

Model based TTCN-3 testing experiences from industrial case studies

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Agenda

Model Based Testing (MBT) and TTCN-3.

Classical expectations to MBT.

Test environment in case studies.

Workflow in MBT.

Case studies overview:

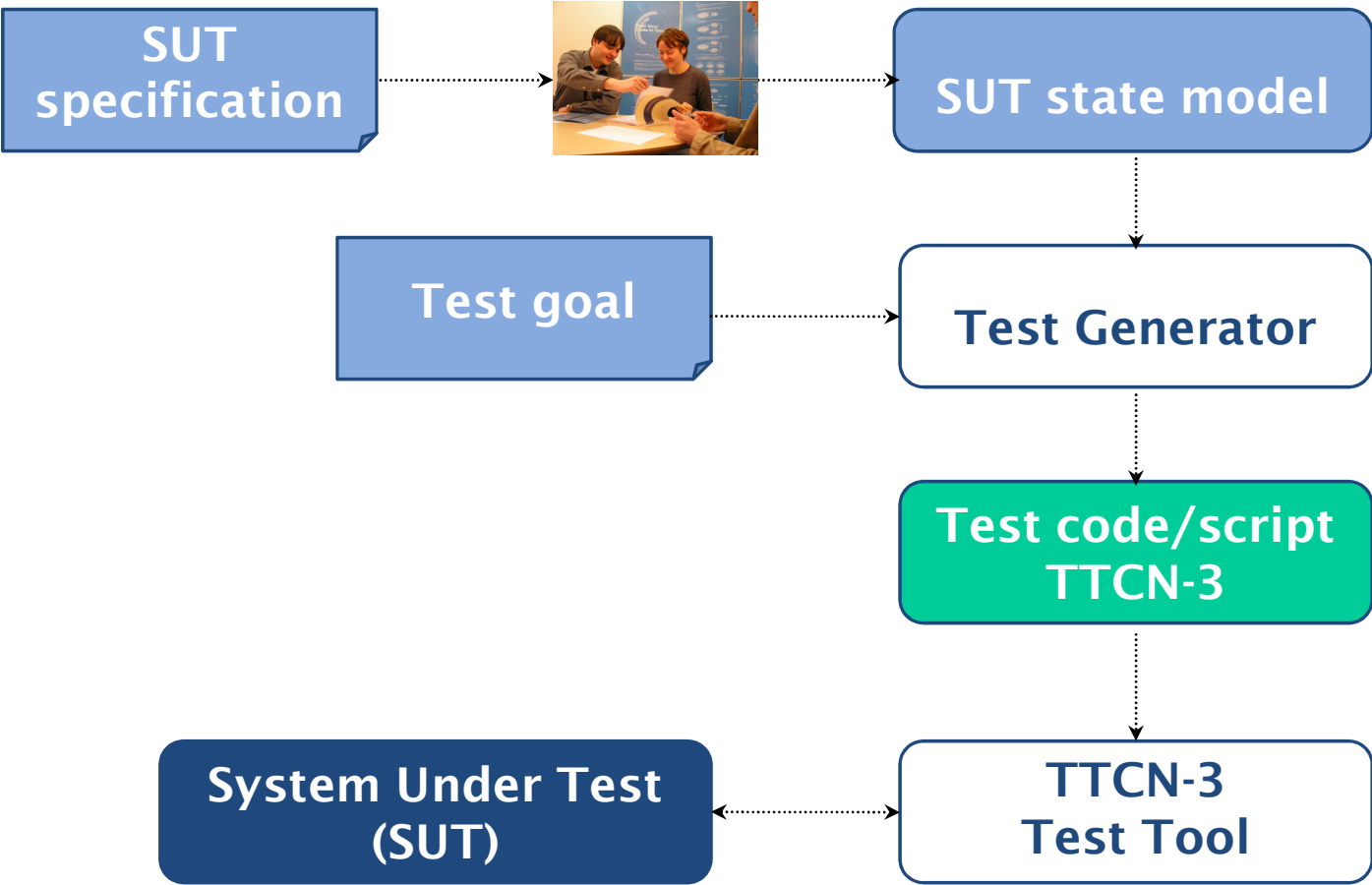
- 1.Regio – Work Force Management (WFM).

- 2.Eliko – Feeder Box Control Unit (FBCU).

Lessons learned from case studies.

Questions ?

Model Based Testing and TTCN-3

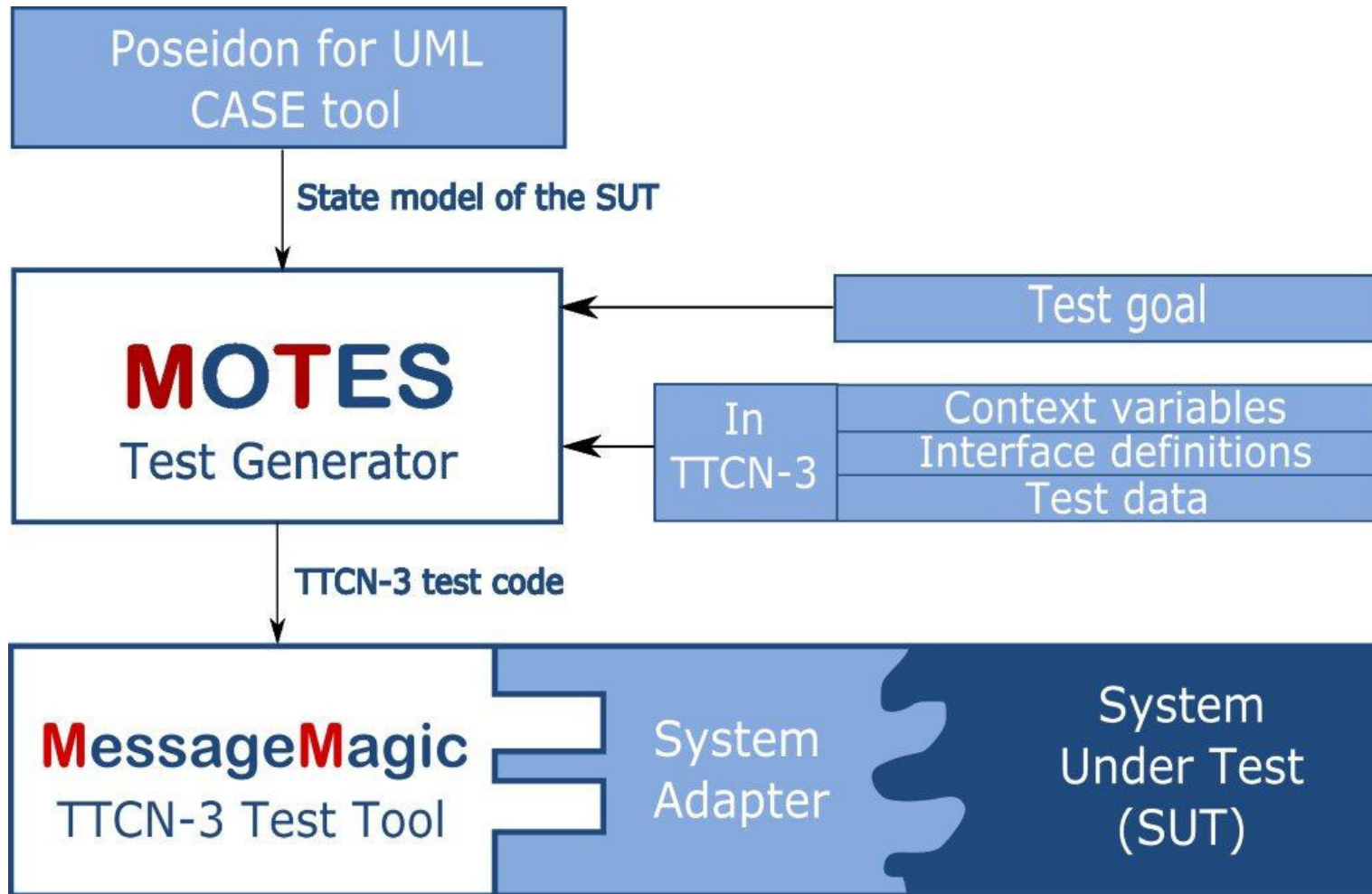


Classical expectations to MBT

1. Through formalization discloses ambiguity in specifications and helps validation of specifications.
2. Better test coverage.
3. Cost effective in maintenance phase.

Our 2 industrial case studies evaluate these statements.

Test environment in case studies

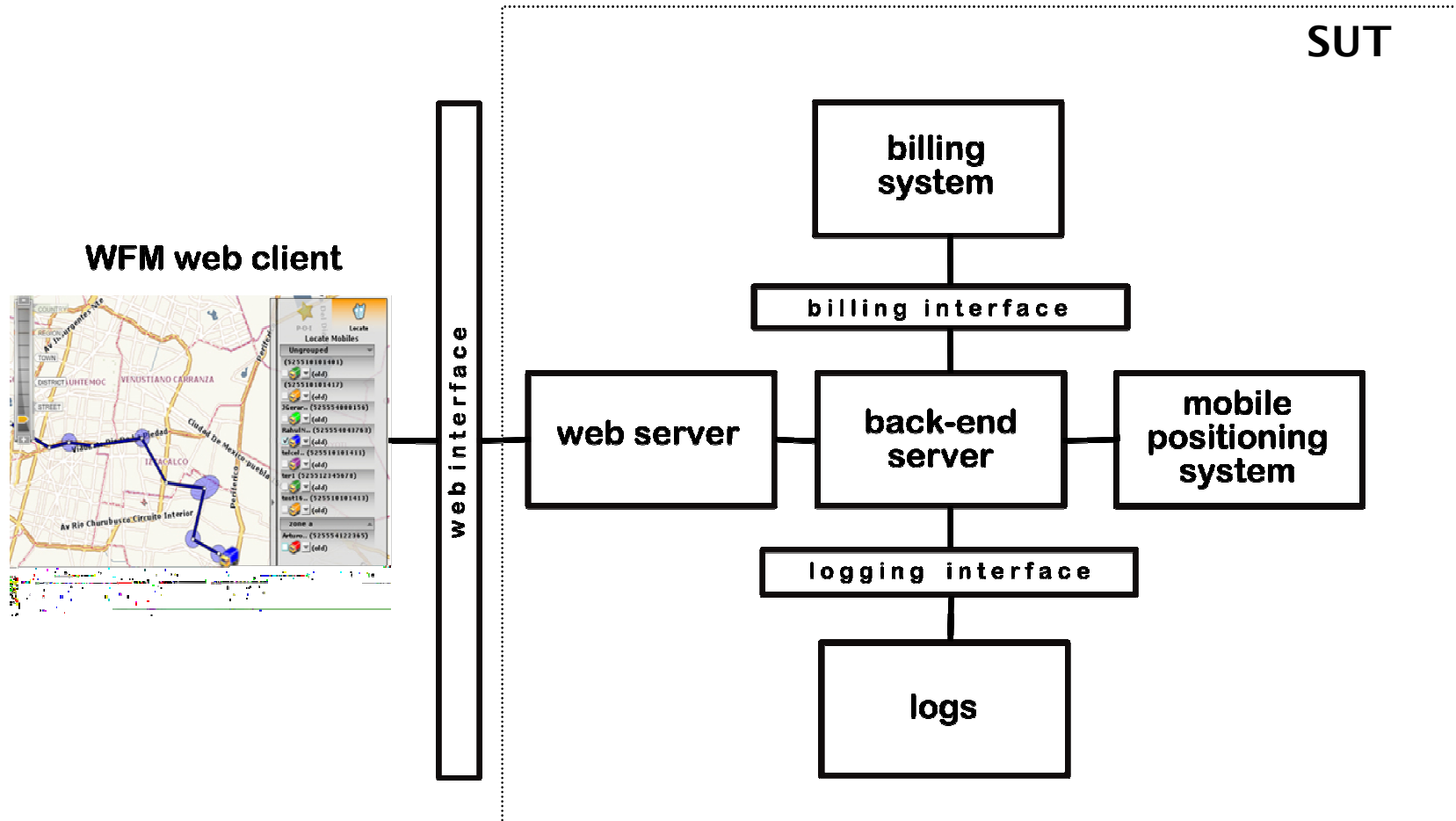


Workflow in case studies

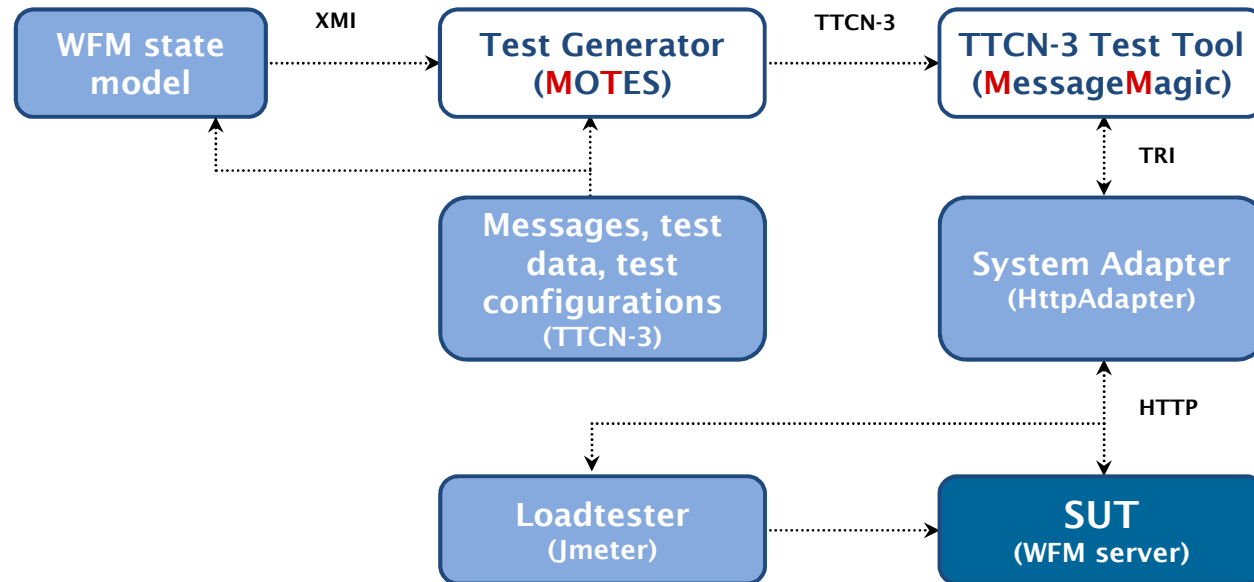
- Prepare test data, messages, configuration, functions in TTCN-3.
- Create system adapter according to TTCN-3 TRI.
- Create codecs.
- Create SUT model.
- Generate tests for specified test goal.
- Execute tests.
- Evaluate results and continue with next increment.

Case study 1 – Work Force Management

WFM - Work Force Management - mobile positioning web-based application.



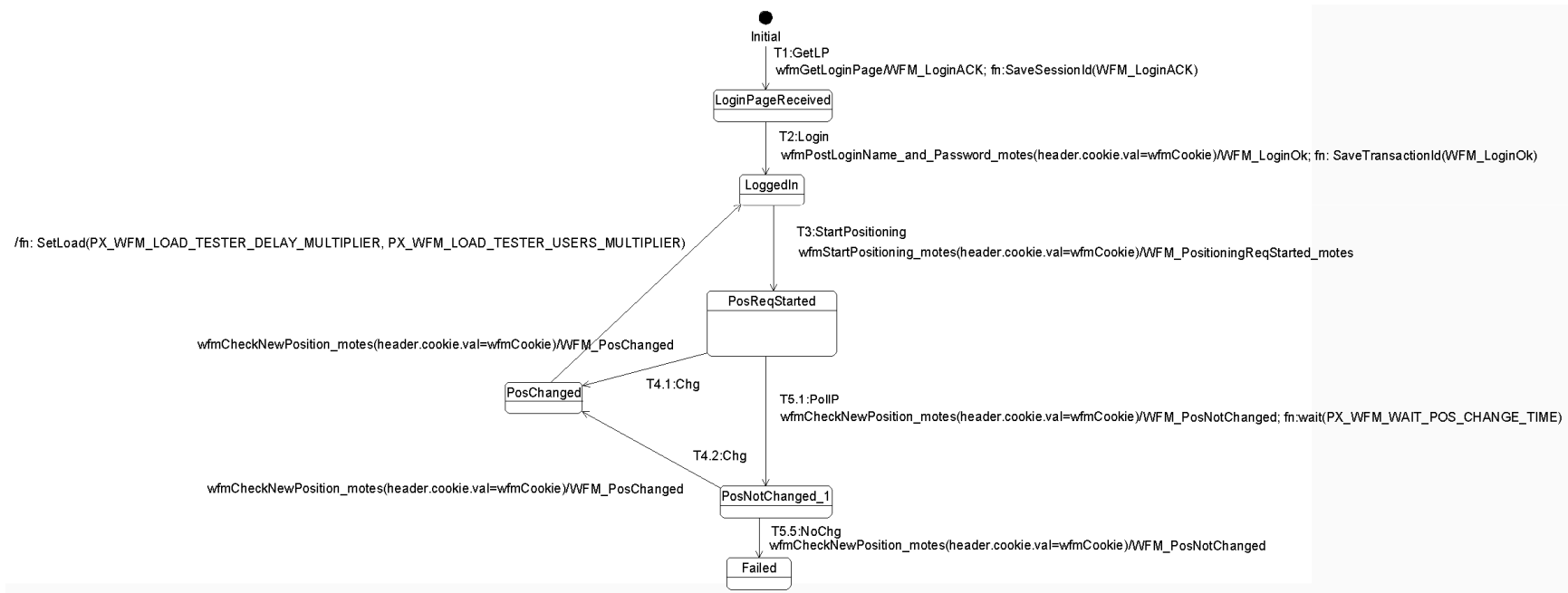
Case study 1 – test environment



Task – test WFM server position polling scenario in case of different loads of the server.

Case study 1 – SUT state model

Non deterministic model representing certain scenario of WFM server functionality.



Case study 1 – results

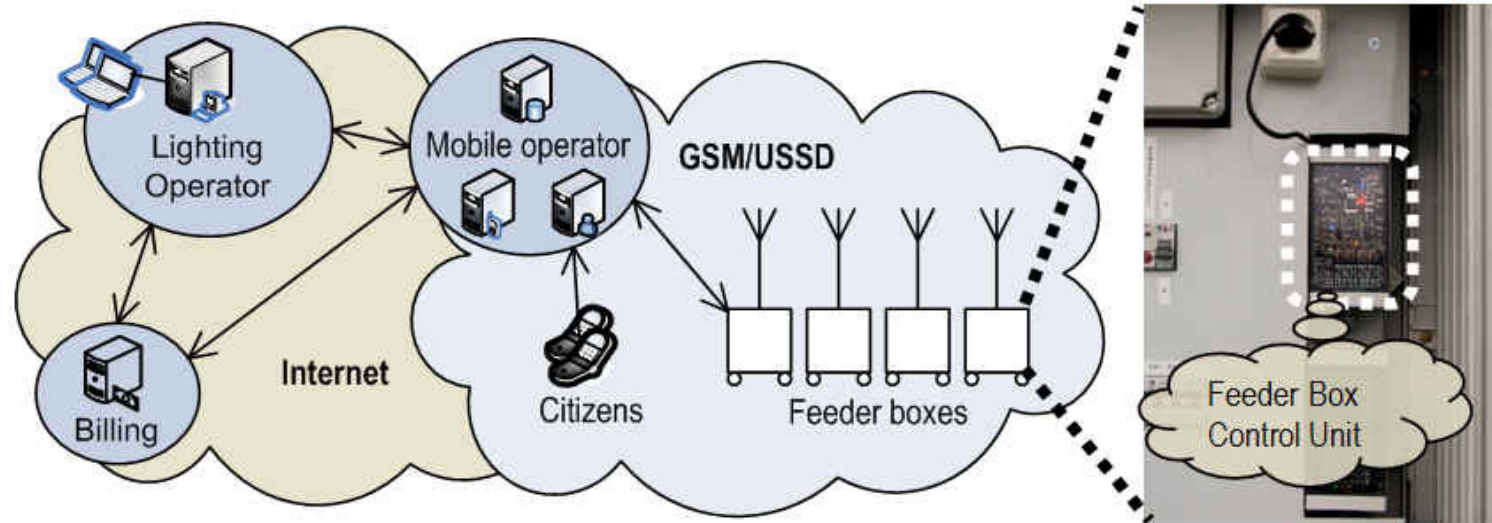
1. MBT is not very efficient for simple scenarios.
2. This case study is good for demonstration of MBT process to potential users.

Numbers:

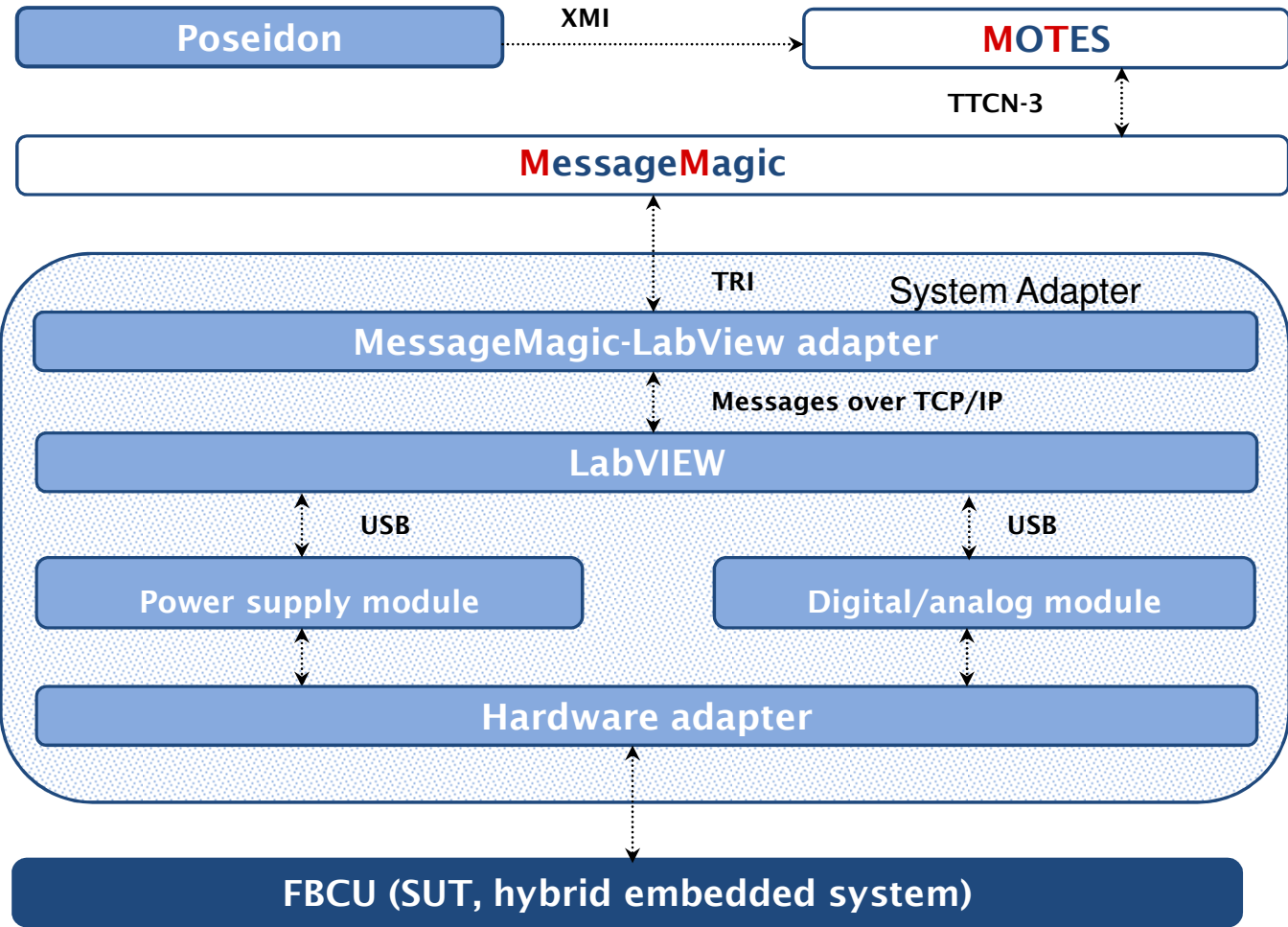
		Time	Code lines
1	TTCN-3 code (messages, test data, configuration, codecs)	15 days	~1000
2	System adapter	5 days	~500
3	Model building	1 day	NA
4	Generated tests	NA	~900
5	Manually written tests	1 day	~70

Case study 2 – Feeder Box Control Unit

Feeder Box Control Unit (FBCU). It is a subsystem of the street lighting control system functioning today in Tartu, the second biggest city of Estonia.

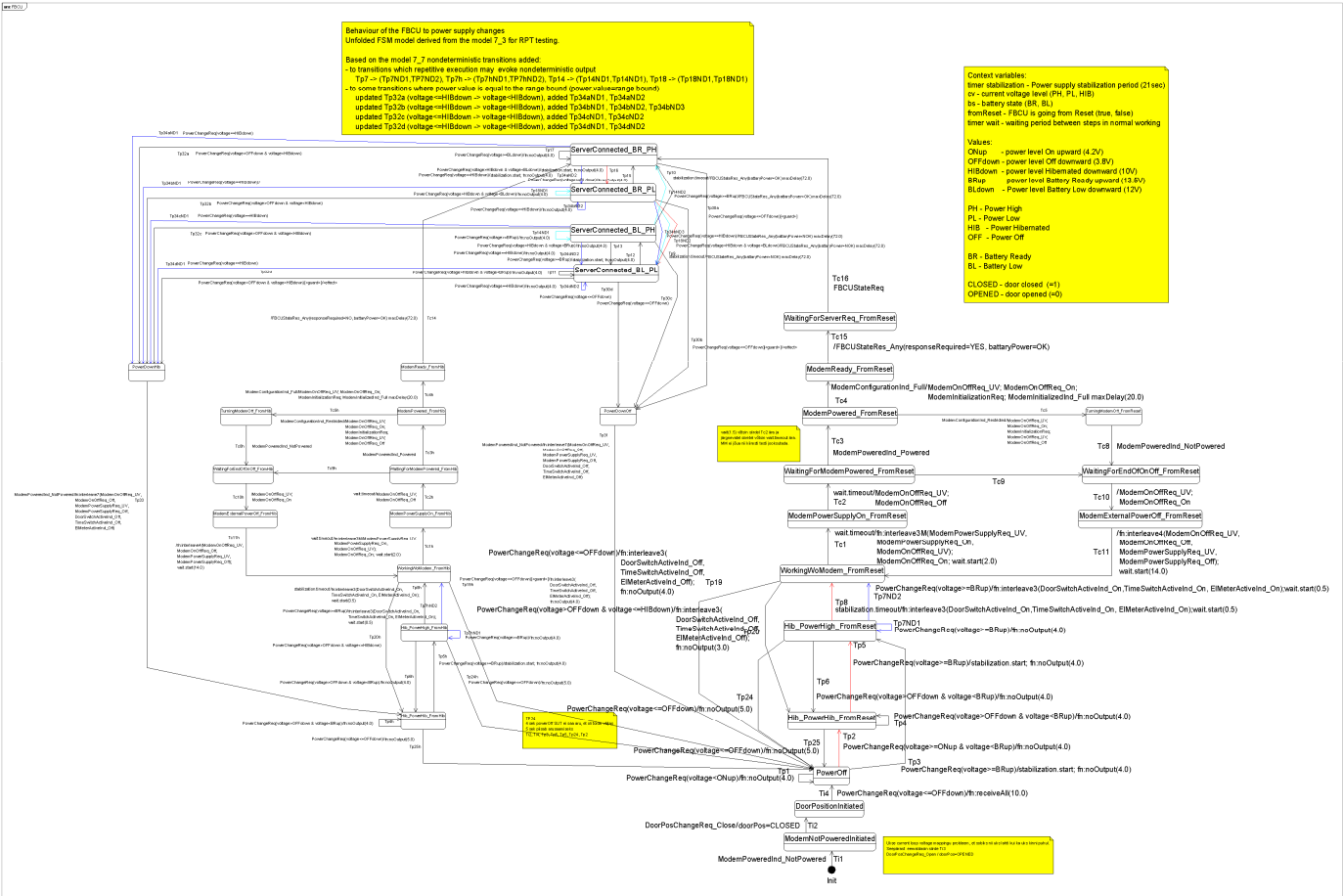


Case study 2 – test environment



Case study 2 – SUT state model

Model of FBCU power management (31 states, 73 transitions)



Case study 2 – results, increment 1

Using MBT in this case study is very efficient, because FBCU behavior is complex and it is easier to change model than rewrite test code – proved in practice.

Numbers (first increment):

		Time	Code lines
1	TTCN-3 code (messages, test data, configuration)	~ 15 days	~ 1100
2	System adapter	150 days	~ 15 000
3	Model building	~ 45 days	NA
4	Generated tests	NA	~ 20 000

Case study 2 – results, increment 2

FBCU changed significantly, new model was built from scratch.

Numbers (second increment):

		Time	Code lines
3	Model building	~ 10 days	NA
4	Generated tests	NA	~ 20 000

3 fatal bugs found.

Lessons learned - issues

1. Lack of qualified engineers, who are able to-do SUT modeling.
2. Modeling and model generation tools are not mature yet.
3. Problems with logs tracing – where is bug – in model, generated code or SUT ?
4. Test generators should support different TTCN-3 versions.

Lessons learned

1. There are common tasks to be solved in both cases (manual and model based TTCN-3 testing).
2. Using MBT with TTCN-3 gives extra advantage (TTCN-3 is dedicated for tests, it is natural to generate TTCN-3).
3. Building the model formalizes SUT behavior and therefore discloses ambiguity in SUT specifications.
4. Model building is resources consuming work, it pays back in maintenance phase – it is easier to alter model and generate tests again.
5. MBT advantages are more visible with complex SUT models.
6. MBT gives very handy approach for exploratory testing.

Thank you !

Questions ?

References:

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