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**
  - 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 P1: MM
- TDL P2: GR
- TDL P3: XF
- TDL P4: TO

User-defined syntax

Final draft ETSI ES 203 119-1 V1.2.0 (2015-04)
Final draft ETSI ES 203 119-2 V1.1.0 (2015-04)
Final draft ETSI ES 203 119-3 V1.1.0 (2015-04)
Final draft ETSI ES 203 119-4 V1.1.0 (2015-04)
TDL in Context: Workflow

**MBT Workflow**

1. **System Requirements Specification**
2. **Model**
3. **Test Generator**
4. **TDL**
5. **Test Code Generator**
6. **TTCN-3 (or Other Execution Language)**
7. **Adaptation**
8. **Executable Tests**

**Manual Workflow**

1. **TPLan**
2. **TDL-TO**
3. **Requirements Level**
4. **Test Design Level**
5. **Test Implementation Level**
6. **Test Execution Level**

**TDL**
TDL in Context: Tooling

- Exchangeable and reusable tool components
TDL in Context: Standardisation

- 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 Lehtmets, Elvior
  - György Réthy, Ericsson
- Discussion with stakeholders during lunch
- Demos and discussions during all breaks
- Reference implementation and UML profile in 2016
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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
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
3rd UCAAT
User Conference on
Advanced Automated Testing
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
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
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, ...

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
• 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.
Andrus Lehtmets, 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 Lehtmets, 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 Lehtmets, 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
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
JOIN THE DISCUSSION!

Sophia Antipolis, French Riviera
20-22 October 2015
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](http://forge.etsi.org/mantis)
- Become part of the team!
- Visit [tdl.etsi.org](http://tdl.etsi.org) for TDL-related news and resources
JOIN THE DISCUSSION!

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

• Original image from Au Resto, Nice