Radio Communication Management

SRS SUBSET-026-3.5

A SysML Test Model

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ITEA 2
INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

The Approach

Goals

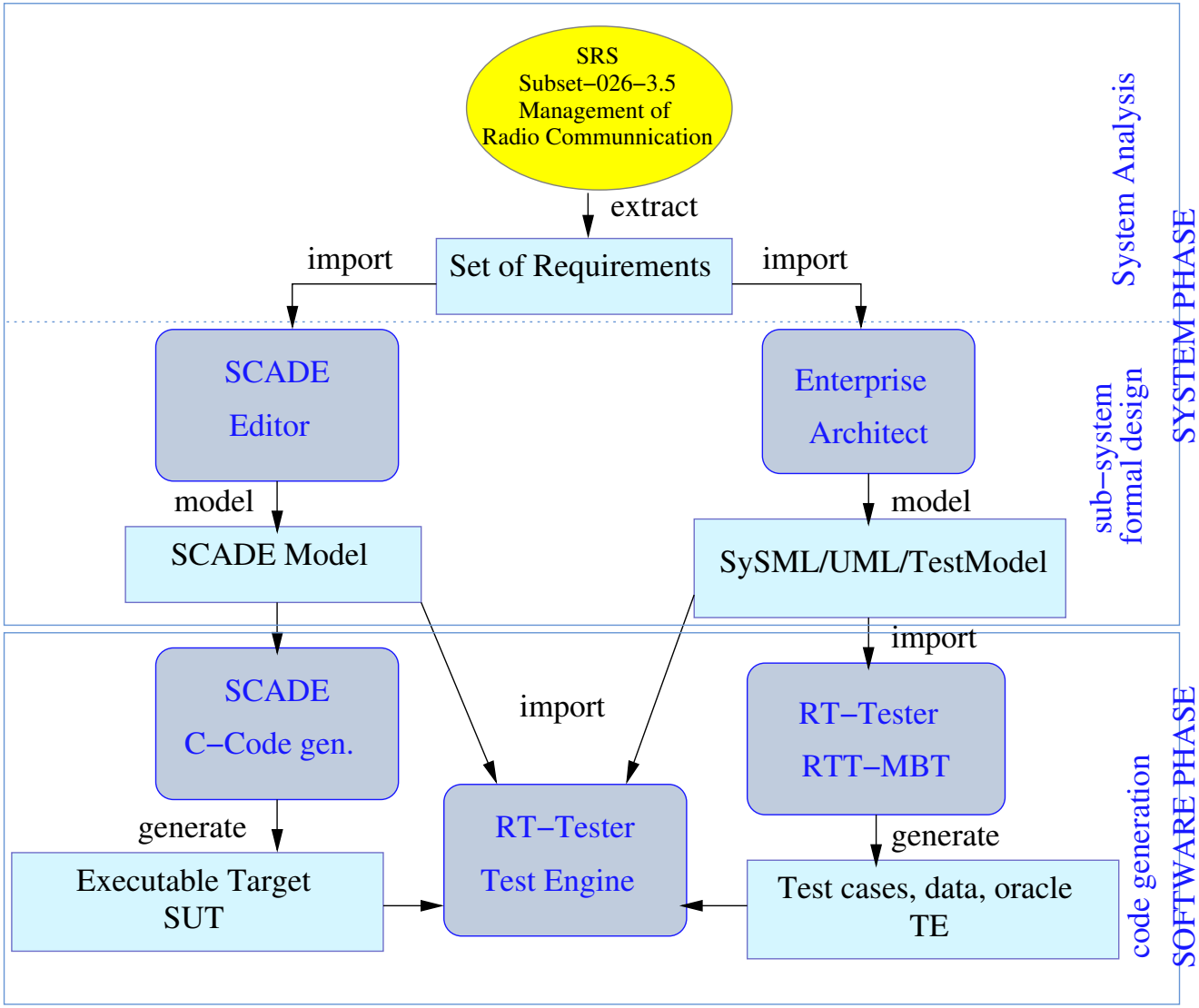
- Design a Test Model from SRS-Subset-026
- Automatically generate test cases, test data and test oracles
- Run the test on generated code

The model

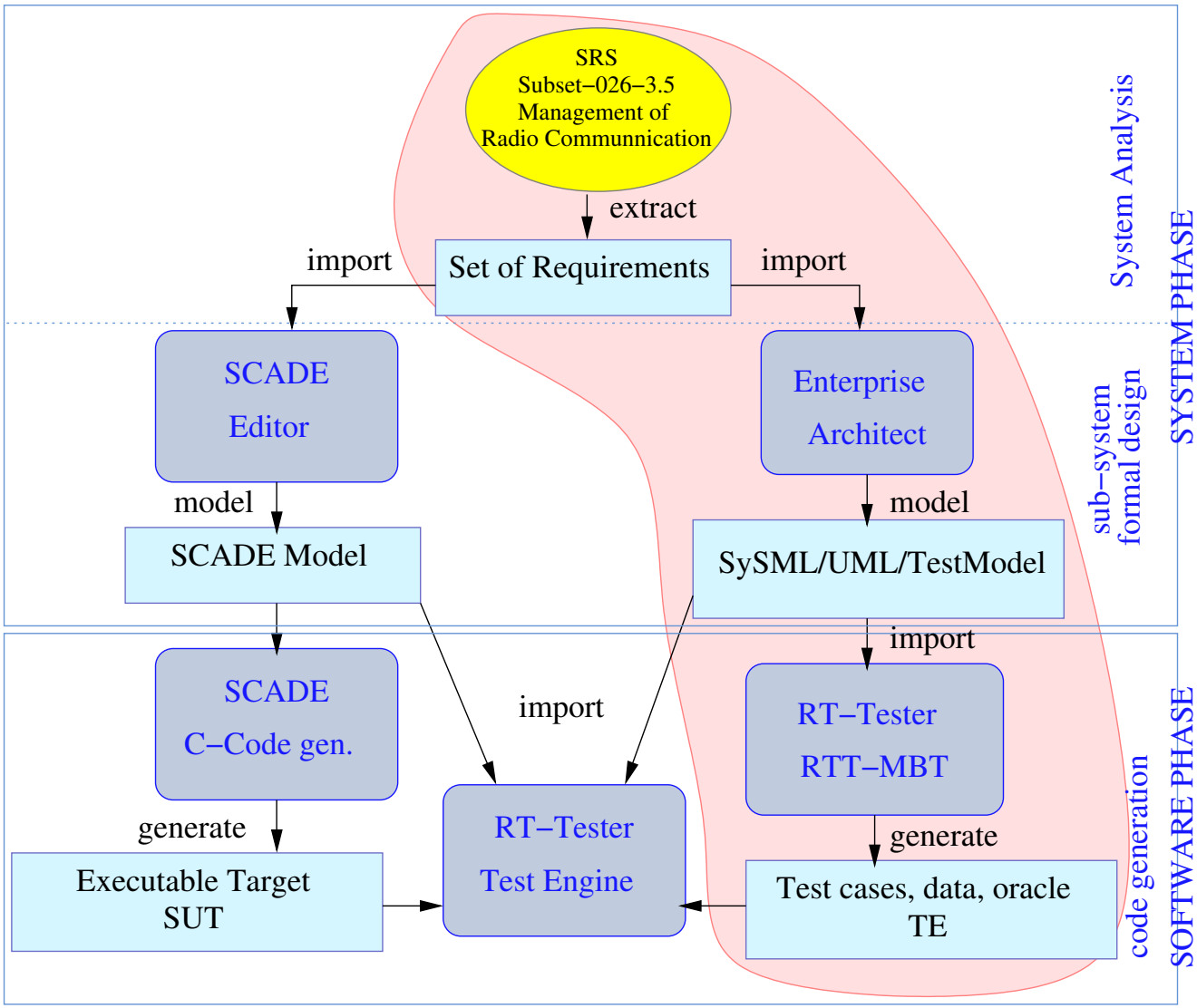
SRS Subset-026-3.5 : Management of the Radio Communication

- SysML/UML
- Enterprise Architect 9.3
- RT-Tester

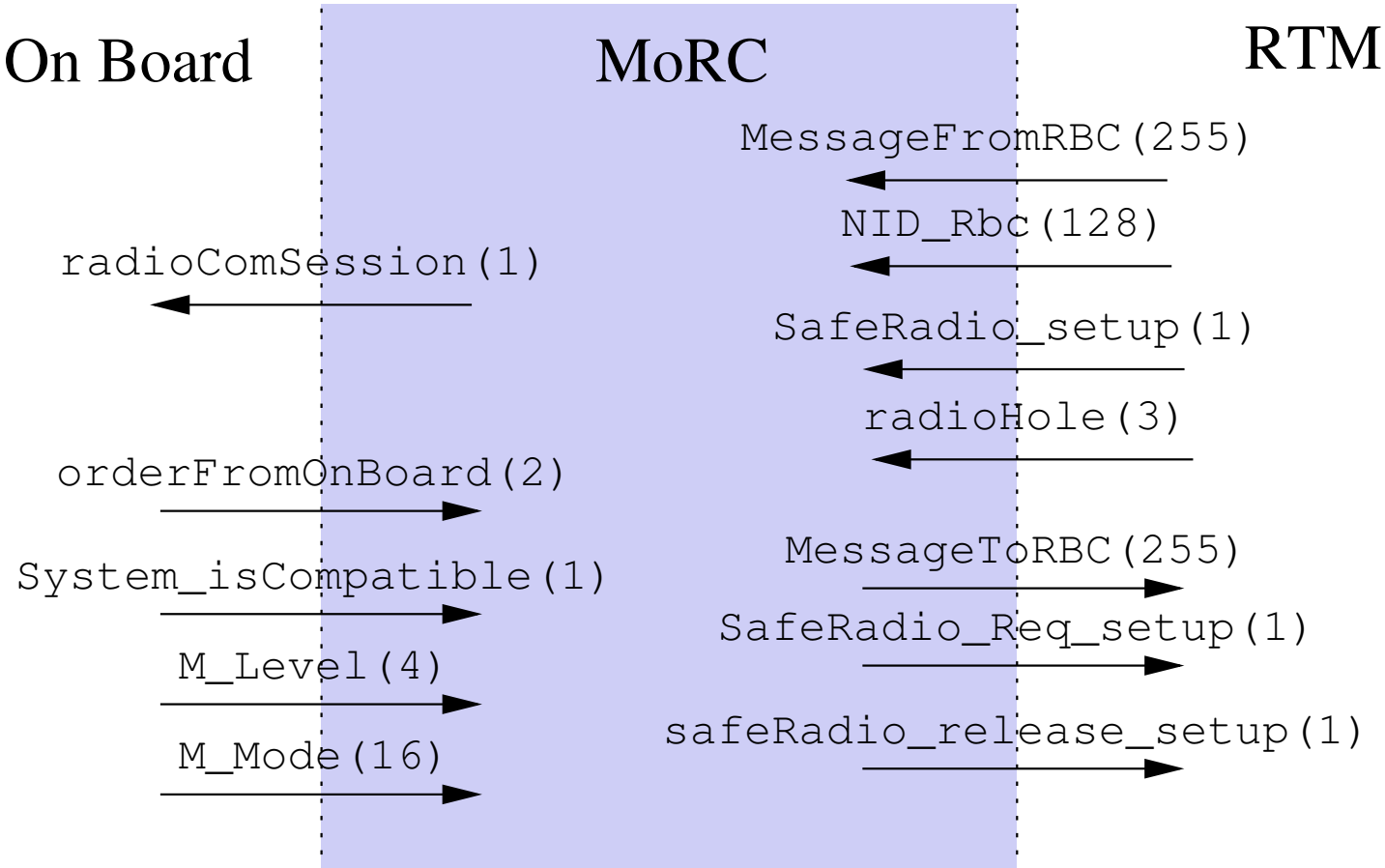
The Methodology



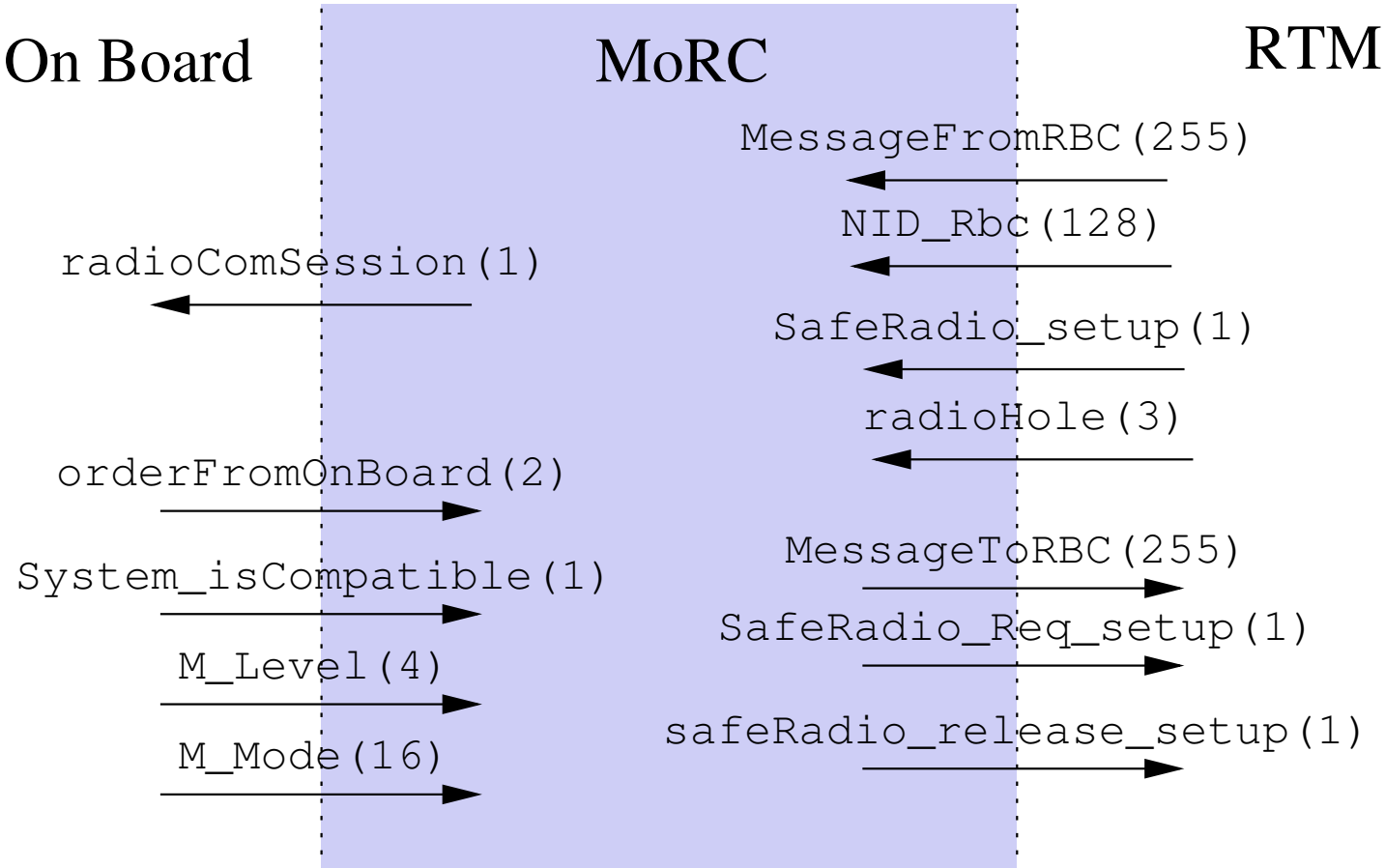
The Methodology



The Model


On Board
MoRC
RTM
MessageFromRBC(255)
NID_Rbc(128)
radioComSession(1)
SafeRadio_setup(1)
radioHole(3)
orderFromOnBoard(2)
MessageToRBC(255)
System_isCompatible(1)
SafeRadio_Req_setup(1)
M_Level(4)
safeRadio_release_setup(1)
M_Mode(16)

The Model



Let's have a look inside ...

Tests generation

Test cases covered	# tests generated
Basic state	11
Transition	28
MC/DC	63
LTL	4
Test 177	2
Total Tests	108
Requirements	36

Experience report

Pros

- General-purpose modeling languages
- Graphical modeling
- Requirement tracing
- Customizable Language
- Easy export (XMI)
- EA Multi-view capabilities

Cons

- SysML need others tools for V&V
- EA is not open source
- EA missing tool from the basic version
- EA XMI not compatible with all others tools

Conclusion on the approach

What I miss

- A defined glossary of the specification
- A clear interface between OBU functions
- A high level dependency of the SRS

Conclusion

The approach

- is ready to be used starting from the SSRS
- fulfills the WP2 requirements

The model

- may be refined
- may be enriched

Tool summary

Enterprise Architect

- Not open source
- Hard to integrate

➔ Use an alternative SysML tool

RT-tester

- SMT solver of RT-Tester (SONOLAR) will become open source this year
- A business model for open source distribution of RT-Tester is currently investigated
- A eclipse plug-in will be available soon
- Certifiable as T3

➔ Well-suited to be integrated in OpenETCS

RT-Tester - Unique Selling Points

- Automated requirements tracing based on SysML test models
- Fully automated test case, test data, and test procedure generation for complex concurrent real-time models
- Justified test strategies compliant with standards
- Comprehensive tool qualification according to
  - ISO 26262
  - RTCA DO178C
  - CENELEC EN50128:2011
- Automated software testing for SCADE software
- Proven product, applied in railway, avionic, and automotive domains
- Open interfaces to cooperating tools (DOORS, other test tools ...)