MODEL BASED TEST DESIGN FOR PERFORMANCE TESTING AND OTHER NON-FUNCTIONAL REQUIREMENTS

MATTIAS ARMHOLT

ERICSSON AB

Agenda

- Introduction
- Model Based Test Design for Performance Testing and other Non-Functional Requirements
- Model Design Techniques
- Conclusions

Introduction

My work

› Function tester at Ericsson AB

› Testing IP functionality in a middleware platform

› Working with MBT and automation for 3 years

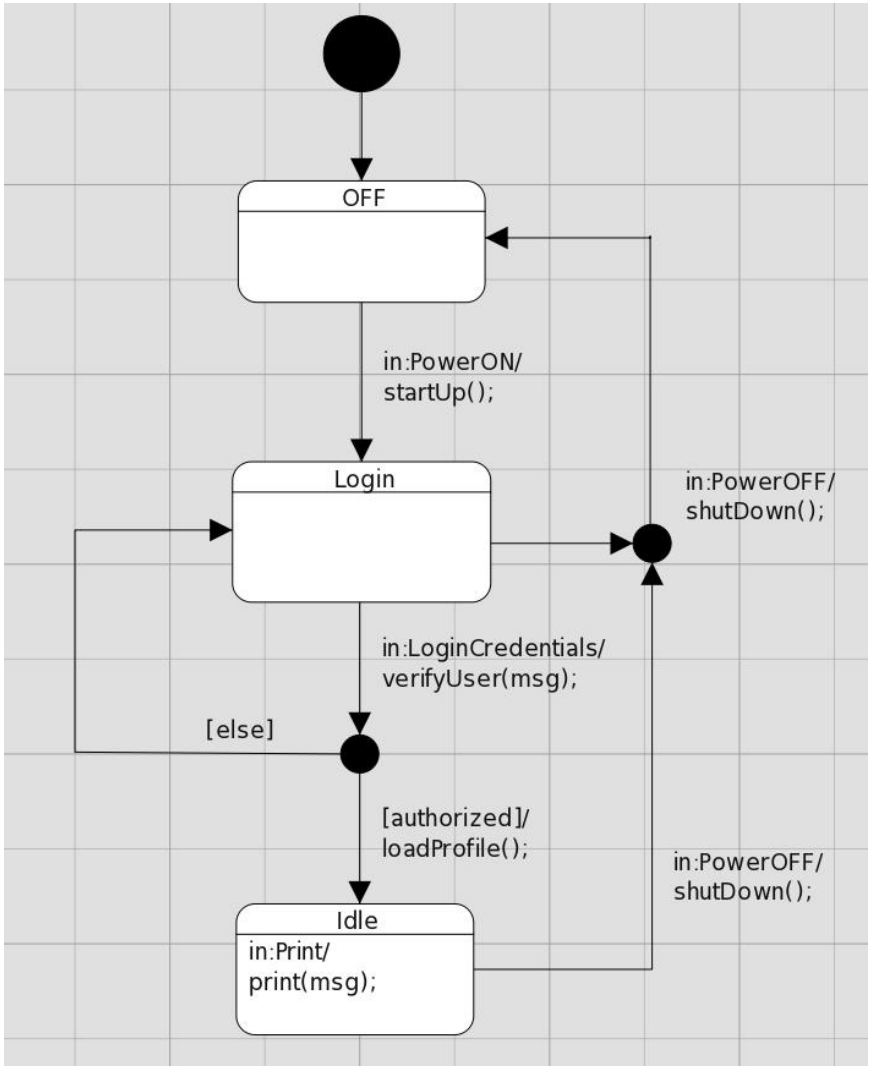
Environment

› Conformiq Modeler – Model Design

› Conformiq Designer – Test generator

› Java and TCL/Expect – Test automation framework

Test models


OFF
in:PowerON/
startUp();
Login
in:PowerOFF/
shutDown();
in:LoginCredentials/
verifyUser(msg);
[else]
[authorized]/
loadProfile();
in:PowerOFF/
shutDown();
Idle
in:Print/
print(msg);

Non-Functional Requirements (NFR)

- Capacity
- Performance Requirements
  - Response time
  - Throughput
  - Processor-utilization
- Interoperability
  - IP Standards
- Robustness
- Stability
- And more …

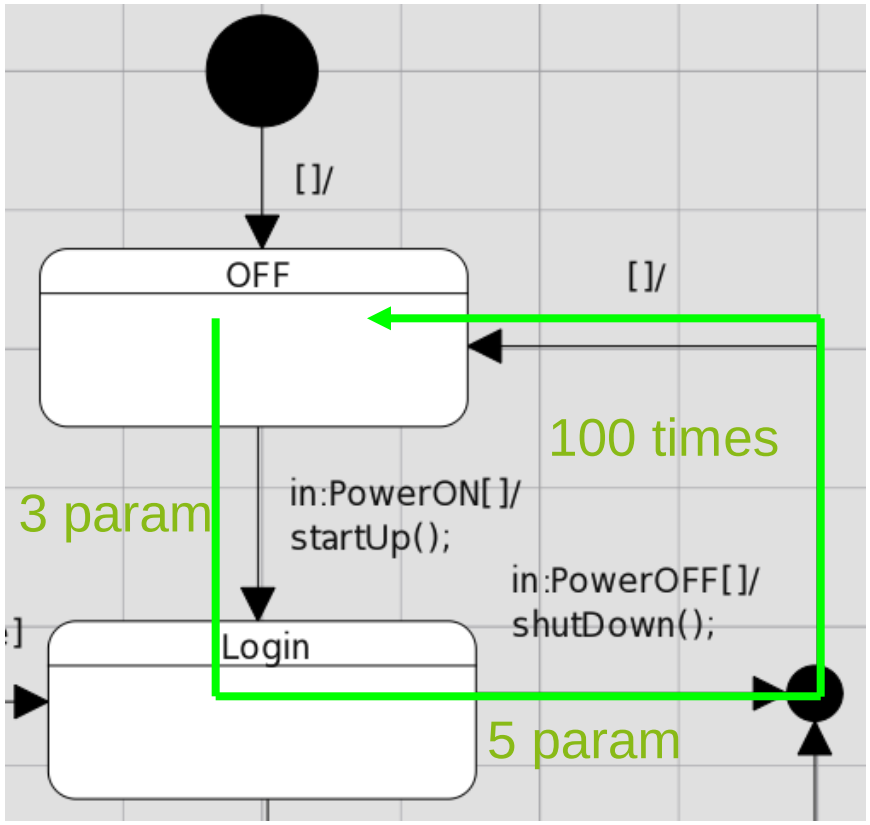
Problems With NFR

Lookahead depth

- Tool algorithm do not want to repeat the same transitions multiple times without fulfilling new requirements or covering new states/transitions.

Parametersation

- Requirements need transitions with several parameters to fire many times.
- The number of parameter combinations becomes unable to handle.
- Would generate thousands of test cases.



Problems With NFR

Robustness/Stability

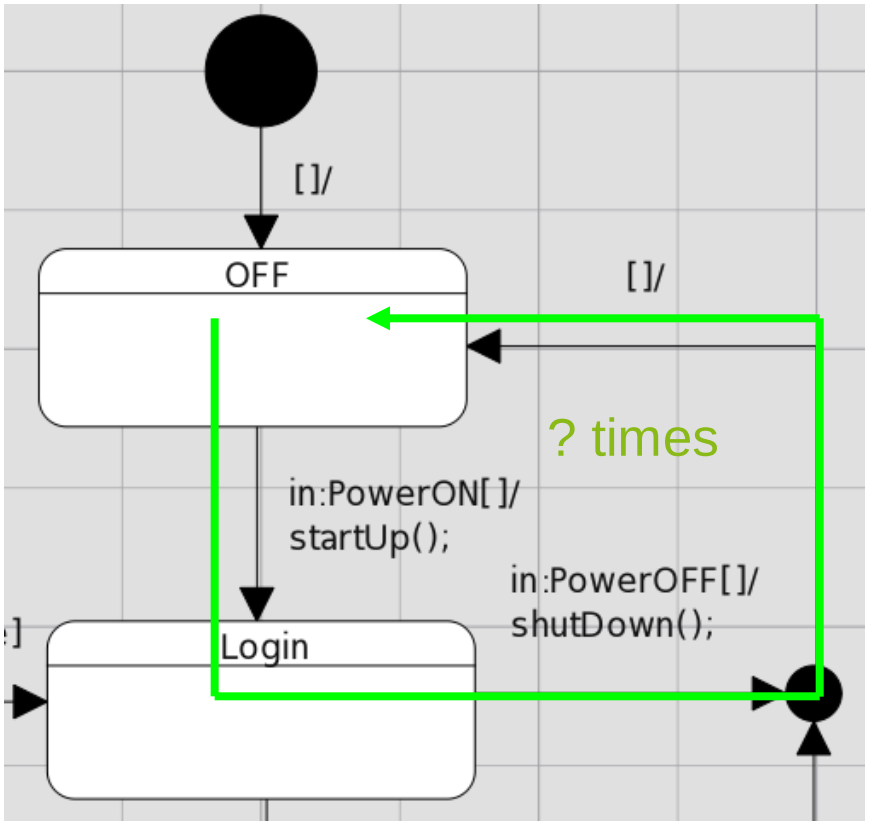
- Nothing new should happen during test

Measurements

- No transition available in SUT for measurements

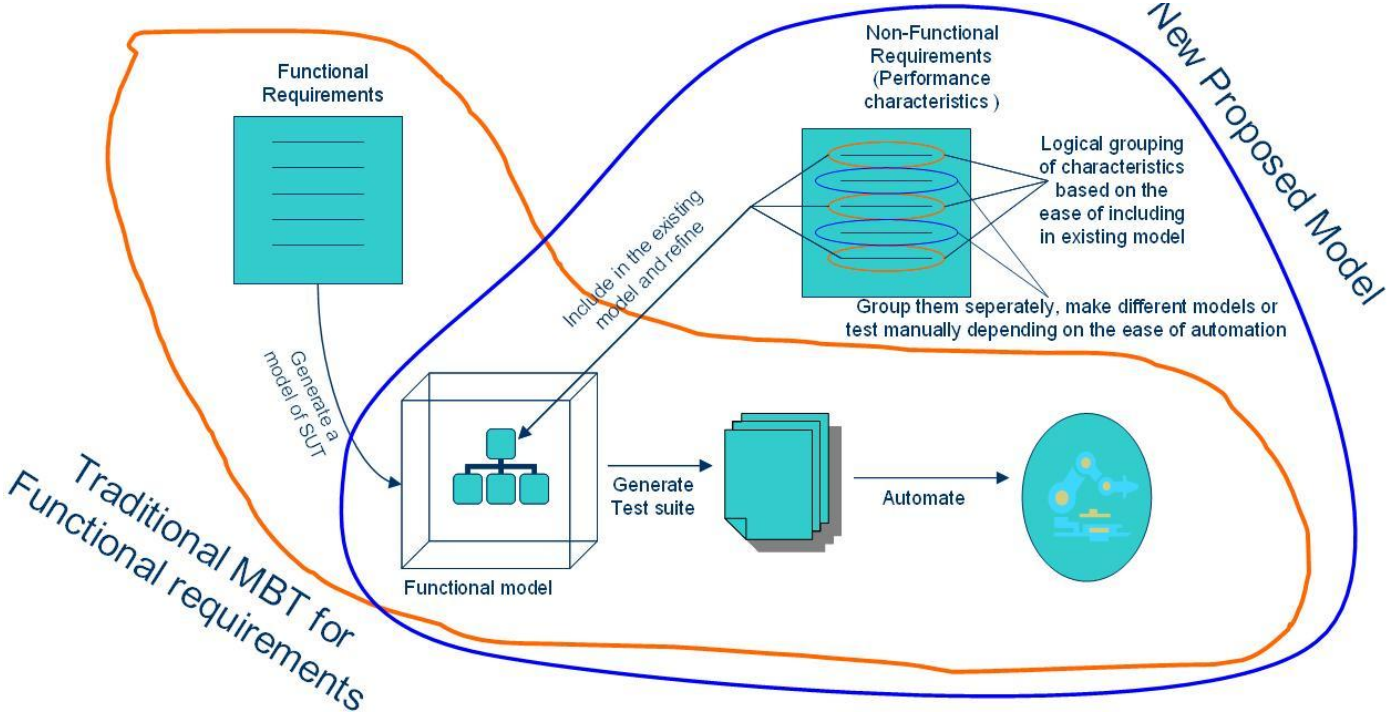
Capacity

- No clear boundary value to test with.



Method For MBT Of NFR

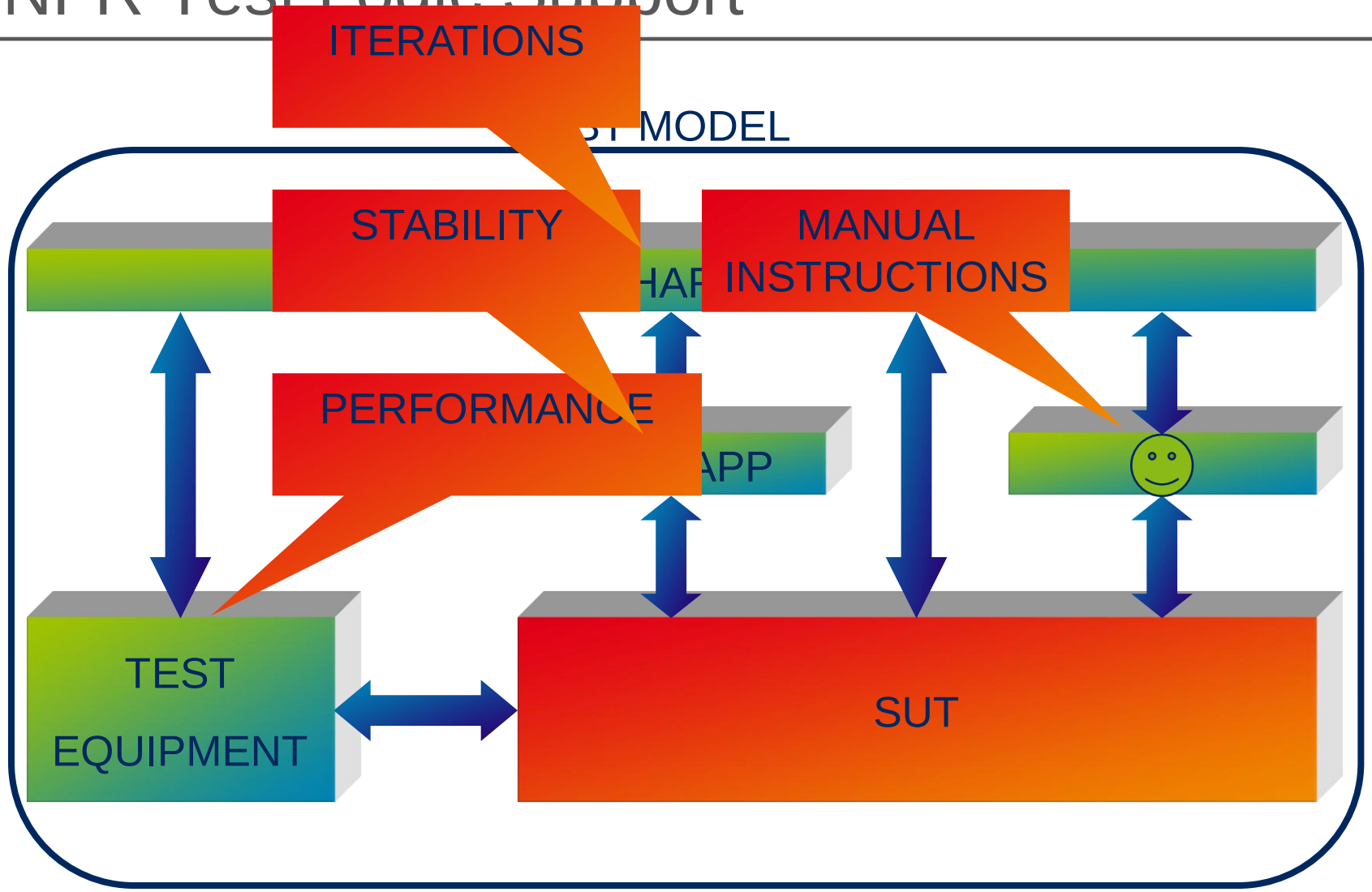
- Group the Non-Functional requirements based on similarities
- Evaluate if the group is possible to include in the model
- Design a test model including non-functional requirements
- Generate Test Cases



NFR Testability

- NFR requirements logic can be included in the test harness/environment
  - Use test applications for iterations
  - External equipment for interoperability
  - Add functionality to test harness
  - Increase SUT testability with test commands
- Testability is one criteria for MBT of NFR

NFR Test Logic Support

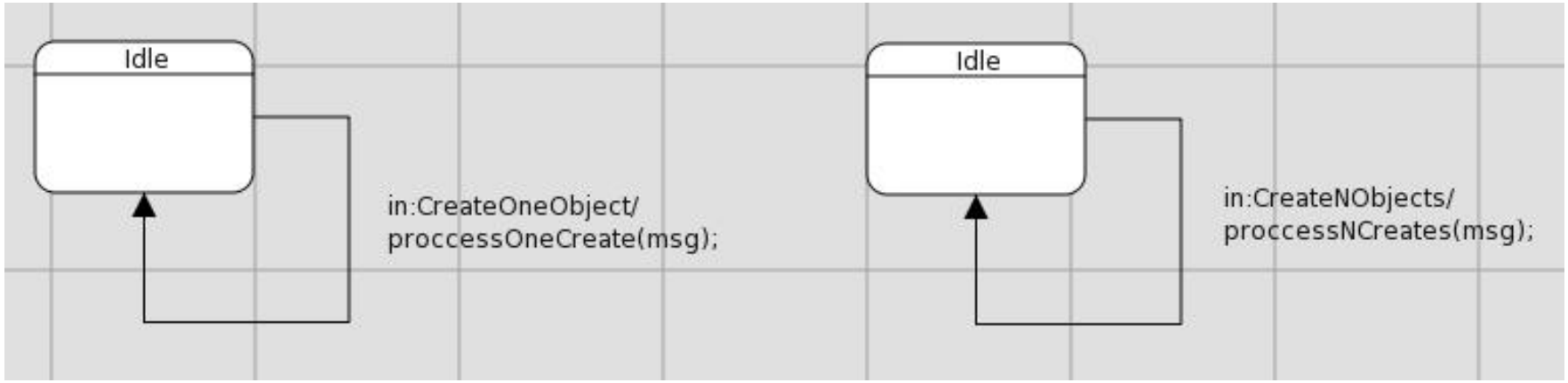


NFR Model Design Techniques

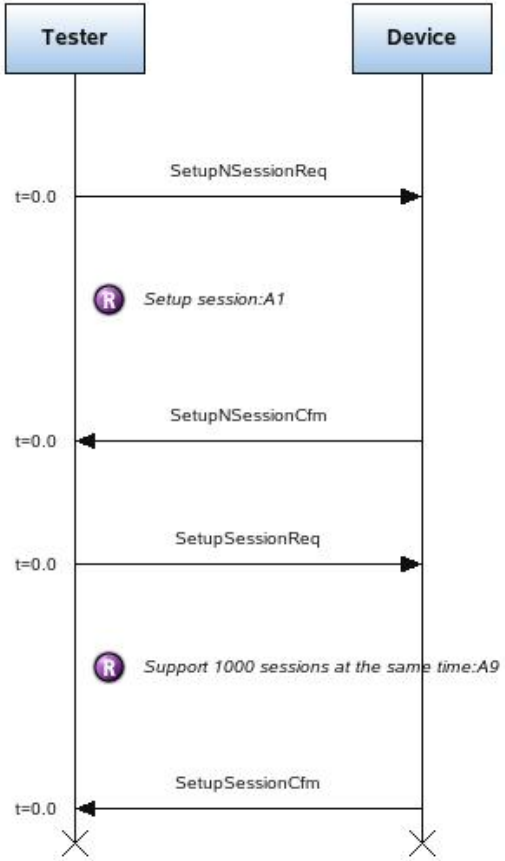
- Design the non-functional requirements in the model with
  - Requirement keyword
  - Ad hoc requirements
  - States
  - Transitions
  - Parameters

NFR Model Design Techniques

- Group iterations together
  - Don’t create 1 host 100 times, create 100 hosts at 1 time
  - Removes risk of parametersation and lookahead depth
  - Reduces test case length makes it easier to read
  - Add logic in test harness or test environment



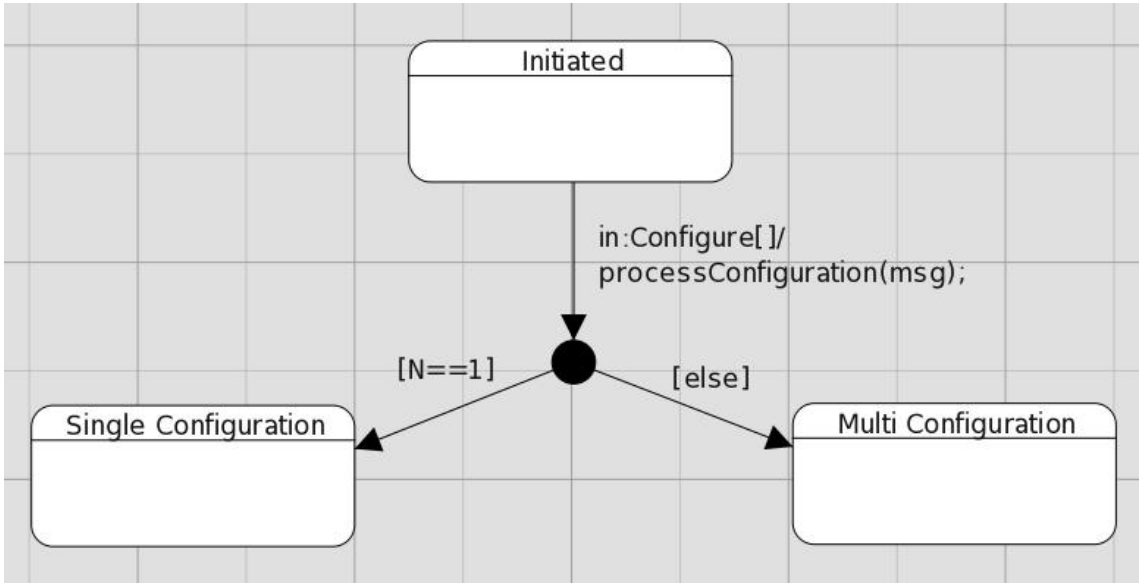
NFR Model Design Techniques



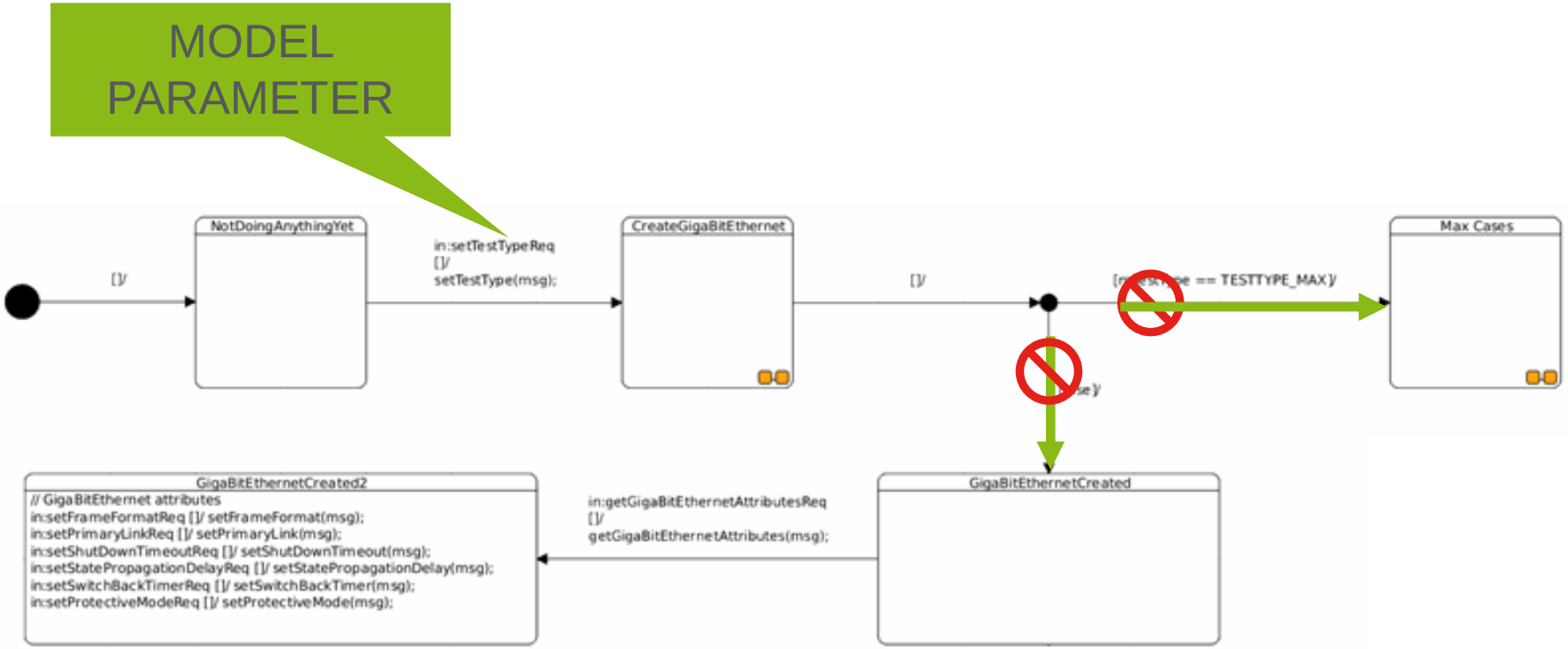
1	SetupNSessionReq	to in	0.0
	sessionid	1 (0x1 0o1 0b1)	
	setupNSessions	999 (0x3E7 0o1747	
2	SetupNSessionCfm	from out	0.0
	numberOfSetupSessionCfm	999 (0x3E7 0o1747	
	result	0 (0x0 0o0 0b0)	
	sessionId	0 (0x0 0o0 0b0)	
	msg	"999 sessions is set	
3	SetupSessionReq	to in	0.0
	sessionid	1000 (0x3E8 0o175(	
4	SetupSessionCfm	from out	0.0
	result	0 (0x0 0o0 0b0)	
	sessionId	1000 (0x3E8 0o175(	
	msg	"Session is setup"	

NFR Model Design Techniques

- Use different abstraction levels
  - Focus the transitions to the parameters that counts for NFR
  - Use precondition when modeling NFR
  - Reduces the risk of unnecessary parameter combination testing



NFR Model Design Techniques

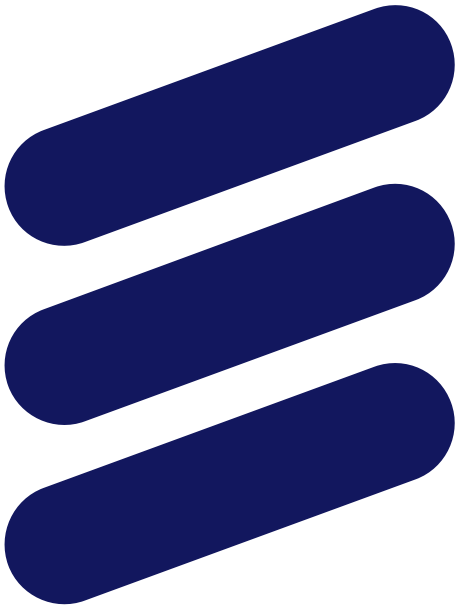


Conclusions

- In order to develop a good model covering non-functional requirements, you need to practice and learn how the tool generate test cases
- Support for testing of NFR must be possible to include in the test harness or test environment
- In general NFR increases logic and complexity in test harness and test environment

Conclusions

- Model cost of NFR the same compared to functional requirements
- Test harness/environment support development for NFR cost more compared to functional requirements
- Most valuable when NFR and functional requirements are modeled together
- Gain maintenance cost by MBT for all requirements
  - Cost less to maintain model + test harness compared to separate test scripts



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