

Sophia Antipolis, French Riviera
20-22 October 2015



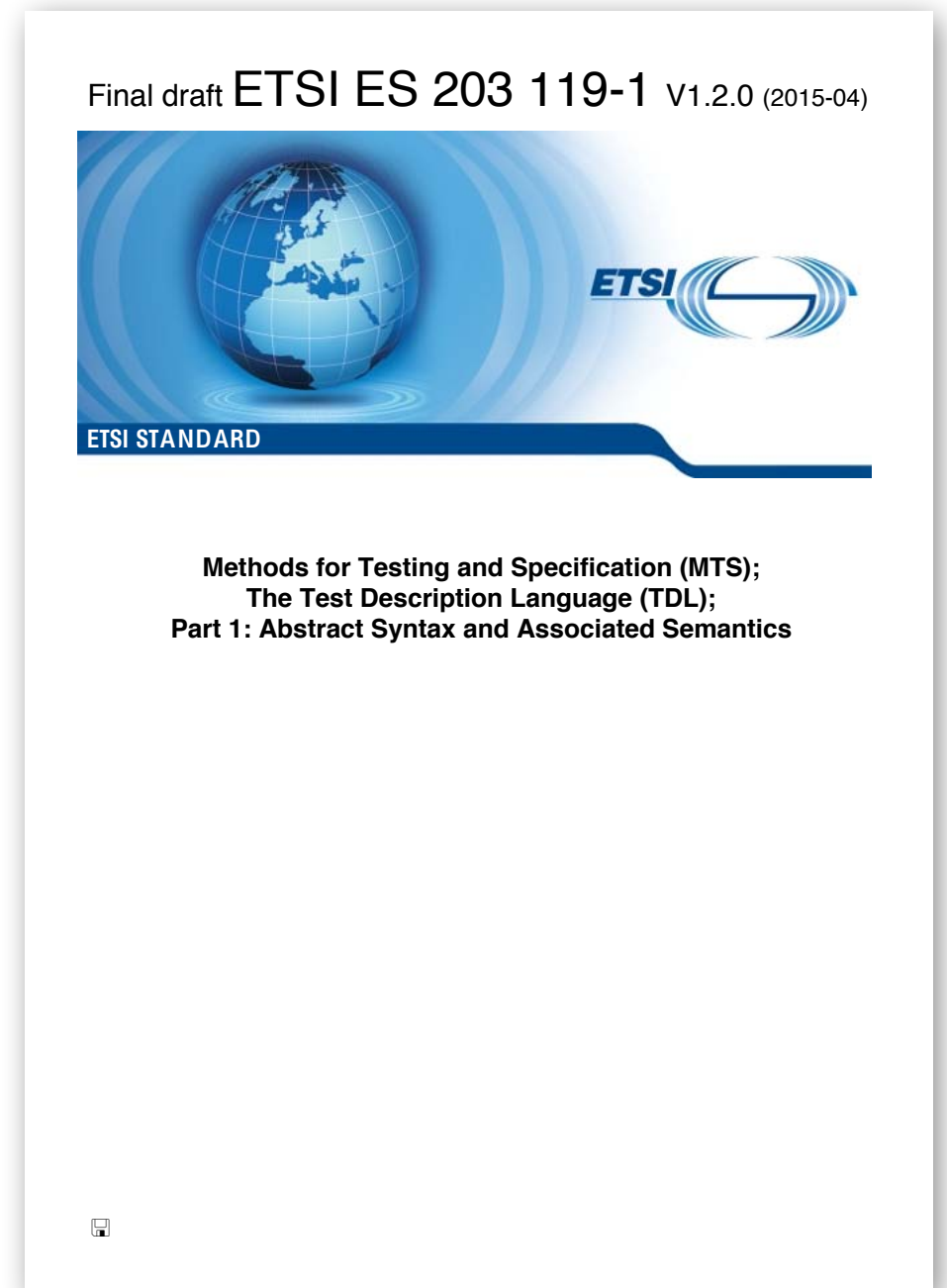
TDL LAUNCH

Moderated by Philip Makedonski, ETSI STF 492



What is TDL?

- Test Description Language
 - Design, documentation, and representation of formal test descriptions
 - Scenario-based approach
- Standardised at ETSI by TC MTS
 - STFs 454, 476, 492 (2013-2015)
 - Siemens, Ericsson, Fraunhofer, ETSI CTI, University of Göttingen, Elvior, Cinderella, CEA

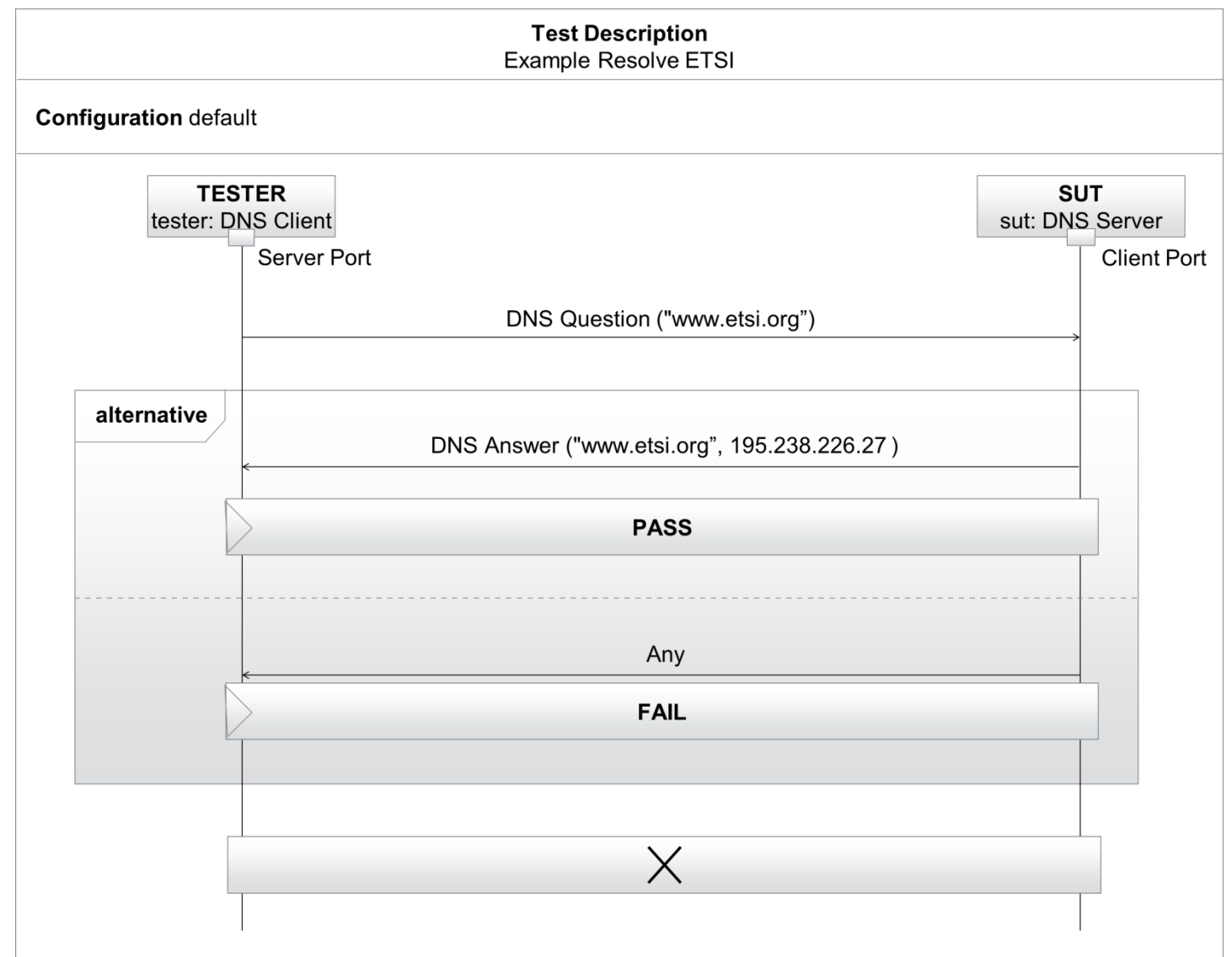


Why TDL?

- Complementary to TTCN-3
 - separate test specification from test implementation
- Applicable in various use cases
 - documentation of products, standards, and tests
 - specification of test execution logic
 - test generation, transformation, and exchange
 - test visualisation and validation
- Agility for ease of test development and review
 - no “one-size-fits-all” notation - custom representations
 - adaptable to different stakeholders (design, review, etc.)

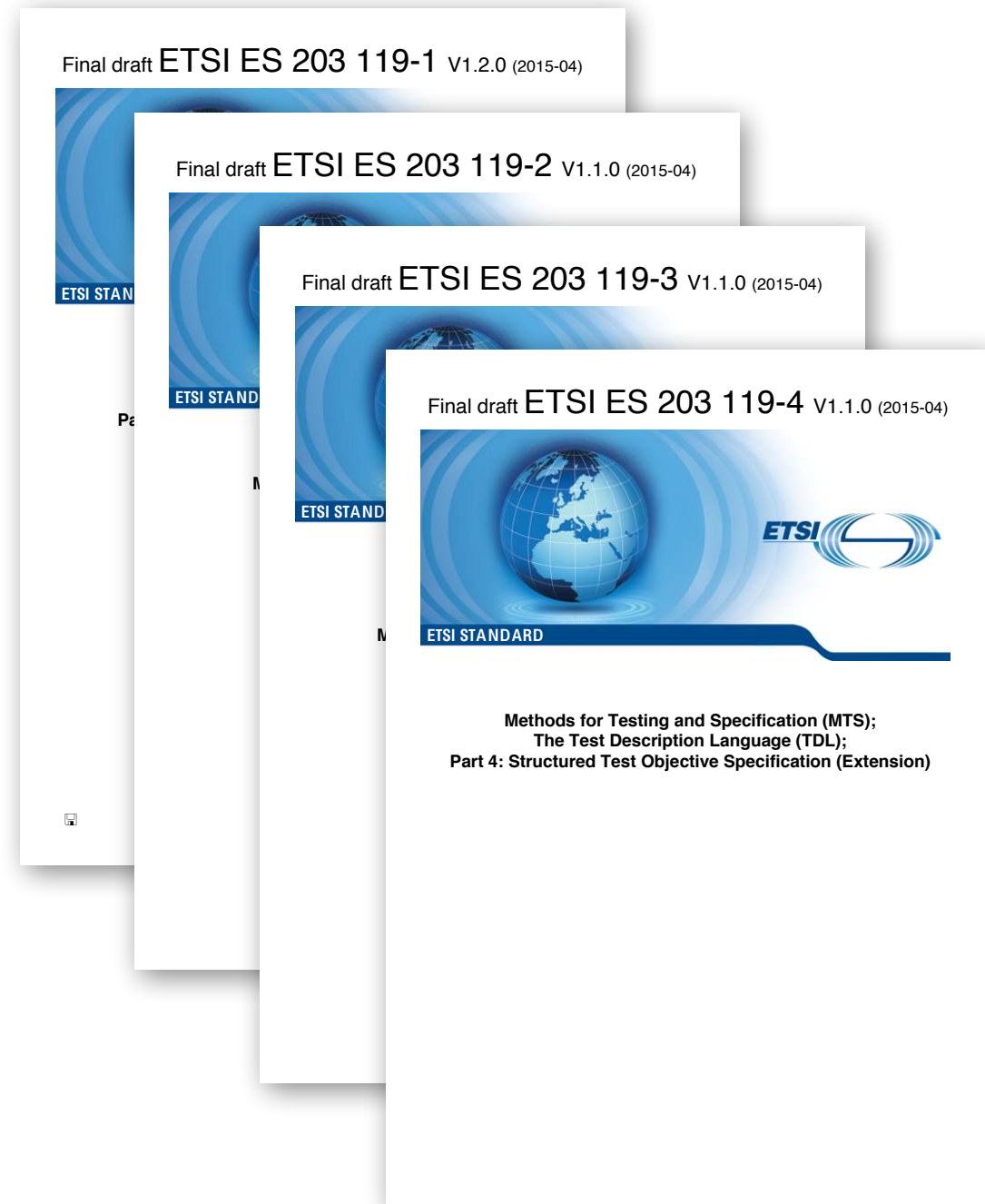
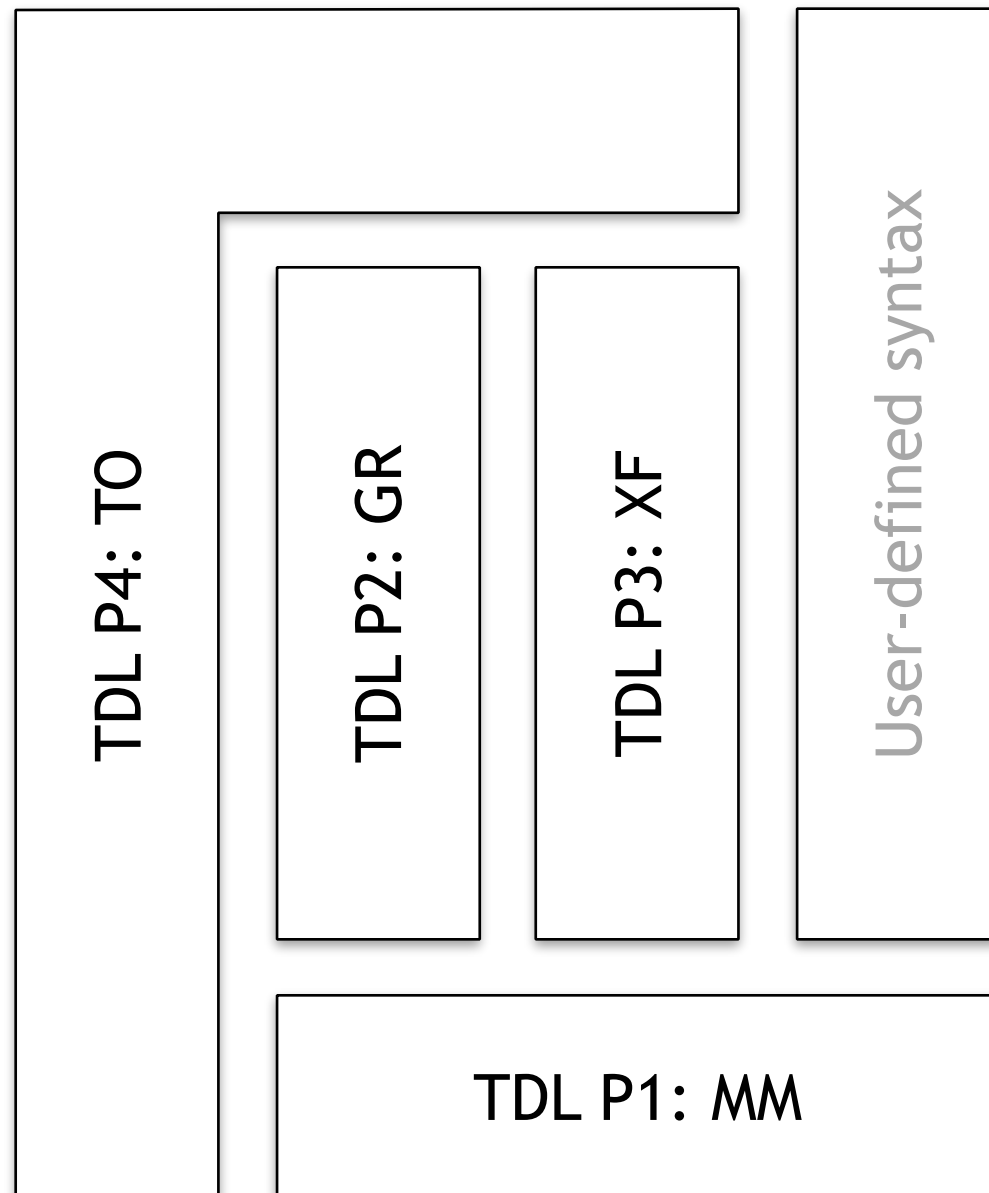
TDL Main Ingredients

- Test objective
- Test configuration
- Expected behaviour
- Abstract test data
- Time

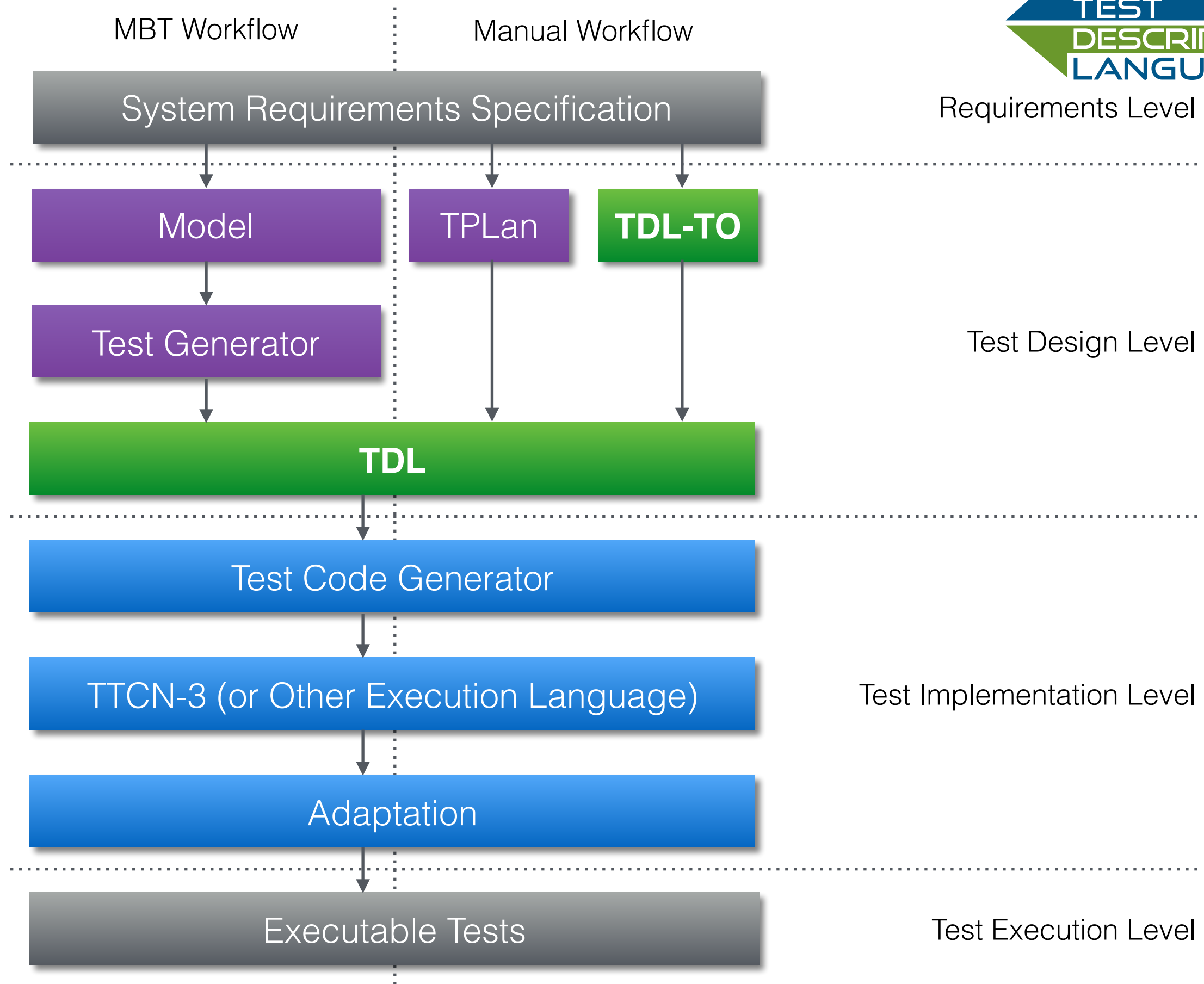


One possible representation: Graphical
(ES 203 119-2: TDL GR)

TDL Standards Today



TDL in Context: Workflow



Requirements Level

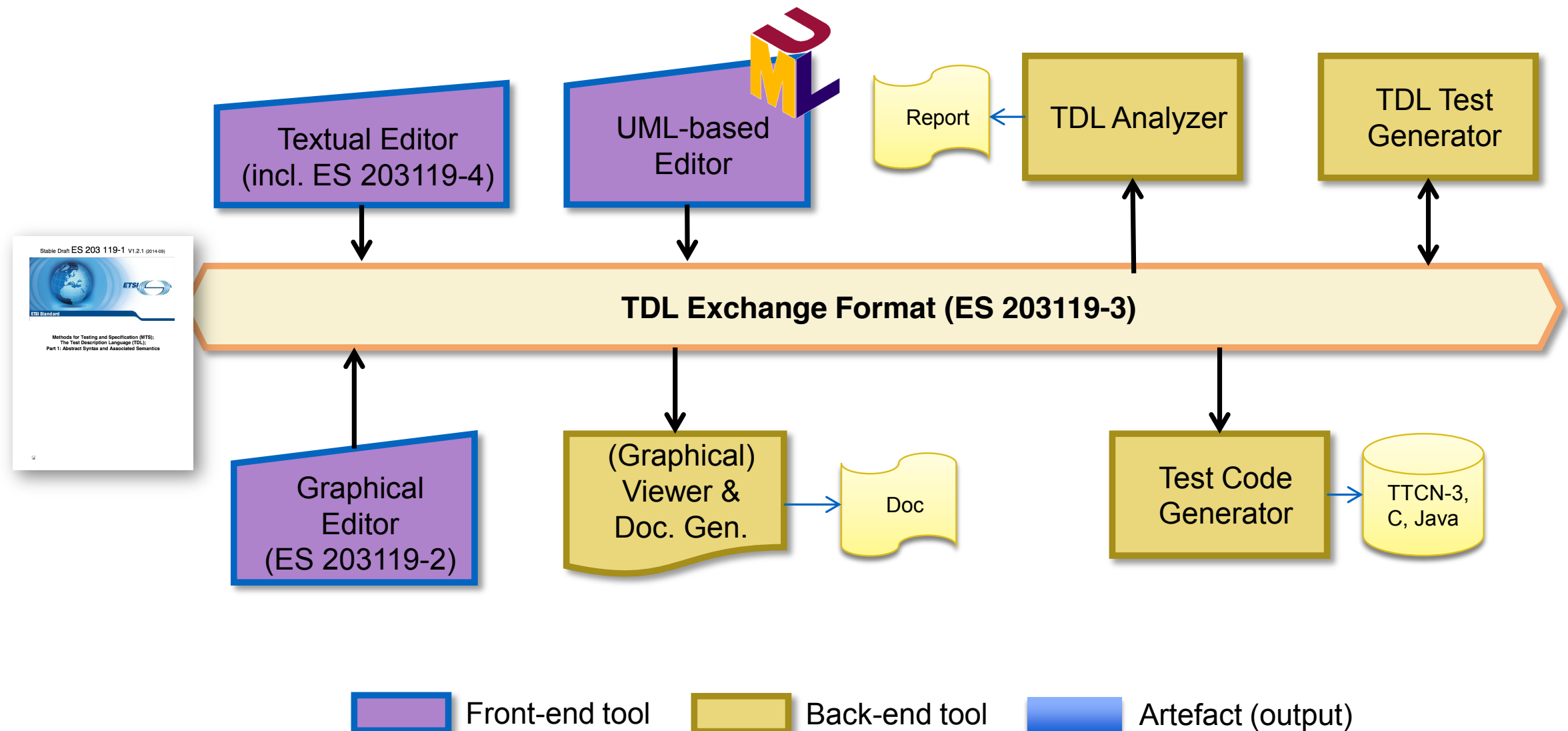
Test Design Level

Test Implementation Level

Test Execution Level

TDL in Context: Tooling

- Exchangeable and reusable tool components



TDL in Context: Standardisation

Base Standard Specification

Identification of Requirements

Creation of ICS/IFS

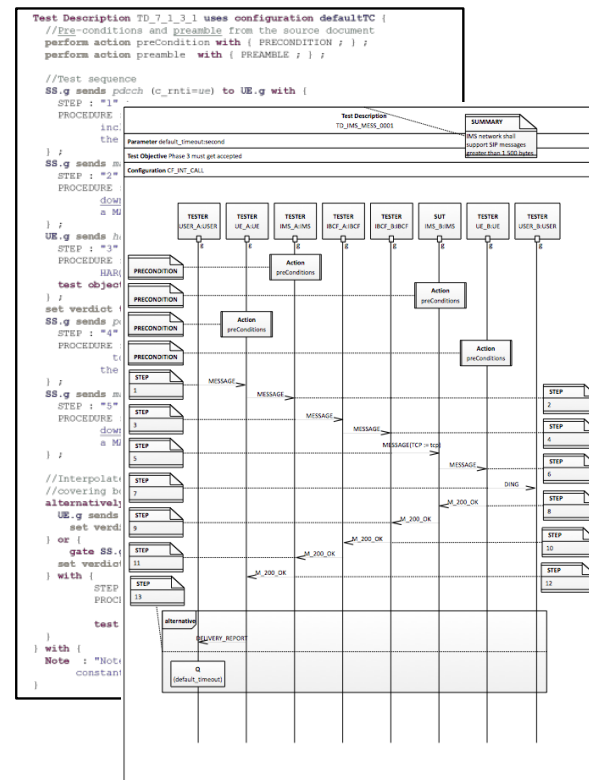
Definition of TSS

Specification of Test Purposes

Specification of Test Descriptions

Specification of Test Cases

Validation

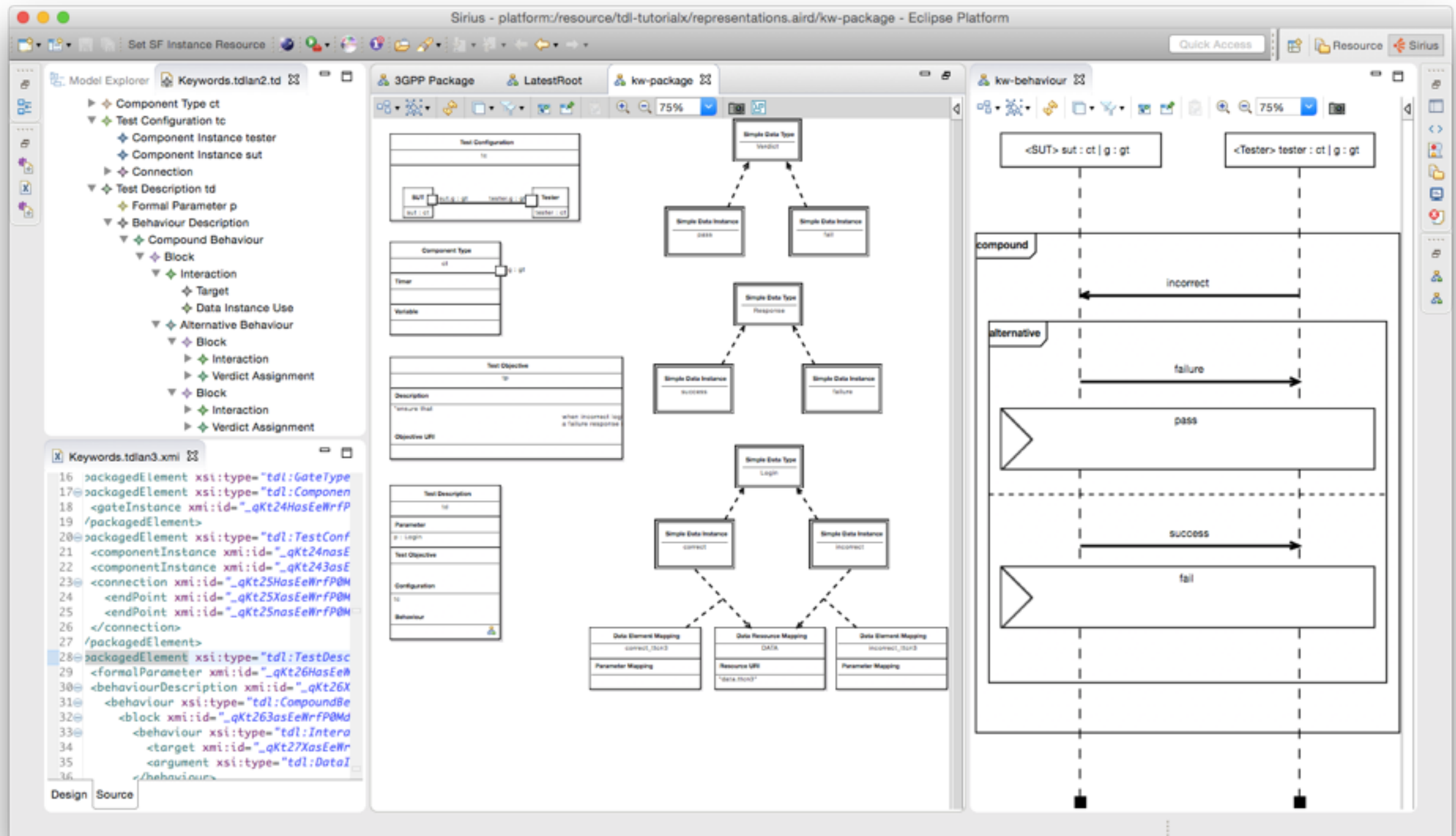


- Representing tests in TR, TS, ES, etc.
- Generating TTCN-3 test logic
- Visualising text execution logs

Coming up...

- Guest speakers
 - Miguel Angel Reina Ortega, ETSI CTI
 - Xavier Zeitoun, CEA LIST
 - Marc-Florian Wendland, Fraunhofer FOKUS SQC
 - Teemu Kanstren, VTT/MetaCase
 - Andrus Lehtmetts, Elvior
 - György Réthy, Ericsson
- Discussion with stakeholders during lunch
- Demos and discussions during all breaks
- Reference implementation and UML profile in 2016

Coming up...



- Reference implementation and UML profile in 2016

Coming up...

- Guest speakers
 - Miguel Angel Reina Ortega, ETSI CTI
 - Xavier Zeitoun, CEA LIST
 - Marc-Florian Wendland, Fraunhofer FOKUS SQC
 - Teemu Kanstren, VTT/MetaCase
 - Andrus Lehtmetts, Elvior
 - György Réthy, Ericsson
- Discussion with stakeholders during lunch
- Demos and discussions during all breaks
- Reference implementation and UML profile in 2016

Sophia Antipolis, French Riviera
20-22 October 2015



MIGUEL ANGEL REINA ORTEGA

ETSI CTI

Miguel Angel Reina Ortega, ETSI CTI

- ETSI Centre for Testing and Interoperability
 - development of testing methodologies in collaboration with ETSI TC MTS
 - support of ETSI Technical Committees in the development of conformance and interoperability test specifications
 - technical support and organisation of Plugtests events (Interoperability, Coexistence, Proofs of Concepts, etc..)
- Testing activities for emerging technologies
 - M2M (Service and Application layers), NFV (Network Functions Virtualization), 5G, IoT

Miguel Angel Reina Ortega, ETSI CTI

- ETSI CTI and TDL
 - shorter test specification development process
 - improved test specification consistency and quality
 - bridge the gap between non-testing experts (standardisation, technical) and test engineers
- TDL in conformance testing
 - detailed test purposes transformed into TTCN-3 test cases
 - strengthen link between test purposes and test suites
- TDL in interoperability testing
 - easier development, better comprehension by stakeholders

Sophia Antipolis, French Riviera
20-22 October 2015



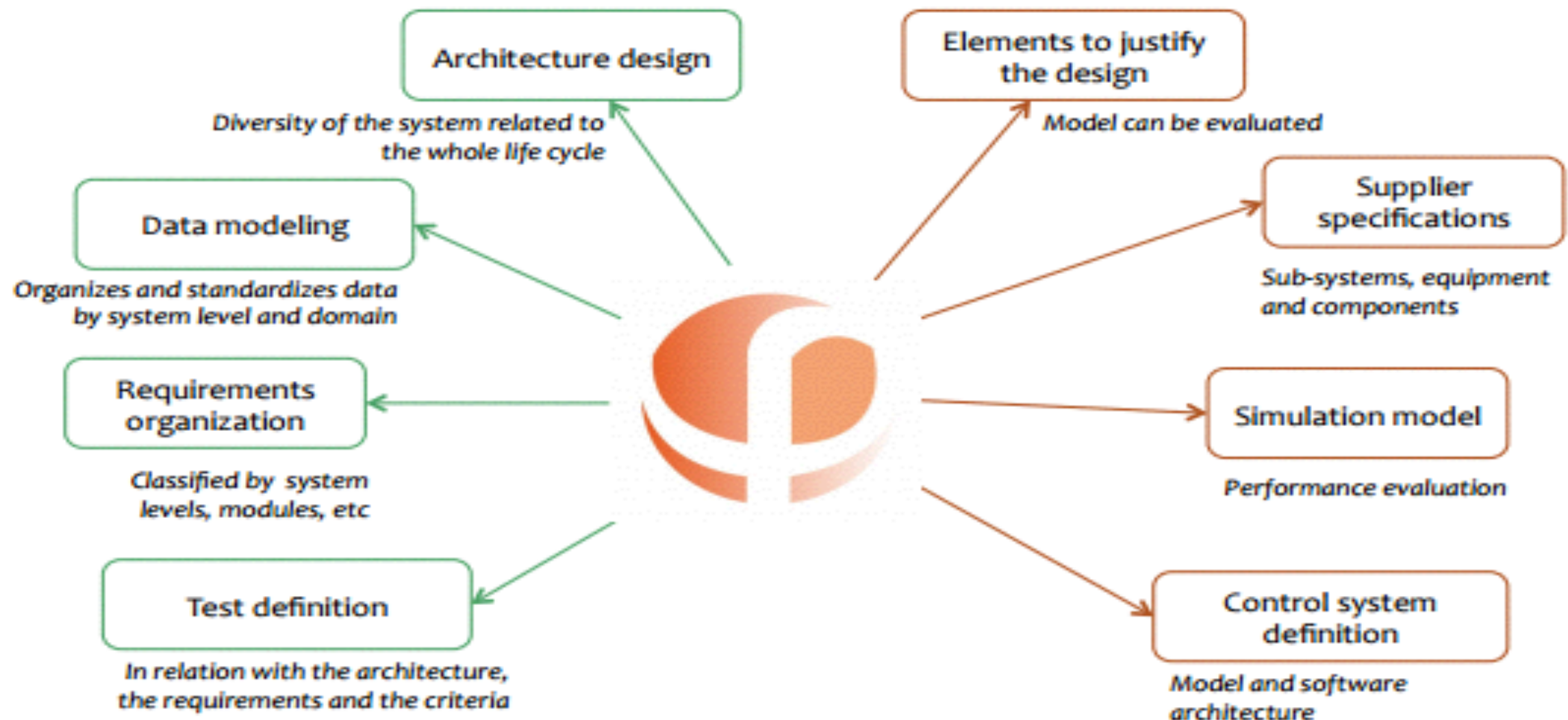
XAVIER ZEITOUN
CEA LIST

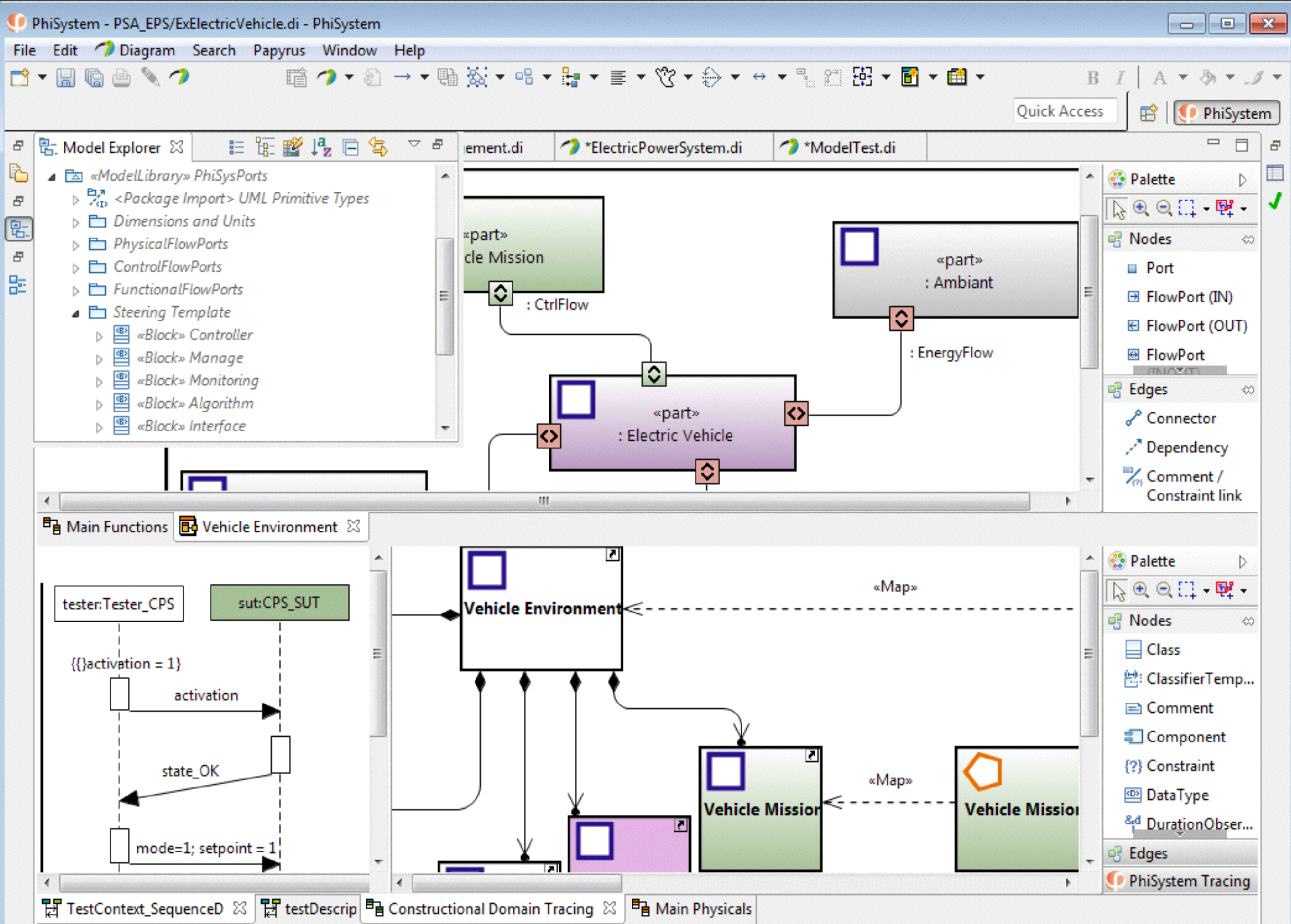
Xavier Zeitoun, CEA LIST

- CEA
 - major player in research and innovation
 - 16000 HR, 3000 publications/year, 1600 patents, 51 labs
- Sherpa Engineering
 - an innovative SME (70 employees)
 - provides solutions for modelling and simulation
 - domain: cyber-physical control systems

Xavier Zeitoun, CEA LIST

- PhiSystem
 - UML-based modelling of Cyber-Physical Systems (CPS)

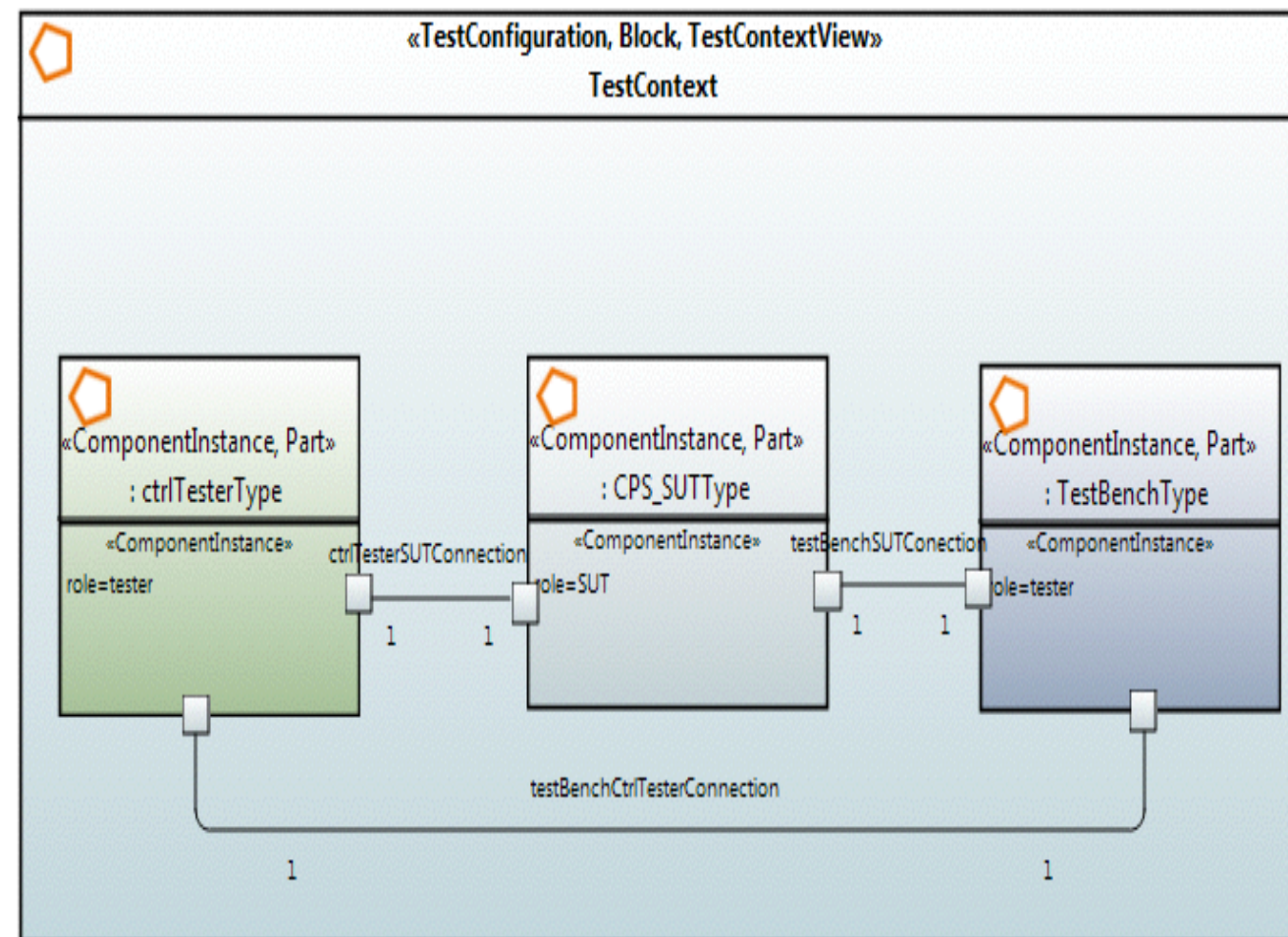




Xavier Zeitoun, CEA LIST

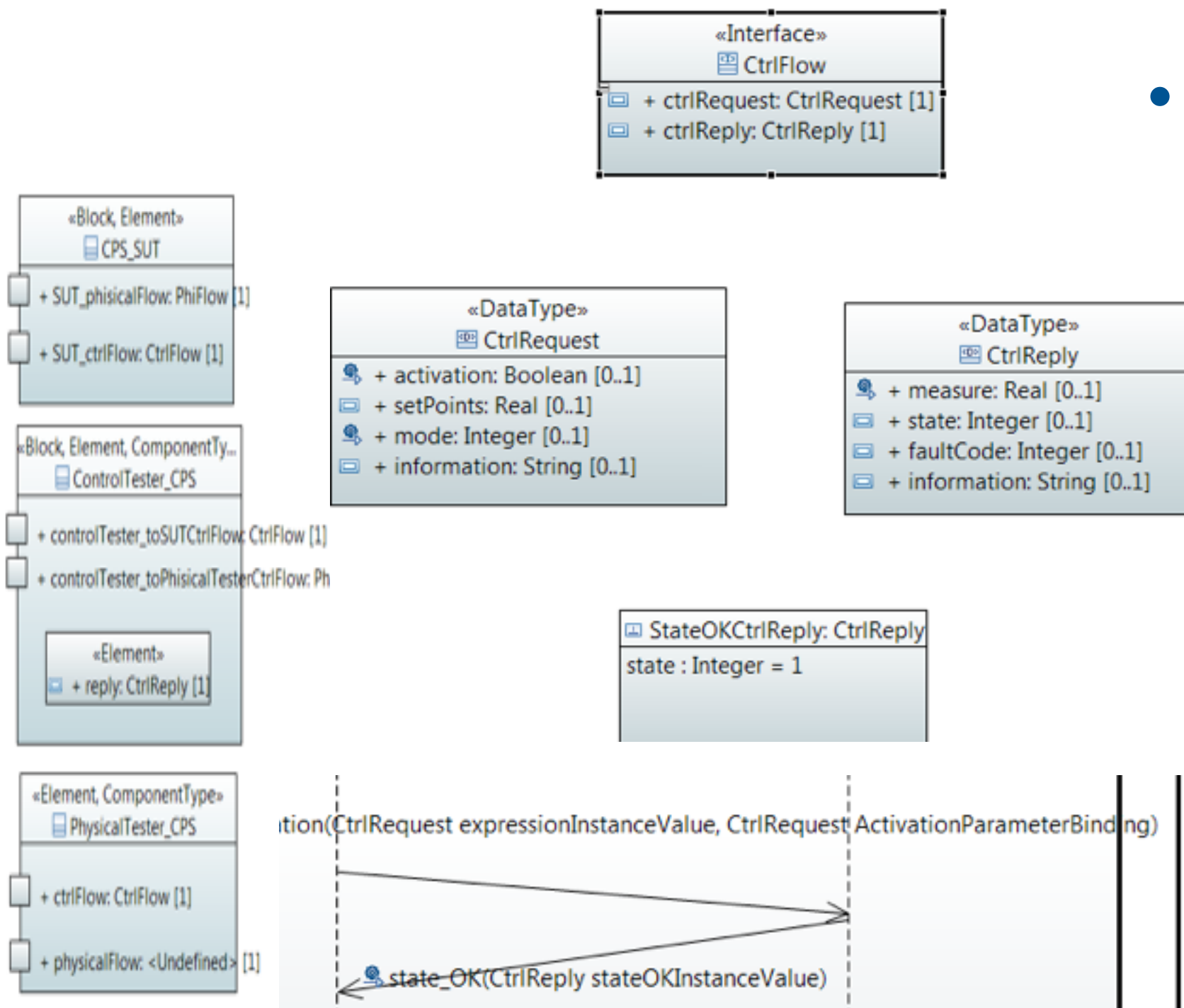
• Test bench modelling for CPS

- Control tester
 - handles the Control flow towards SUT and TestBench
- Physical tester
 - represents the TestBench
 - its connection with SUT represents physical interaction
- SUT
 - specialises the actual SUT modelled in PhiSystem



- Notable feature of TDL : Factorisation of the initialisation of the bench using the TestDescriptionReference Concept

Xavier Zeitoun, CEA LIST



• Data path specification

- DataDefinition Diagram
 - Declaration of Types and Instances in a
- TestConfiguration Diagram
 - Declaration of a valid communications types by assigning the GateType in
- Usage in the TestDescription
 - in guards, argument of Interactions
- Reception of data
 - using the Target Concept for specifying the target component variable

Sophia Antipolis, French Riviera
20-22 October 2015



MARC-FLORIAN WENDLAND

Fraunhofer FOKUS SQC

Marc-Florian Wendland, FOKUS SQC

- Fraunhofer FOKUS
 - ICT research institute
 - domains: open communication systems, smart cities
- System Quality Center (SQC)
 - cross-cutting competence center of Fraunhofer FOKUS
 - technology and knowledge transfer
 - new methods and approaches for software-intensive systems
 - active in standardisation of MBSD, MBT and test automation
 - partners from diverse domains - automotive, e-health, aerospace, transportation, government, etc.

Marc-Florian Wendland, FOKUS SQC

- Fraunhofer FOKUS and TDL
 - ensure compatibility, consistency and harmonisation of ETSI technologies (e.g., TTCN-3)
 - Integration of expertise in development and utilisation of test modelling languages
 - harmonisation of TDL with test-related standards such as UML Testing Profile
 - unite the industrial MBT communities
 - extend the portfolio offered to the industry

Sophia Antipolis, French Riviera
20-22 October 2015



TEEMU KANSTREN

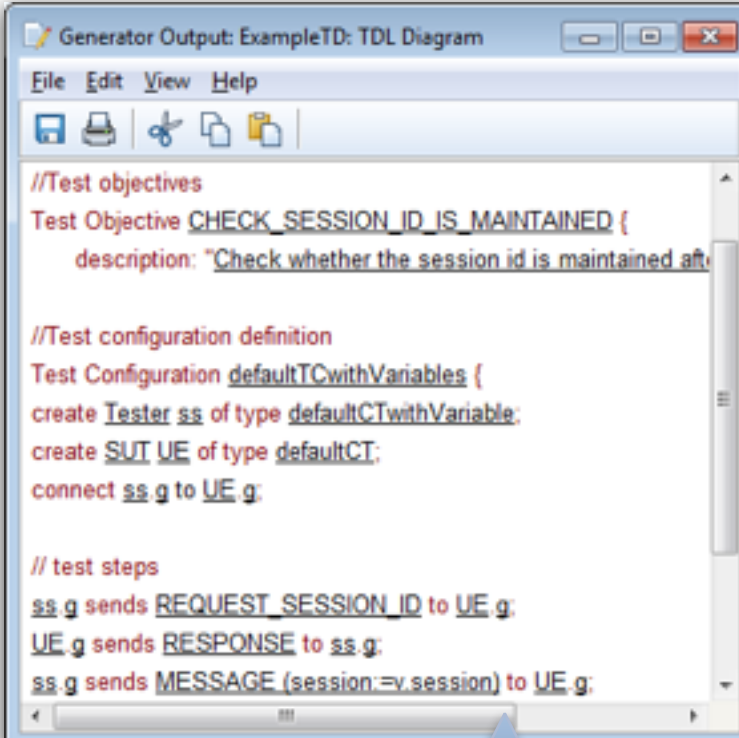
VTT / MetaCase

Teemu Kanstren, VTT/MetaCase

- VTT
 - leading Nordic research and technology organisation
- MetaCase
 - provider of MetaEdit+ DSM and DSL workbench
- VTT and MetaCase collaboration
 - research and industrial use of MBT and test automation
 - domains: automation, telecommunication, automotive
- VTT, MetaCase and TDL
 - modelling, generation, and integration with tools (MetaEdit+, OSMO, etc.)

Teemu Kanstren, VTT/MetaCase

- Plenty of test tools (industry & academia)
 - test modelling, generation, execution, analysis, ...
 - often far apart and hard to integrate or switch
- TDL potential for interoperability
 - transform between tools with less effort
 - make use of best features & combinations
 - provide a common infrastructure & language



```
//Test objectives
Test Objective CHECK_SESSION_ID_IS_MAINTAINED {
  description: "Check whether the session id is maintained after"

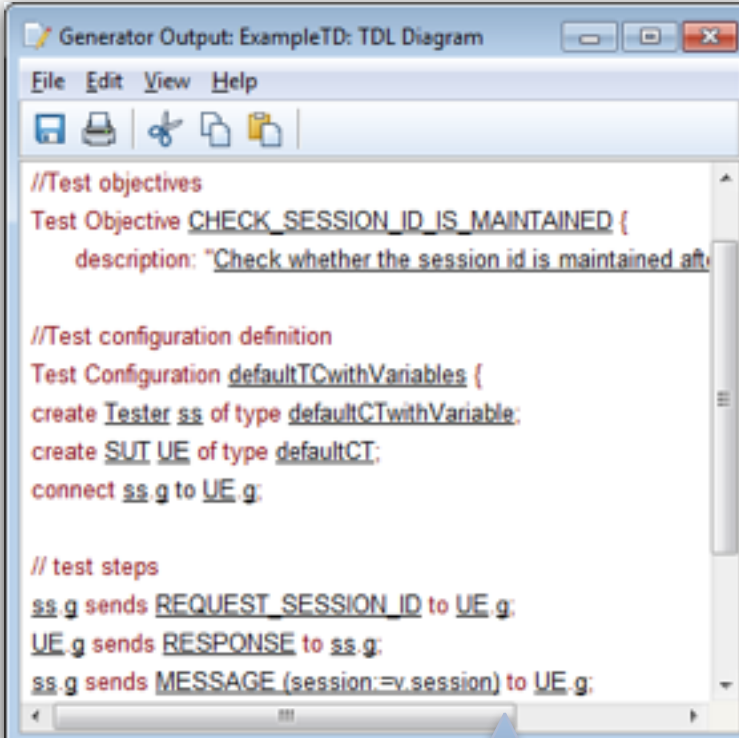
//Test configuration definition
Test Configuration defaultTCwithVariables {
  create Tester ss of type defaultCTwithVariable;
  create SUT UE of type defaultCT;
  connect ss.g to UE.g;

// test steps
ss.g sends REQUEST_SESSION_ID to UE.g;
UE.g sends RESPONSE to ss.g;
ss.g sends MESSAGE (session:=v.session) to UE.g;
```

Sample of generation
output

Teemu Kanstren, VTT/MetaCase

- Interoperability scenarios examples
 - specify tests with TDL editors, generate tests, ...
 - create tests using DSL, transform to TDL, check models, optimise paths, generate tests, ...
 - generate TDL from MBT, check, optimise, visualise, execute, ...



```
//Test objectives
Test Objective CHECK_SESSION_ID_IS_MAINTAINED {
  description: "Check whether the session id is maintained after..."

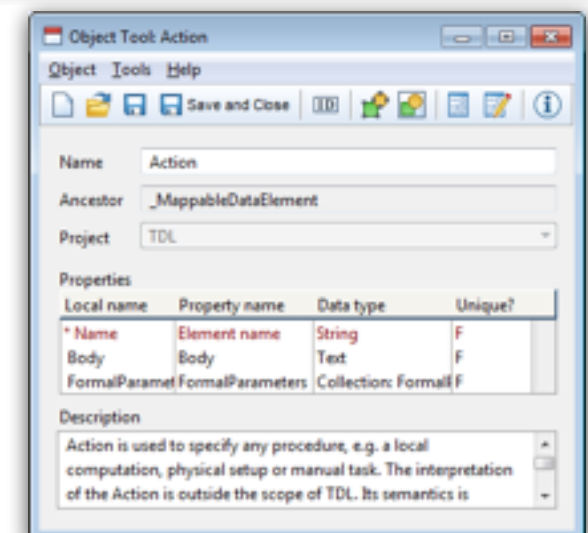
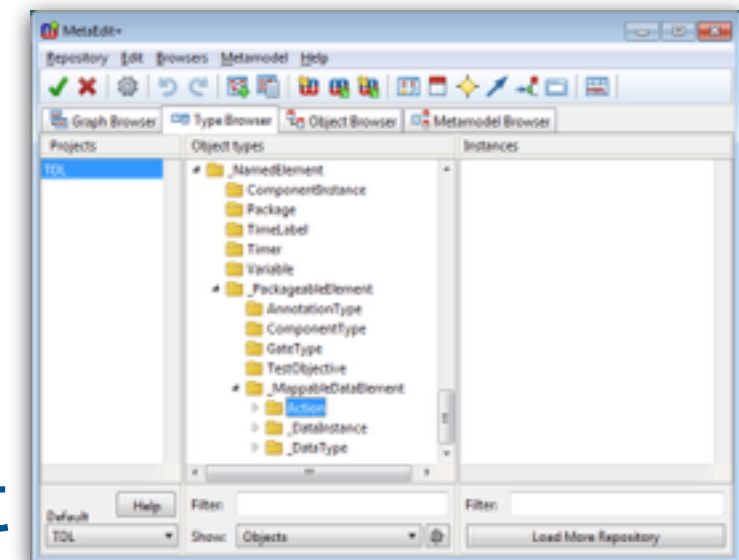
//Test configuration definition
Test Configuration defaultTCwithVariables {
  create Tester ss of type defaultCTwithVariable;
  create SUT UE of type defaultCT;
  connect ss.g to UE.g;

// test steps
ss.g sends REQUEST_SESSION_ID to UE.g;
UE.g sends RESPONSE to ss.g;
ss.g sends MESSAGE (session:=v.session) to UE.g;
```

Sample of generation output

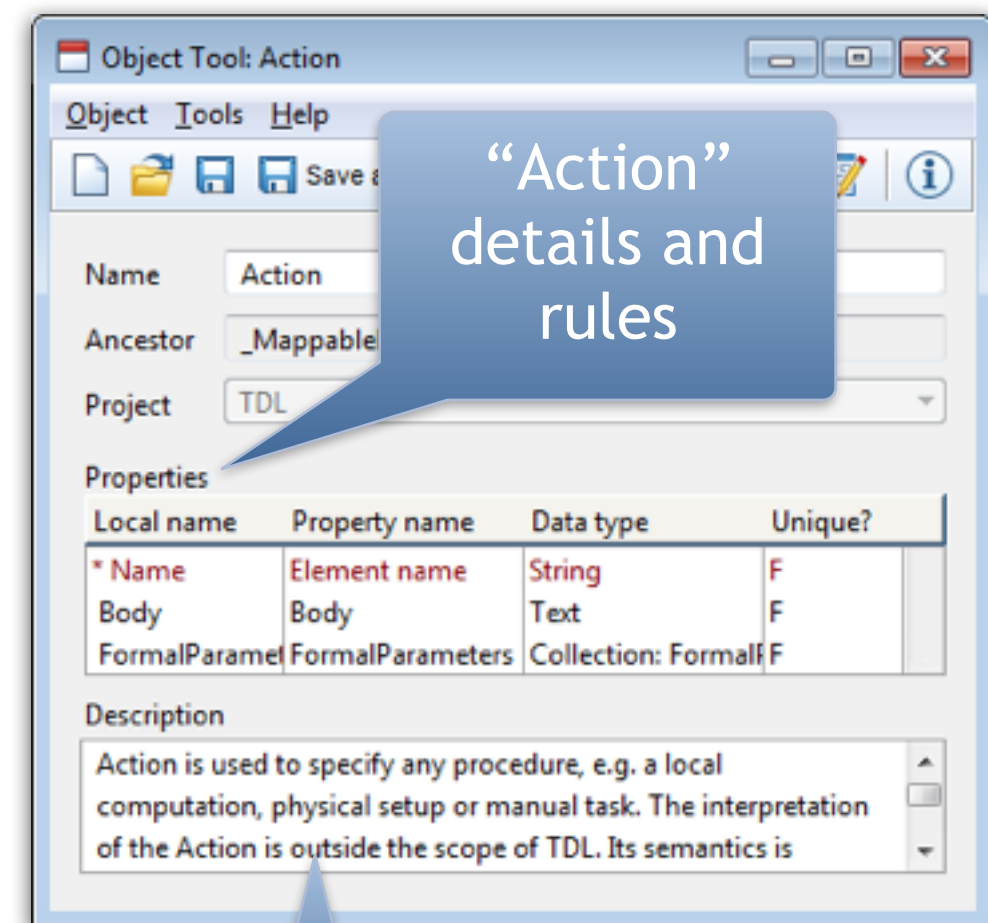
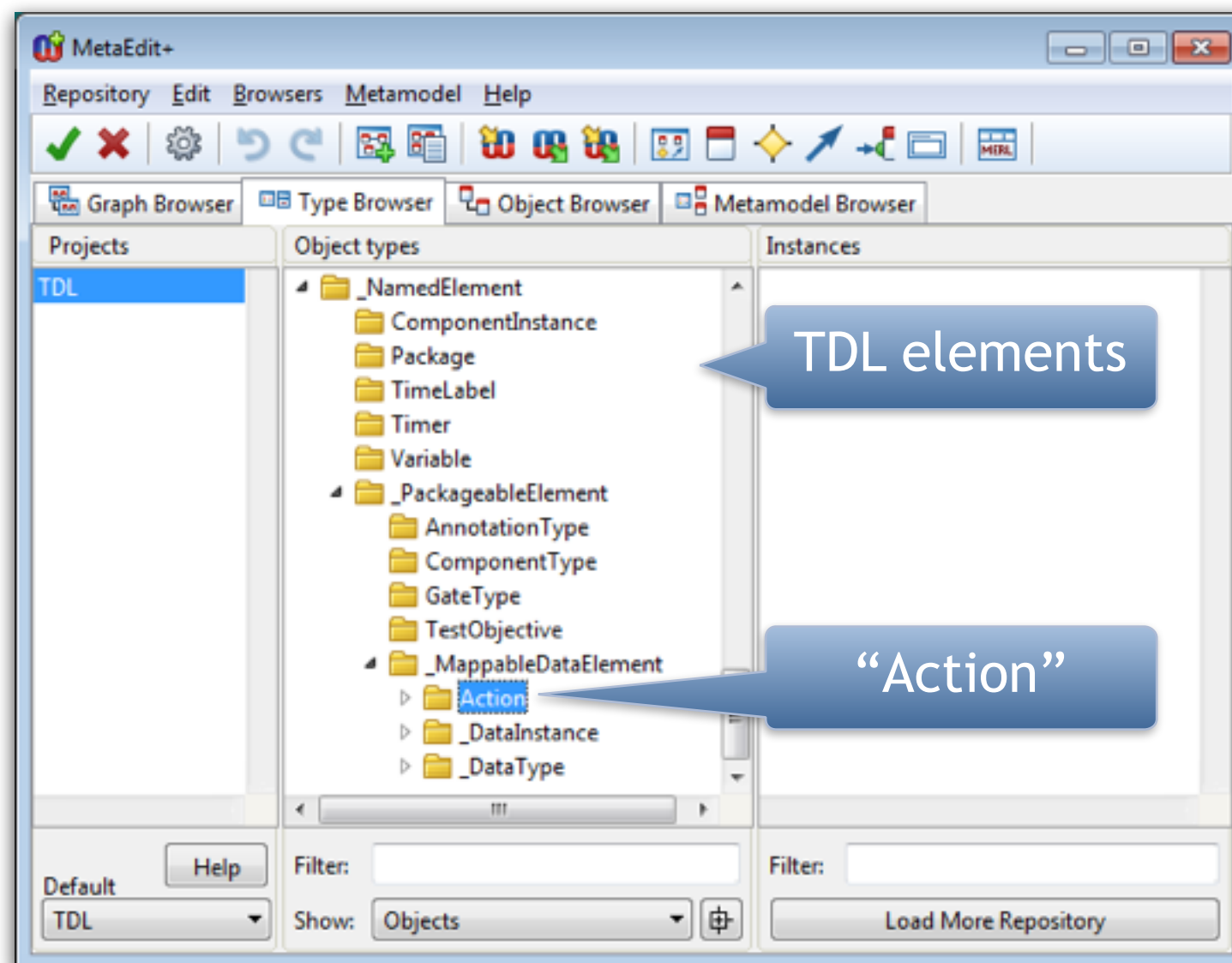
Teemu Kanstren, VTT/MetaCase

- MetaEdit+ implementation of TDL covers
 - elements, constraints, notation, generators
 - meta-model and constraints validated at the modelling time
- TDL meta-model can be extended
 - agile language and generator development
 - existing models update to changes in TDL
- TDL meta-model can be easily linked to other languages
 - UML, AUTOSAR, SDL, DSLs...



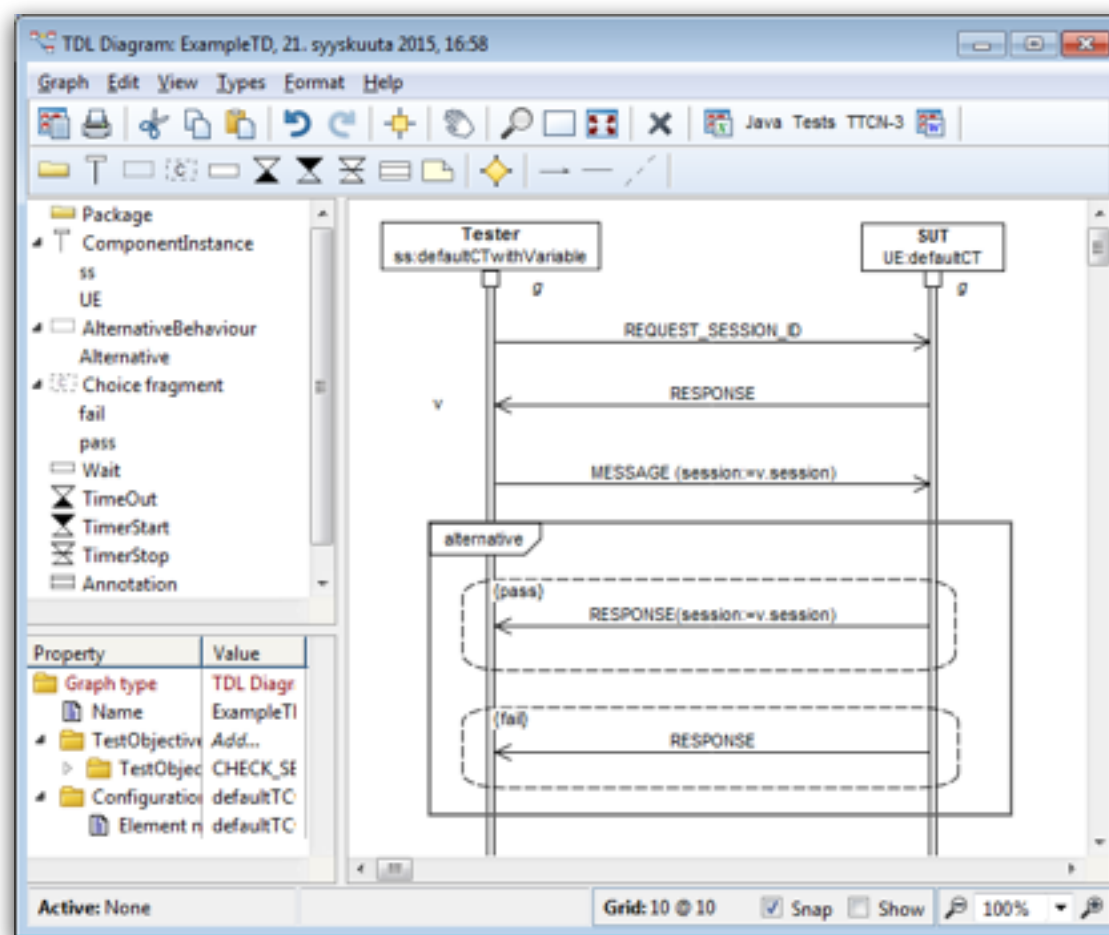
Teemu Kanstren, VTT/MetaCase

- MetaEdit+ implementation of TDL



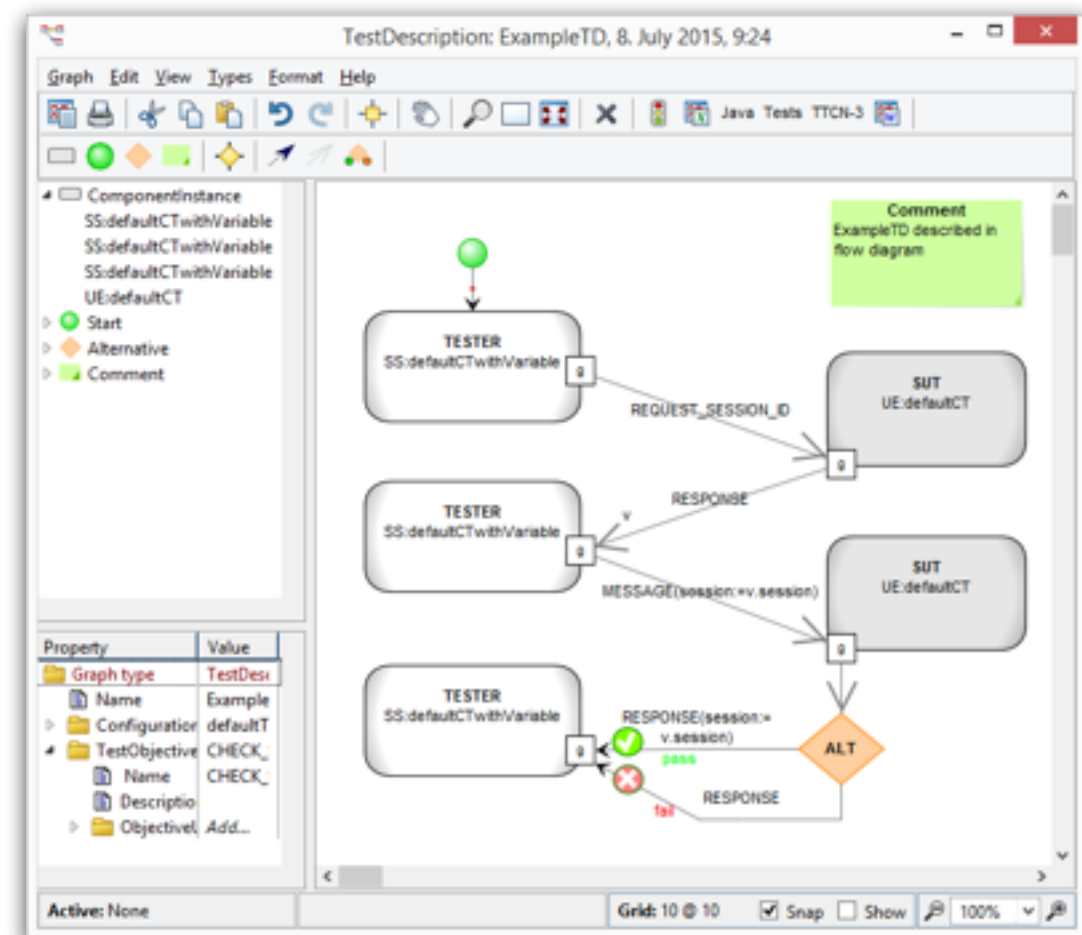
Teemu Kanstren, VTT/MetaCase

- MetaEdit+ implementation of TDL



TDL Graphical Syntax:

Methods for Testing and Specification (MTS);
 The Test Description Language (TDL);
 Part 2: Graphical Syntax



TDL Custom Syntax:

User defined syntax based on activity diagrams, supports multiple gates, sub-activities, complex conditions, etc.

Sophia Antipolis, French Riviera
20-22 October 2015



ANDRUS LEHTMETS

Elvior

Andrus Lehtmetts, Elvior

- Elvior
 - established 1992 in Tallinn, Estonia
 - test automation tools supporting TTCN-3 and MBT
- ETSI member
 - part of TC MTS
 - contributing to the standardisation of TTCN-3 and TDL

Andrus Lehtmetts, Elvior

- Elvior and its users
 - make test automation with TTCN-3 more effective
 - increase number of TTCN-3 users in test automation
- Opportunities with TDL
 - custom syntaxes reduce the need for programming skills
 - more effective application of MBT and test automation
 - lower threshold for applying MBT and automated test generation among test managers and test engineers

Andrus Lehtmetts, Elvior

- Adopting TDL
 - complements MBT and automated test generation
 - easier visualisation of generated test sequences
 - easier interoperability between tools
- TDL and TTCN-3 in test automation
 - create high level TDL test scripts instead of TTCN-3 code
 - use standardised graphical syntax or custom-tailored ones
 - hide TTCN-3 complexity from testers
 - rely on TTCN-3 as test execution platform

Sophia Antipolis, French Riviera
20-22 October 2015



GYÖRGY RÉTHY

Ericsson

György Réthy, Ericsson

- Ericsson
 - supports the standardisation of TDL from the very beginning
 - participating directly in the standardisation of TDL
 - part of TC MTS
- TDL at Ericsson
 - leads to increased efficiency, faster test case development
 - can be used during system specification
 - reused in development and system testing phases
 - raising the abstraction level of test case design
 - better overview, documentation

György Réthy, Ericsson

- MBT at Ericsson
 - integration of manual and MBT-enabled test case design
 - generated and manually designed TCs integrated by means of TDL
 - all test cases visualised and reviewed as one test suite
 - reuse the same test execution platform regardless of test case design approach

Sophia Antipolis, French Riviera
20-22 October 2015



JOIN THE DISCUSSION!

Join the Discussion!

- Discussion with stakeholders during the lunch break
- Further information and demos at the TDL booth
 - CEA - “Embedding TDL into the UML environment”
 - Elvior - “Visualising generated tests with TDL”
 - MetaCase - “Custom representations and editors for TDL”
 - UG - “TDL in education with custom tooling”
- Contribute to TDL at <http://forge.etsi.org/mantis>
- Become part of the team!
- Visit tdl.etsi.org for TDL-related news and resources

Sophia Antipolis, French Riviera
20-22 October 2015



JOIN THE DISCUSSION!

Demos and more at the TDL booth
News and resources at tdl.etsi.org



Credits

- Original image from Au Resto, Nice

