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Planning Demonstration of the QPP Concept: The Prototype of Transition Criteria Checker

Content

- Goals
- Transition Criteria Tool Life Cycle of Qualifiable Eclipse Projects
- Milestones
- Effort Monitoring
- Summary

Goals: Eat your own Dog Food

- **Demonstrate the concept**
- **Refine the concept**
- **Start a prototype for DO-330 qualification**
  - Can be used to qualify any tool according to DO-330
  - Can be integrated into Eclipse (QPP)
- **First use case (TORFunction):**
  - Compute the qualification state of a product based on the model as described in Tool Development Plan (Life cycle process)
- **First tool functions (TRFunction)**
  - Validator for the model
  - Derived tool functions: Edit, Load & Save models
- **Steps (monitor effort):**
  - Build a team (“Tool Provider”, “Validators”,…)
  - Set up the project (Eclipse, git, gerrit, bugzilla, DO-330 model)
  - Implement the tool
  - Qualify the tool
- **Milestones: see later slides**

This makes it applicable also to other tools from the Polarsys group

Well-defined (and small) problem

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Tool Life Cycle for Qualifiable Plugins

- **Combines the following processes:**
  - Planning (TORs)
  - Development (TR, LLRs)
  - Integration (Verification)
  - Configuration Management
  - Quality Assurance
- **Fits to existing processes (Project process, Release Process) by extending them with a "Qualification Stage"**
- **The following stages are defined (and can be determined automatically from the DO-330 model) such that every release has a well-defined qualification stage**

  - **Unqualified-Pre-Alpha Release** ("**Undefined**"): unknown qualification state
  - **Qualification Alpha-Release** ("**Analyzed**"): The TORs are defined and TQL is determined
  - **Qualification Beta-Release** ("**Feature-Complete**"): All requirements (TORs and TRs) are described and have traces to LLRs and Code
  - **Qualification Release Candidate** ("**Verification Defined**"): All required verification steps are defined. No open bugs of the category "Blocker" are available.
  - **Qualification Release**: ("**Successfully Verified**") Verification has been successfully executed and are documented within the qualification kit
- **Transition Criteria are formally defined, based on the DO-330 model**

Tool Life Cycle Transition Criteria

- **Defined in the "Tool Development Plan"**
- **Required by DO-330-4.2.1, DO-330-4.2.2, DO-330-4.3.b**
- **Quite formal definition (can be checked automatically) based on the DO-330 model of the tool**
- **Example (truncated): Transition to Qualification Alpha State ("Analyzed")**

- The *Project* has a nonempty *Name*, *Provider, Validator*,
- The *Project* has a *ControlStatus=Reviewed*
- The *Project* has the following TORs specified (in a *TORs* container):
  - At least one *TORFunction* defined. All *TORFunction* elements have
    - nonempty *ID*
    - nonempty *Description*
    - *ControlStatus=Reviewed*
  - At least one *TORContext* defined. All *TORContext* e
    - nonempty *ID*
    - nonempty *Description*
    - *ControlStatus=Reviewed*
  - At least one *TORFormat* defined. All *TORFormat* e
    - nonempty *ID*
    - nonempty *Description*
    - *ControlStatus=Reviewed*

All *TORFunction* elements should have

- at least one *PotentialError* in the *AnalysisElements* composition
- For every potential error in the *TORFunction* which has an assigned mitigation (check/restriction) the shall be an artifact flow (to/from) the mitigation's *TORFunction*, if the mitigation's *TORFunction* is different from the *TORFunction* of the *PotentialError*.
- A set of "derived errors", consisting of
  - all errors (*AnalysisElements* of kind *PotentialError*) of the assigned *FunctionAttributes* and
  - all errors (*AnalysisElements* of kind *PotentialError*) of the *ArtifactAttributes* of the *Artifact* are *CreatedBy* or *ModifiedBy* the *TORFunction*. Note that if a *TORFunction* has several outputs with the same *ArtifactAttribute* element assigned, than the errors of the *ArtifactAttribute* are multiple times in the set with a different *ID* that refers to the *Artifact* in which they can occur.
- For each derived error in the set there is either
  - a copy of the *PotentialError* contained in the *TORFunction* or
  - another *PotentialError* contained in the *TORFunction* that subsumes the derived error, i.e. has the *PotentialError* of the *AnalysisAttribute* in the association *Subsumes*.

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Milestones: Setup, Req. & Analysis

- **M1: Initial team and process (status reports as part of WP5 telcos) defined**
  - Tool Providers: BMW-CarIT, Validas, VV?, IKV?..
  - Validators: Validas, BMW-CarIT, VV?, IKV? ..
- **M2: Set up the repository with the following plugins**
  - "**model**": org.eclipse.do330.model: the do-330 model
  - "**edit**": org.eclipse.do330.model.edit: the generated edit
  - "**editor**": org.eclipse.do330.model.editor: the generated editor
  - "**checker**": org.eclipse.do330.model.lifecycle.transition.checker: checker
  - "**checker.ui**": org.eclipse.do330.model.lifecycle.transition.checker.ui: the checker's UI
  - "**product**": org.eclipse.do330.model.product: product for the prototype
- **M3: Create DO-330 model files for each plugin**
- **M4: Create TORs for each plugin in the DO-330 model**
  - Review them and model this using "VerificationData" elements
- **M5: Determine TQLs for each plugin**
  - Analysis (potential errors, mitigations,..) review
- **M6: Reach Qualification Alpha State for all plugin models (manual check)**

Milestones 2: Implement & Verify

No sequential order in the tool milestones

- **M-Impl: implement the tool**
- **M-Impl-mdl: model the implementation with DO-330 model**
- **M-Verify:**
  - review the architecture
  - test the tool (including coverage measurement) and with the models from the plugins
- **M-Verify-mdl**
  - Model the verification
- **M-Docu: document the tool (using manual generation from the model)**
- **M-Candidate: reach the qualification stage: "Qualification Release Candidate" for the critical plugins (check this using the tool)**

Milestones 3: Tool Qualification

- M-Qualification: Reach the qualification stage: “Qualification Release” for the critical plugins (check this using the tool)
- M-QKit: Build a qualification build of the tool (configuring the source build)
- M-Liaison: Apply the qualification kit and demonstrate it to external audience
- M-Summary: summary the efforts for building and qualifying the tool

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Effort Monitoring

- **Goal: Estimate the efforts for tool qualification (relative to implementation)**
- **The work is monitored by defining the following activities (for each plugin)**
  - Learning: Method, infrastructure, DO-330,.. (not related to the tool)
  - Concept: Improvement of the concept (not related to the tool)
  - Setup: Creation of the project (not related to a plugin)
  - Management: Meetings, Coordination, Presentations, ..
  - Requirements (including analysis of TQL)
  - Implementation
  - Test
  - Documentation (manual generation)
  - Other verification (reviews, qualification)
- **Every contributor shall monitor his activities (for every plugin) and to report efforts it in the status meetings.**
- **There is no commitment on resources and time schedules required!**

Excel for Effort Monitoring

- **Proposal: One table for all efforts/contributors for a tool**

Efforts.xlsx - Microsoft Excel

Datei | Start | Einfügen | Seitenlayout | Formeln | Daten | Überprüfen | Ansicht

Einfügen | Calibri | 11 | Standard | Bedingte Formatierung | Als Tabelle formatieren | Zellenformatvorlagen | Einfügen | Löschen | Format | Sortieren und Filtern | Suchen und Auswählen

Zwischenablage | Schriftart | Ausrichtung | Zahl | Formatvorlagen | Zellen | Bearbeiten

E1 | Activity

	A	B	C	D	E	F
1	Date	Effort (h)	Contributor	Plugin	Activity	Co
2	01. Jun	2	Validas	NONE	Management	Ki
3	01. Jun	6	BMW-CarIT	NONE	Management	Ki Michael, Student
4	01. Jun	2	BMW-CarIT	NONE	Setup	Cr
5	04. Jun	1	Validas	NONE	Learning	Co
6	04. Jun	0,5	Validas	product	Requirements	Pr ments formalization
7	05. Jun	0,5	BMW-CarIT	product	Other V&V	Ac rements
8	06. Jun	0,5	Validas	model	Requirements	de s
9	06. Jun	0,25	Validas	edit	Requirements	de s
10	06. Jun	0,25	Validas	checker.ui	Requirements	derived from product TORs
11	06. Jun	0,25	Validas	editor	Requirements	derived from product TORs
12	06. Jun	0,5	Validas	checker	Requirements	derived from product TORs
13	07. Jun	2	Validas	product	Requirements	Classification (Risk Analysis)
14	07. Jun	1	Validas	edit	Requirements	Classification (Risk Analysis)
15	07. Jun	1	Validas	editor	Requirements	Classification (Risk Analysis)
16	07. Jun	1	Validas	checker.ui	Requirements	Classification (Risk Analysis)
17	07. Jun	2	Validas	checker	Requirements	Classification (Risk Analysis)
18	10. Jun	4	BMW-CarIT	checker.ui	Implementation	created new plugin for UI contributions of checker
19						

slotosch:
The following activites have been identified:
* Learning
* Concept
* Setup
* Management
* Requirements
* Implementation
* Test
* Other V&V
* Documentation

Demo1_TransitionChecker

Zelle E1: kommentiert von slotosch | 100 %

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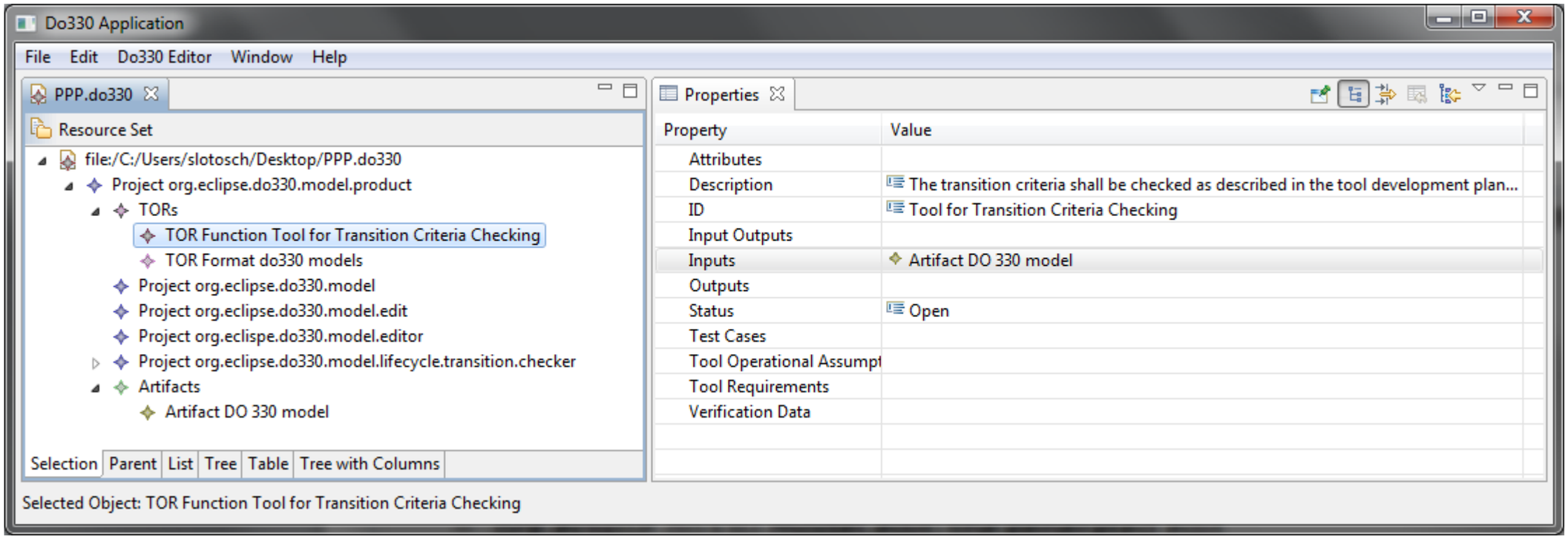
Summary

- **Eat your own dog food**
- **Demonstrator: DO-330 transition criteria checking**
  - Can be reused for Eclipse-Integration (QPP)
  - Can be used for tool qualification
  - Efforts monitoring
  - Access to all concept documents and models
- **Milestones defined**
- **Start work & have fun!**



Thank You!

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