CONFORMIQ
Automated Test Design™

ELVIOR

End-to-End Testing Automation in TTCN-3 environment using Conformiq Qtronic™ & Elvior MessageMagic™

Andres Kull, Elvior, andres.kull@elvior.ee
Kullo Raiend, Elvior, kullo.raiend@elvior.ee
Ajay Garg, Conformiq, ajay.garg@conformiq.com

TTCN-3 Users Conference 2009, Asia, Bangalore, India

CONFORMIQ
Automated Test Design™

ELVIOR

Agenda

- Introduction
- Model-Based Testing & Automated Test Design
- X-Lite softphone testing: A case study
- Test generation and test execution workflow
- SUT (X-Life Softphone) model
- Generating the TTCN-3 test. suite
- Test execution environment
- The value of end-to-end test automation

CONFORMIQ
Automated Test Design™

ELVIOR

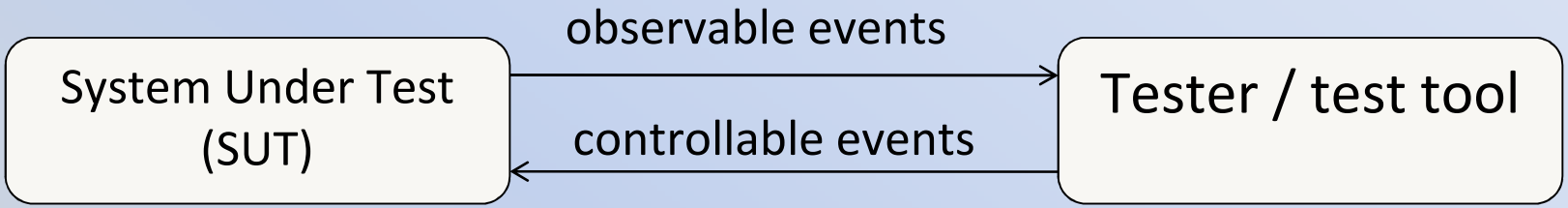
Introduction

- A Joint case study from Elvior & Conformiq
- Confomiq - model-based automated test design tool provider
  - Conformiq Qtronic™
    - Automatically generates human readable test plans, test cases, and executable test scripts from UML models
- Elvior – TTCN-3 test tool provider
  - MessageMagic
    - TTCN-3 test development and execution platform

CONFORMIQ
Automated Test Design™

ELVIOR

Black-box functional testing

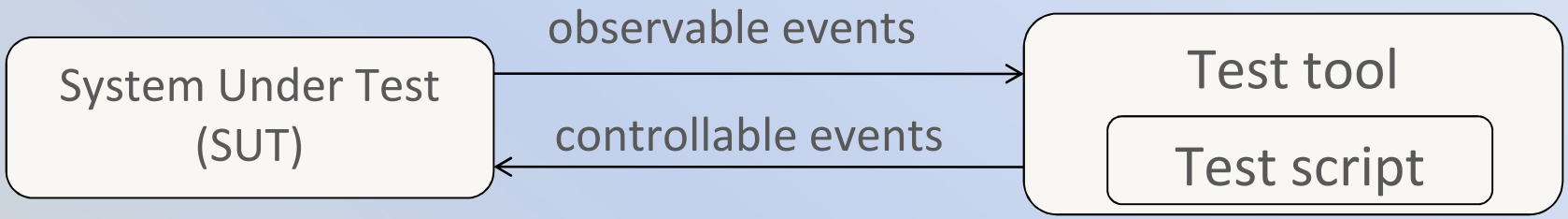


- Purpose: to verify that system conforms to its requirements
- Precondition: SUT must be controllable and observable from outside
- SUT examples:
  - controllers in telecommunications, automotives, avionics,…
  - software embedded in smart gadgets
  - web applications
  - software subsystems on any system hierarchy levels

CONFORMIQ
Automated Test Design™

ELVIOR

Automated black-box functional testing



- Test is controlled by test script
- Suitable test types:
  - Functional Tests
  - Regression tests
  - Conformance tests
  - Load tests
  - Smoke tests

CONFORMIQ
Automated Test Design™

ELVIOR

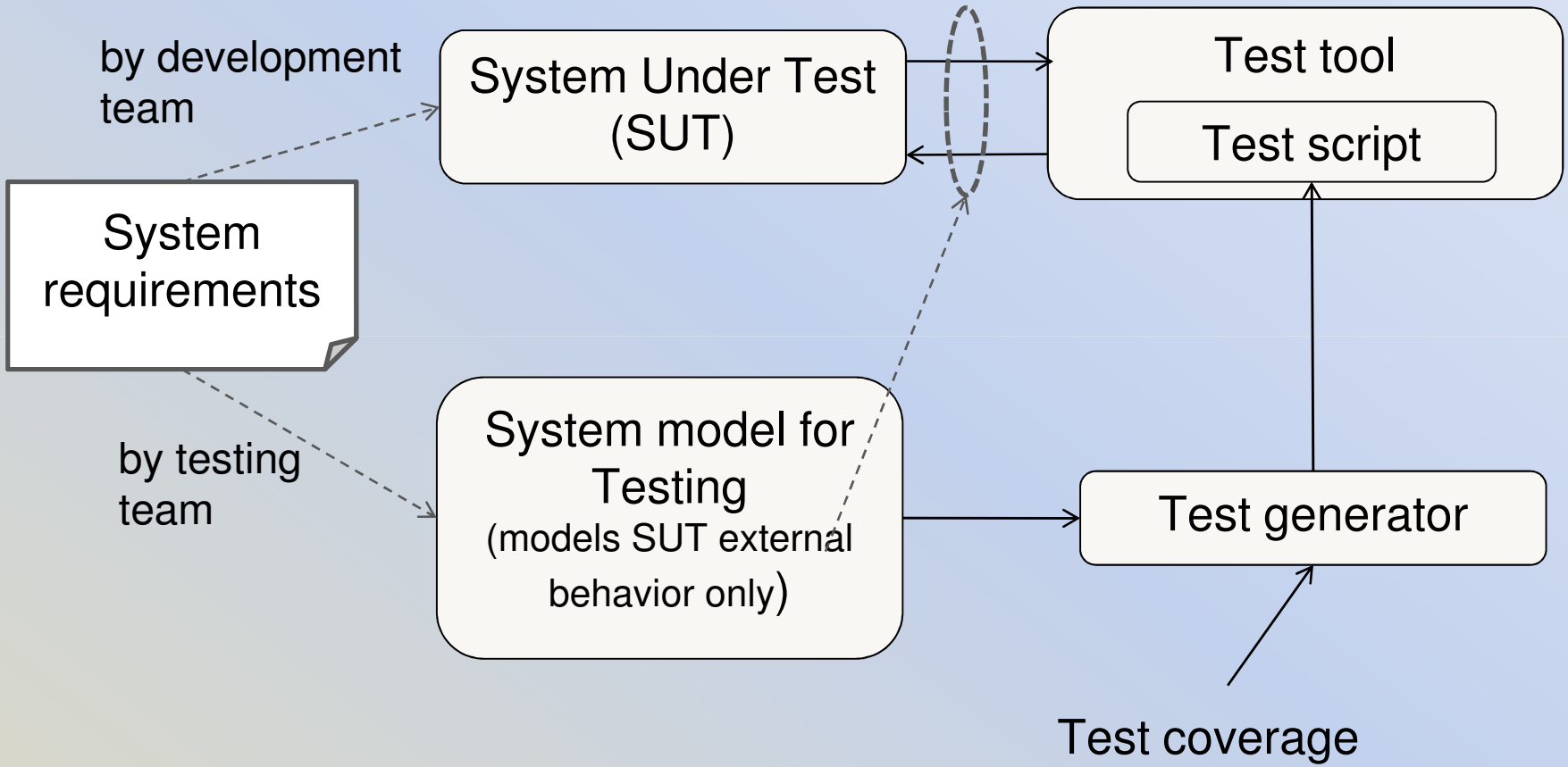
Problems with manual test scripting

- Tests creation or design phase:
  - Writing of test scripts is time consuming
  - Poor test coverage
  - Missing Test Cases
  - Error Prone Tests
  - Often only test cases for basic (“normal“) behaviour are automated
- Tests maintenance phase:
  - Number of test scripts grows over time
  - Requirement or Function Changes requires going trough entire test suite to make changes
  - Overall very high maintenance costs

CONFORMIQ
Automated Test Design™

ELVIOR

Model-Based Testing in a nutshell



CONFORMIQ
Automated Test Design™

ELVIOR

Model-based testing benefits

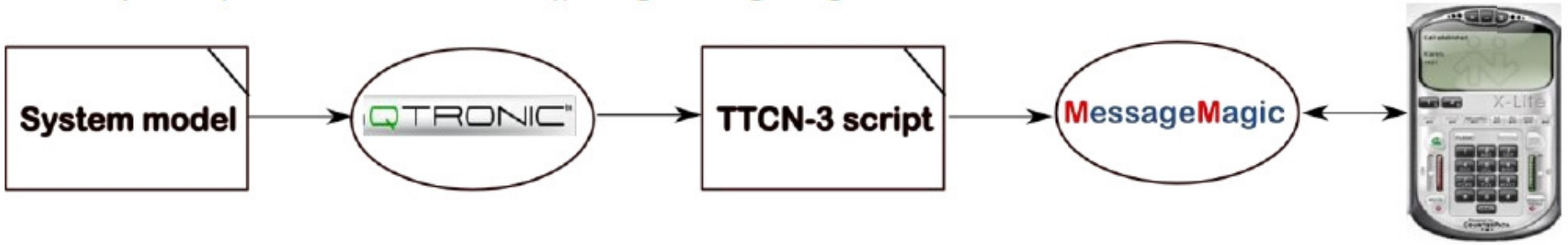
- Tests creation or design phase:
  - Models are created instead of scripts
  - Good systematic test coverage
  - Tests are free of bugs

- Tests maintenance phase:
  - Models are maintained instead of tests
  - Requirement or Function Changes requires going trough relevant models to make changes
  - Acceptable maintenance costs

CONFORMIQ
Automated Test Design™

ELVIOR

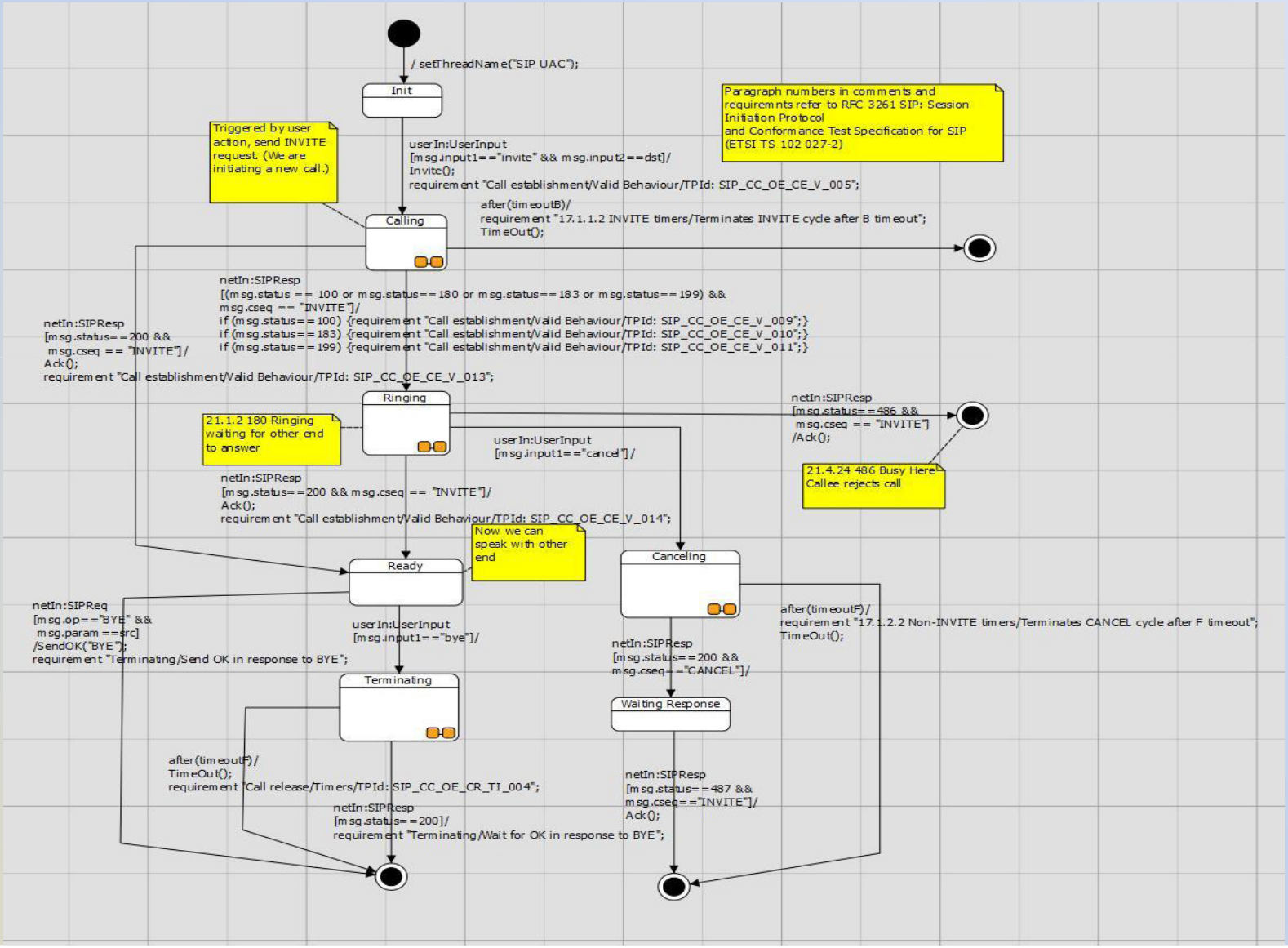
X-Lite softphone testing case study
Test generation and execution workflow



CONFORMIQ
Automated Test Design™

ELVIOR

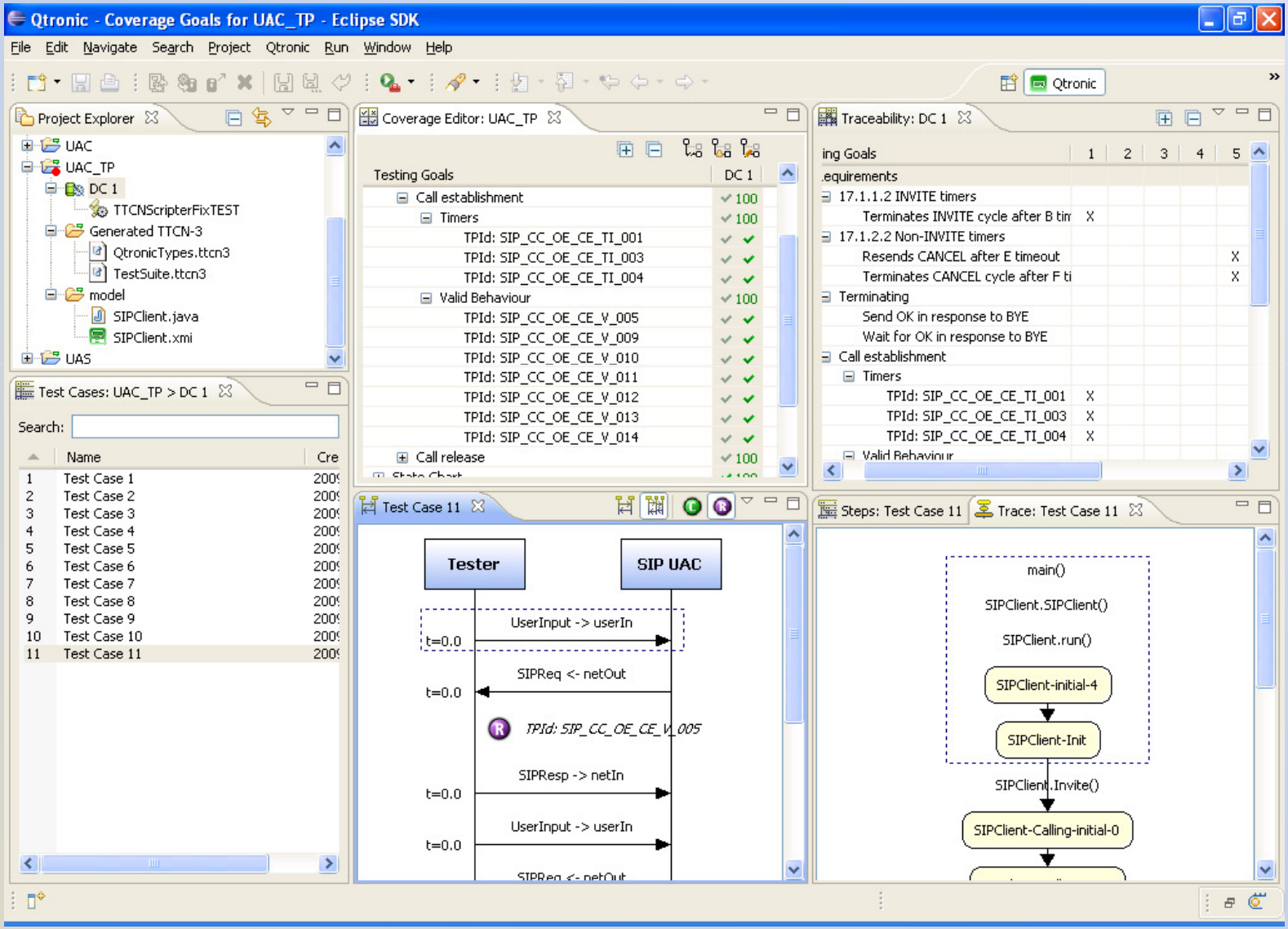
SUT Model



CONFORMIQ
Automated Test Design™

ELVIOR

Generating TTCN-3 Test suite



CONFORMIQ
Automated Test Design™

ELVIOR

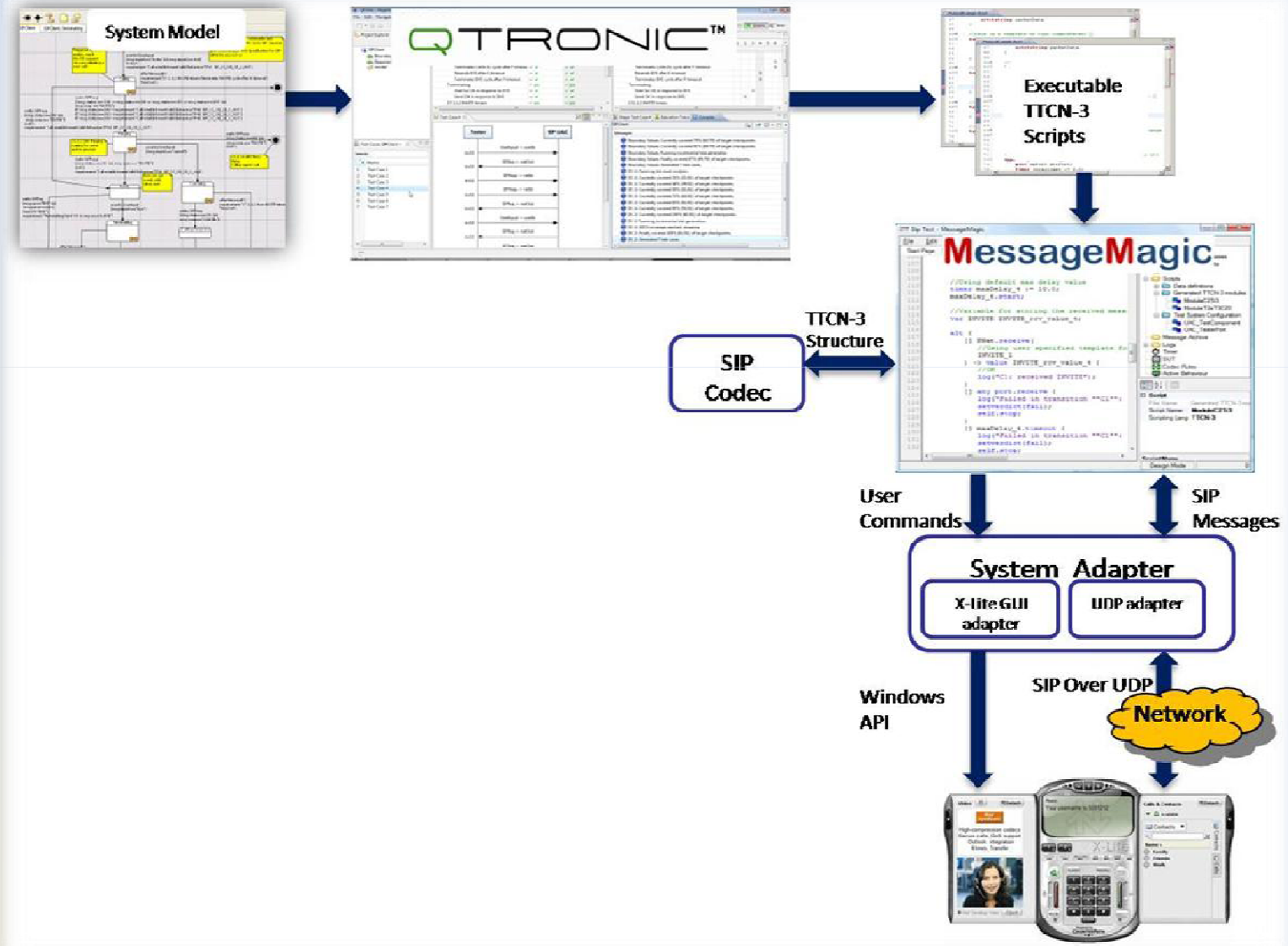
Generated TTCN-3 test suite

```
module TestSuite
{
    import from QtronicTypes all;
    /* User provided imports begin */
    import from QtronicTestHarness all;
    /* User provided imports end */
    /* Qtronic generated alt step */
    altstep QtronicDefaultAlt() runs on QtronicMTC
    {
        [] any port.receive
        {
            harnessTimer.stop;
            setverdict(fail);
            qtronic_end_test_case();
            stop;
        }
        [] harnessTimer.timeout
        {
            setverdict(fail);
            qtronic_end_test_case();
            stop;
        }
    }
    /* Generated test case #1 */
    testcase Test_Case_1() runs on QtronicMTC system QtronicHarnessSystem
    {
        var float oldtimer := 0.0;
        var float SLACK := 10.0;
        var default default_behaviour_ref;
        qtronic_start_test_case();
        default_behaviour_ref := activate(QtronicHarnessAlt());
        log("Structural feature: method: main()");
        log("Structural feature: method: SIPClient.SIPClient()");
        log("Structural feature: method: SIPClient.run()");
        log("Structural feature: state: SIPClient-initial-4");
        log("Structural feature: transition: SIPClient-initial-4->SIPClient-Init-9");
        log("Structural feature: state: SIPClient-Init");
        qtronic_send_UserInput_to_userIn(UserInputTemplate1);
        oldtimer := 0.0;
        log("Structural feature: transition: SIPClient-Init->SIPClient-Calling-initial-0-0");
        log("Structural feature: method: SIPClient.Invite()");
        harnessTimer.start((0.0 - oldtimer) + SLACK);
        qtronic_receive_SIPReq_from_netOut(SIPReqTemplate2);
        harnessTimer.stop;
        oldtimer := 0.0;
        log("Requirement: requirement: Call establishment/Valid Behaviour/IPId: SIP_CC_OE_CE_V_005");
```

CONFORMIQ
Automated Test Design™

ELVIOR

Test Execution Environment



CONFORMIQ
Automated Test Design™

ELVIOR

Value of end-to-end- test automation

- Direct link between design and quality assurance
  - system models are important testing assets
  - reduces test maintenance costs (models are easier to change than the actual test scripts)
- Covers the whole test process
  - from the system modelling
  - to the tests execution against the SUT and test results evaluation
- Modelling, test generation and test execution tools from different providers can form an quality assurance process
- Automatically generated test scripts can be stored in configuration management / version control systems, and they can be executed Independent of the test generation system
- Case study shows how model-based end-to-end test automation can be employed in TTCN-3 driven quality assurance process using the tools available from Conformiq and Elvior

CONFORMIQ
Automated Test Design™

ELVIOR

More Information

www.elvior.com

www.conformiq.com

Andres Kull, Elvior, andres.kull@elvior.ee
Kullo Raiend, Elvior, kullo.raiend@elvior.ee
Ajay Garg, Conformiq, ajay.garg@conformiq.com