EXPERIENCES FROM APPLYING MBT IN AN AGILE SCRUM CONTEXT

AN MBT UC 2011 PRESENTATION

ATHANASIOS KARAPANTELAKIS (athanasios.karapantelakis@ericsson.com)
ALLAN ANDERSSON (allan.andersson@ericsson.com)
JOHAN MALMBERG (johan.malmberg@ericsson.com)
BOGUMILA RUTKOWSKA (bogumila.rutkowska@ericsson.com)

ERICSSON AB, TELLUSBORGSVÄGEN 83-85, 126 25 STOCKHOLM, SWEDEN

OVERVIEW

- Introduction to test domain
- Approach
- Contributions and results
- Technical challenges
- A mental model for deployment of MBT in SCRUM projects
- Conclusion

INTRODUCTION TO TEST DOMAIN

- Test Scope: modeling of O&M interfaces (man-machine communication) for a telecommunication system.
  - User point of view when creating models
  - Because of a strict, formalized structure of commands, there is no requirement for wrappers or APIs.
    - Success story with MBT: Generic command and printout handling in test execution harness.
    - Cost efficiency: wrapper class per interface versus wrapper class per command.
- Test methodology: application of MBT for testing a system being developed using SCRUM.

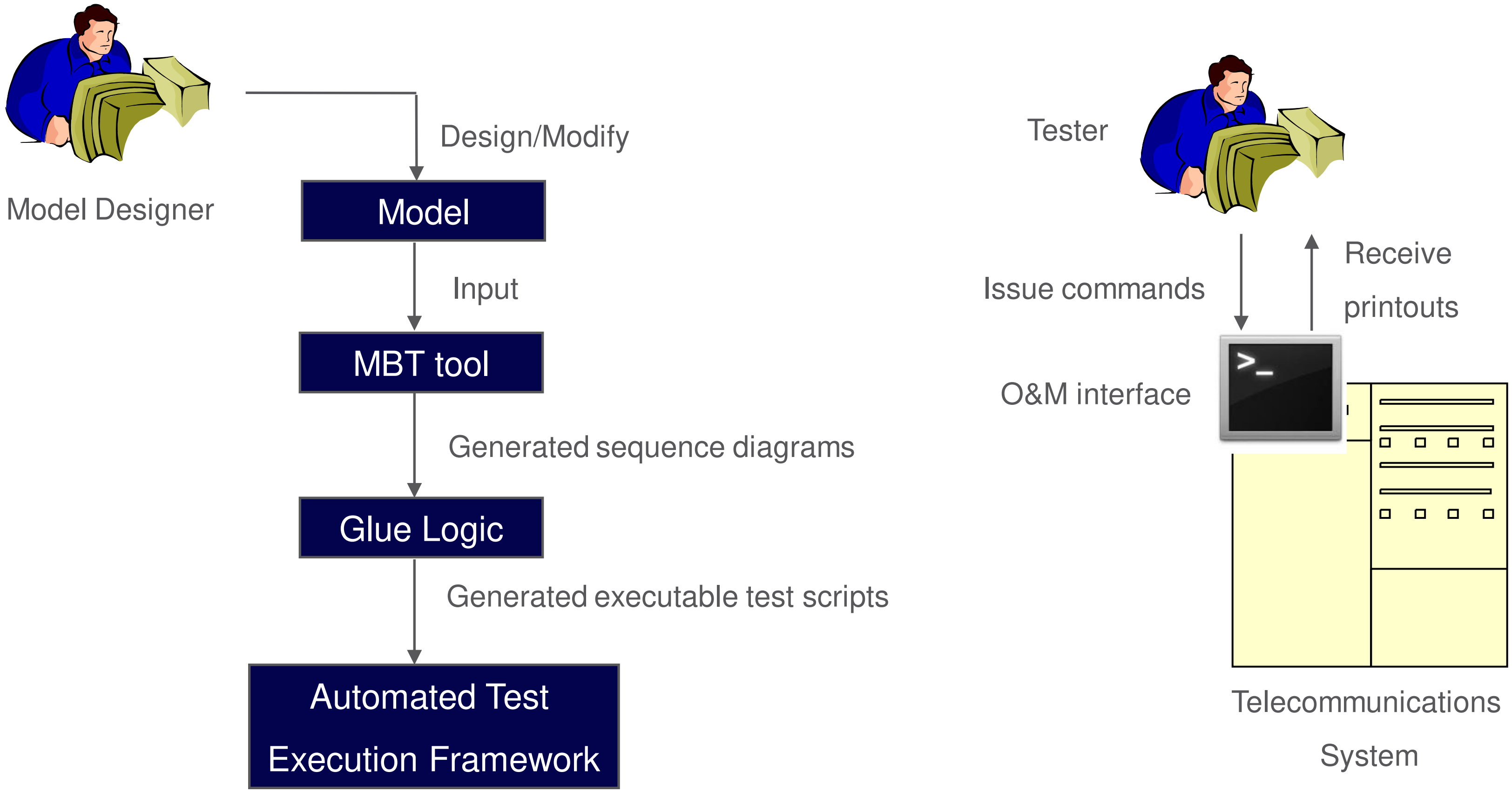
Introduction → Approach → Contributions and results → Technical Challenges → MBT in SCRUM mental model ⟶ Conclusion

Approach (1/3)

- Background and tool selection
  - Conformiq:
    - Provider of an MBT tool suite used to design models and generate test cases out of those models.
    - Model design is UML-based complemented by Java-like code.
    - Black-box testing approach: models describe sequences of incoming and outgoing *messages* to and from the system being modeled.
  - Glue logic
    - Code between the model domain and the test execution platform
    - *Translates* the sequence diagrams produced from the model to executable test cases.
    - Incoming messages to the system are O&M commands, and outgoing messages are command printouts.
      - Based on logic in the model, glue logic creates a set of executable test scripts, through a process within which incoming messages from the model are interpreted as O&M commands, and ougtoing messages are interpreted as command printouts.

Introduction → **Approach** → Contributions and results → Technical Challenges → MBT in SCRUM mental model ⟶ Conclusion

APPROACH (2/3)



Model Designer

Design/Modify

Model

Input

MBT tool

Generated sequence diagrams

Glue Logic

Generated executable test scripts

Automated Test Execution Framework

Tester

Issue commands

Receive printouts

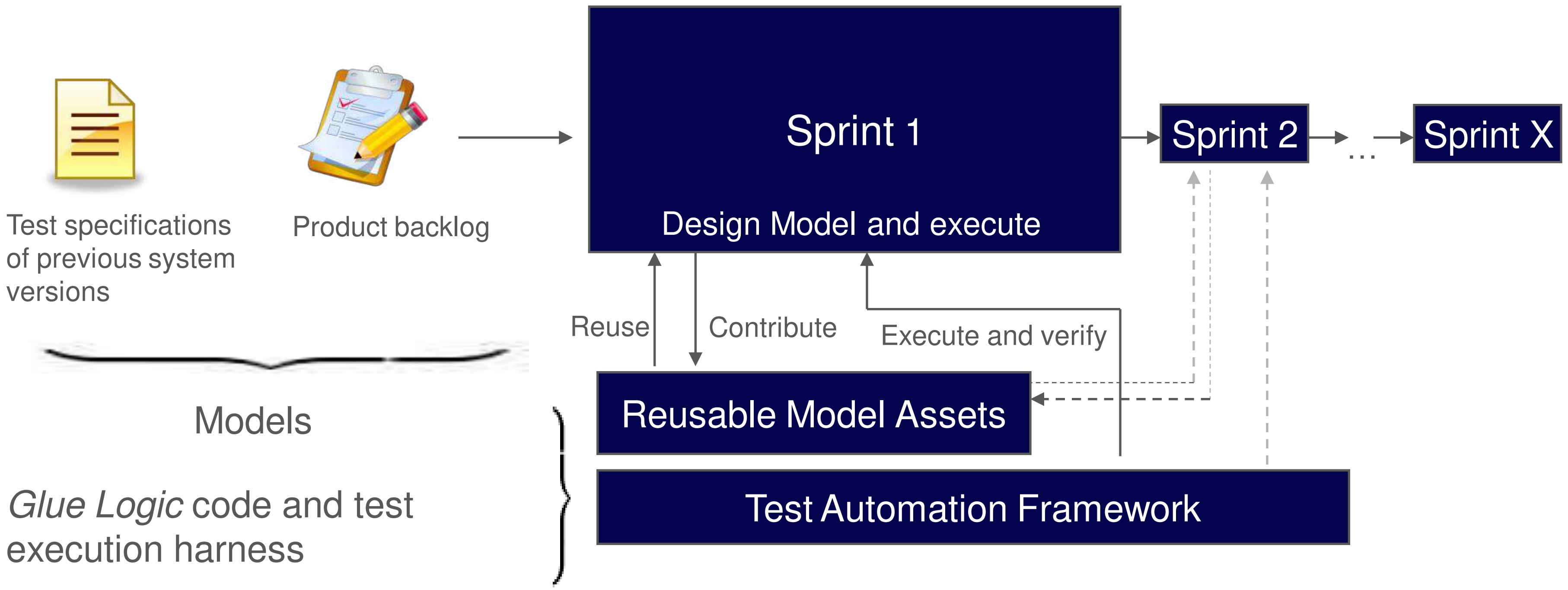
O&M interface

Telecommunications System

APPROACH (3/3)

Timeline

MBT Evaluation	MBT Deployment



Test specifications of previous system versions

Product backlog

Models

Glue Logic code and test execution harness

Sprint 1

Design Model and execute

Sprint 2

…

Sprint X

Reuse

Contribute

Execute and verify

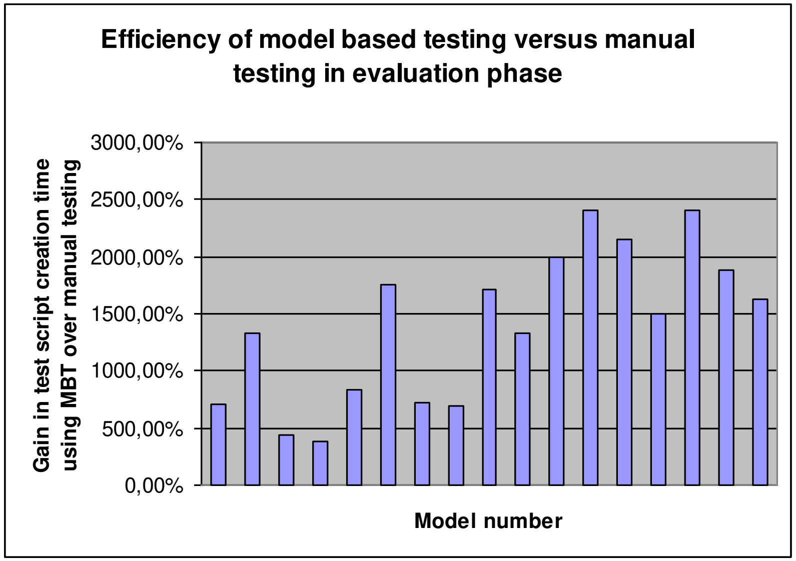
Reusable Model Assets

Test Automation Framework

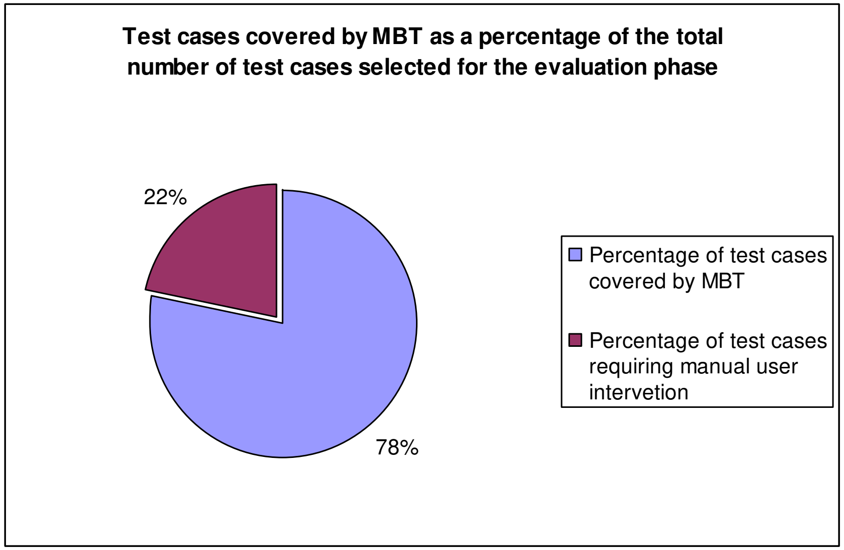
Introduction → **Approach** → Contributions and results → Technical Challenges → MBT in SCRUM mental model ⟶ Conclusion

EVALUATION

- Duration (approximately two months)
- Time segmentation (man hours)
  - As a percentage of total time
    - Creation and refinement of glue logic (**one time effort**): 53%
    - Creation of models (including verification of models/execution of test cases): 47%



Efficiency: average gain in time of MBT versus manual testing ~14x



Completeness: We managed to cover 78% of the test specification

Introduction → Approach → **Contributions and results** → Technical Challenges → MBT in SCRUM mental model ⟶ Conclusion

TECHNICAL CHALLENGES

- Read data from printouts
  - Contracts between the test harness and model-level design.
- Non-deterministic situations
  - Ambiguous command printouts
- Large number of test cases (impacts test execution time)
  - Compacting test suite

MODELING A PROCESS

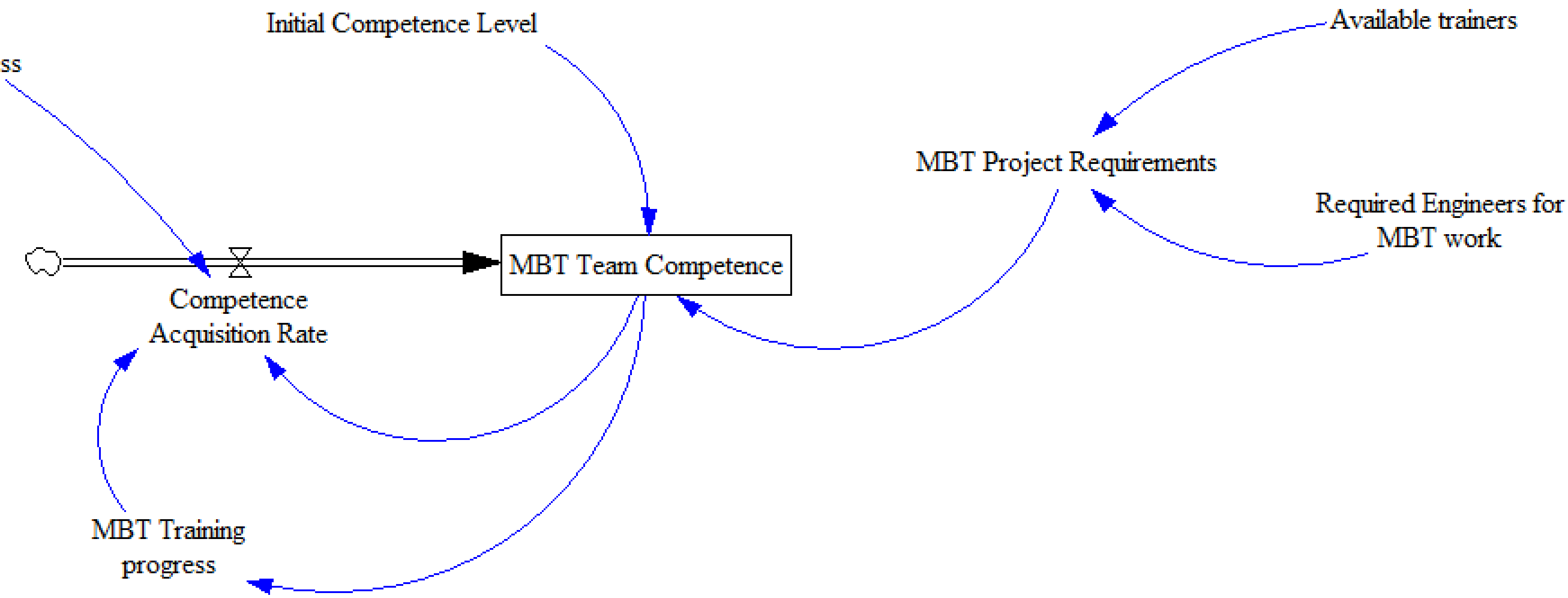
- Value of modeling the “MBT introduction” process
  - Simulations help correlate measurable parameters to varying values of preset parameters.
  - Facilitates project planning, assignment of resources, estimation of costs.

- Using System Dynamics (SD) mental models as a tool for planning for MBT deployment within a SCRUM project.
  - Define MBT introduction stages
    - Preparation
      - Automated test execution framework
      - MBT training
    - Deployment
  - Define model parameters
    - Measurable parameters
      - Cost of resources, time to deliver, quality
    - Preset parameters
      - Number of engineers allocated, project/training deadlines

Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

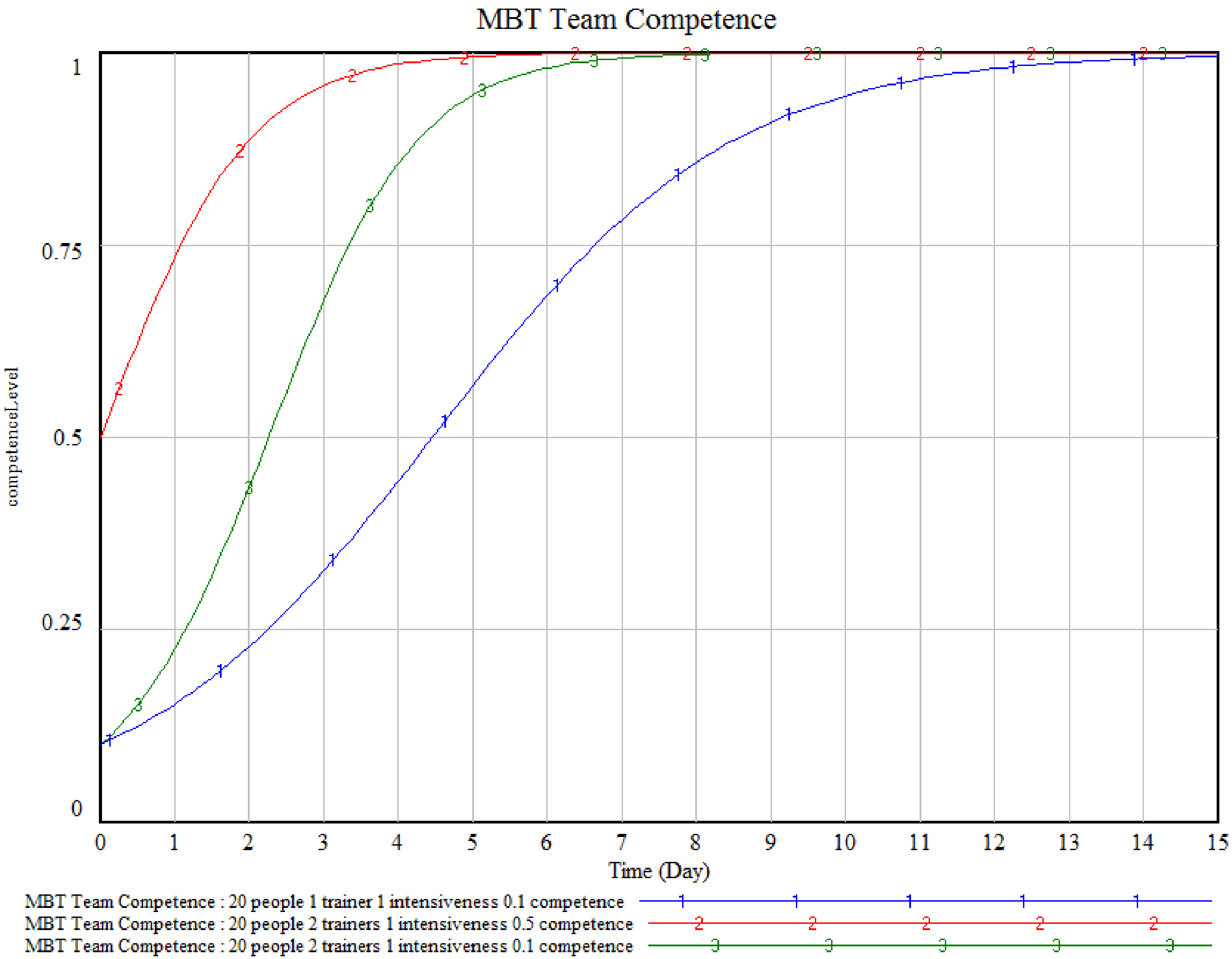
MBT TRAINING

Mental model for capturing the process of
MBT training within AXE I&V



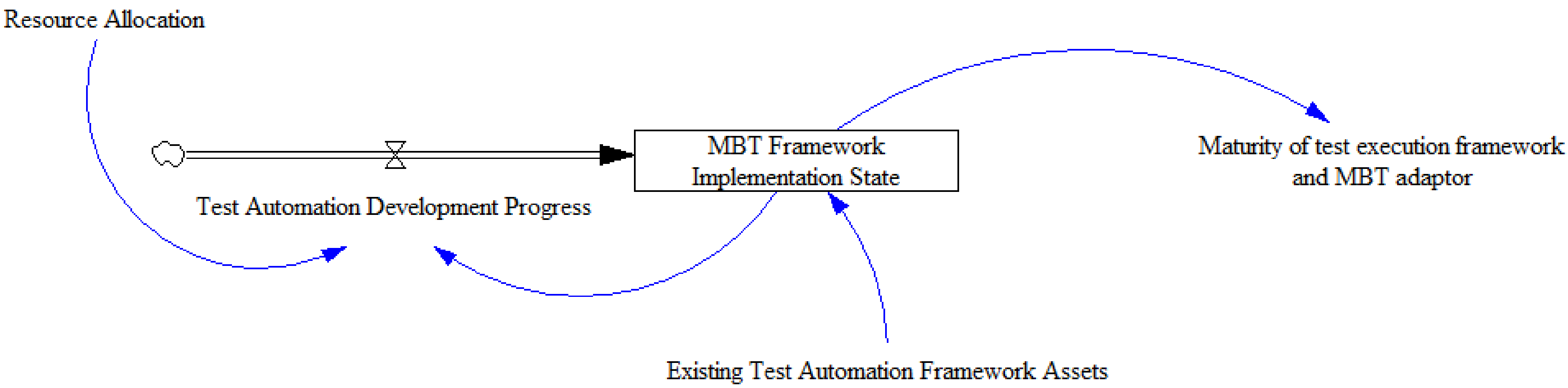
Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

MBT TRAINING DYNAMICS



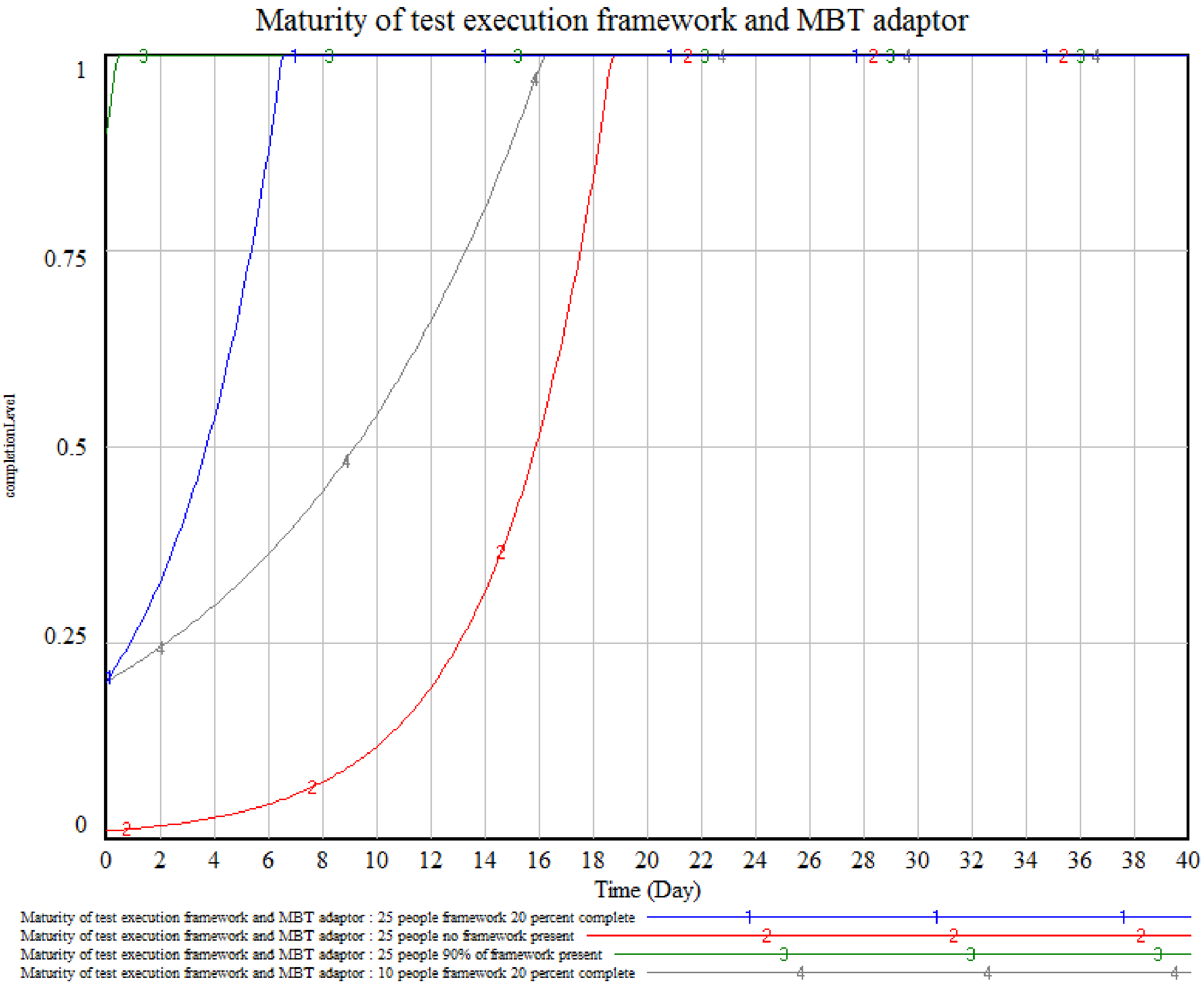
DEVELOPMENT OF TEST EXECUTION AUTOMATION FRAMEWORK

Mental model for capturing the process of developing an MBT test automation framework


Resource Allocation
MBT Framework Implementation State
Maturity of test execution framework and MBT adaptor
Test Automation Development Progress
Existing Test Automation Framework Assets

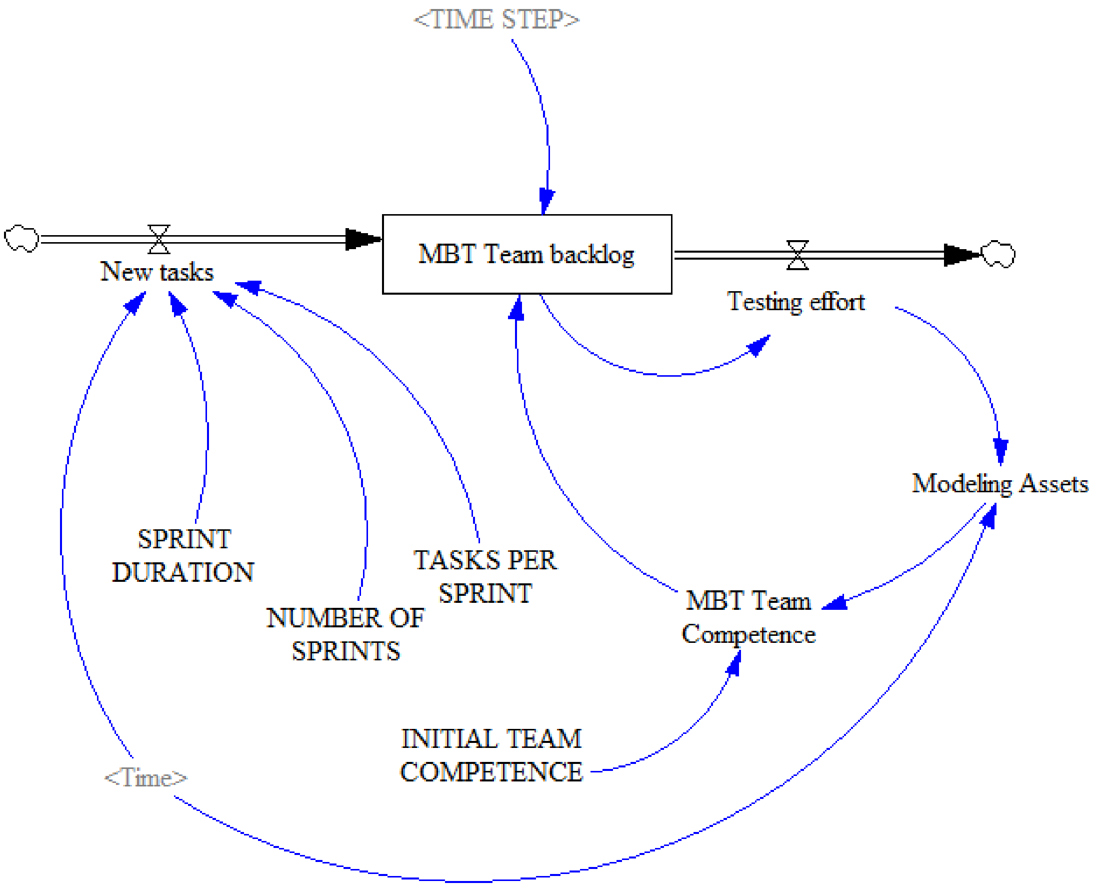
Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

DYNAMICS OF THE FRAMEWORK DEVELOPMENT PROCESS



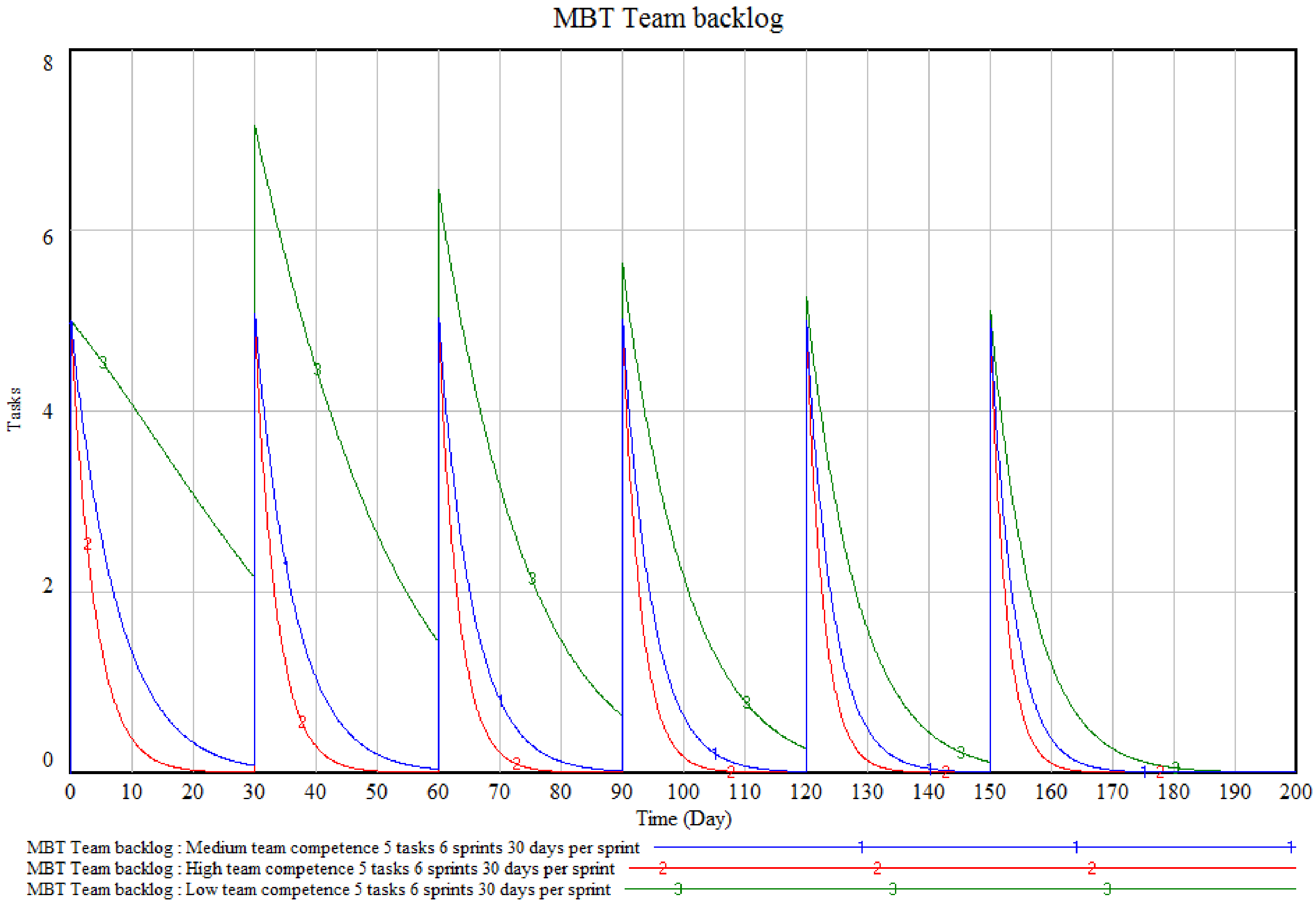
CAPTURING THE PERFORMANCE OF MBT WITHIN SCRUM

Mental model for capturing the MBT way-of-working within SCRUM processes



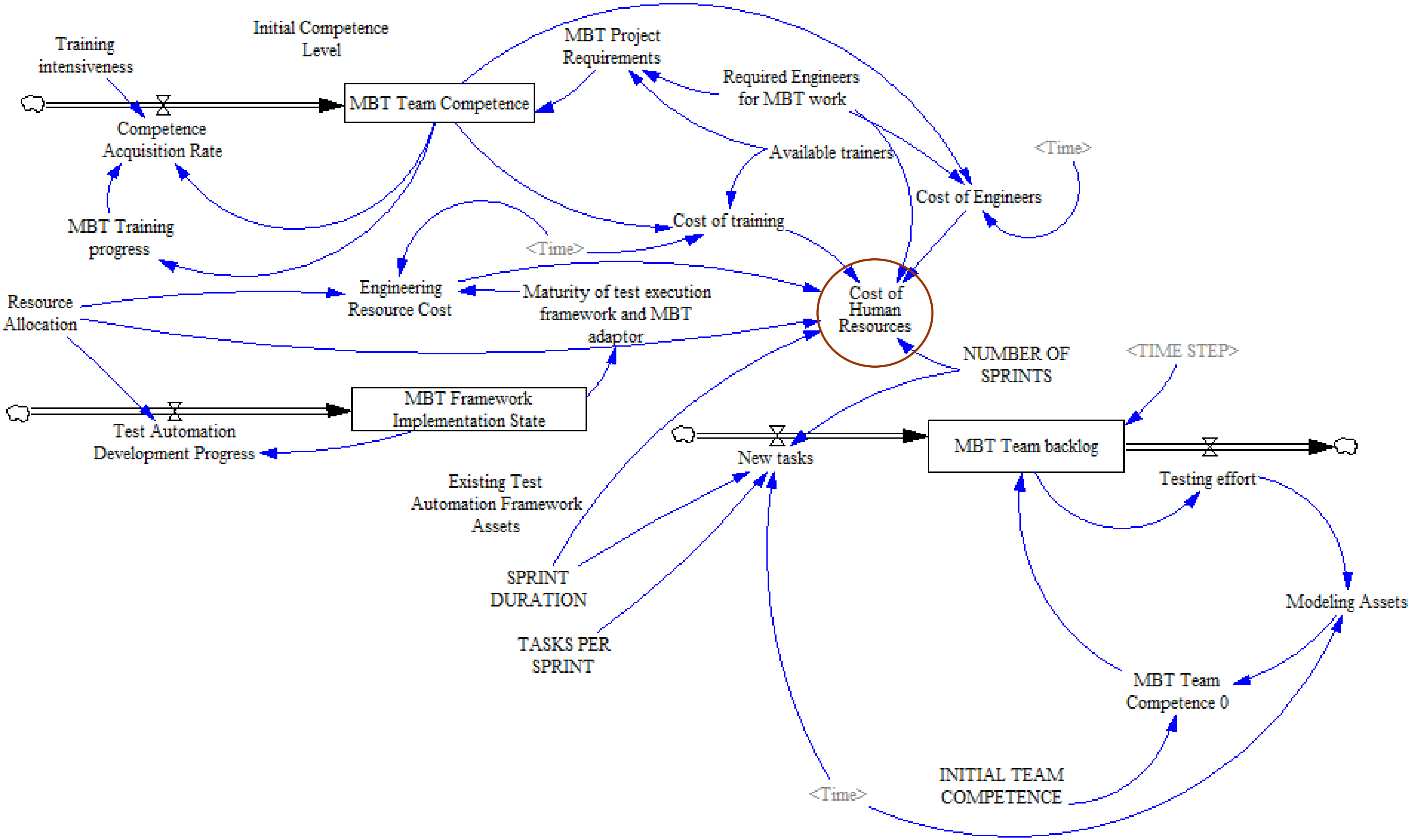
Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

MBT TEAM EFFICIENCY DYNAMICS



Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

COMBINING MODELS



Introduction → Approach → Contributions and results → Technical Challenges → **MBT in SCRUM mental model** ⟶ Conclusion

LESSONS LEARNED

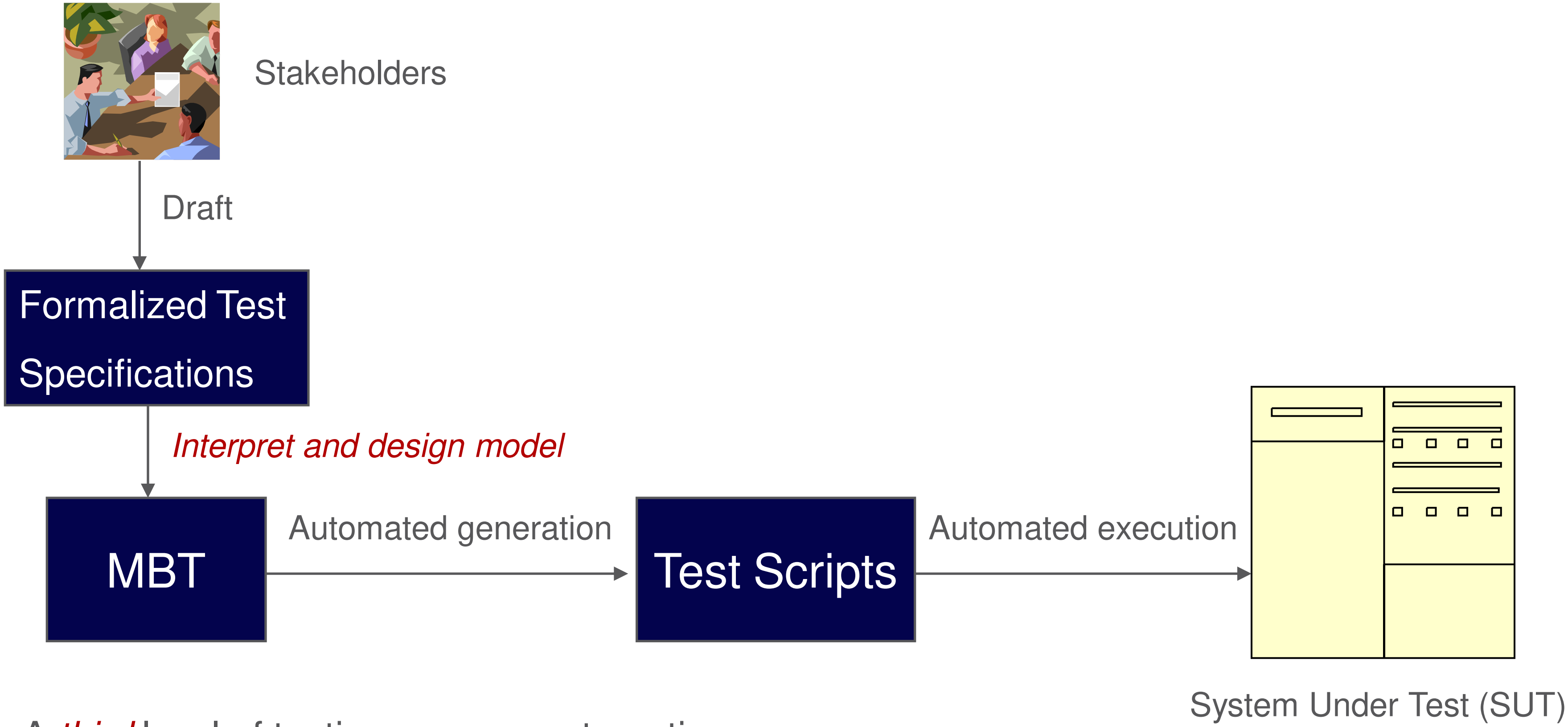
Experiences from evaluation

- Models can focus on the final solution
  - In every sprint, execute only the subset of test cases generated from the model that correspond to implemented functionality.
- Design teams may come up with temporary workarounds, not present in the final version
  - Model workarounds can be introduced and deactivated later
  - Save efforts for redesigning the model later

Experiences from simulation of SD models

- SD models capture the inter-relations of variables that determine project success.
  - Resource allocation, based on engineer experience, that leads to lower costs.
  - Resource allocation, based on engineer experience, that delivers results faster.
    - *But also*: Optimal allocation of engineers that leads to the best compromise of time and costs.

PLANNING AHEAD



Stakeholders

Draft

Formalized Test Specifications

Interpret and design model

MBT

Automated generation

Test Scripts

Automated execution

System Under Test (SUT)

A *third* level of testing process automation

- Complete model creation versus model “stubs”.
- Generated test cases consistency, correctness.
- Reduced testing costs, lead-time.

ERICSSON