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Qualification of Eclipse-based Tools Vision and Roadmap-Status

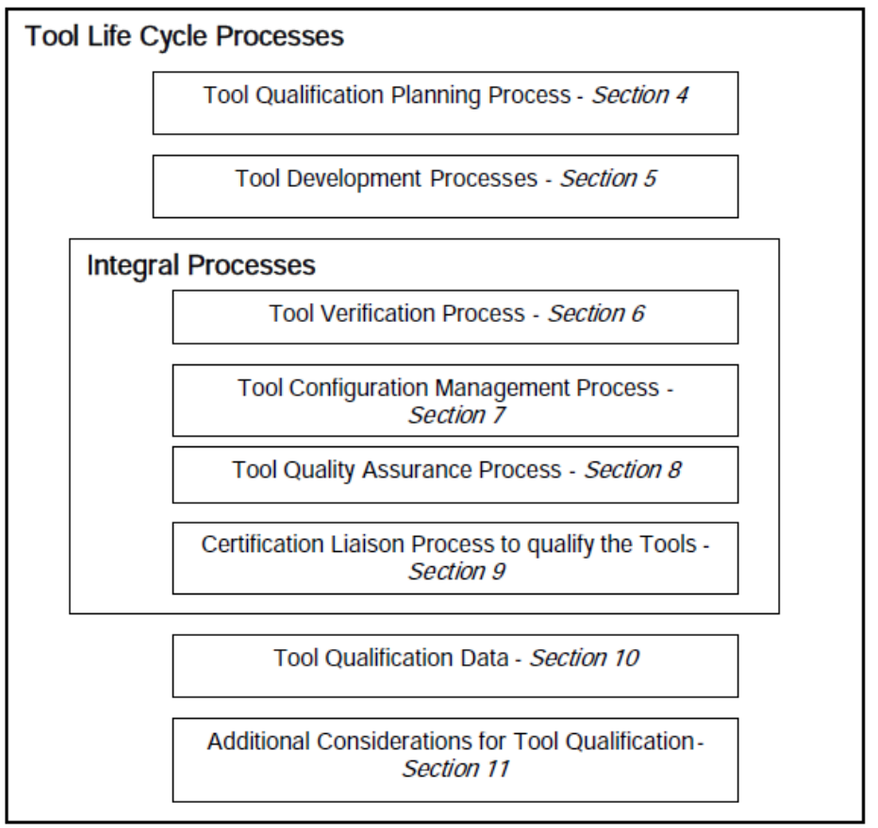
Tool Qualification (Summary)

- **Standards require tool qualification: ISO 26262, IEC 61508, DO, EN 50128**
- **Qualification process:**
  - Classify all used tools (Impact, Use-Cases, Artifacts)
  - Qualify critical tools
  - Use tools
- **Qualification Methods ISO 26262**

Table 4 — Qualification of software tools classified TCL3

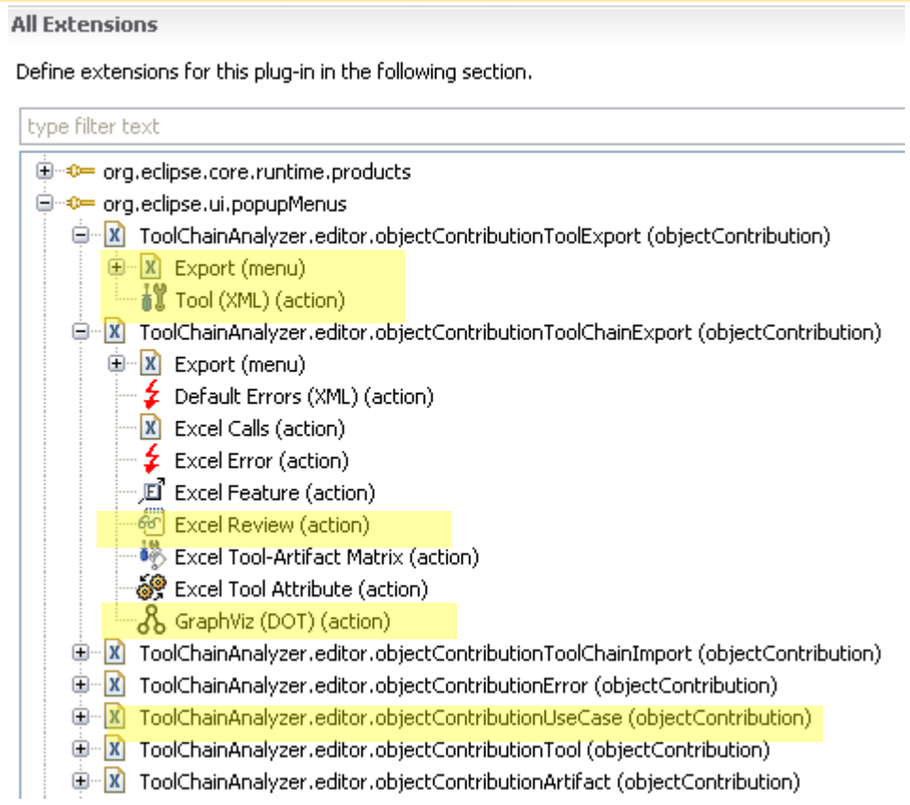
Methods		ASIL			
		A	B	C	D
1a	Increased confidence from use in accordance with 11.4.7	++	++	+	+
1b	Evaluation of the tool development process in accordance with 11.4.8	++	++	+	+
1c	Validation of the software tool in accordance with 11.4.9	+	+	++	++
1d	Development in accordance with a safety standard[a]	+	+	++	++

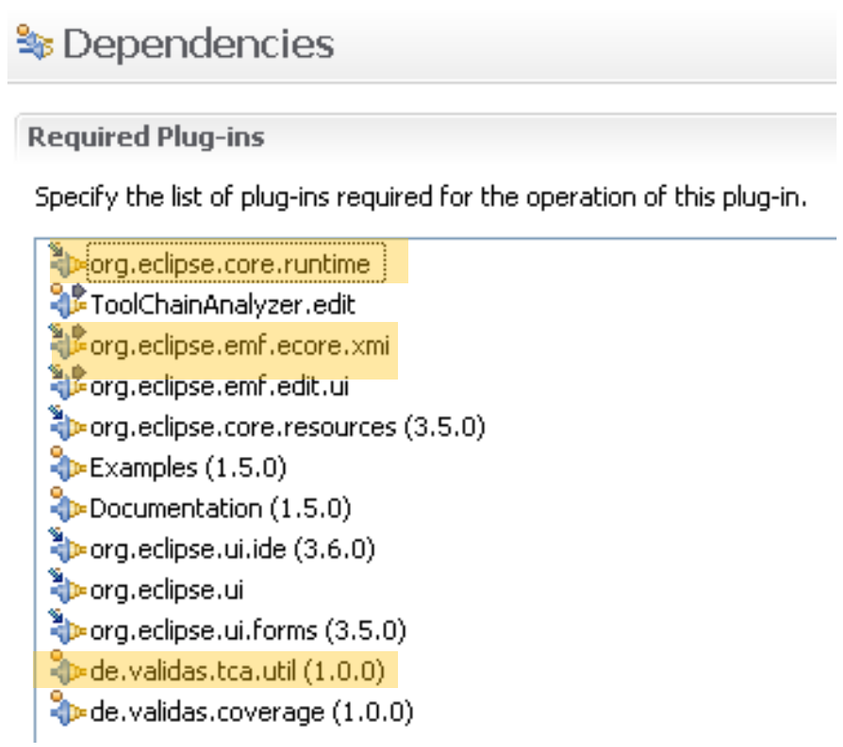
- **Qualification Method DO-330 Development in accordance with a safety standard:**
  - Processes Requirements
  - Required Documents
  - Required Verification
  - Required Qualification Process
  - …



Qualification of Eclipse-Based Tools

1. **Determine Tool Use-Cases (required features / “TORs”)**
2. **Determine potential errors in features**
3. **Determine possible checks & mitigations**
4. **Determine qualification needs (remaining critical features)**
   A. Identify critical features / contributions (Actions, …)
   B. Identify the plugins of critical features / contributions





5. **Qualify critical features in plugin (not complete plugins!) including derivation of assumptions on required plugins / features**
6. **Check Qualification requirements of required plugins / features**

Qualification according to DO-330

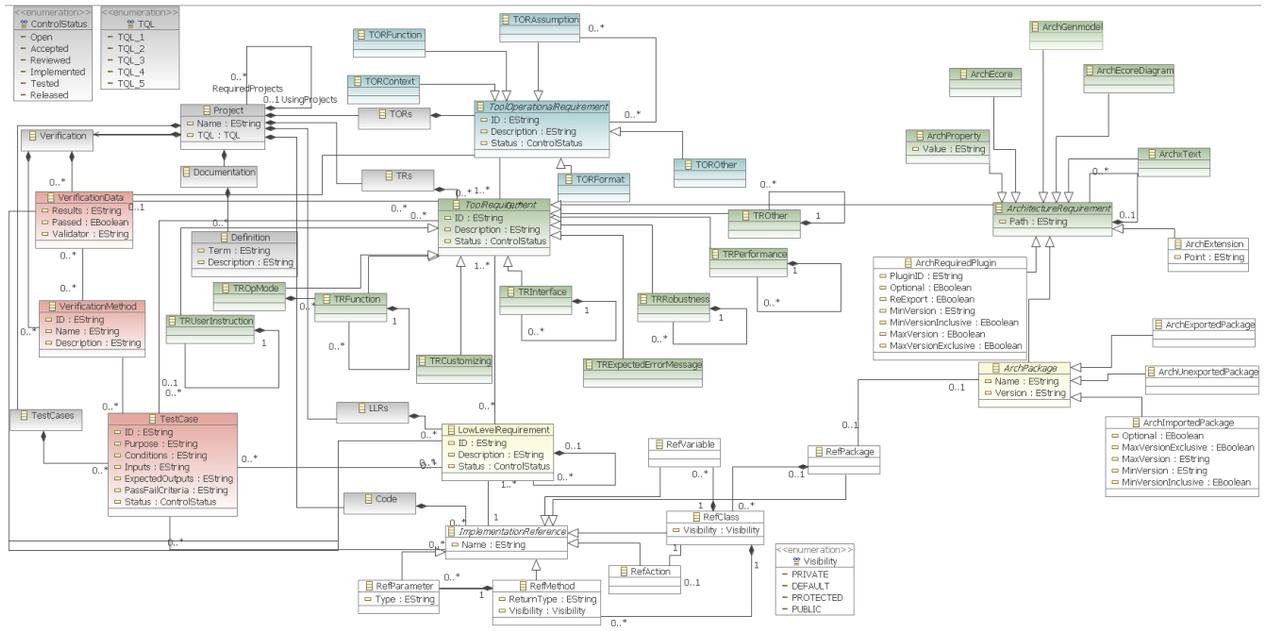
- **Tools**
  - Tool Operation Requirements (TORs): “The critical features” in the plugin
  - Tool Requirements (TRs): Features and design of plugin (mapped to TORs)
  - …
  - Complete safety development process including V&V
- **COTS-Tools (unchanged tools e.g. standard eclipse plugins)**
  - DO-330 requires “almost complete” DO-330 development
  - Main Changes:
    - T-0: Tool Operational Process
    - T-10: Tool Qualification Liasion Process
- **Eclipse: Qualification has to be applicable for each plugin**
  - Eclipse defaults and
  - tool specific
- **Qualification of plugins will make assumptions on required plugins**

Annex A Table	Objectives Applicable to Tool Developer
T-0	Objectives 2, 4 and 5: Applicable Others: Not applicable
T-1	All: Applicable
T-2	All: Applicable
T-3	All: Applicable
T-4 to T-7	All: Applicable
T-8	All: Applicable
T-9	All: Applicable
T-10	All: Not applicable

Qualification Kit for Eclipse-Plugins

- **Requirements**
  - Tool Operational Requirements (TORs)
  - Tool Requirements (TRs) including architecture requirements
  - Low-Level-Requirements (LLRs)
- **Tracing**
  - TORs <-> TRs
  - TRs <-> LLRs
  - LLRs <-> Code
  - TRs <-> **Tests**
  - LLRs <-> **Tests**
- **Process**
  - Definitions
  - Documentation of development
- **Verification**
  - Tests, Reviews, Tracing
  - Process conformance

Requirements structure covering DO-330 aspects



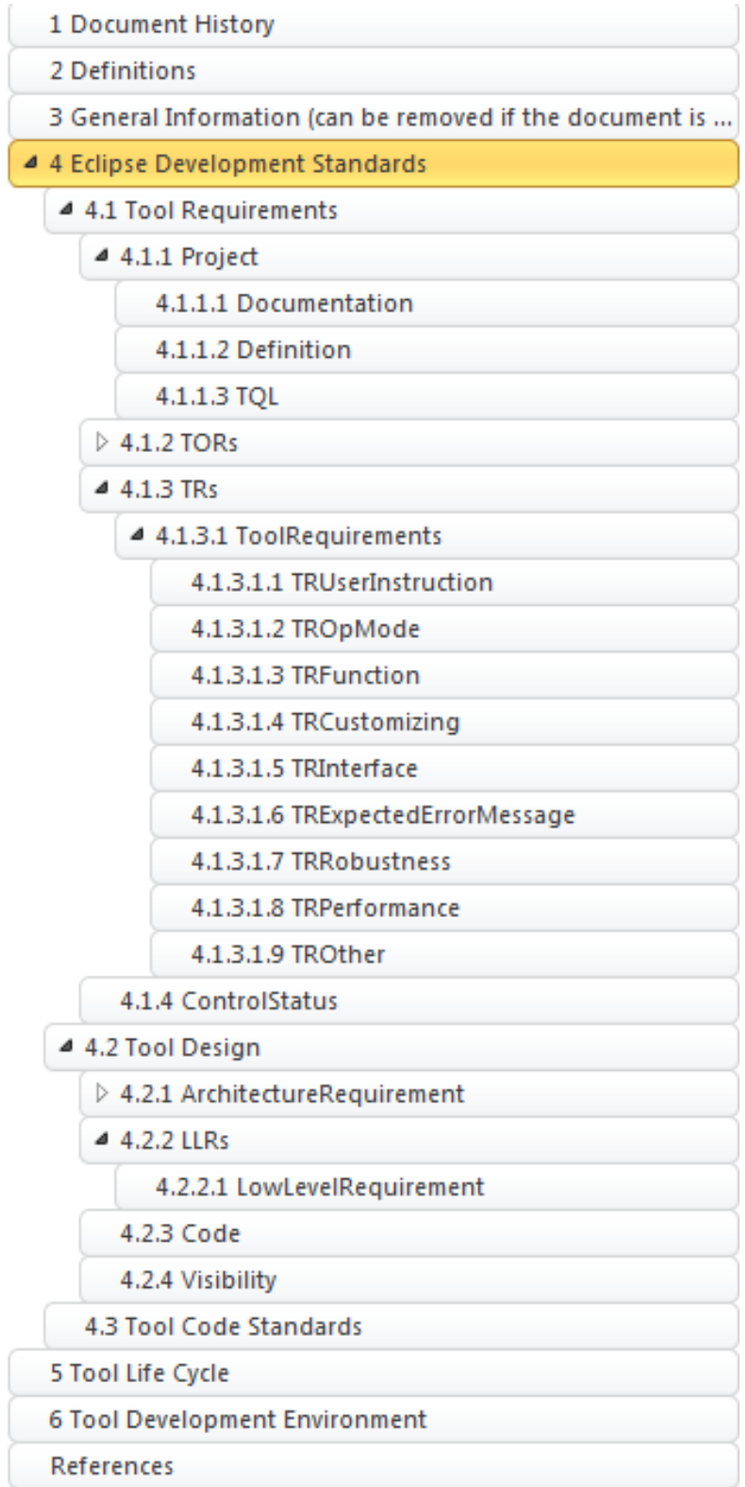
Tool Automatization possibilities in Eclipse (critical features)

- Requirements Modeling
- Tracing data using @tags/templates
- Completeness checking
- Test execution (including coverage)
- Many generation steps
  - LLRs from Java-doc
  - Architecture Requirements from EMF
  - Tests from EMF
- Generation of DO-330 documents …

Required Documentation

- **Generic Documents**
  - For development of all plugins
  - Once created and validated
  - E.g. Tool Development Plan, Tool Verification Plan
- **Tool/Plugin specific documents**
  - Can be generated from
    - the presented model
    - The chosen architecture (packages, EMF, xText,..)
    - The code-documentation
  - Need to be verified
  - Examples
    - Requirements for <Tool>
    - Design for <Tool>
    - Test-Specification for <Tool>
    - ….
- **Both need to be checked for DO-330 compliance**

Tool Development Plan

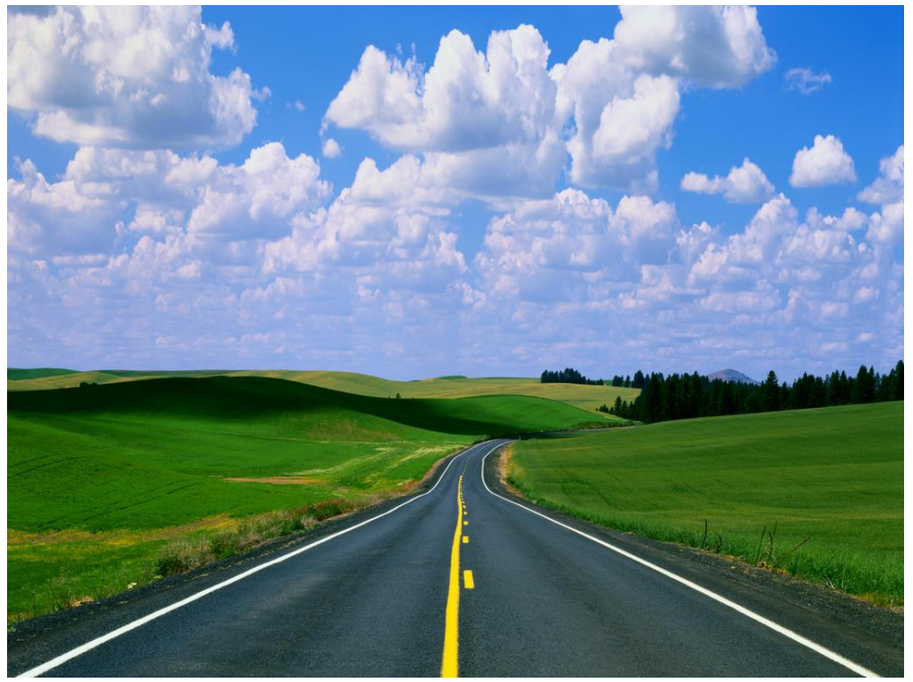


Status 3rd April 2012

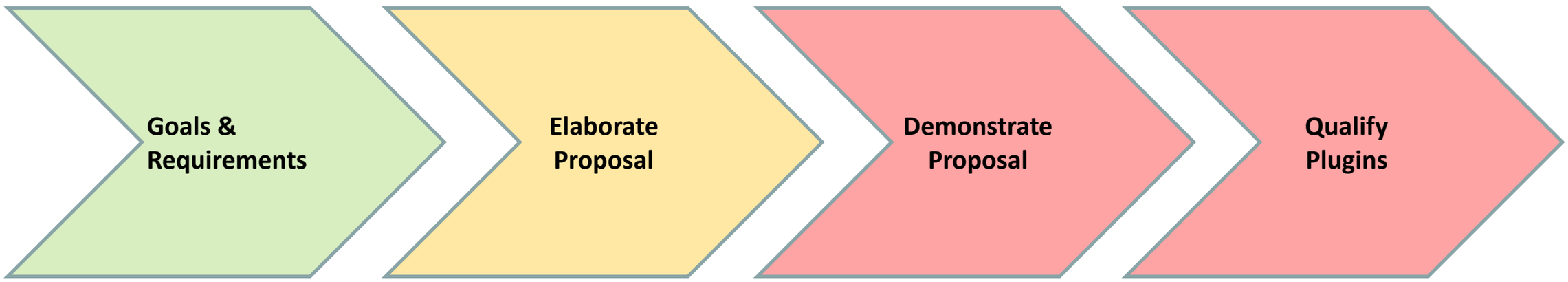
- **Created EMF model "DO-330" (including generic editor tool!) to generate**
  - Requirements for <Tool/Plugin>
  - Design for < Tool/Plugin >
  - Test-Specification for <Tool/Plugin >
- **Created Instance of the DO-330 model for the Validas Tool "TCA"**
- **Manually created documents (drafts to show structure of documents)**
  - Requirements for TCA
  - Design for TCA
  - Test-Specification for TCA
- **Selected Test Environment (CodeCover) for executing tests with MC/DC coverage measurement**
- **Implemented one reference test for TCA with 100% MC/DC coverage**
- **Started working on generic Tool Development Plan document**
- **Started checking DO-330 compliance**
- **Next steps:**
  - Extend processes and general documents: Verification, Quality Assurance, Life Cycle, ..
  - Extend model & documentation examples
  - Continue DO-330 compliance checking
  - Integration into Eclipse Foundation (processes, documents, …): Eclipse Project

Roadmap - Status April 2012

1. Identify goals & requirements for tool qualification in Eclipse
2. Propose process / project
3. Demonstrate tool qualification & improve proposal
4. Establish proposal: Qualify (selected) plugins



Status April 2012



Identified	In progress: status: feasible	Ready to start	Ready to start (Prototyping)

Summary: Qualification is feasible and qualification (based on current prototype) could be started now

Thank You!

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