



The Standards People



TTCN-3 General Concepts and Applications

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For: **TTCN-3 Webinar**

06.10.2020

Agenda

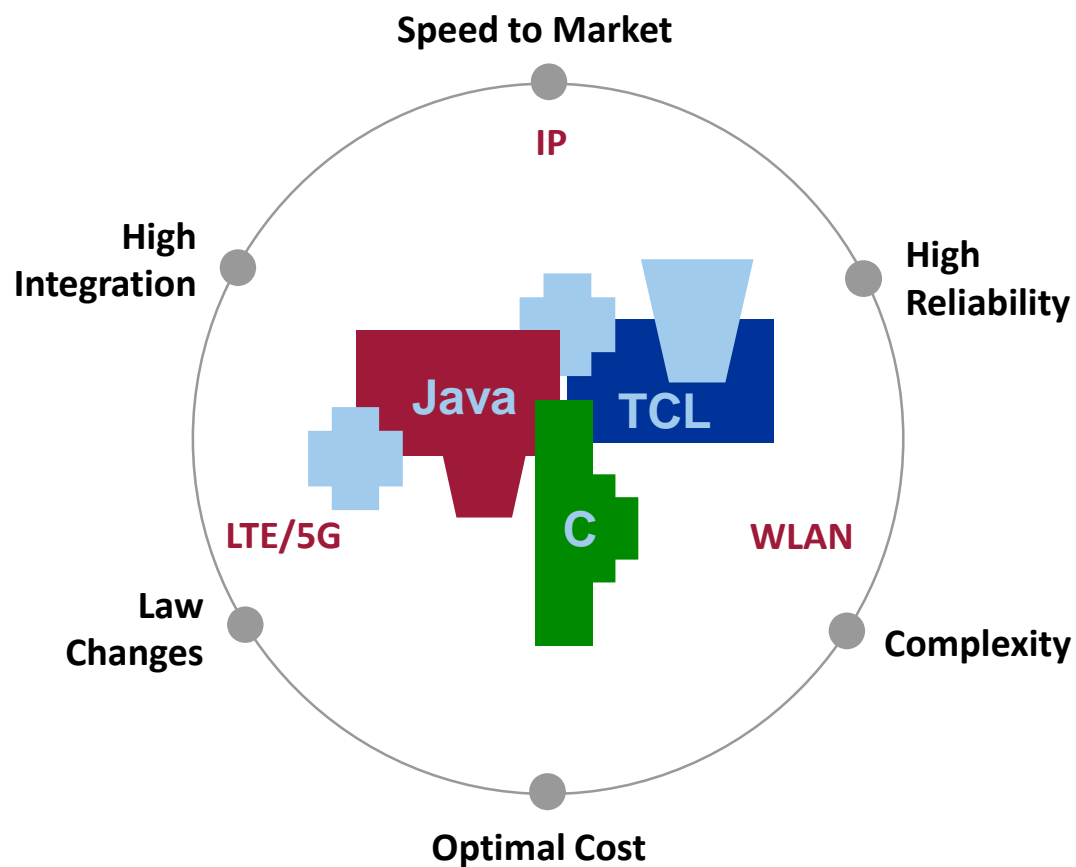
- Introduction
- Language concepts, standards and tools
- Application domains
- Summary and outlook





Introduction

Why Using TTCN-3

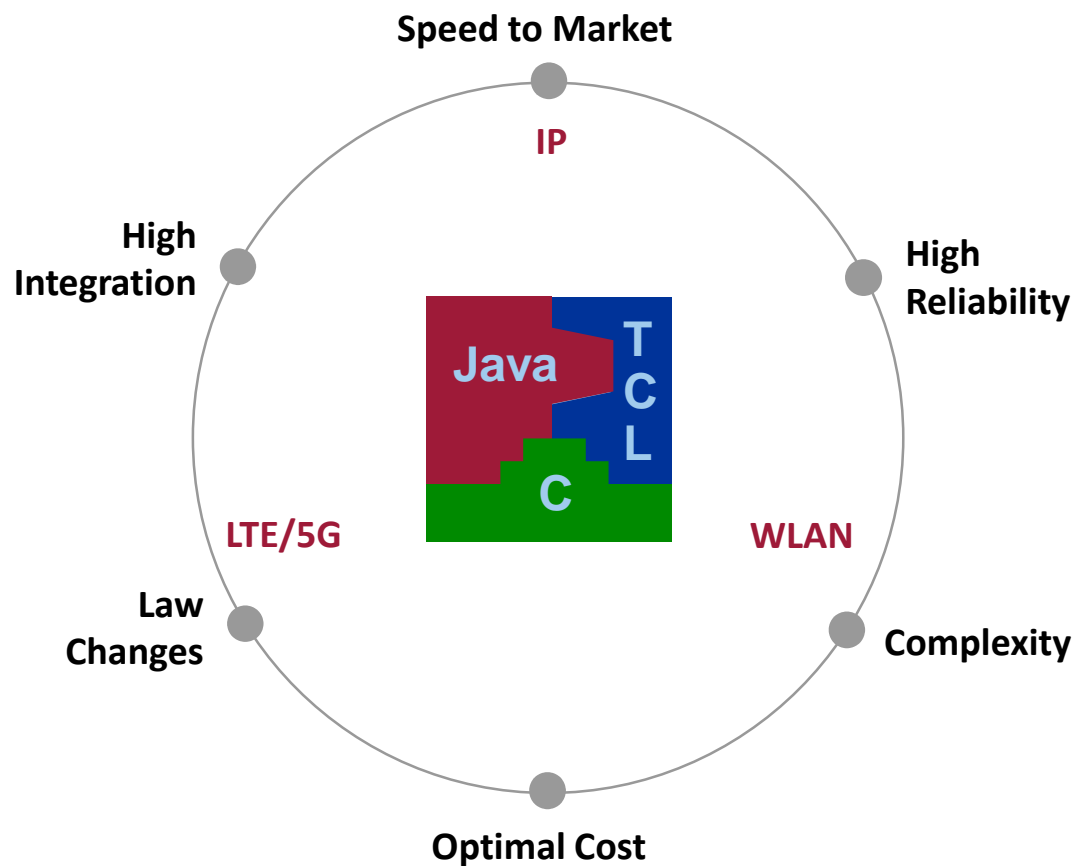


Test Methods

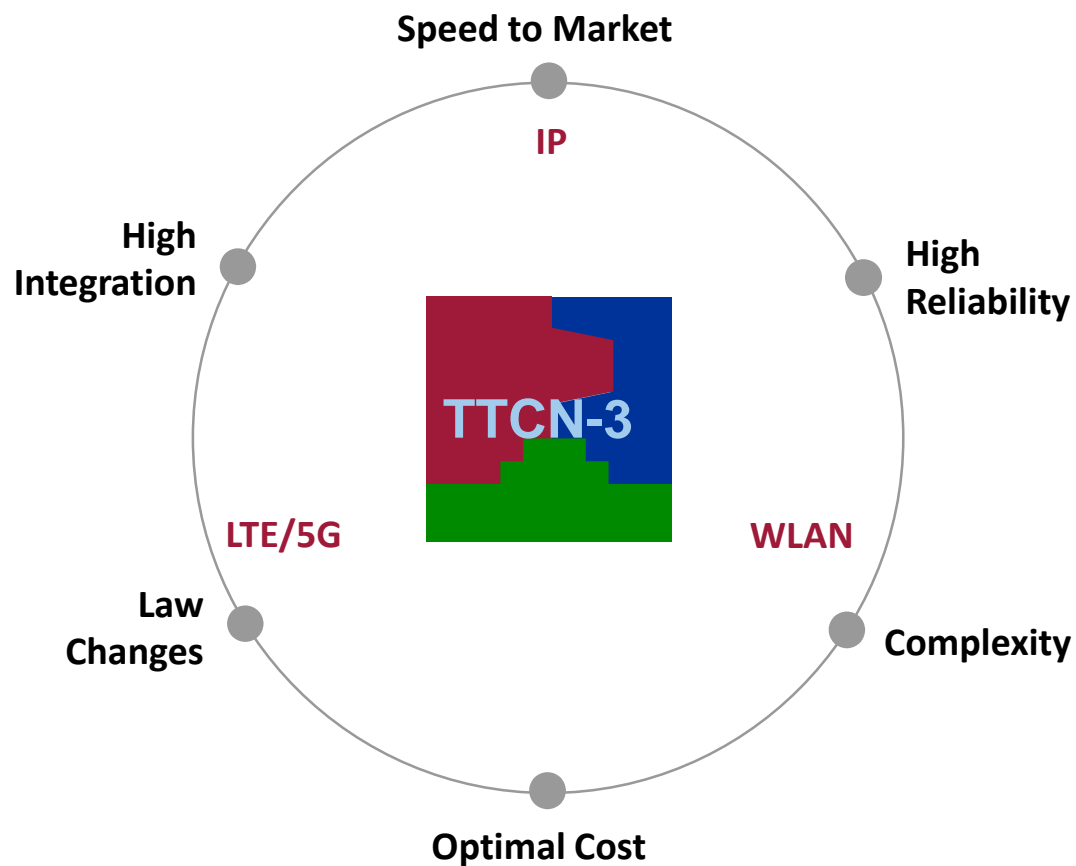
MISMATCH

Requirements

Why Using TTCN-3



Why Using TTCN-3



High Quality

MATCH

Requirements

Test Methods

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

...has been
tested using



specifications
written in
TTCN-3 ?

The International Test language

Challenge Test Automation



- TTCN-3 is the **Testing and Test Control Notation**
- **Internationally standardized** testing language for formally defining test scenarios.
- Designed **purely for testing**



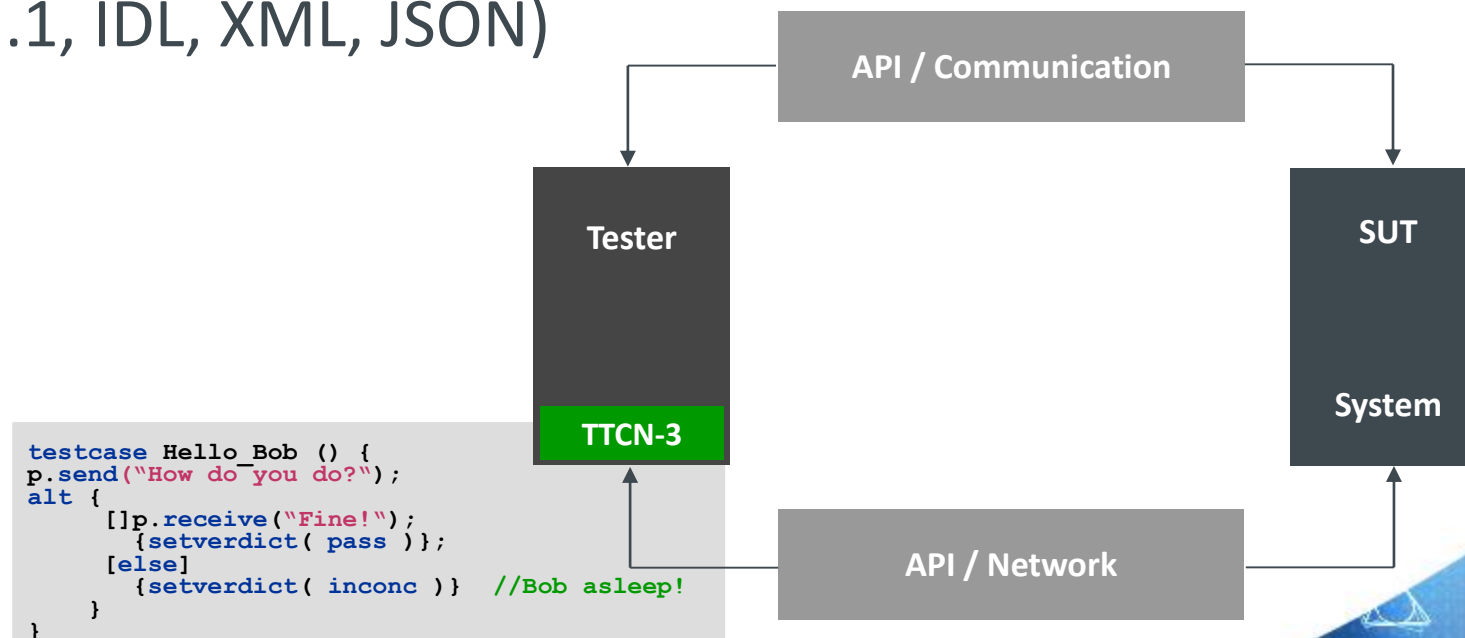
Testing of communication scenarios



```
testcase Hello_Bob () {
    p.send("How do you do?");
    alt {
        []p.receive("Fine!");
            {setverdict( pass )};
        [else]
            {setverdict( inconc )} //Bob asleep!
    }
}
```

Testing and Test Control Notation (TTCN-3)

- Distributed testing
- Automatic execution (TTCN-3 -> Java/C++) and logging
- Import and use of external data types (ASN.1, IDL, XML, JSON)



Design Principles of TTCN-3

- One test technology for different tests

- ✓ Distributed, platform-independent testing
- ✓ Integrated graphical test development, documentation and analysis
- ✓ Adaptable, open test environment



- Areas of Testing

- ✓ *Conformance and functional testing*
- ✓ *Interoperability and integration testing*
- ✓ *Real-time, performance, load and stress testing*
- ✓ *Security testing*
- ✓ *Regression testing*



- Used for system and product qualification and certification

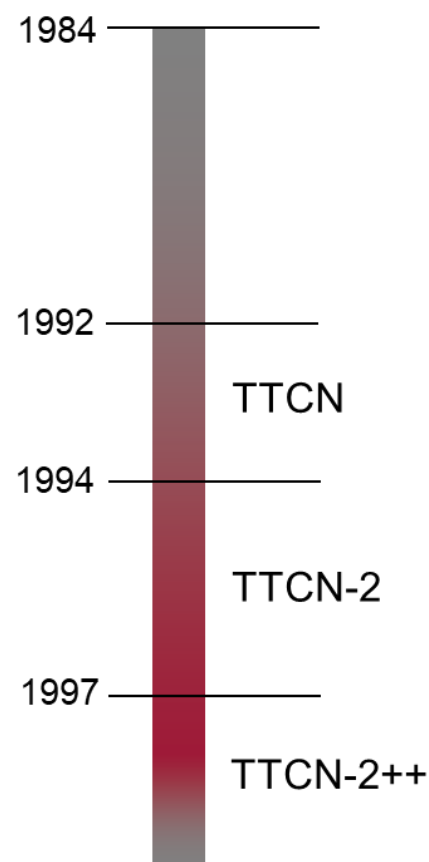
TTCN-3 History

TTCN (1992)

- published as ISO standard
- **Tree and Tabular Combined Notation**
- used for protocol tests:
GSM, N-ISDN, B-ISDN

TTCN-2/2++ (1997)

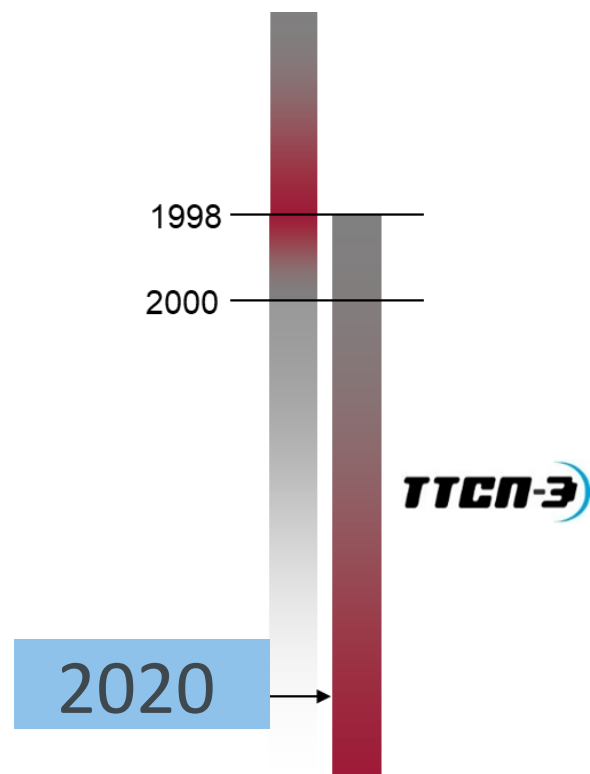
- enhancements by ETSI MTS
- module concept, concurrency
- used for conformance tests



TTCN-3 History (Cont.)

TTCN-3 (2000)

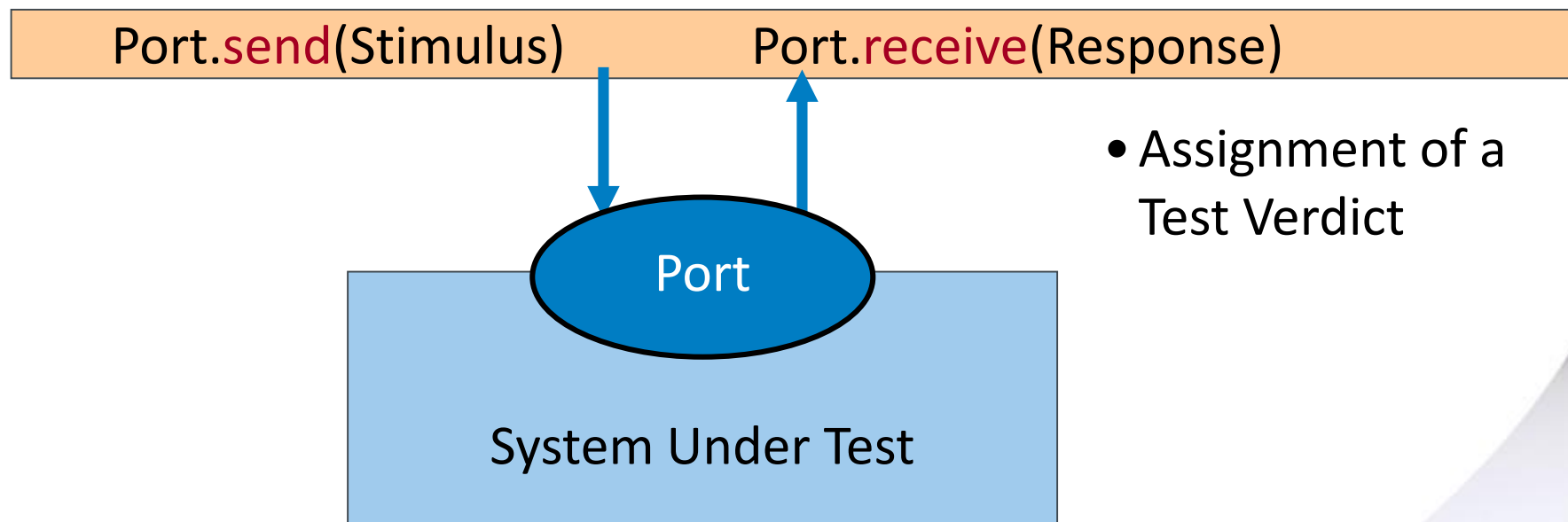
- Further development by ETSI MTS
- **Testing and Test Control Notation**
- Standardized test specifications:
 - ✓ SIP, SCTP, M3UA, IPv6
 - ✓ HiperLan, HiperAccess, WiMAX
 - ✓ 3GPP **UMTS, LTE, NB-IoT, 5G**
 - ✓ OMA
 - ✓ TETRA
 - ✓ MOST, AUTOSAR, **ITS**
 - ✓ EUROCONTROL
 - ✓ **oneM2M**



Language concepts

TTCN-3 is designed for Dynamic Testing

TTCN-3 Test Case

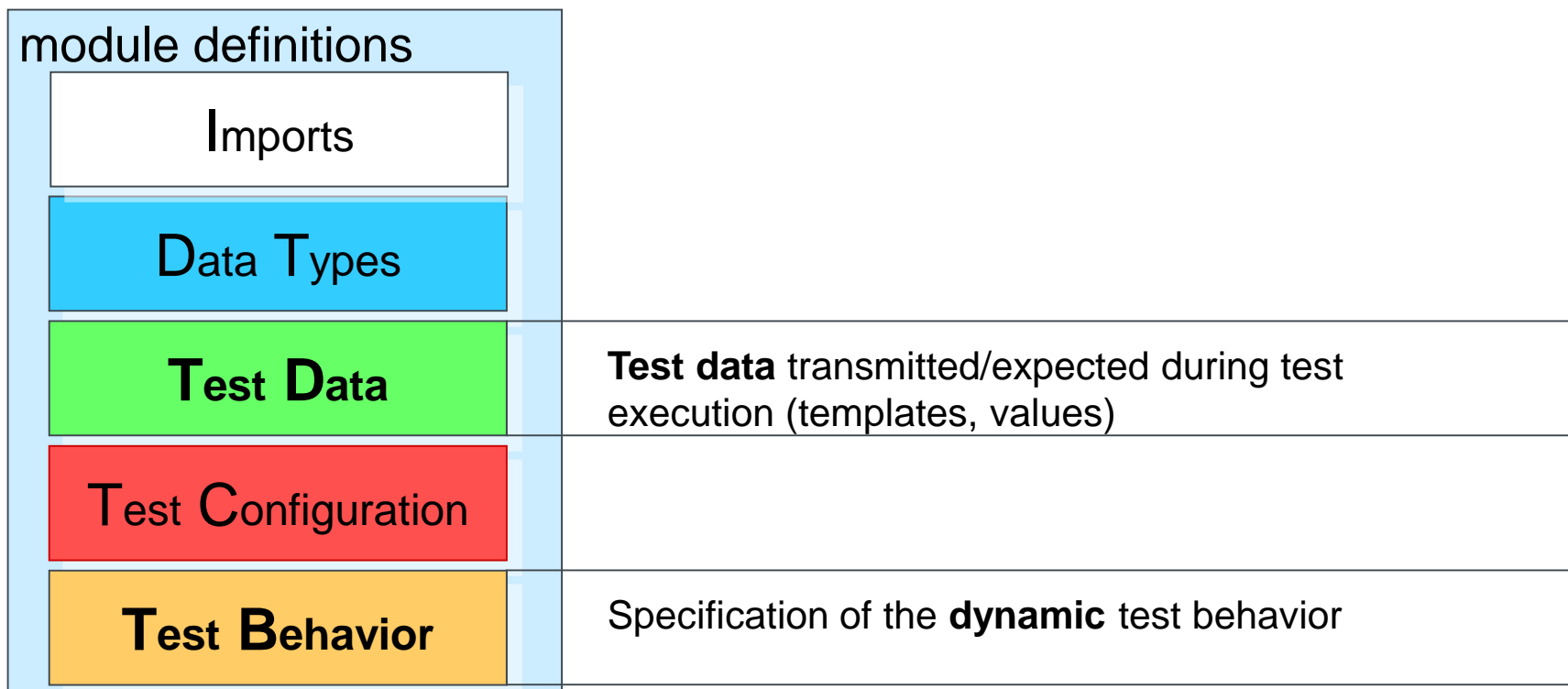


- Assignment of a Test Verdict

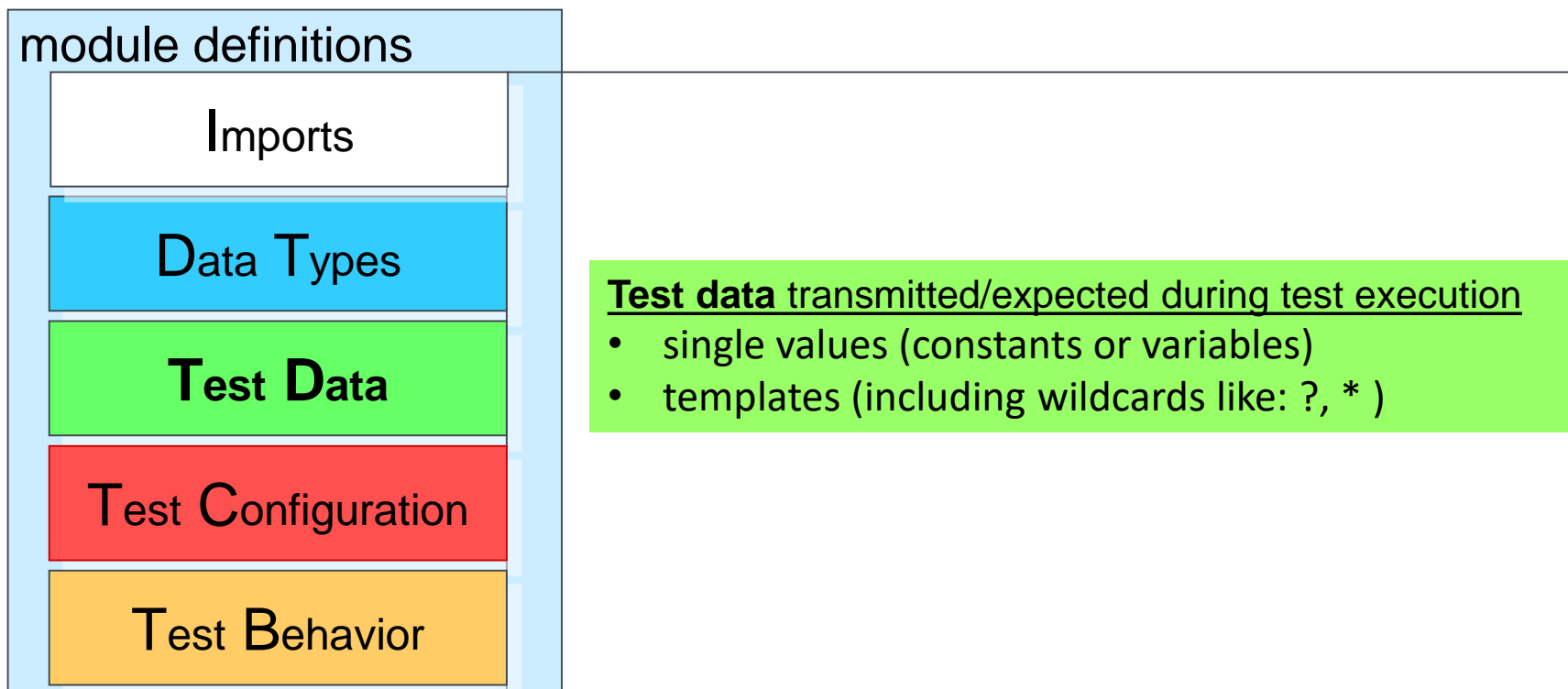
Major language elements of TTCN-3 notation

module definitions		
Imports		Importing definitions from other modules defined in TTCN-3 or other languages
Data Types		User defined data types (messages, PDUs, information elements, ...)
Test Data		Test data transmitted/expected during test execution (templates, values)
Test Configuration		Definition of the test components and communication ports
Test Behavior		Specification of the dynamic test behavior

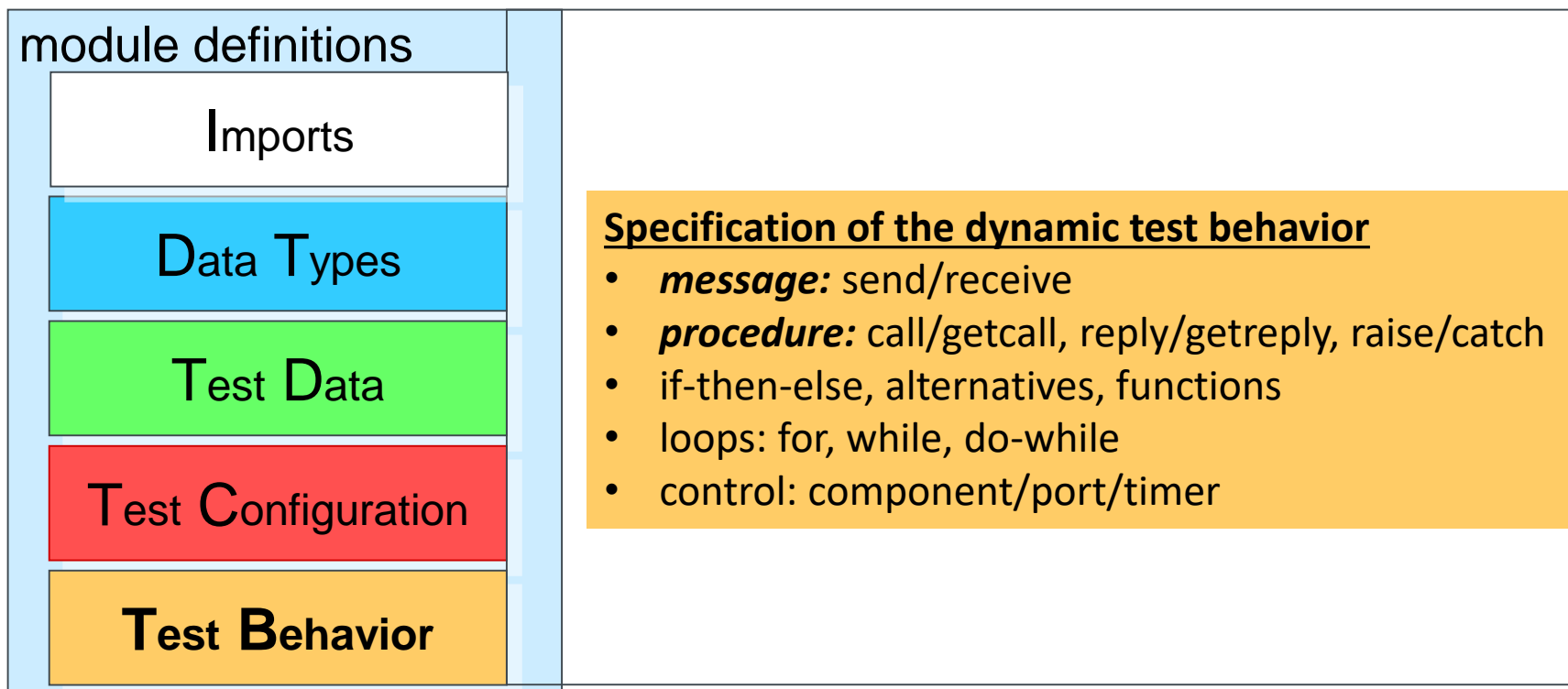
Major language elements of TTCN-3 notation



Major language elements of TTCN-3 notation

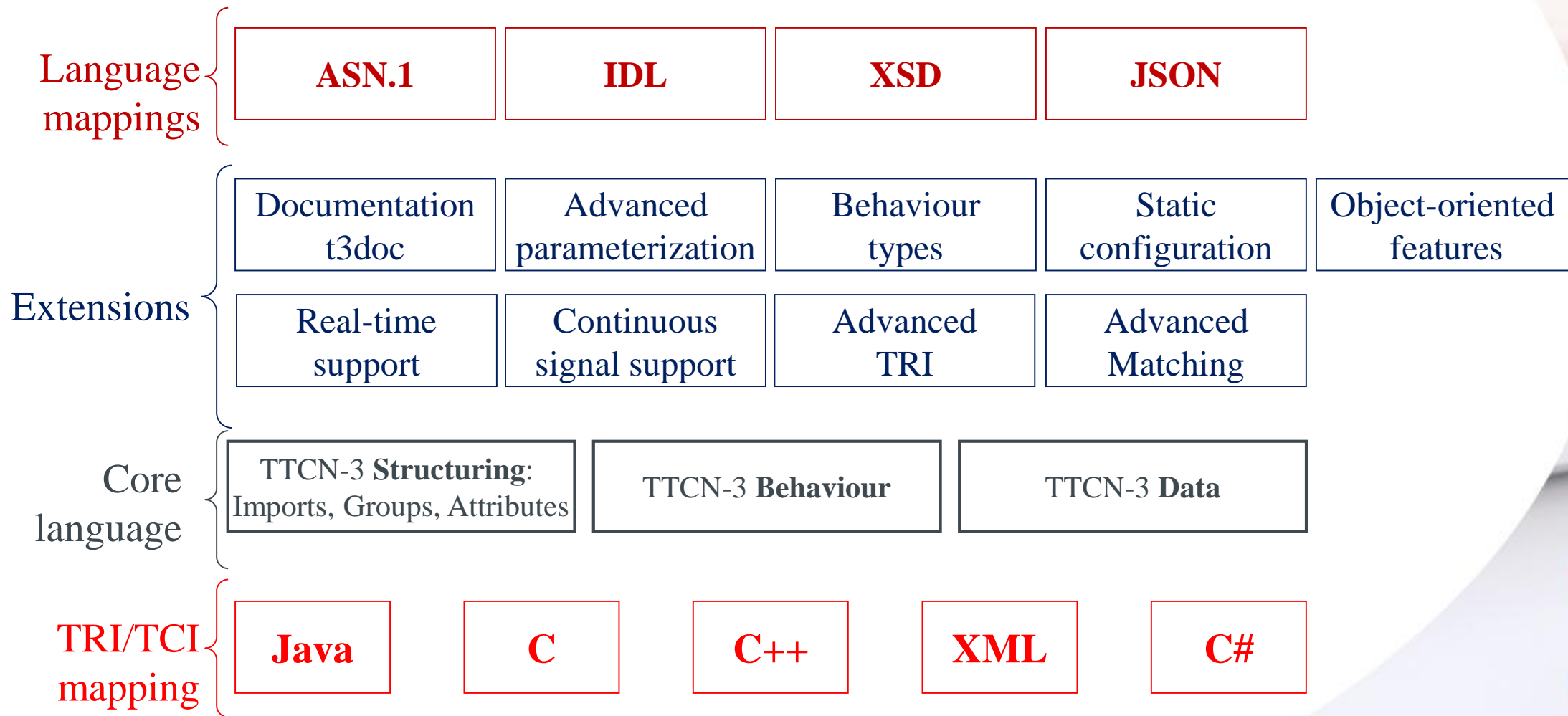


Major language elements of TTCN-3 notation

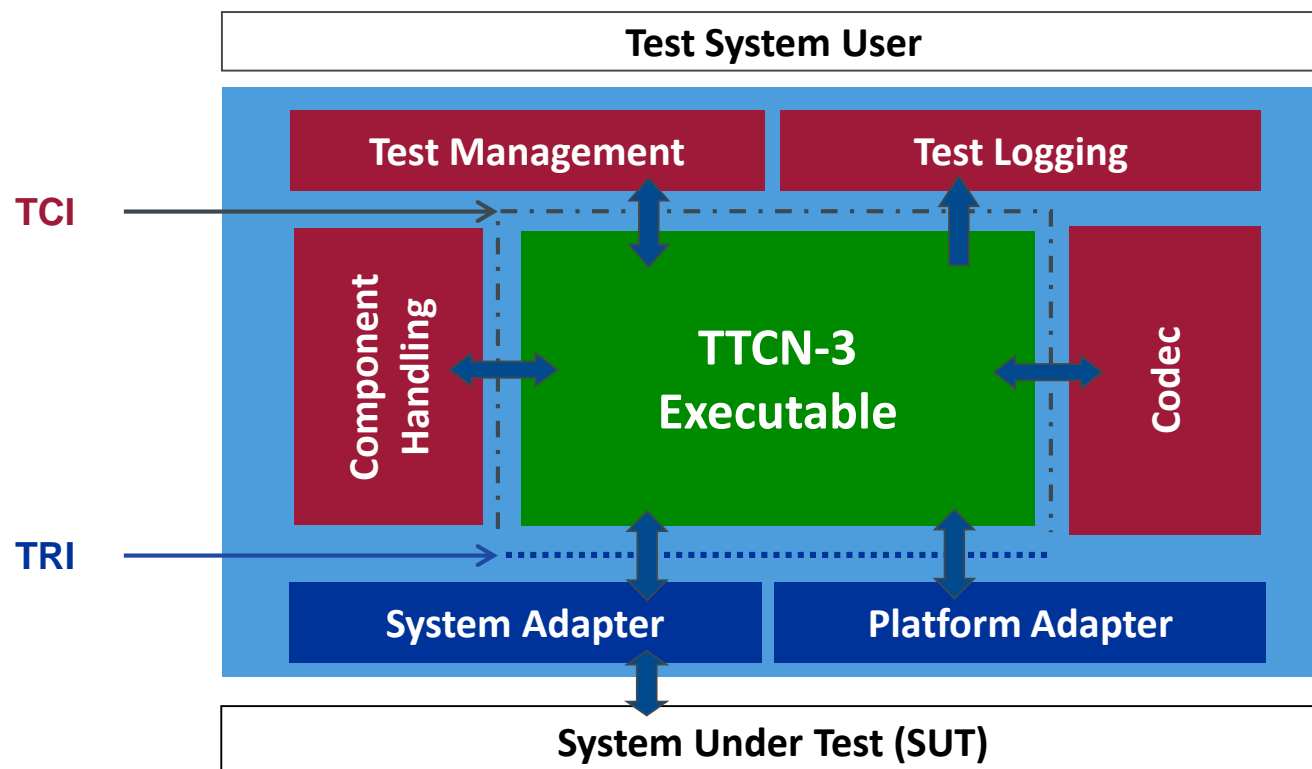


Standards and Tools

TTCN-3 Standards Overview



A TTCN-3 Test System

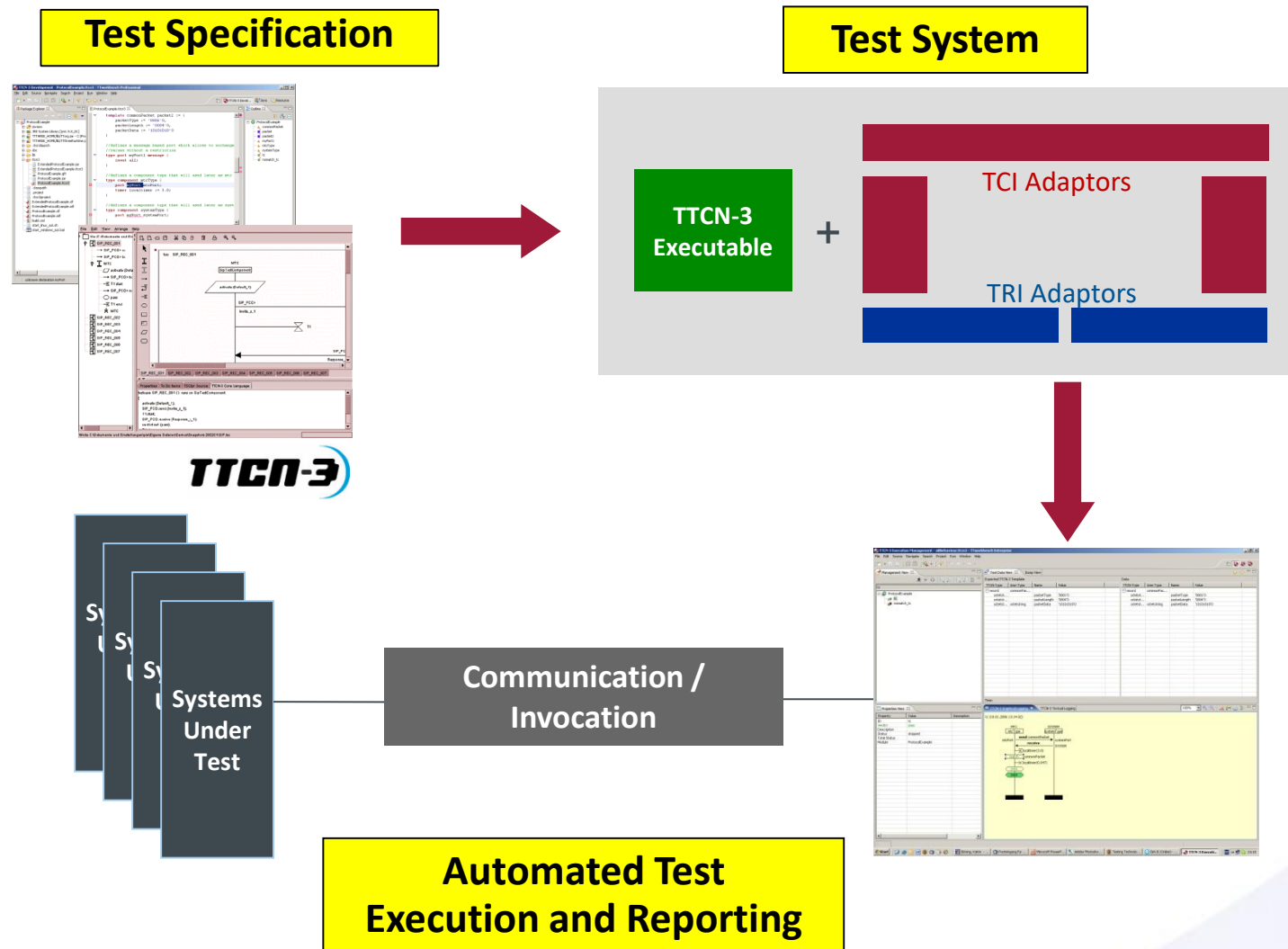


ETSI ES 201 873-1
TTCN-3 Core Language

ETSI ES 201 873-5
TTCN-3 Runtime Interface (TRI)

ETSI ES 201 873-6
TTCN-3 Control Interfaces (TCI)

Implementation



TTCN-3 tools (source: www.ttcn-3.org)

TTCN-3 Compilers and Interpreters



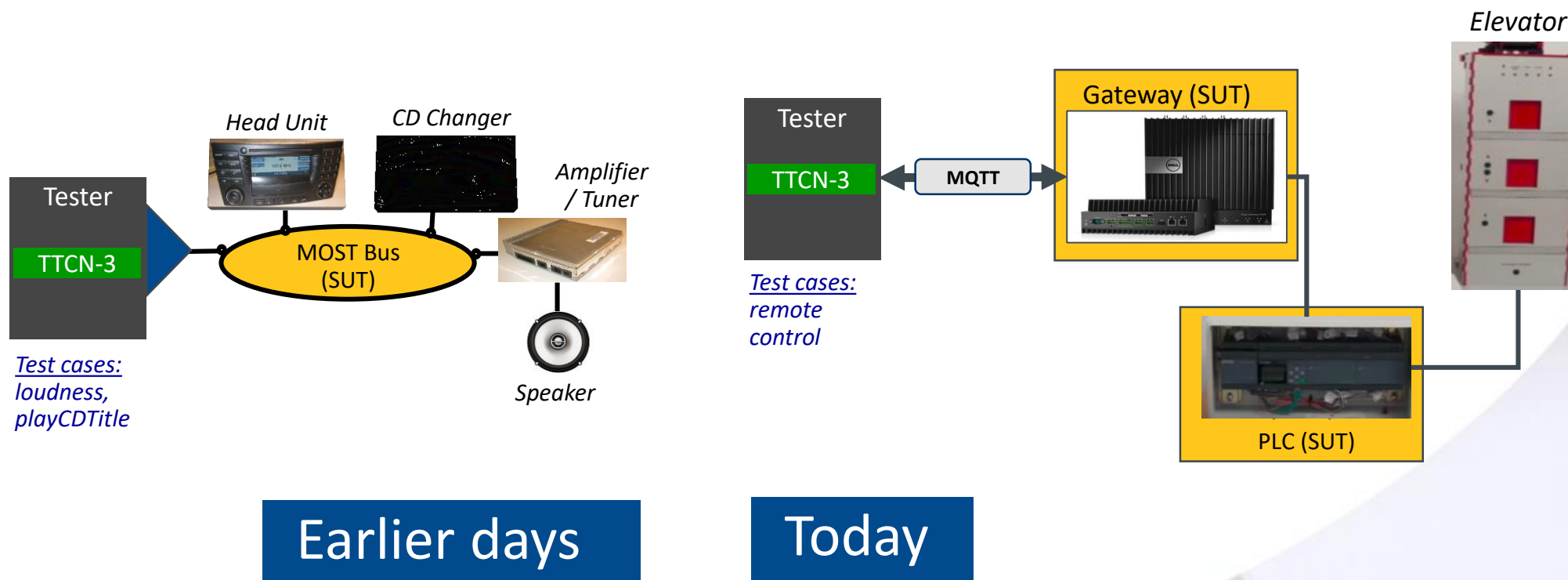
TTCN-3 Generators and Support



Application Domains

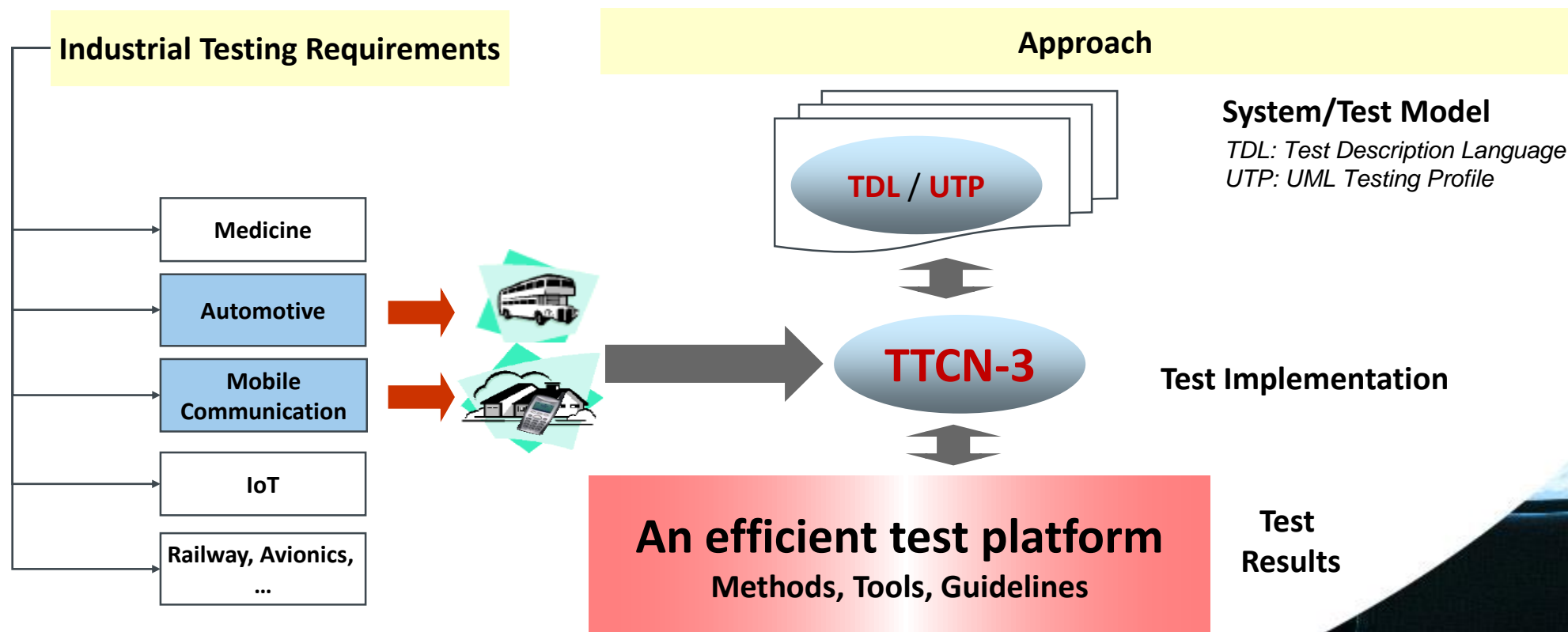
TTCN-3 for multiple purposes

- Test technology addresses various protocols and interfaces
- Control of *real* and/or *virtual* devices (special hardware-interfaces, simulators)



TTCN-3 in industry

- Develop an efficient **test platform** fulfilling **industrial testing** requirements
- Execute **high-level** test models, e.g. **TDL** and **UTP**



TTCN-3 domain: Medicine

- SiemensMED (image processing)
- **HL7** eHealth protocols (interoperability)

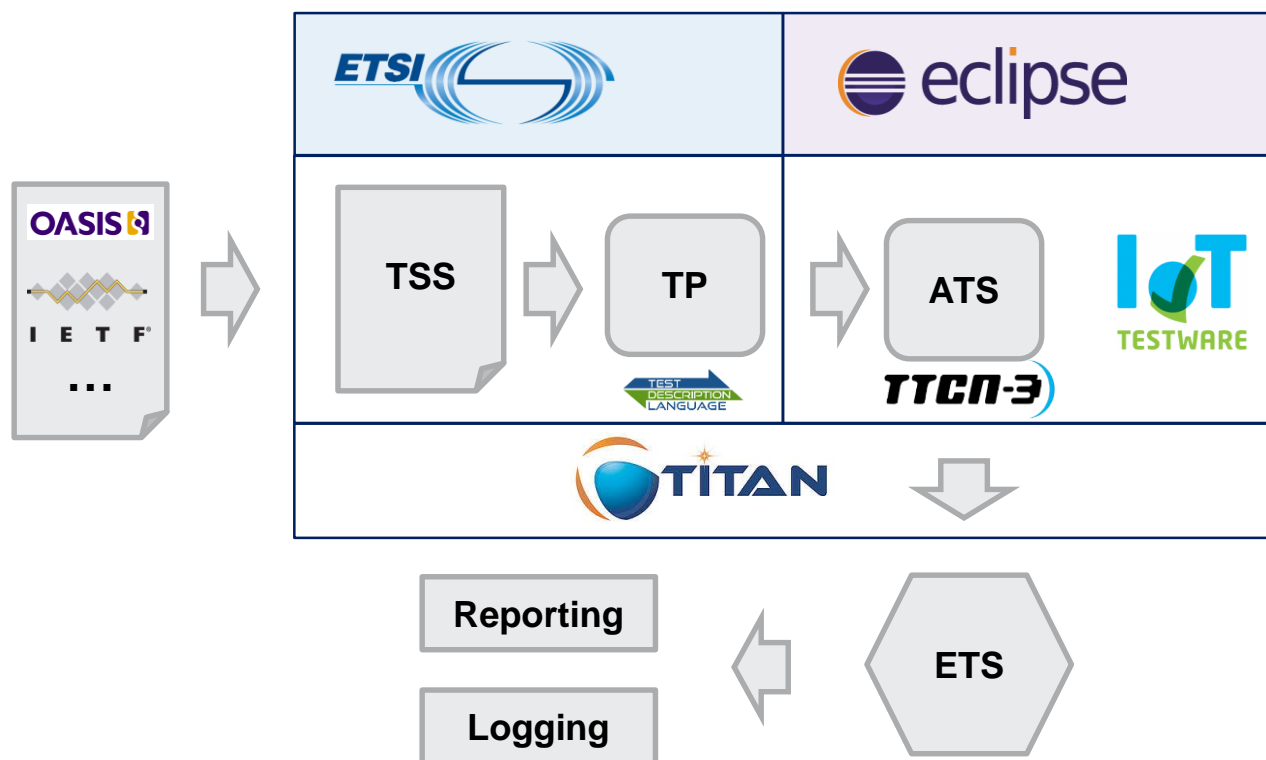


Upcoming E-Health infrastructure for Germany

- High security requirements (e.g. certificates, cryptography)
- Multiple heterogenous interfaces:
 - Card Terminals & simulations,
 - Webservices, OCSP server etc.



TTCN-3 domain: Internet of Things (IoT)



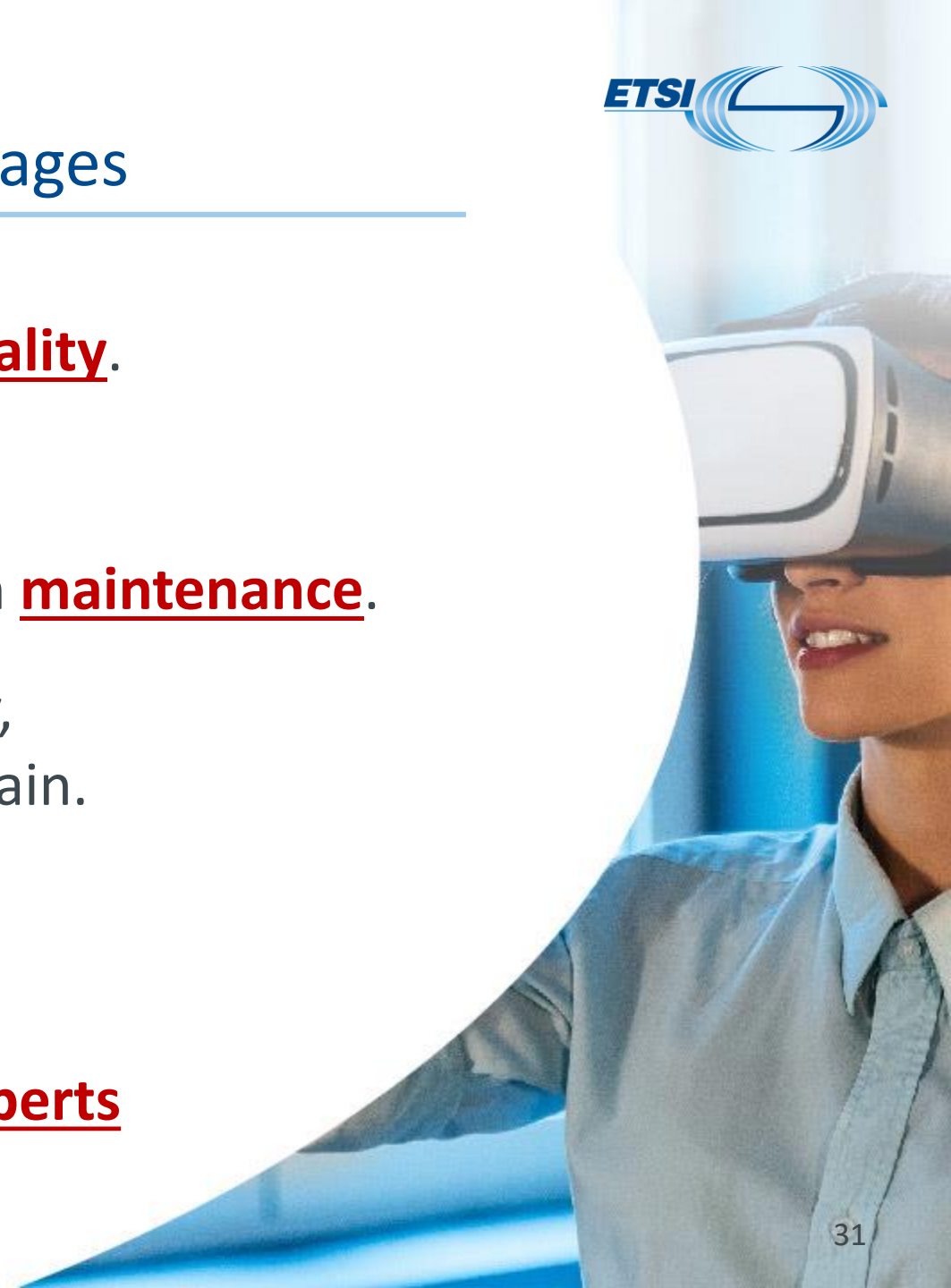
IoT-Testware:

- ✓ MQTT
- ✓ CoAP

Summary and outlook

Good Reasons for standardized test languages

- They significantly increases your system quality.
- You can focus on what to test, not on how.
- They reduce costs and efforts in test system maintenance.
- They are independent of access technology, operating system and implementation domain.
- They support communication between system development and test department.
- You can count on available and certified experts



TTCN-3 Sources

Online Information

→ www.ttcn-3.org

TTCN-3 Conference/Webinar

→ ETSI, UCAAT, STV, ...

TTCN-3 Standards, Papers, Book

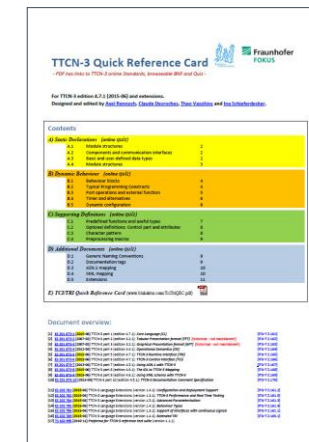
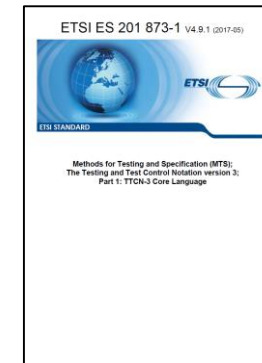
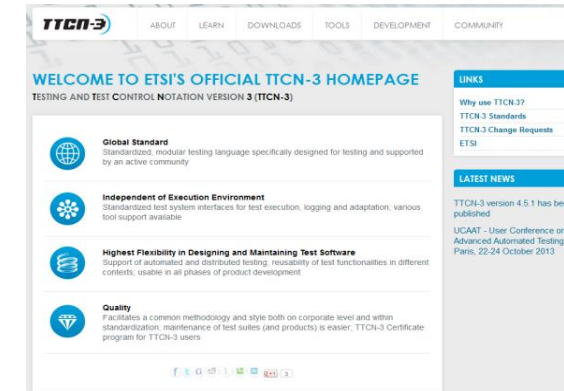
→ <https://www.ttcn.de/en/>

Quick Reference

→ <http://www.blukaktus.com/>

Exercises and Tooling

→ Research licenses



Q&A

For further information please visit www.ttcn-3.org
and/or contact ETSI TC MTS via www.etsi.org/MTS

Next:



9th October 2020, 10 AM