Welcome to the World of Standards

ETSI

World Class Standards

THE ETSI TEST DESCRIPTION LANGUAGE (TDL)

Results from the ETSI project STF 454

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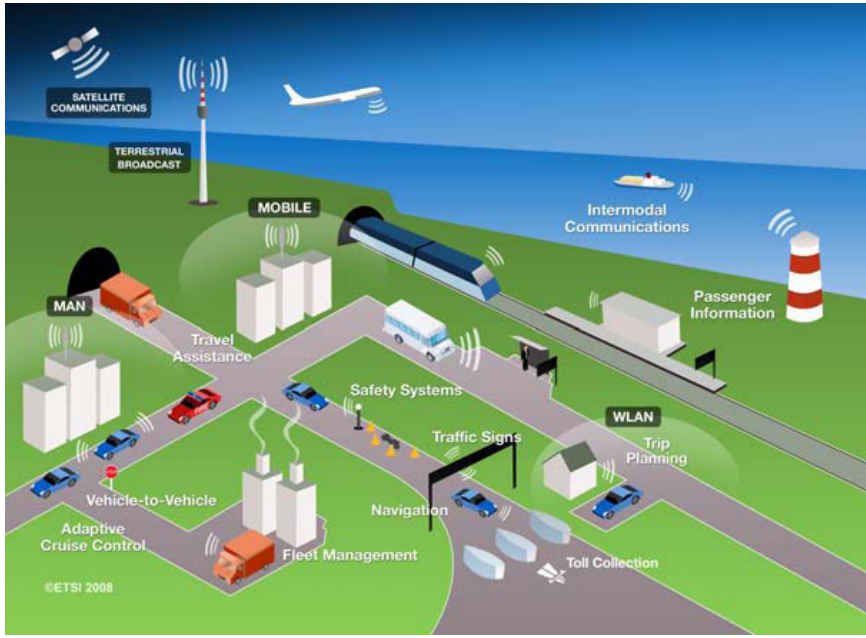
Outline

- Motivation and introduction
- Design principles
- An example
- Conclusions, next steps

MOTIVATION AND INTRODUCTION

Validating Complex Systems

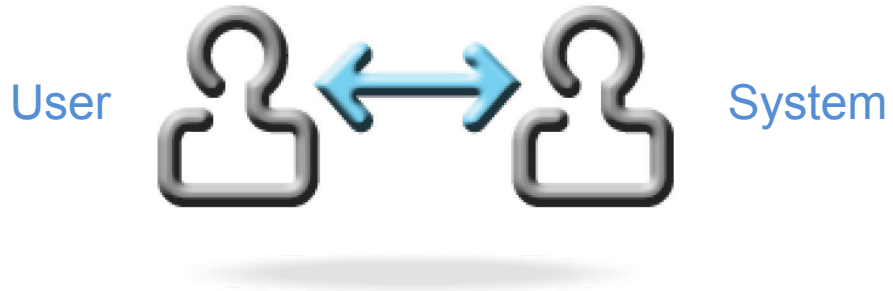
- Engineered systems become more and more complex
  - Complex design (→system of systems)
  - Complex behavior (→real-time)
  - Complex data (→big data)
- Validation and testing need to cope with complexity
  - Proper modeling techniques
  - Proper test automation
  - Proper fault analysis techniques



Intelligent Transport Systems © ETSI

Software Development Turns Agile

- An agile process follows different approaches
  - Story/feature driven modeling
  - Test driven development, etc.
- Leads to scenario-based approach in testing
  - Describe a scenario of interacting with the system
  - Define test objectives from requirements and connect them to scenarios
  - Derive tests from scenarios and automate them



TDL Addresses Needs from Practice

TDL for testing reactive distributed real-time systems

- Provides common black-box testing concepts
- Adjustable to domain-specific needs
- Supporting agile testing process

TDL is standardized

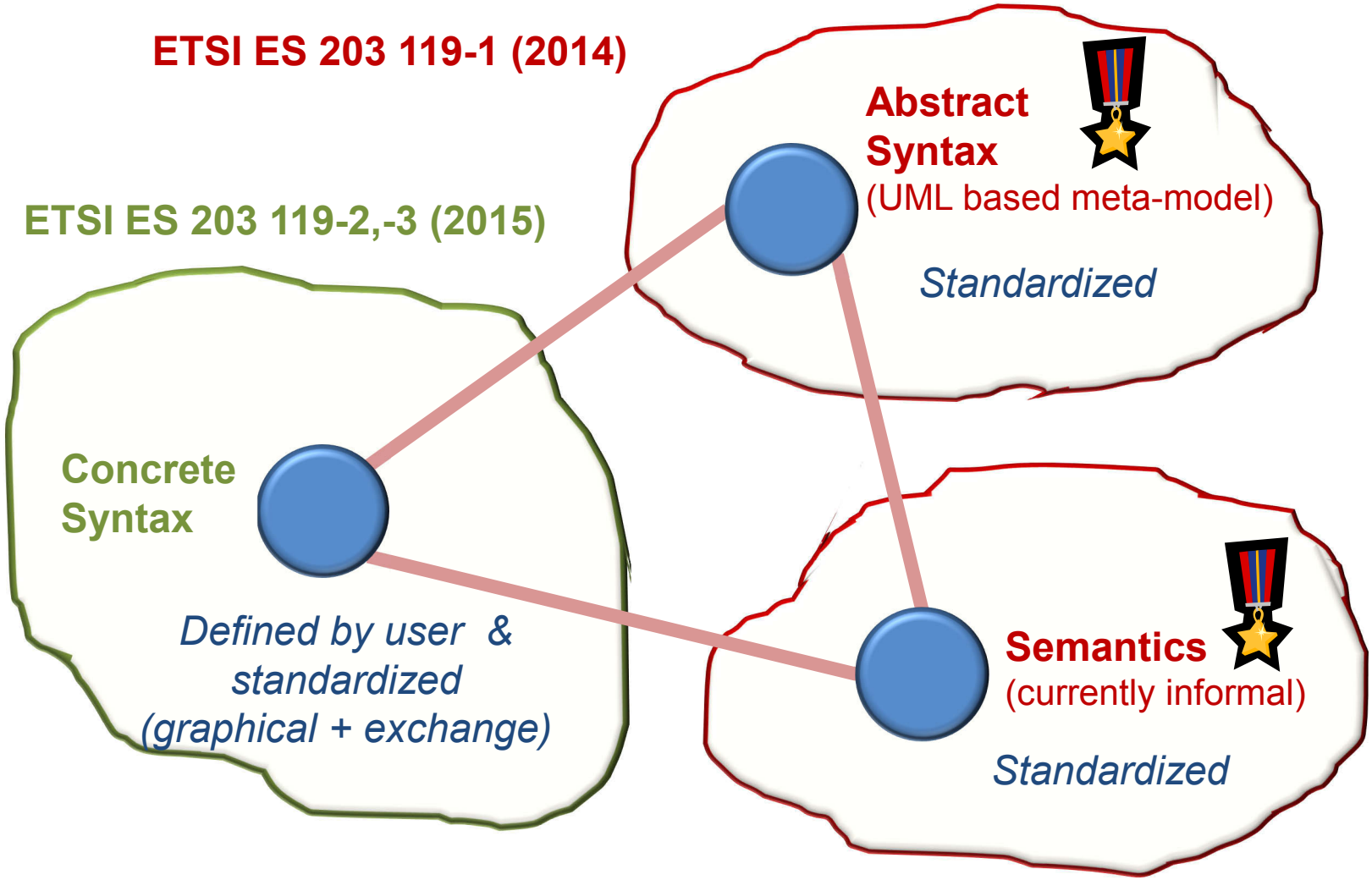
- Clear semantics
- Interoperability of tools and test specifications
- Maintained and kept updated with user needs

TDL use cases

- Manual specification of tests for functional/conformance/interoperability testing
- Representing tests from other sources, e.g. output from MBT test generators
- Documentation of tests

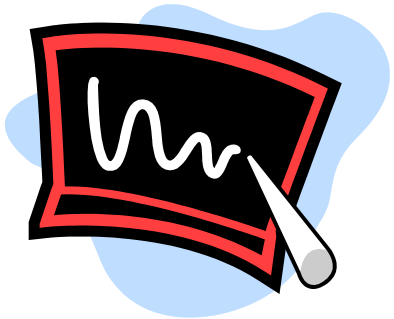
DESIGN PRINCIPLES

ETSI Standards on TDL Design

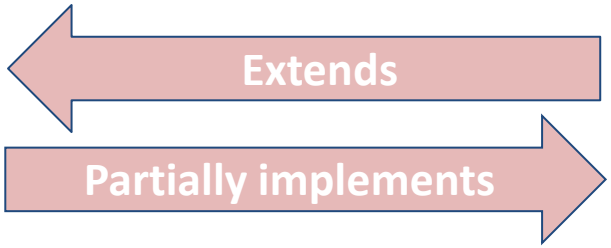


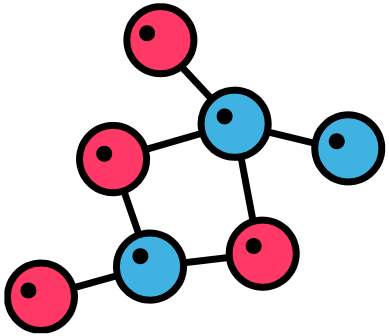
TDL is Adjustable by User

- Concrete syntax may cover only parts of the meta-model
- Meta-model can be extended by a user if need arises
- User extensions of the meta-model can be subjected to further TDL standardization and maintenance



User-defined TDL concrete syntax



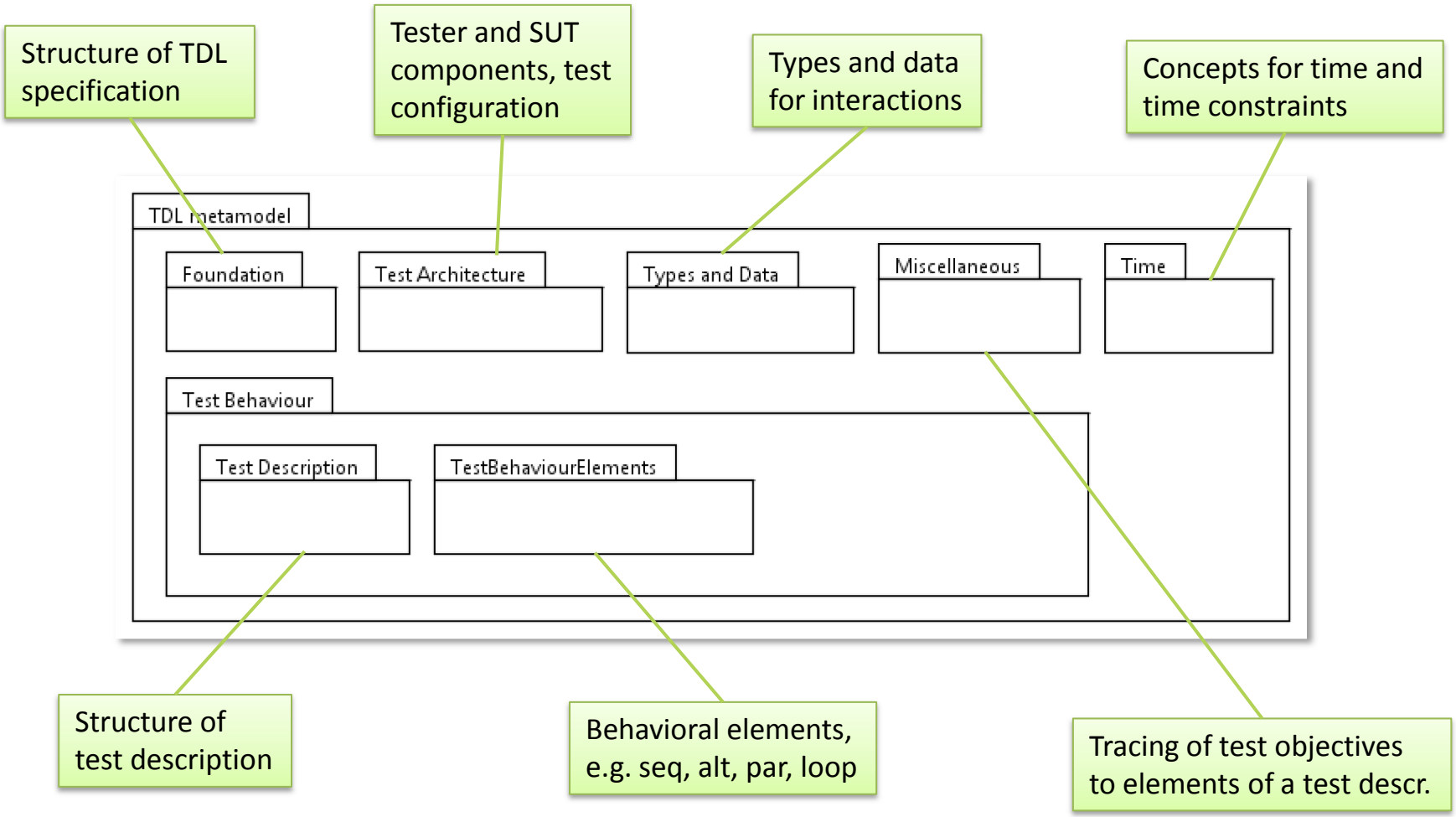


TDL meta-model with user extensions

Key elements of a TDL specification

- Test configuration
  - Set of interacting **components** in the roles **Tester** or **SUT**
- Test description
  - Represents the **expected** foreseeable (passing) behaviour, i.e. any deviation is a fail
  - Expresses a test in terms of **interactions** of data exchanged between tester and SUT components
  - Interactions are **totally ordered**, i.e. they are implicitly synchronized among components
- Test data
  - Represented as abstract **name tuples**

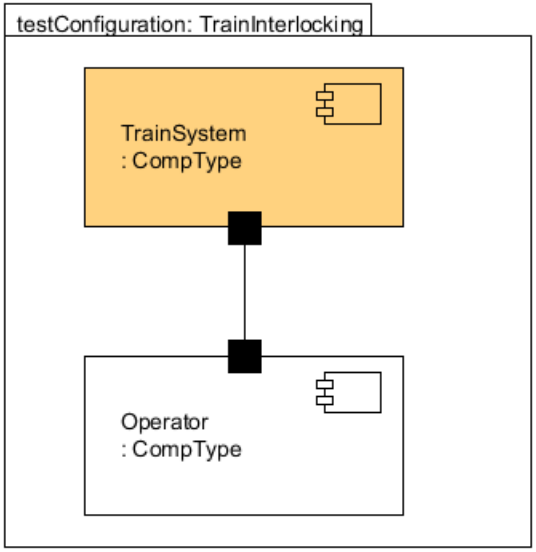
TDL Meta-Model Overview



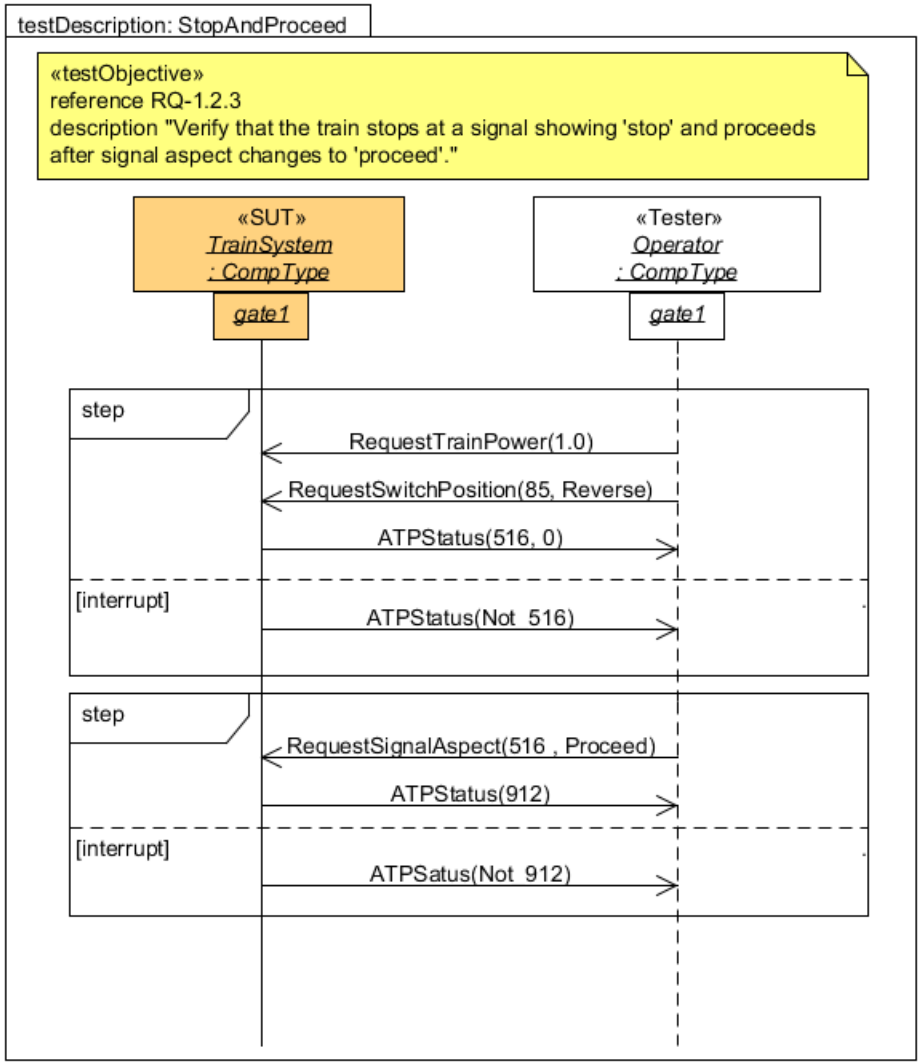
AN EXAMPLE

Example: Scenario on a Rail Interlocking System (Siemens, MBAT)

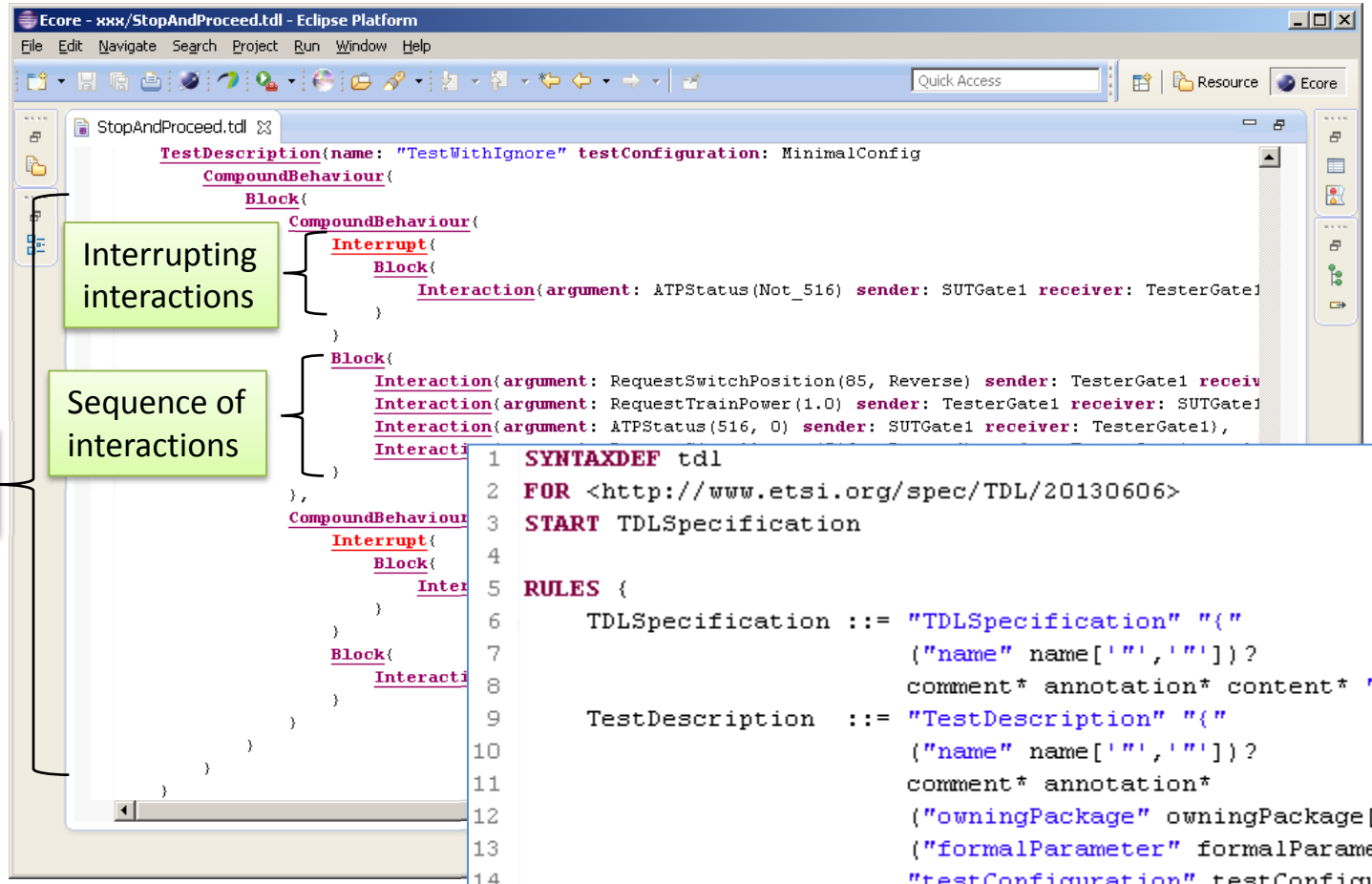
Test Configuration



Test Description



Generated Editor for Textual TDL Specifications (EMFText)




```
1  SYNTAXDEF tdl
2  FOR <http://www.etsi.org/spec/TDL/20130606>
3  START TDLSpecification
4
5  RULES {
6      TDLSpecification ::= "TDLSpecification" "{"
7                           ("name" name['"','"'])?
8                           comment* annotation* content* "}";
9      TestDescription  ::= "TestDescription" "{"
10                          ("name" name['"','"'])?
11                          comment* annotation*
12                          ("owningPackage" owningPackage[])?
13                          ("formalParameter" formalParameter[])*
14                          "testConfiguration" testConfiguration[]
15                          ("testObjective" testObjective[])*
16                          behaviour timeConstraint* "}";
17
```

(Partial) TDL Concrete Syntax

CONCLUSIONS, NEXT STEPS

Conclusions, Next Steps

- TDL meta-model is available currently as an ETSI draft standard
  - Further validation of the meta-model necessary
  - Final draft for publication planned for January 2014
- Next steps
  - Design of concrete syntaxes (graphical + exchange format)
  - Getting tool support: editors, analyzers, test generators
  - Further refinement of the TDL meta-model
  - Extend TDL to support test automation
    - Extensions to ensure executability
    - Composition of test descriptions → User story models

Team & Acknowledgement

- **Team**

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