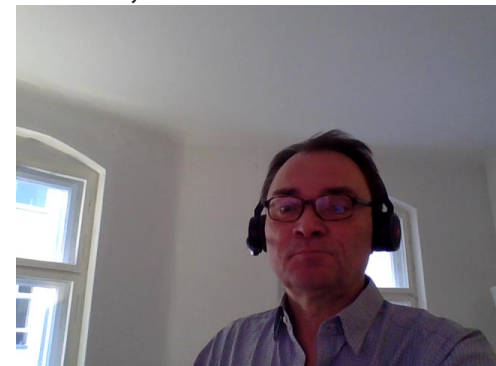


USING TDL FOR STANDARDISED TEST PURPOSE DEFINITIONS



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IEEE QRS/STV, 13th December 2020, Macau (China)



- **Our Context**
- **ETSI Testing approach**
 - **TDL**
 - **TTCN-3**
- **Application samples within ETSI**
 - **TC INT projects**
 - **TC MTS standardisation**




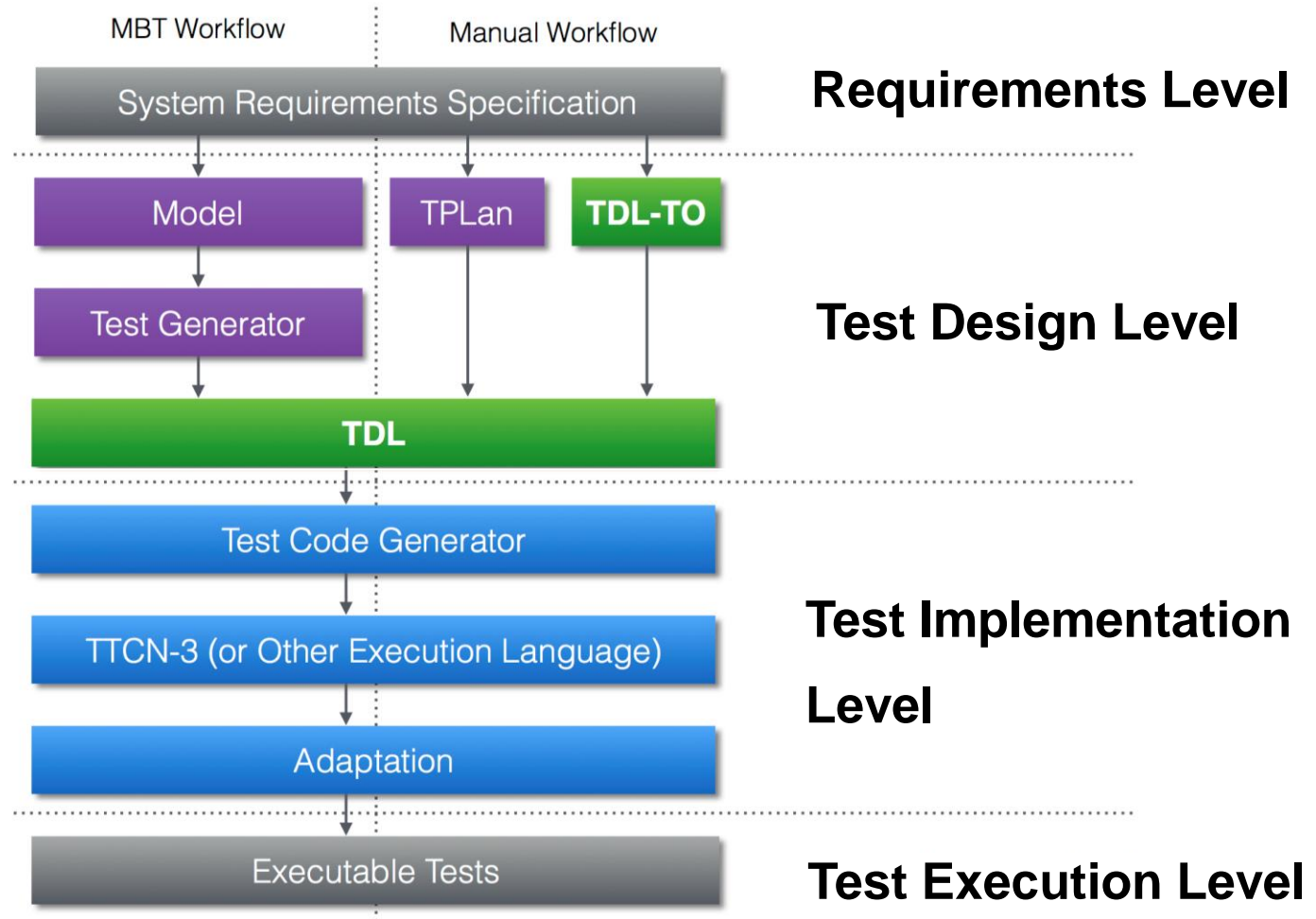
- ETSI is a leading standardisation organisation for **Information and Communication Technology** (ICT) standards fulfilling European and global market needs.

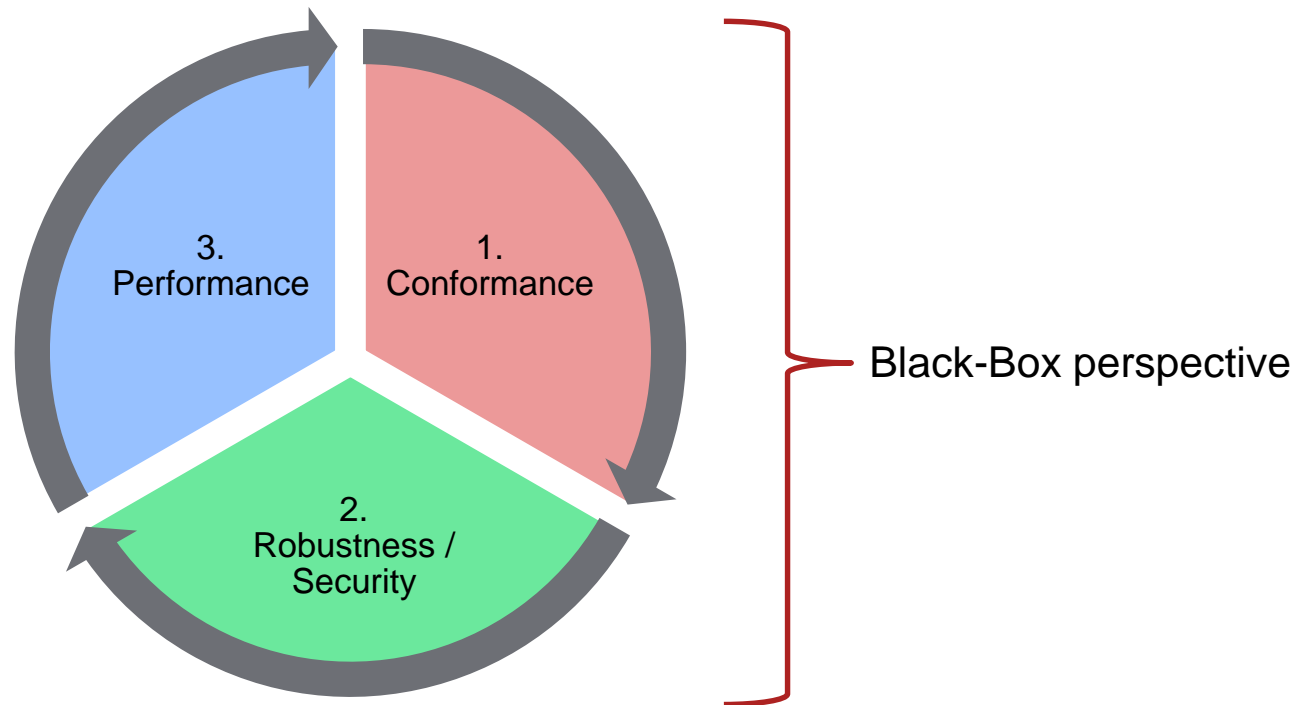
- ETSI test specifications are developed according to the well-proven methodology defined in ISO/IEC 9646.

This framework recommends that the test specifications include:

Test Purposes, Test Descriptions and Test Cases.

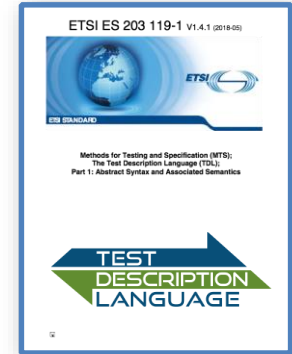
- **Technical Committee “Methods for Testing and Specification”** 
- **Working Group TDL** provides and oversees roadmap for further development of TDL and the TDL open source project
- **Working Group TST** develops IoT test catalogues and specifications (not covered elsewhere)
 - The **types of testing** include conformance, interoperability, security and performance testing
 - The initial technical **focus** is:
 - IoT **network layer**
(communication protocols, node connectivity, edge computing etc.),
 - **Basic security** of IoT devices





Test Description Language

- Design, documentation, representation of formalised test descriptions
- Scenario-based approach



Testing and Test Control Notation

- Specification and implementation of all kinds of black-box tests
- Component-based approach



1) Test configurations

2) Test Suite Structure

3) Test purpose (catalogue)

4) Test implementation (TTCN-3)

TP Id	TP_MQTT_Broker_CONNECT_001
Test Objective	The IUT MUST close the network connection if fixed header flags in CONNECT Control Packet are invalid
Reference	[MQTT-2.2.2-1], [MQTT-2.2.2-2], [MQTT-3.1.4-1], [MQTT-3.2.2-6]
PICS Selection	PIC_BROKER_BASIC
Initial Conditions	
Expected Behaviour	
<pre>ensure that { when { the IUT receives a CONNECT message containing header_flags indicating value '1111'B; } then { the IUT closes the TCP_CONNECTION } }</pre>	
Final Conditions	


```
Test Purpose {  
  TP Id TP_HELLO_MSG_SERVER /* Summary */  
  Test objective "Establishing Connection  
                 with EndpointUrl"  
  Reference      "OPC-UA,Part-6-  
                 Mappings#section-7.1.3"  
  Expected behaviour  
    ensure that {  
      when {...}  
      then {...}  
    }  
}
```

- **Informal text specification**
(semi-structured)
- **Simple description structure**
(event occurrence sequences)
- **Global keyword definitions**
(domain specific)
- **Single test observation**
(for pass/fail verdict criteria)

1) Test configurations

2) Test Suite Structure

3) Test purpose (catalogue)

4) Test implementation (TTCN-3)

Did you know that **YOUR PHONE...**

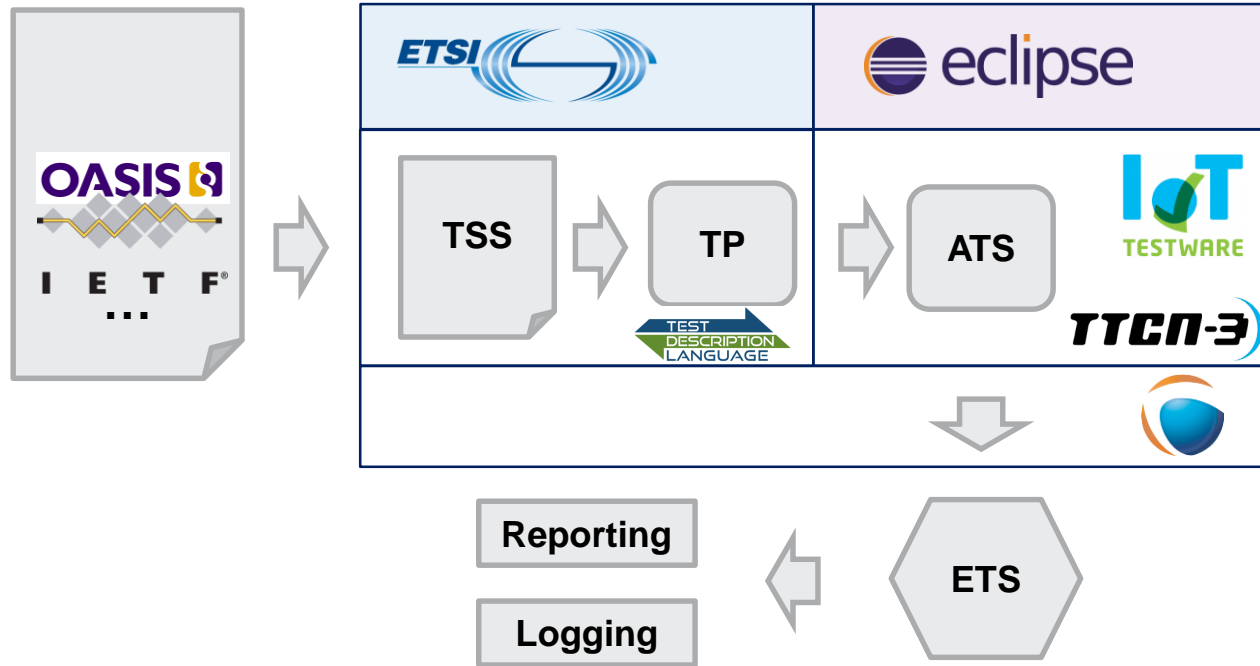


- Technical Committee “Core Network and Interoperability Testing (INT)”
- Specialist/Testing Task Forces on “Voice and video services over LTE”
 - ✓ For multiple interfaces of the identified test configurations
 - ✓ Packages with common domain definitions (library concept)
 - ✓ More than 300 TDL-TO test purposes
 - ✓ TDL Open Source Project (TOP) tools

```
Configuration {  
  Interface Type defaultGT accepts DiameterMessage;  
  Component Type DiameterComp with  
    gate g of type defaultGT  
;  
  Test Configuration CF_VxLTE_INT containing  
    SUT component EPC_PGW_A of type DiameterComp  
    SUT component EPC_PCRF_A of type DiameterComp  
    SUT component S_CSCF_A of type DiameterComp  
    SUT component I_CSCF_A of type DiameterComp  
    SUT component P_CSCF_A of type DiameterComp  
    SUT component HSS_A of type DiameterComp  
    SUT component EPC_MME_A of type DiameterComp  
    SUT component IMS_AS_A of type DiameterComp  
    connection between EPC_MME_A.g and HSS_A.g  
    connection between EPC_PGW_A.g and EPC_PCRF_A.g  
    connection between EPC_PCRF_A.g and P_CSCF_A.g  
    connection between HSS_A.g and S_CSCF_A.g  
    connection between HSS_A.g and I_CSCF_A.g  
    connection between IMS_AS_A.g and HSS_A.g  
;  
  Test Configuration CF_VxLTE_RMI containing  
    SUT component EPC_PGW_B of type DiameterComp  
    SUT component EPC_PCRF_A of type DiameterComp  
    SUT component EPC_PCRF_B of type DiameterComp  
    SUT component P_CSCF_B of type DiameterComp  
    SUT component HSS_A of type DiameterComp  
    SUT component EPC_MME_B of type DiameterComp  
    connection between EPC_MME_B.g and HSS_A.g  
    connection between EPC_PGW_B.g and EPC_PCRF_B.g  
    connection between EPC_PCRF_A.g and EPC_PCRF_B.g  
    connection between EPC_PCRF_B.g and P_CSCF_B.g  
;  
} // End of Configuration section
```



APPLICATION: IOT-TESTWARE – THE TWO PILLARS



Legend:

TP: Test Purpose

TSS: Test Suite Structure












ATS: Abstract Test Suite

ETS: Executable Test Suite

SUT: System Under Test

AVAILABLE TEST SPECS – MTS TST WORK PROGRAM



Work Item Monitoring - MTS TST					
7 WIs, Work in progress, displaying 1 to 7				Displays	30
Work item number	Version	Current status	Next status	Rapporteur name	
MTS TST					
DTS/MTS-TST8 (TS 103 848)	 0.1.1	 TB approval (2020-11-02)	Draft receipt by ETSI Secretariat	Hackel Sascha	IEC 62443-4-2
DTS/MTS-TSTCoAP-1 (TS 103 598-1)	 0.1.1	Stable draft (2020-09-07)	Final draft for approval	Hackel Sascha	
DTS/MTS-TSTCoAP-2 (TS 103 598-2)	 0.1.0	Stable draft (2020-09-06)	Final draft for approval	Hackel Sascha	CoAP
DTS/MTS-TSTCoAP-3 (TS 103 598-3)	 0.1.0	 WG approval (2020-11-20)	TB approval	Gheorghe-Pop Ilie-Daniel	
DTS/MTS-TSTMQTT-1 (TS 103 597-1)	 0.1.2	 TB approval (2020-11-02)	Draft receipt by ETSI Secretariat	Pintar Bostjan	MQTT
DTS/MTS-TSTMQTT-2 (TS 103 597-2)	 0.1.0	Stable draft (2020-09-04)	Final draft for approval	Pintar Bostjan	
DTS/MTS-TSTMQTT-3 (TS 103 597-3)	 0.1.4	 WG approval (2020-11-20)	TB approval	Gheorghe-Pop Ilie-Daniel	

<https://portal.etsi.org/tb.aspx?tbid=860&SubTB=860>

BENEFITS OF TDL AS A TEST SPECIFICATION LANGUAGE

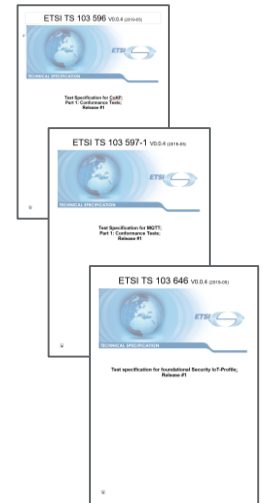
- ✓ **Abstract** → Keeps you focused on *what* to test
- ✓ **Standardised** → Helps you to produce *repeatable* results independently from a chosen certain tool or tool provider
- ✓ **Application focus** → Wide *range* of features for *today's* interconnected, concurrent, embedded, real-time *systems*
- ✓ **Semi-formal** → Helps you to keep test specifications consistent over evolving systems (meta-modelling supported static code analysis)
- ✓ **Multiple syntaxes** → Provide test specifications in a language that different *stakeholders* understand best (graphical, textual, other)
- ✓ **Tool support** → The *TDL Open source Project* (TOP) offers tool support for the use of TDL



SUMMARY & OUTLOOK



- ✓ Standardised test purposes
 - Used in multiple **domains**:
e.g. mobile, access/core networks, ITS
 - **Test types**, e.g. conformance, interop, security



- ✓ Advanced testing technology:
 - Used for **certification**:
e.g. UMTS, LTE, 5G, oneM2M



- ✓ ETSI continues **maintenance** and **evolution**
 - TDL: <https://tdl.etsi.org/>
 - TTCN-3: <http://www.ttcn-3.org/>



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Thank you for your attention!

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