AMASS

Architecture-driven, Multi-concern and Seamless Assurance and Certification of Cyber-Physical Systems

WP5: Seamless Interoperability

First EAB Workshop
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Seamless Interoperability Objectives

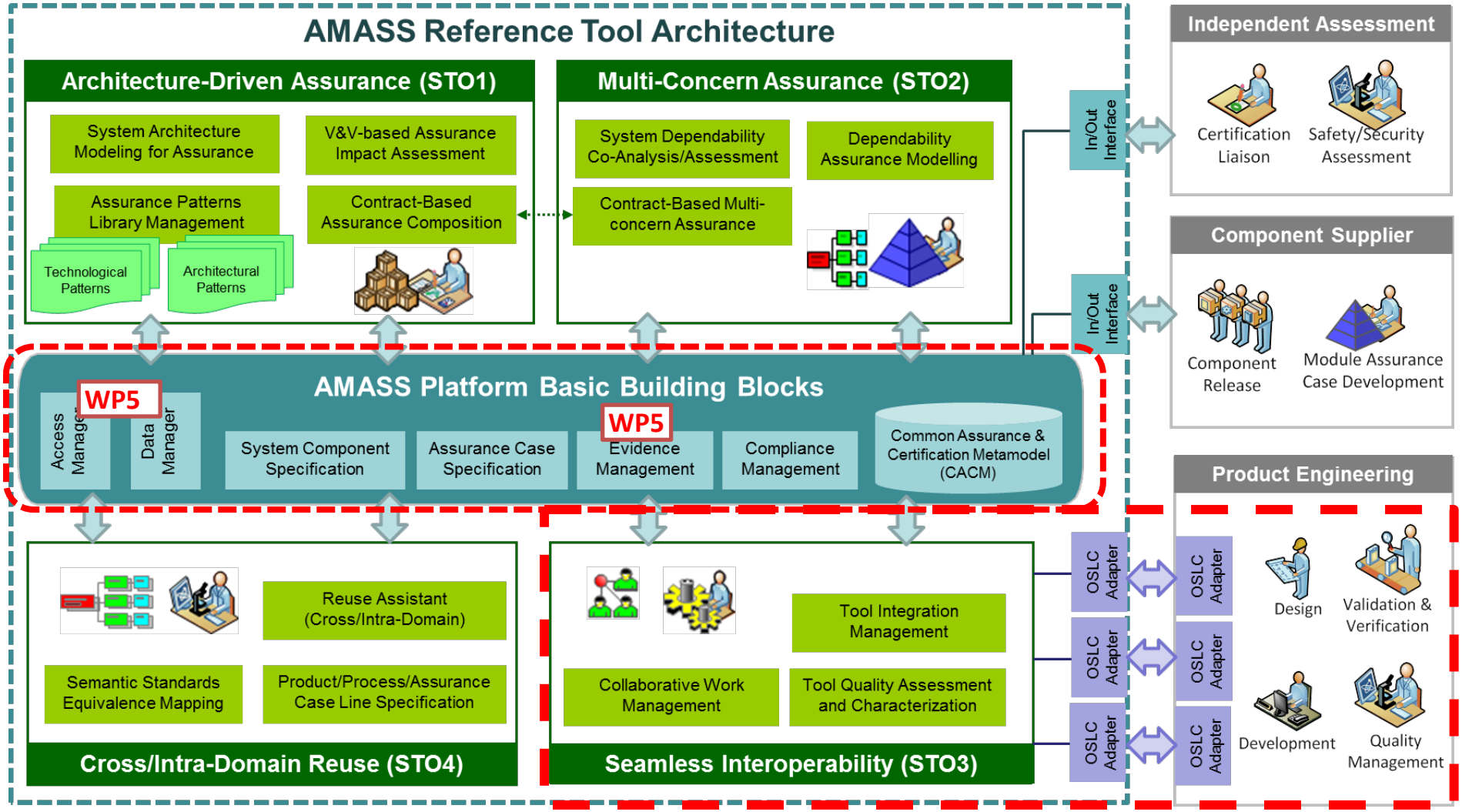
To develop a fully-fledged open tool platform that will allow developers and other assurance stakeholders to guarantee seamless interoperability of the platform with other tools used in the development of CPSs.

→ Develop an open and generically applicable approach to ensure the interoperability between the tools used in the modelling, analysis, and development of CPS.

Main specific objectives:

1. To define the baseline for an intelligent, automated, and highly customizable tool infrastructure for seamless interoperability and its management
2. To provide an extensible tool architecture that supports the intended use cases
3. To investigate suitable generic approaches for tool integration
4. To define metamodel(s) as a foundation for tool integration
5. To provide and demonstrate the seamless tool integration by the provision of a tool chain with selected tools

Seamless Interoperability Work Areas



WP5

Seamless Interoperability Work Areas

- Tool Integration Management
  - Need for better intertwining assurance and engineering activities, and thus for integrating their tool support
  - Focus on OSLC
- Collaborative Work Management
  - Different stakeholders (and roles) are involved in CPS assurance & certification and need to collaborate
  - The stakeholders need to share information
- Tool Quality Assessment and Characterisation
  - CPS development and V&V tools can also pose safety risks
  - The tools must be characterized, tool output quality must be assessed, and tool selection impact must be analysed

Seamless Interoperability Baseline

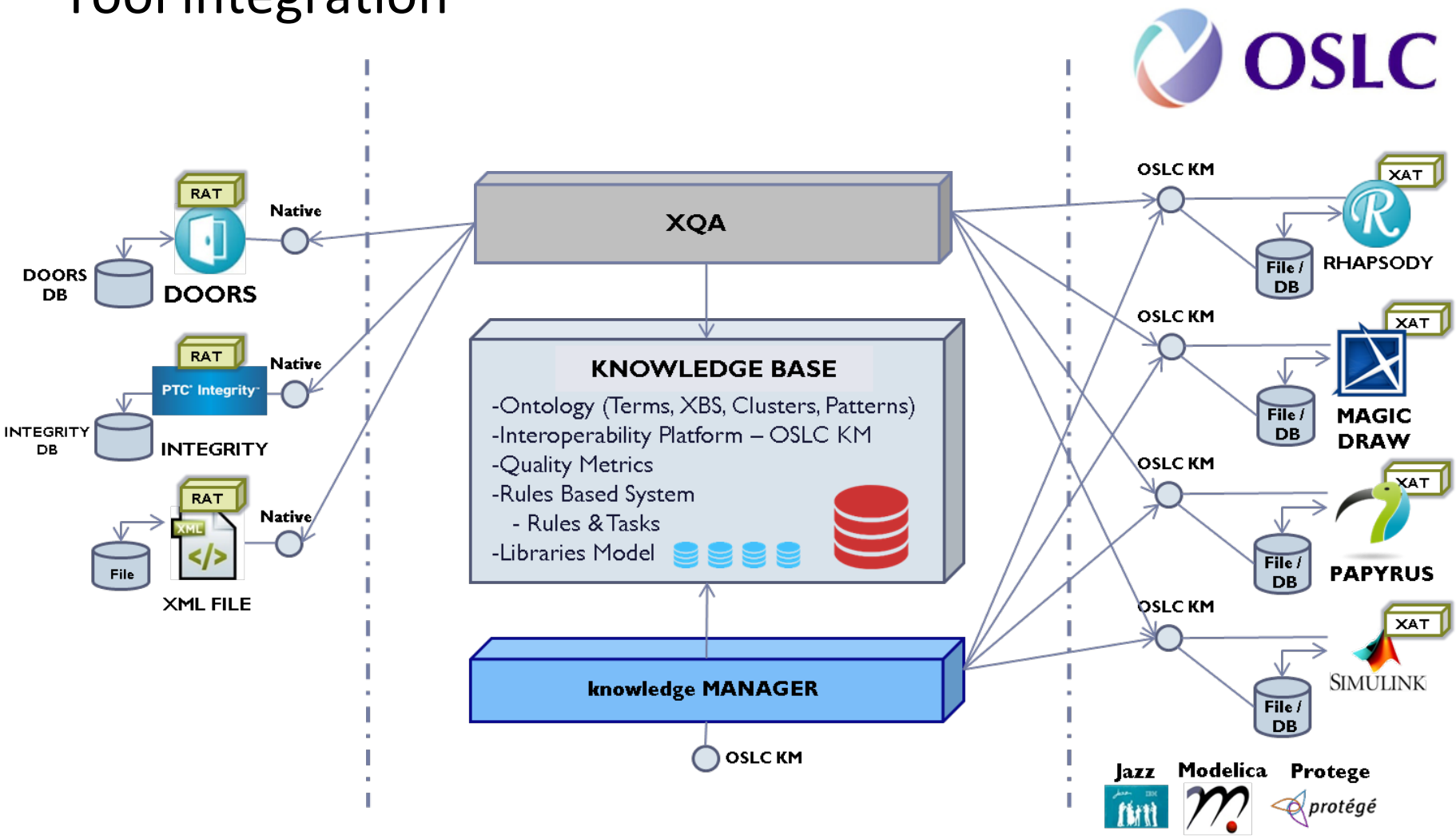
	State of the Art	State of the Practice
Authentication	Single sign-in	Sign-in for every tool
Collaboration	Live collaboration on same set of data	Diff/merge (complicated and error-prone) or locking (not really collaboration)
Change management	Complete history of changes with manually created baselines	Daily check-ins to repository
Installation	No installation required	Installation on hard-drive with installer
Data changes	Push notifications across tool borders	Manual data import and export
Data exchange	Single source of truth	COM, XML, proprietary file format
Tool integration	Standardized data bus (Tasktop Sync, ModelBus, OSLC)	Point to point

Seamless Interoperability Baseline

ID	User Story
US_04	As a tool user I want to **access the tools data concurrently** with other users so that the integrity of the data is guaranteed and that I am aware of the concurrence modifications rules and effects.
US_05	As a tool manager I want to **grant access to users** according to (a) tool functionality, (b) type of information (e.g., specific project, date range) so that users get access according to their profiles.
US_06	As a tool manager I want **data to be readily available in non-proprietary formats**.
US_07	As a tool user I want to **create and enter data only once**.
US_10	As a tool auditor I want **automatic collection of lifecycle and status data in a transparent way** as part of workflow.
US_11	As a tool user I want data to **move through process with minimal manual intervention.**

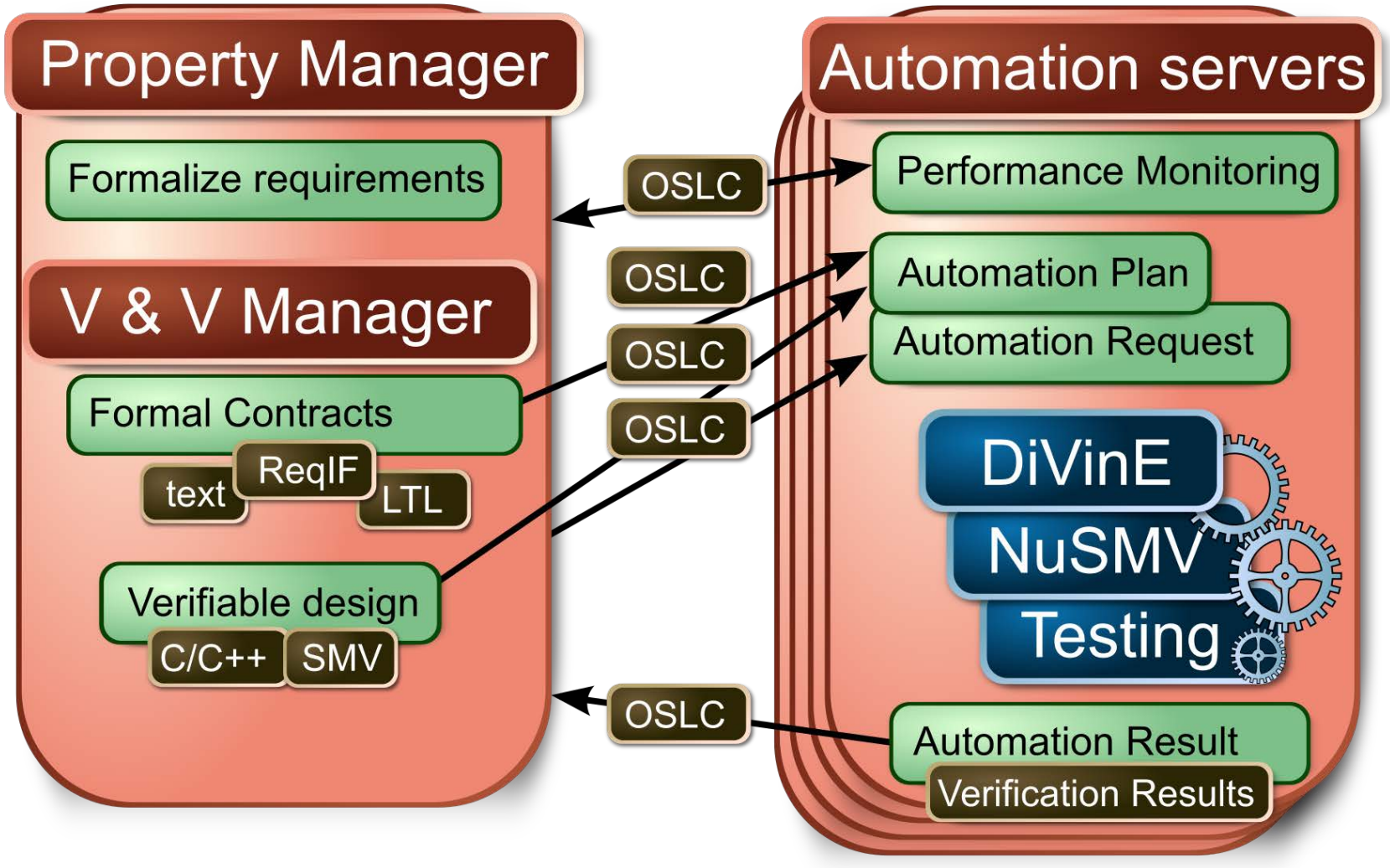
Seamless Interoperability Technologies

Tool integration



Seamless Interoperability Technologies

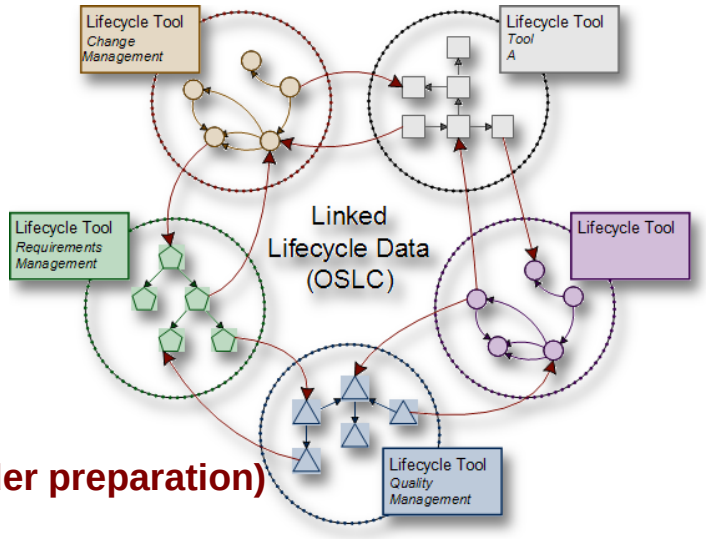
Tool integration



Seamless Interoperability Technologies

Tool integration: OSLC-KM

- Specific resource shape for knowledge management and definition
- Objective: Data and services
  - oslc_km:Artifact
  - oslc_km:MetaProperty
  - oslc_km:RSHP
  - oslc_km:Concept

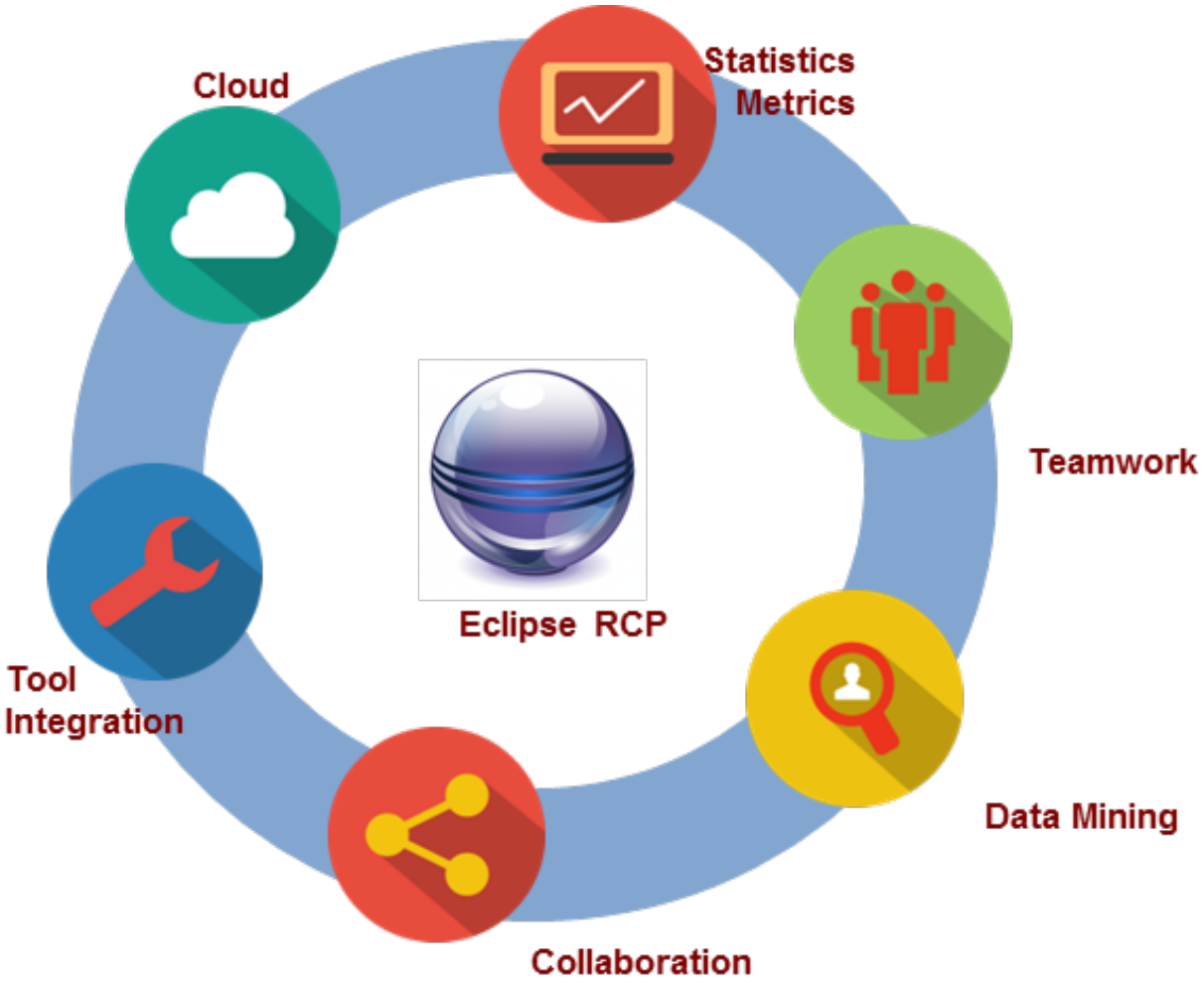


(Publication under preparation)

- Possibility of automatic generation of connectors
- Work with over 10 external tools
  - KM, RQA, RAT, Jazz, Papyrus, Rhapsody, MagicDraw, OpenModelica, Protégé, Simulink, ASCE, MS Word, MS Excel…

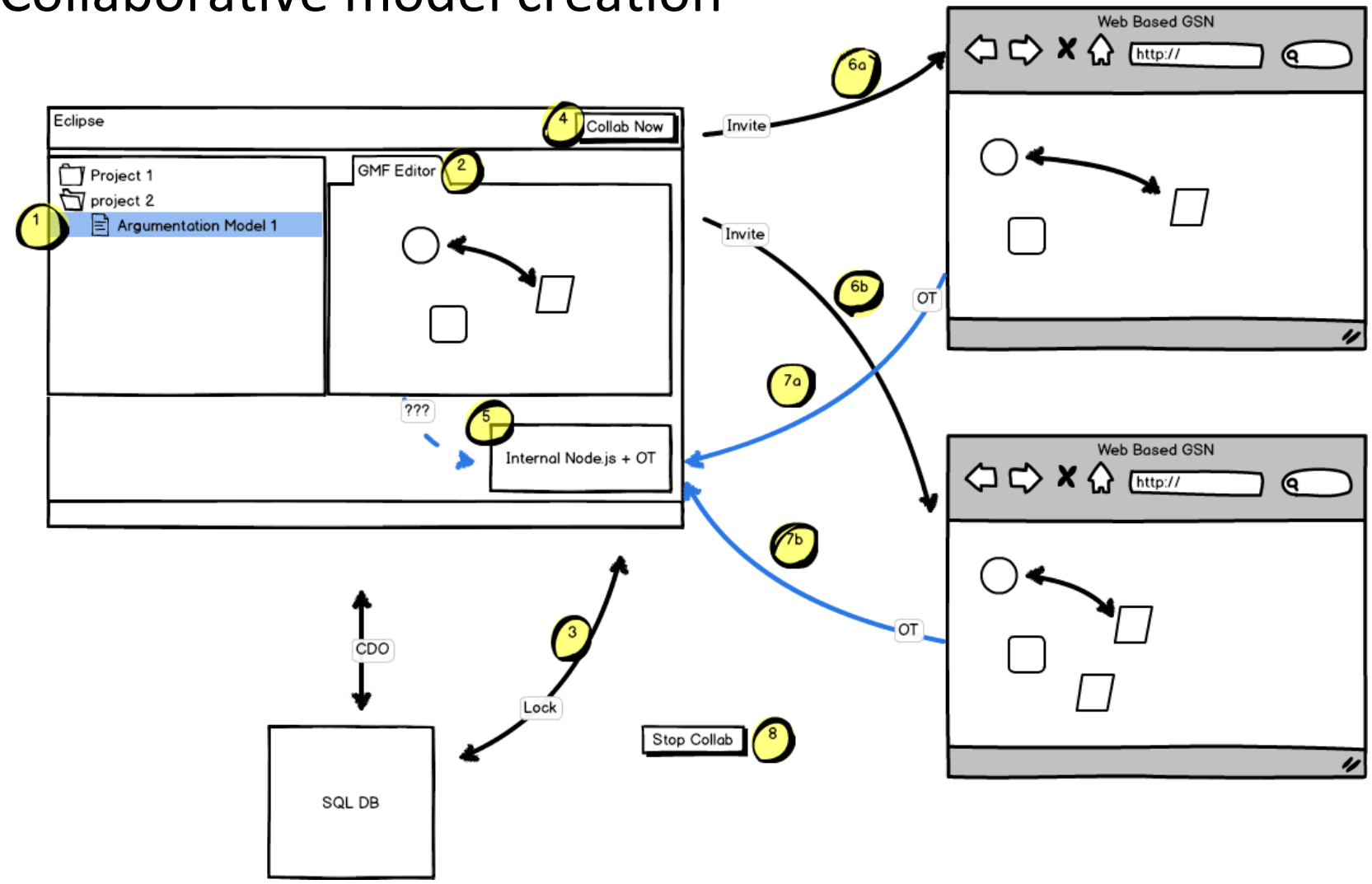
Seamless Interoperability Technologies

Collaborative work



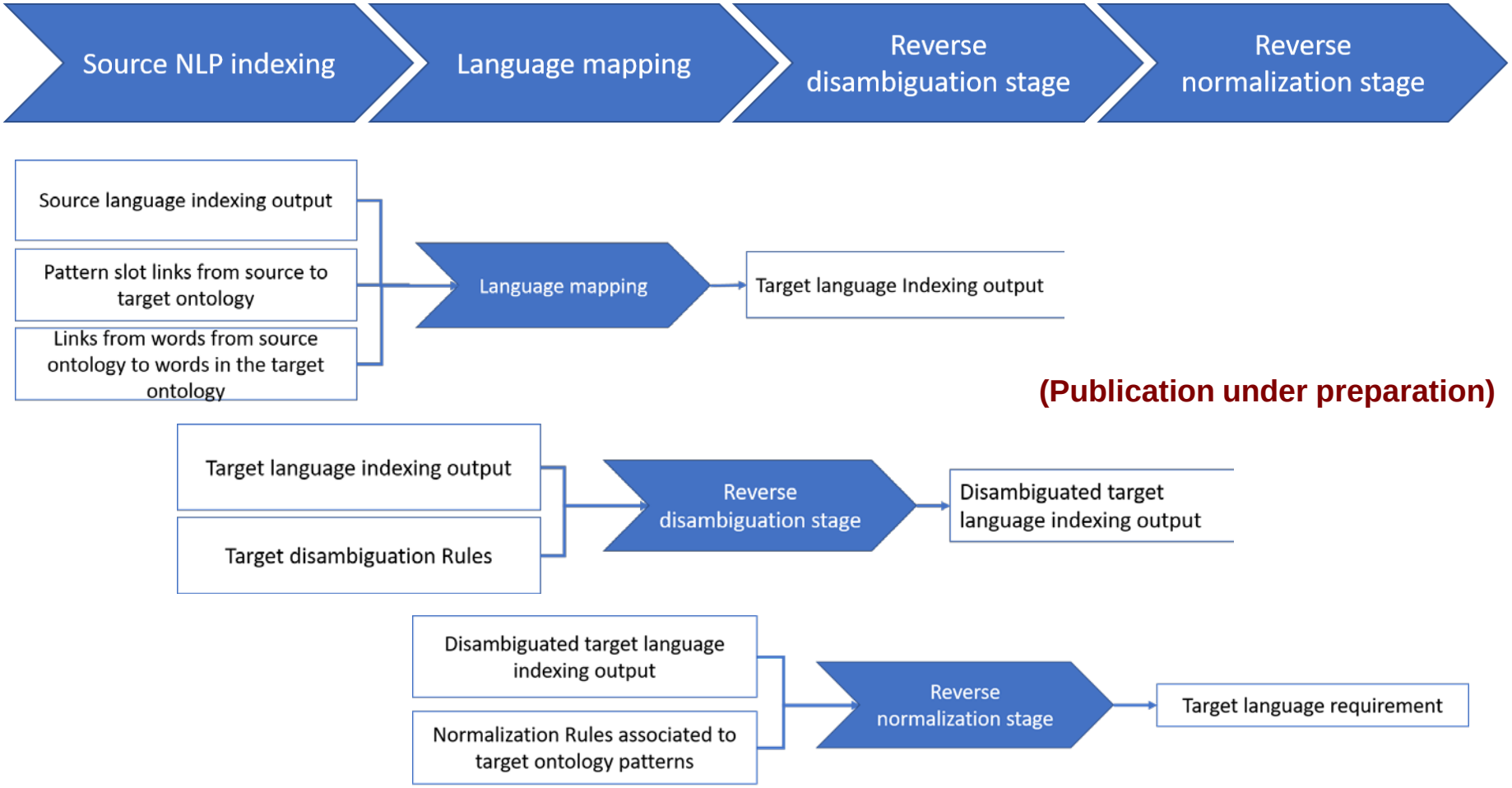
Seamless Interoperability Technologies

Collaborative model creation



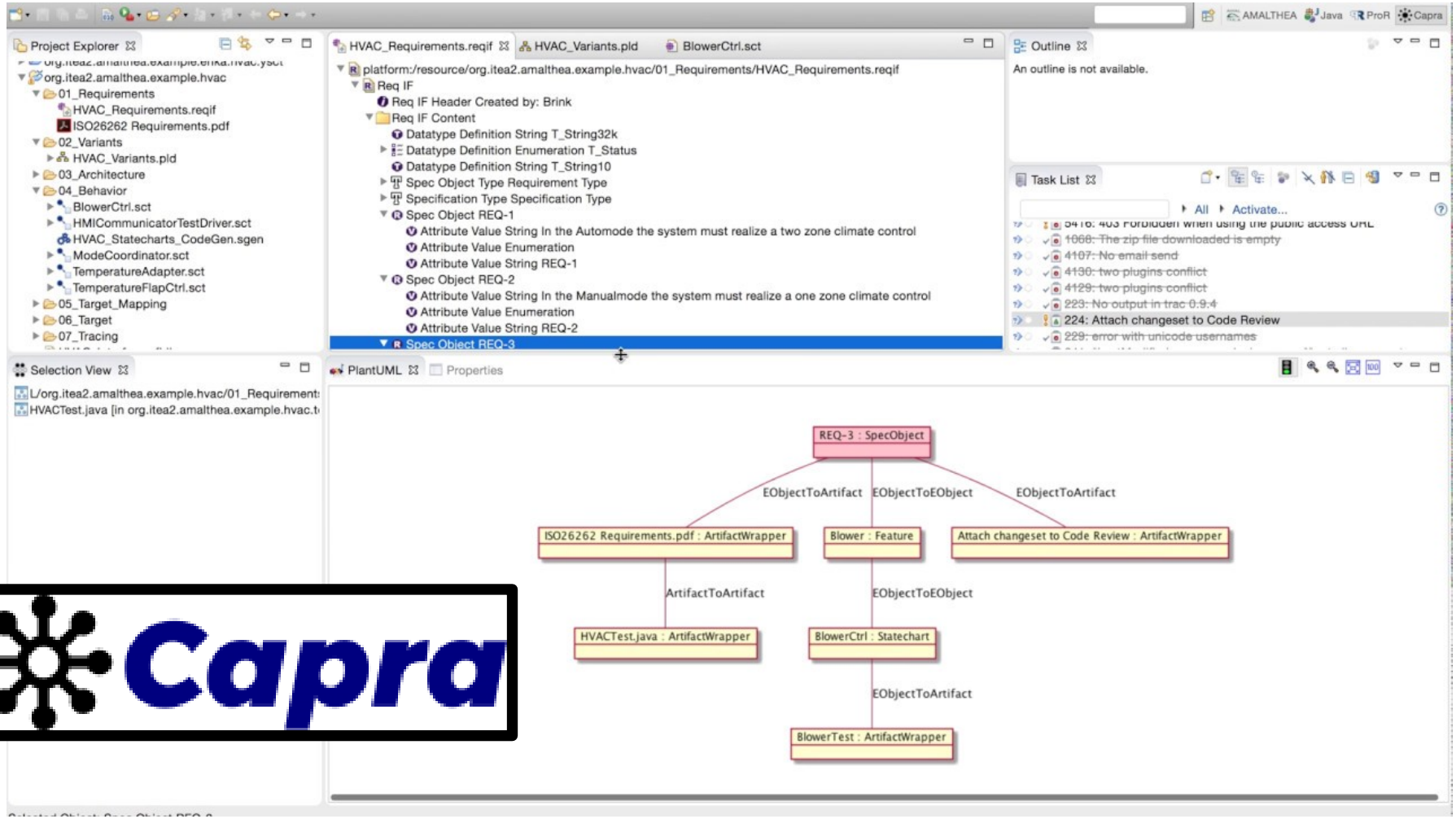
Seamless Interoperability Technologies

Collaborative work: automatic translations



Seamless Interoperability Technologies

Traceability with Capra



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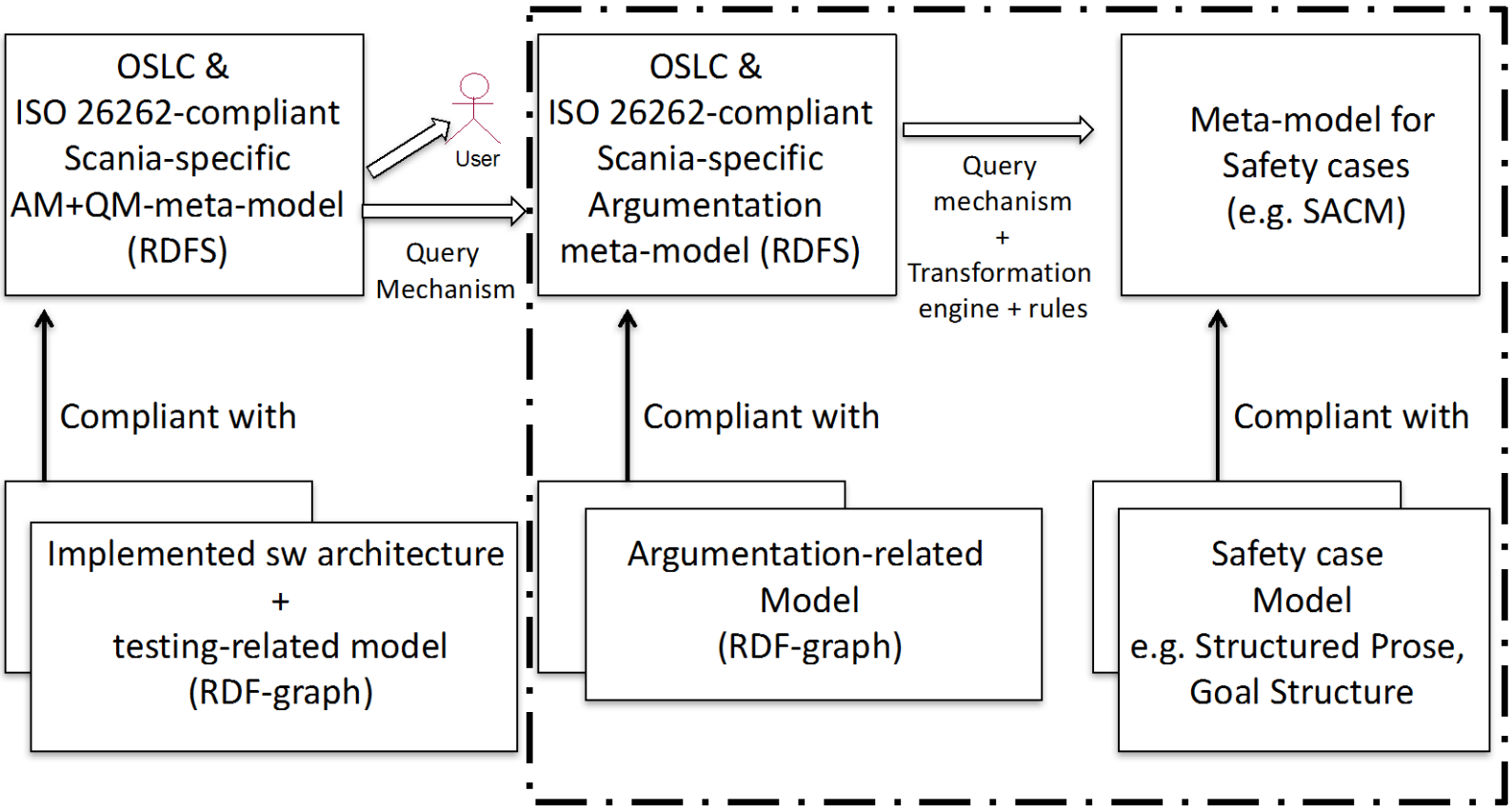
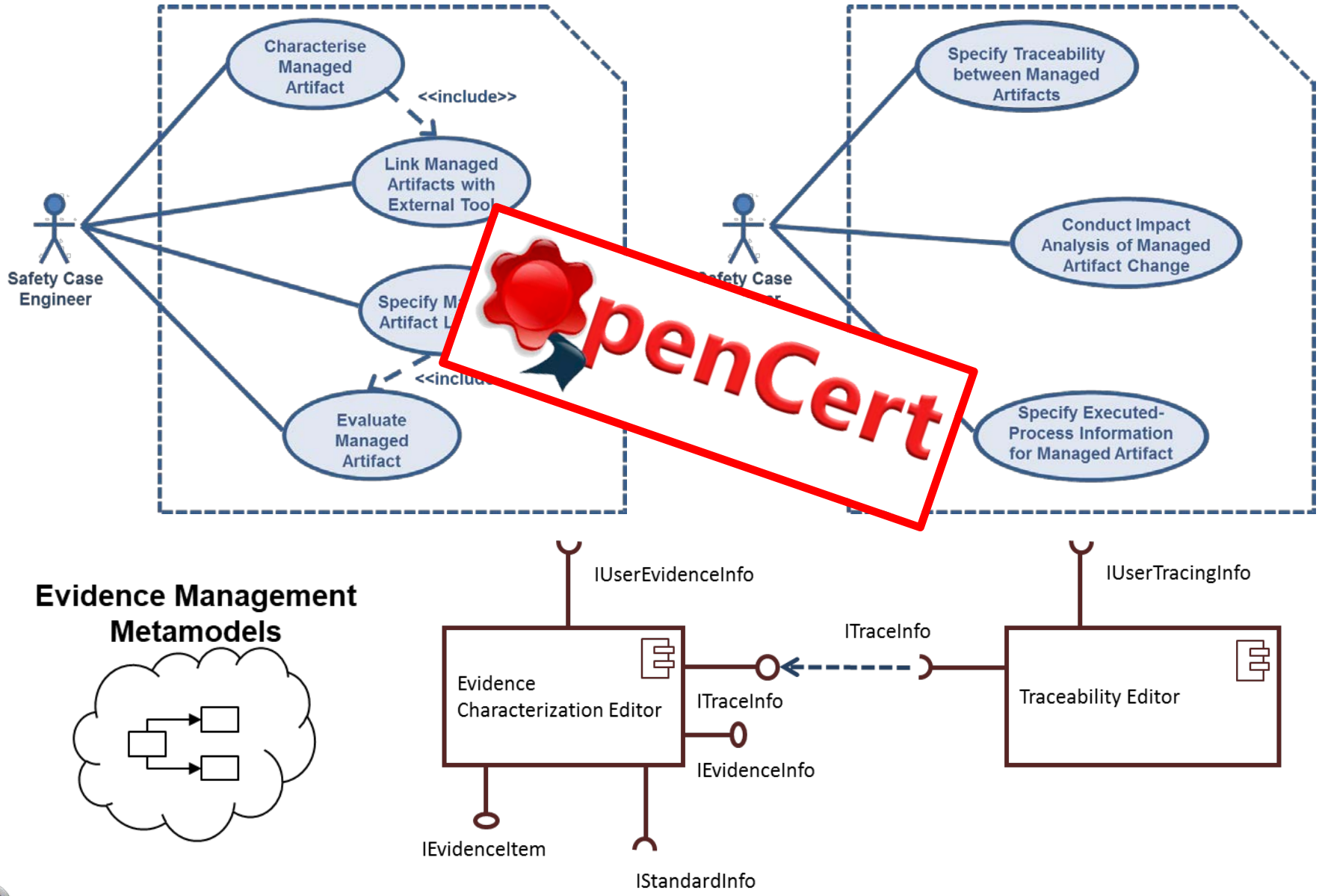
OSLC-based traceability



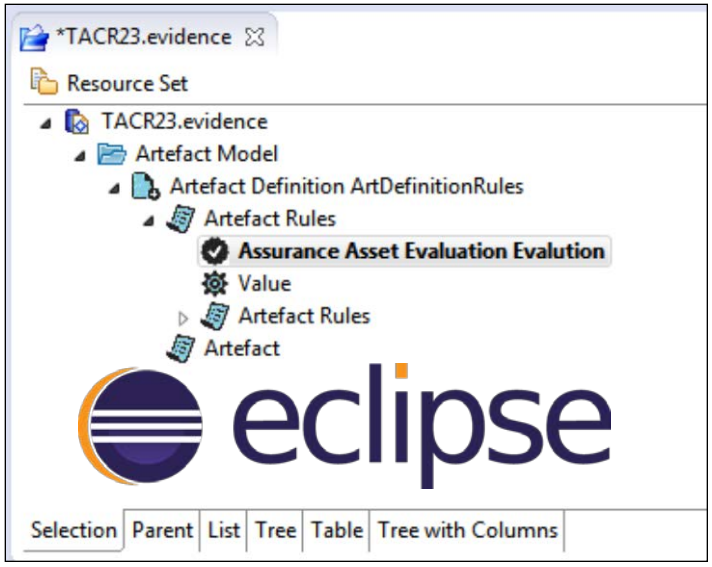
B. Gallina, M. Nyberg: Pioneering the Creation of ISO 26262-compliant OSLC-based Safety Cases. WoSoCer 2017

Seamless Interoperability Implementation

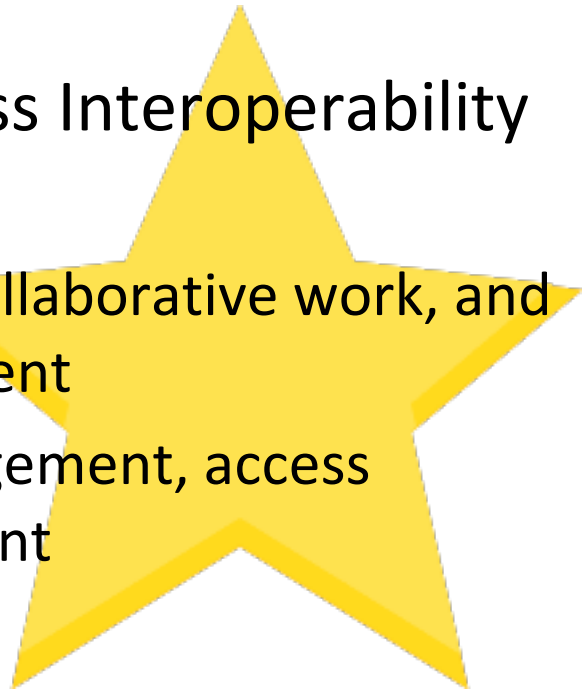


Seamless Interoperability Implementation

	Eclipse	Web
Evidence storage	Artefact & lifecycle CRUD	Artefact information check
Evidence traceability	Artefact relationships CRUD	-
Evidence evaluation	Artefact evaluation CRUD	Evaluations & completeness check
Evidence change impact analysis	Impact trigger & propagation	Impact check
Integration with external tools	SVN	SVN, API



Seamless Interoperability Main Achievements



- During the first project year, Seamless Interoperability has dealt with:
  - Three main aspects: tool integration, collaborative work, and tool quality characterisation & assessment
  - Three basic building blocks: data management, access management, and evidence management
- The work has allowed us to:
  - Set a common conceptual basis for seamless interoperability, including metamodels and expected advanced features
  - Envision and start designing and implementing specific solutions, by exploiting existing technologies (e.g. OSLC and web collaboration)
  - Release the first prototype, based on OpenCert

Seamless Interoperability Next Steps

- Tool integration
  - AMASS OSLC-based approaches
  - Demonstration on selected tool chains
- Collaborative work
  - Exploitation of web-based technologies
  - Demonstration with collaborative assurance info editing
- Enhancement of WP5 basic building blocks
  - CAPRA as traceability tool
  - Access management with CDO security mechanisms
  - Extension of CDO-based data management

Questions?