

<b>STF 573 - Final Report for ETSI</b>			
<b>Presented to ETSI meeting</b>		<b>Author:</b>	Prof. Jens Grabowski
		<b>Date:</b>	15/04/2020
<b>Doc ref</b>		<b>Version</b>	

<b>STF</b>	<b>573</b>
<b>TBWG</b>	<b>MTS</b>

<b>STF leader</b>	Prof. Jens Grabowski
<b>TB responsible</b>	Mr. Dirk Tepelmann
<b>Administrator</b>	Ms. Elodie Rouveroux

<b>STF title:</b>	TTCN-3 Evolution 2019
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<b>Milestone</b>	<b>C</b>		<b>Status Template</b>	<b>Covers the period until (cut-off date)</b>	31/05/2020
<b>Objective</b>	Final report to be approved at MTS#80 Publication of deliverables, STF closed				
<b>Achieved</b>	Yes/No	<i>Indicate whether the objective has been achieved If the objective is not achieved, give a short explanation in the "remarks"</i>			
<b>Remarks</b>					

**Achieved dates**

<b>Template</b>	<b>Draft report</b>	<b>TB approval</b>	<b>ETSI approval</b>		
15/04/2020					

## 1 Executive summary

The TTCN-3 testing language has intensively been developed by ETSI during the last decade and, by today, it consists of 17 ETSI standards, altogether more than 1650 pages. The language is also endorsed by ITU-T as the Z.16x and Z.17x Recommendation series. By now TTCN-3 is used exceptionally as the formal specification language of standardized test suites and has also become an important testing technology at various ETSI member companies and in several industrial domains (for further details see <http://www.ttcn-3.org/index.php/about/references/applicatio-domains>) and standards organizations (for further details see <http://www.ttcn-3.org/index.php/about/references>).

TTCN-3 has an important role in standardization; it is an enabler technology in many areas. Several conformance and end-to-end/interoperability test standards have been developed and being developed by 3GPP, ETSI TBs INT, ERM, ITS and oneM2M/smartM2M. 3GPP is using TTCN-3 for UE conformance tests from Rel. 8 and onward to LTE and VoLTE, with NB-IoT on horizon. In the C-ITS area also several TTCN-3 test suites have been developed and they start playing important roles in ITS Plugtests™ events, with automated C-ITS interoperability testing being in progress. In 2016 oneM2M has started using TTCN-3 for IoT/M2M conformance test development that has been continued in ETSI smartM2M in 2017. oneM2M is also developing an open source test tool to execute the conformance tests.

The purpose of STF573 – “TTCN-3 evolution 2019” is to maintain the high quality of the language – that currently consists of 17 ETSI standards - and at the same time keep it harmonized with the new requirements of the users, new application areas and new ways of working like Agile SW development. The STF team consists of 6 experts.

During its working sessions, STF573 progressed 53 Change Requests (CRs) in 9 documents, updated the TTCN-3 leaflet and TTCN-3 web pages, developed educational material for a webinar describing the effective usage of the TTCN-3 Object Oriented (OO) features, identified and implemented additional OO features, and developed the first version of a standard library for OO features.

13 CRs will remain open. They have to be resolved in the scope of the next TTCN-3 maintenance project.

## **2 Introduction**

As the use of TTCN-3 expands, users naturally comment on the language, expecting improvements and maintenance issues to be addressed. TB MTS is committed to keep the language powerful, up-to-date and well maintained, hence a change request (CR) procedure has been put in place. At the time of proposing this STF, there were many open TTCN-3 CRs and several CRs have been received during the lifetime of the STF. Details can be found in clause 4.1.

### **2.1 Scope, major aims of the STF work**

The main aim of the STF work was to handle TTCN-3 CRs, reporting defects / requesting clarifications and requesting new features and implement the solutions in the related ETSI standards. Furthermore, the STF updated the TTCN-3 leaflet and TTCN-3 web pages, developed educational material for a webinar describing the effective usage of the TTCN-3 OO features, identified and implemented additional OO features, and developed the first version of a standard library for OO features. See the details in clause 4.1.

### **2.2 STF activity and expected output**

The TTCN-3 language evolution work comprises the following tasks:

- Review and resolve change requests reporting technical defects, or requesting clarifications and new language features for all existing TTCN-3 language standards.
- Develop proposals for language extensions requested by 3GPP, OMA, ETSI members and the TTCN-3 community and consent the solution with the contributor(s).
- Implement agreed solutions.
- Manage the change request (CR) process.
- Manage the interim versions of the standard, according to 3GPP needs, and the versions for approval.
- Present the TTCN-3 standards' status and the work of the STF at the conference(s) associated with ETSI TB MTS and at ETSI TB MTS meetings.
- Updating TTCN-3 leaflet and web pages.
- Development of educational material for the effective usage of the TTCN-3 OO features. The educational material will be used for a webinar to be organized by the STF.

- Further development of TTCN-3 Language Extensions: Object Oriented features - Implementation of additional features needed for a more efficient use of the TTCN-3 OO features.
- Development of a standard library for OO features supporting the effective use of the TTCN-3 OO features.

The expected output are

- the revised versions of the TTCN-3 standard documents, for which one or more CRs have been resolved,
- updated versions of the TTCN-3 leaflet and the TTCN-3 web pages,
- educational material for a webinar describing the effective usage of the TTCN-3 OO features,
- identified and implemented additional OO features, and
- the first version of a standard library for OO features.

Interim versions of TTCN-3 standard documents were not required by 3GPP and therefore not produced.

### 2.3 Relation with the reference TB and with other bodies, inside and outside ETSI

The reference TB for the STF is TB MTS. TB MTS supervises the STF work at regular TB meetings. TB MTS has also established a TTCN-3 Steering Group to resolve technical issues escalated by the STF or any ETSI member to the TB. The work status of the STF is reported to TB MTS after each STF session (by mail correspondence on the MTS-GEN mail exploder list) and at each regular TB MTS meeting. STF outputs will also be reviewed and approved by TB MTS. Some active TB MTS members have also been involved in this STF and hence be in direct contact with TB MTS via the usual communication means (e.g., MTS-GEN mailing list, MTS face-to-face meetings, conference calls).

## 3 Overview of the organization of the activity

### 3.1 Team composition and experts' qualification

The STF consists of the following 7 experts:

Name	Organization/Company	Qualification
Jens Grabowski	University of Goettingen	Researcher on test methods and test languages
Philip Makedonski	University of Goettingen	Researcher on test methods and test languages
Axel Rennoch	Fraunhofer FOKUS	TTCN-3 user, researcher on test methods
György Réthy	Testcom OU	TTCN-3 user, tool provider
Kristóf Szabados	Testcom OU	TTCN-3 user, tool provider
Tomaš Urban	Elvior OU	TTCN-3 tool provider
Jacob Wieland	Spirent	TTCN-3 tool provider

**Philip Makedonski** and **György Réthy** have not physically participated in the joint STF sessions, but contributed by following the ongoing work in Mantis and providing useful feedback via Email and telephone.

### 3.2 STF teamwork, distribution of tasks, working methods

The TTCN-3 language evolution work comprises the following tasks:

- Review and resolve CRs reporting technical defects, or requesting clarifications and new language features for all existing TTCN-3 language standards.
- Develop proposals for language extensions requested by 3GPP, OMA, ETSI members and the TTCN-3 community and consent the solution with the contributor(s).
- Implement agreed solutions.
- Manage the change request (CR) process.

- Manage the interim versions of the standard, according to 3GPP needs, and the versions for approval.
- Present the TTCN-3 standards' status and the work of the STF at the conference(s) associated with ETSI TB MTS and at ETSI TB MTS meetings.
- Develop, review and implement updates of the TTCN-3 leaflet and the TTCN-3 web pages.
- Develop and review educational material for a webinar describing the effective usage of the TTCN-3 OO features.

For performing these tasks, the STF session plan contained three working sessions in 2019 with all experts present and two weeks of (partially voluntary) homework spent for final CR cleaning and editorial work on the draft deliverables. Face-to-face working sessions of the STF have been:

- W32, 04 – 09 August 2019, Tallinn
- W35, 26 – 28 August 2019 (3 days), Berlin
- W51, 16 – 18 December 2019 (3 days), Tallinn

During the face-to-face working sessions, the STF work was mainly based on the CR resolution process. Newly identified issues were reported in form of new CRs. The CR resolution process was executed in the following manner:

1. Discussion of the CR within the STF and, where necessary drafting a rough resolution.
2. Assignment of the CR to an STF member for developing a resolution.
3. Development of a CR resolution. The development may require:
  - a. Further discussions with individual STF members or with the whole STF,
  - b. Perform inquiries to the reporter of the CR in case of ambiguities, or
  - c. Raising related CRs if several TTCN-3 language features or documents are affected.
4. Proofreading of the CR resolution by another STF expert. Step 3 is re-entered in case of problems.
5. Implementation of the resolution by the editor of the TTCN-3 standard. The implementation includes another proofreading of the resolution.

Please note:

- Interim versions of TTCN-3 language standards were not required by 3GPP and therefore not produced.

### 3.3 Liaison with the reference TB and/or the Steering Group

There was no need to liaise.

### 3.4 Meetings attended on behalf of the STF with the reference TB and other ETSI TBs

Date	Place	TB/Orga	Event description	Reason to attend	Expert(s)
10.09 – 11.09.19	Munich, Germany	TC MTS	MTS#78 regular meeting	Presentation of progress report (milestone A)	Jens Grabowski
22.10. – 24.10.19	Bordeaux, France	TC MTS	User Conference on Advanced Automated Testing (UCAAT)	Participation at ETSI booth	Jens Grabowski
28.01 – 29.01.20	ETSI HQ	TC MTS	MTS#79 regular meeting	Presentation of progress report (milestone B)	Axel Rennoch
12.05 – 13.05.20	online	TC MTS	MTS#80 regular meeting	Presentation of final report, discussion of webinar	Jens Grabowski

### 3.5 STF communications, presentations, promotion, inside and outside ETSI, WEB pages etc

- The STF573 webpage can be found on: <https://portal.etsi.org/STF/STFs/STF-HomePages/STF573>.
- The work of STF573 has been presented and discussed on the ETSI UCAAT conference in October 2019.
- Further external communication is done via Mantis and emails (for Mantis see: [http://oldforge.etsi.org/mantis/view\\_all\\_bug\\_page.php](http://oldforge.etsi.org/mantis/view_all_bug_page.php)).

## 4 Final status of the activity

### 4.1 Overview of the STF work

STF 573 organized three working sessions in 2019 with all experts present and two weeks of (partially voluntary) homework spent for final CR cleaning and editorial work on the draft deliverables. Face-to-face working sessions of the STF have been:

- W32, 04 – 09 August 2019, Tallinn
- W35, 26 – 28 August 2019 (3 days), Berlin
- W51, 16 – 18 December 2019 (3 days), Tallinn

The work of STF 573 was mainly based on the resolution of CRs. The progress of the work on CRs can be followed in detail by using ETSI's Mantis system at [http://oldforge.etsi.org/mantis/view\\_all\\_bug\\_page.php](http://oldforge.etsi.org/mantis/view_all_bug_page.php).

The STF has delivered the following final drafts for TB approval of the revised ETSI standards in time:

- RES/MTS-201873-1 v 4.12.1 (ES 201 873-1) TTCN-3 Part 1: TTCN-3 Core Language
- RES/MTS-201873-6 v4.12.1 (ES 201 873-6) TTCN-3 Part 6: TTCN-3 Control Interface (TCI)
- RES/MTS-201873-7v481ASN-1 (ES 201 873-7) TTCN-3 Part 7: Using ASN.1 with TTCN-3
- RES/MTS-201873-9 v 4.11.1 (ES 201 873-9) TTCN-3 Part 9: Using XML schema with TTCN-3
- RES/MTS-202784ed171 (ES 202 784) TTCN-3 extension: Advanced Parameterization
- RES/MTS-202785BehTypesv171 (ES 202 785) TTCN-3 extension: Behaviour Types
- RES/MTS-202789 ed151xTRI (ES 202 789) TTCN-3 extension: Extended TRI
- RES/MTS-203022-AdvMatch v141 (ES 203 022) TTCN-3 extension: Advanced Matching
- RES/MTS-203790-OOF v1.2.1 (ES 203 790) TTCN-3 extension: Object-Oriented Features

Other deliverables in the ToR didn't receive any CR or no CR was resolved, therefore according to the STF's ToR, no new version was produced and published.

During the working sessions in Tallinn and Berlin, the **53** CRs listed below have been resolved and closed:

#### Part 01: TTCN-3 Core Language

(22 CRs)

- 7455 The type of formal in parameters of external functions should be allowed to be 'any'
- 7603 Delete note on template restriction passing table
- 7611 Valid port lists for the procedure operations
- 7618 alternative event headers could allow a boolean combinators
- 7682 Table with index-operators using keys as indices should be supported
- 7798 Address problems with implicit default alt invocation
- 7813 Missing template restrictions in return clause declaration
- 7826 Non-backward compatibility issue with reserved words of extension packages
- 7846 Preprocessing macro `_SCOPE_` value "control" to be clarified
- 7857 Superfluous restriction 16.1.4.k
- 7858 Invalid restriction for non-deterministic lazy and fuzzy parameters
- 7860 CR 7611 wasn't properly added to the specification
- 7861 Indirect reference to a deprecated feature

- 7865 the text for union alternatives can be easily misunderstood to support omit being assigned to alternatives
- 7867 the ispresent, ischosen, isvalue, isbound predefined functions should be moved to operations.
- 7869 unfortunate wording
- 7875 Typos in the section 21.3.10
- 7876 Restrictions in 21.3.10 are incorrectly numbered
- 7877 Invalid reference to alstep return value
- 7883 Fully initialized templates
- 7884 the current standard is not really specific on how records with port types as field work
- 7891 Missing syntax rules for functions and altsteps in BNF

**Part 06: TTCN-3 Control Interface (2 CRs)**

- 7847 Java mapping of tliPrCatchChecked\_c
- 7849 C++ mapping of address parameter in TCI-TL check operation

**Part 07: Using ASN.1 with TTCN-3 (1 CRs)**

- 7805 Support of ASN.1 sequence with extension containing mandatory fields

**Part 09: Using XML with TTCN-3 (2 CRs)**

- 7835 incorrect example?
- 7848 Mapping XML Schemas: Name clashes in NoTargetNamespace

**Ext Pack: Advanced Parametrization (ES 202 784) (2 CRs)**

- 7852 Allow inline type expressions also as actual type parameters
- 7853 classes should allow type parameterization

**Ext Pack: Behaviour Types (ES 202 785) (2 CRs)**

- 7812 mtc and system clauses in behaviour types
- 7822 Invalid restriction on values of behaviour types

**Ext Pack: Extended TRI (ES 202 789) (1 CR)**

- 7816 There should be some way to determine what to log as 'TriMessage' for xtriSend

**Ext Pack: Advanced Matching (ES 203 022) (7 CRs)**

- 7785 Add Mutation annotations to the Value data type
- 7818 Dynamic Matching: wrong type used for template mw\_closeTo
- 7819 semantic of (Restriction a):The dynamic matching syntax shall only be used in a typed context.
- 7820 Wrong definition of templates in EXAMPLE.
- 7821 Clarify semantic of examples (usage of value-lists and value retrieval assignment)
- 7827 Semantic of disjunction
- 7829 Syntax of repetition for arrays and of types

**Ext Pack: Object-Oriented Features (ES 203 790) (14 CRs)**

- 7830 Clarification request for OO features (order or member initializer and constructor)
- 7831 Clarification request for OO features (reaching super super class)
- 7832 incorrect syntax used in example
- 7833 typo in comment
- 7834 case else in the select case is not described
- 7854 Better BNF derivations for 'this' and this-related entities are necessary
- 7855 BNF for ClassMember should not allow more than one ConstructorDef
- 7856 Implicit constructor shall only provide parameters for non-var fields without initializer
- 7859 Modified BNF/restrictions for functions, external functions and altsteps
- 7863 libraries that could be added to OO
- 7866 Allow nested classes
- 7868 External classes should be allowed internal members (direct and inherited)

As part of **progress of the work on Task 1** “Resolution of outstanding CRs, preparing drafts of new versions, updating TTCN-3 leaflet and web pages, STF573 updated the TTCN-3 leaflet before UCAAT 2019 and continuously contributed to the TTCN-3 webpages ([www.ttcn-3.org](http://www.ttcn-3.org)).

The **progress of the work on Task 2** “Development of educational material for the effective usage of the TTCN-3 OO features” will be presented to MTS#79 in contribution MTS(20)079006. Due to additional requests for improvements at MTS#79, the material has been updated and will be presented again at MTS#80. A date for a Webinar should be discussed and scheduled during MTS#80.

The **progress of the work on Task 3** “Further development of TTCN-3 Language Extensions: Object Oriented features - Implementation of additional features needed for a more efficient use of the TTCN-3 OO features” is related to the progress of the work on the CRs:

- 7862 Allow trait classes and multiple inheritance,
- 7864 Allow overloading for object methods,
- 7866 Allow nested classes, and
- 7868 External classes should be allowed internal members (direct and inherited).

Each CR defines an additional feature needed for a more efficient use of the TTCN-3 OO features. As indicated in the CR list for “Ext Pack: Object-Oriented Features (Draft ES 203 790)” the CRs 7866 and 7868 have been resolved and closed. For the CRs 7862 and 7864 the STF developed and discussed complete resolutions. Due to general open discussion items regarding implementability and usage, the STF decided to continue the discussion on these features in the scope of the next TTCN-3 maintenance STF and, thus, to shift the resolution of both CRs to 2020.

The **progress of the work on Task 4** “Development of a standard library for OO features supporting the effective use of the TTCN-3 OO features” is related to the work on CR:

- 7863 libraries that could be added to OO.

The library is finalized (i.e., CR 7863 is resolved and closed) and has been implemented as Annex B of ES 203 790 “TTCN-3 Ext Pack: Object-Oriented Features”.

## 4.2 Technical risk, difficulties encountered and corrective actions taken

During the work of the STF, no technical risks or difficulties have been encountered.

As expected and similar to previous TTCN-3 maintenance STFs, the resolution of 13 CRs (10.05.2020), has been left open for a future TTCN-3 maintenance STF. The open CRs are:

- Ext Pack: Object-Oriented Features (ES 203 790) (5 CRs)
  - 7862 Allow trait classes and multiple inheritance
  - 7864 Allow overloading for object methods.
  - 7870 Allow definition of class properties
  - 7871 Class templates to be added to the language?
  - 7920 Clarification request: how should equality/inequality work for objects?
- Part 01: TTCN-3 Core Language (2 CRs)
  - 7874 Reintroduce restriction on restricted modified templates
  - 7890 module parameters should behave like variables during control part execution
  - 7892 Allow modification of matching symbols on static template level
  - 7911 Correct TTCN-3 Parts list in Foreword
  - 7925 Non-abstract signature templates
- Part 11: Using JSON with TTCN-3 (5 CRs)
  - 7913 conflicting examples for solidus encoding
  - 7914 conflicting definition and examples for usi encoding
  - 7915 Wrong field older in the example union
  - 7916 The name "Values" does not seem to follow the naming convention of other types
  - 7917 please add an example for number forbidden in JSON
- Ext Pack: Advanced Parametrization (ES 202 784) (1 CR)
  - 7912 Missing reference

## 5 ETSI deliverables

Deliverable: <b>RES/MTS-201873-1v4.12.1</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3 Core V4121</b>	Achieved date
Creation of WI by WG/TB	2018-11-12
TB adoption of WI	2018-11-26
Start of work	
Early draft	
Stable draft	
Final draft for approval	2020-01-29
TB approval	
Draft receipt by ETSI Secretariat	
Publication	2020-05-04

Deliverable: <b>RES/MTS-201873-6v4.12.1</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3 TCI V4121</b>	Achieved date
Creation of WI by WG/TB	2018-11-12
TB adoption of WI	2018-11-26
Start of work	
Early draft	
Stable draft	
Final draft for approval	2020-01-29
TB approval	
Draft receipt by ETSI Secretariat	
Publication	2020-05-04

Deliverable: <b>RES/MTS-201873-7v481ASN-1</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3: the use of ASN.1</b>	Achieved date
Creation of WI by WG/TB	2018-01-26
TB adoption of WI	2018-01-26
Start of work	
Early draft	
Stable draft	
Final draft for approval	2020-01-29
TB approval	
Draft receipt by ETSI Secretariat	
Publication	2020-05-04

Deliverable: <b>RES/MTS-201873-9v4.11.1</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3 XSD V4111</b>	Achieved date
Creation of WI by WG/TB	2018-11-12
TB adoption of WI	2018-11-26
Start of work	
Early draft	
Stable draft	
Final draft for approval	2020-01-29
TB approval	
Draft receipt by ETSI Secretariat	
Publication	2020-05-04



Deliverable: <b>RES/MTS-202784ed171</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3 extension: Advanced Parameterization</b>	<b>Achieved date</b>
Creation of WI by WG/TB	<b>2016-11-18</b>
TB adoption of WI	<b>2016-11-07</b>
Start of work	
Early draft	
Stable draft	
Final draft for approval	<b>2020-01-29</b>
TB approval	
Draft receipt by ETSI Secretariat	
Publication	<b>2020-05-04</b>

Deliverable: <b>RES/MTS-202785v171</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN-3 BehTypes V171</b>	<b>Achieved date</b>
Creation of WI by WG/TB	<b>2017-09-21</b>
TB adoption of WI	<b>2017-09-27</b>
Start of work	
Early draft	
Stable draft	
Final draft for approval	<b>2020-01-31</b>
TB approval	
Draft receipt by ETSI Secretariat	
Publication	<b>2020-05-04</b>

Deliverable: <b>RES/MTS-202789ed151</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>Extended TRI</b>	<b>Achieved date</b>
Creation of WI by WG/TB	<b>2014-10-03</b>
TB adoption of WI	<b>2014-10-03</b>
Start of work	
Early draft	
Stable draft	
Final draft for approval	<b>2020-01-29</b>
TB approval	
Draft receipt by ETSI Secretariat	
Publication	<b>2020-05-04</b>

Deliverable: <b>RES/MTS-203790-OOFv1.2.1</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>TTCN3ext_OOed111</b>	<b>Achieved date</b>
Creation of WI by WG/TB	<b>2018-11-12</b>
TB adoption of WI	<b>2018-11-26</b>
Start of work	
Early draft	
Stable draft	
Final draft for approval	<b>2020-01-29</b>
TB approval	
Draft receipt by ETSI Secretariat	
Publication	<b>2020-05-04</b>

Deliverable: <b>RES/MTS-203022-AdvMatchv141</b> Current status: <b>Publication (2020-05-04)</b> Working title: <b>Advanced Matching</b>	<b>Achieved date</b>
Creation of WI by WG/TB	<b>2018-11-12</b>
TB adoption of WI	<b>2018-11-26</b>
Start of work	
Early draft	
Stable draft	
Final draft for approval	<b>2020-01-29</b>
TB approval	
Draft receipt by ETSI Secretariat	
Publication	<b>2020-05-04</b>

# Annex A Performance indicators

## A.1. Performance Indicators objectives achieved

### Contribution from ETSI Members to STF work

- Voluntary work of experts (free of charge or with partial remuneration)
  - The STF experts provided voluntary work for email discussions between joint work sessions and for implementing resolutions in the TTCN-3 standard documents.
- Steering Group meetings (number of participants/duration)
  - TTCN-3 steering has been done during TB MTS meetings. There was no issue that needed escalation to the SG.
- Direct contribution of delegates (e.g. number of documents/comments/e-mail)
  - CRs have been raised from TTCN-3 users, tool providers and ETSI STFs. All CRs have been treated equally. The number of contributions raised from delegates has not been counted. Experts in STF 550 also work in other STFs and raise CRs in the scope of the other STFs.

### Liaison with other stakeholders

- TTCN-3 Change Requests are received in the CR handling tool (Mantis)
  - CRs have been raised from TTCN-3 users, tool providers and ETSI STFs. All CRs have been treated equally.
- The STF may liaise with 3GPP STF 160 and any other users within or outside ETSI
  - The STF has regularly exchanged emails with STF160 to clarify urgency of STF160 CRs; also participated at STF160s TTCN-3 tool vendors meetings.

### Quality of deliverables

- Approval of deliverables according to schedule
  - The STF met all deadlines specified in the ToR.
- Respect of time scale, with reference to start/end dates in the approved ToR
  - The STF met all deadlines specified in the ToR.
- Quality review by TB
  - The quality of the work and progress of the STF was monitored by the TB based on the mandatory progress reports and on verbal reports of the STF during the MTS meetings.

### Time recording

- The STF experts reported in the days spent for the performance of the services in TAM.

## A.2. Performance Indicators objectives not achieved

- Contribution from other ETSI TBs
  - No CR is received directly from other TB (though several CRs received from STF160).
- Contributing the TTCN-3 standards to ITU-T SG17 for endorsement and assisting the endorsement process
  - This issue didn't require any specific action from the STF, it will be handled by TB MTS according to the normal procedure.
- TTCN-3 tools implementing newest TTCN-3 features
  - New features added by this STF will be implemented only after publishing the STF's deliverables. The STF doesn't receive information directly about which language features are implemented by which tool vendor.
- Quality review by ETSI Secretariat
  - The STF is not aware of specific actions required for a quality review by ETSI Secretariat.

## Annex B Resources allocated and spent

**Author:** ETSI - Funded Activities  
**Period covered:** From: 15/05/2019 To: 31/05/2020  
**Status:** Final  
**Status date:** 15/04/2020

### B.1 Summary of resources allocated and spent (real cost)

The resources allocated through the ETSI FWP was 86 800,00 € in total. These have been divided into Manpower and travel budgets. The total expenses are summarized in the table below.

**Table 1: Summary of resources spent**

	Expertise Service Provision	Travel	Total
Resource Available	83 400,00€	3 400,00€	86 800,00€
Resource Usage	83 400,00€	2 083,92€	85 483,92€
<b>Variance (Avail. - Usage)</b>	0,00€	1 316,08€	<b>1 316,08€</b>

This table provides a detailed view on the travels of the STF.

**Table 2: Travels**

Expert Name	Event	Place	Date From	Date To	Cost (EUR)
Jens Grabowski	MTS#78	Munich	10/09/2019	11/09/2019	186,30€
Jens Grabowski	STF 573 UCAAT 2019 participation	Bordeaux	22/10/2019	24/10/2019	1 090,36€
Axel Rennoch	MTS#79	Sophia-Antipolis	28/01/2020	29/01/2020	807,26€
<b>Total Travels:</b>					<b>2 083.92 €</b>