thoughts

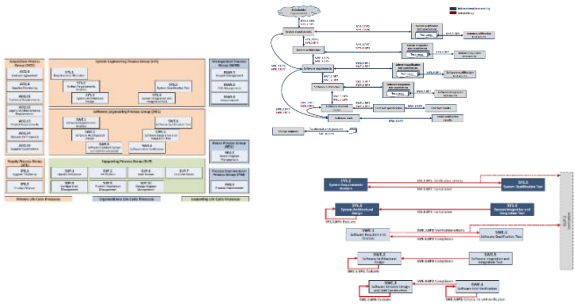
Value of Connected Engineering

- We want to link processes and data across teams to have in a **Connected Engineering** approach:
  - Using a **transversal configuration of connected engineering data** providing a **unified context** to engineering activities
  - And providing
    - **early detection of problems trough technical collaborative reviews**
    - **end-to-end traceability**
    - **help coordinating change processes**
    - **support for compliance processes**

Share and Review ⟷ **Link and follow impacts** ⟷ **Improve standard compliance**







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Sodius Portfolio based on OSLC

SECollab

RDF repository handling multi-model workspaces

Traceability and linking capabilities

Reviews across heterogeneous data

Extensible set of tool **connectors**

OSLC Adapter for PTC Windchill

ALM/PLM Corporate Repository Interfaces

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Contact us

To get more information about our automation & interoperability solutions…

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