

# “Industrial Strength” Test Case

Model Interchange SIG

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Ed Seidewitz

# “Industrial Strength” Test Case

- Developed by Model Driven Solutions, under contract to the U.S. National Institute of Standards and Technology (NIST)
- Available on the OMG server
  - misig/16-08-01 – Report
  - misig/16-08-02 – ZIP archive of model files

# “Industrial Strength” Test Case

*Goal: An interoperability test case reflecting the challenges of “industrial strength” projects.*

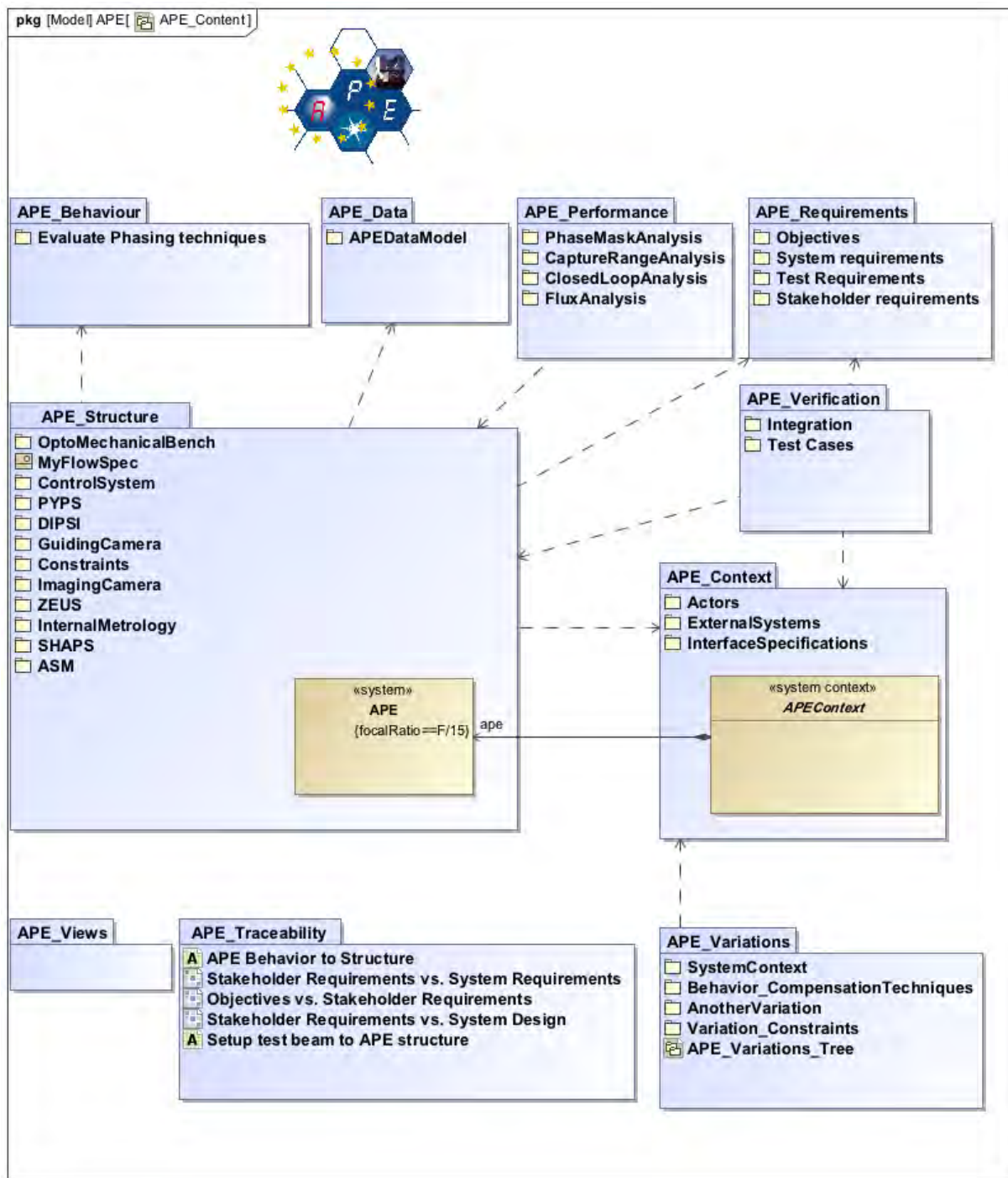
- Single model split across multiple “module” files
- Different parts created and maintained using different modeling tools
- Configuration management of changes made across various parts
- Combined software and hardware modeling using UML and SysML

# “Industrial Strength” Test Case

- Requirements for the delivered test case:
  - Relatively large SysML model
  - Realistic end-to-end scenario
  - Multiple modules
  - Multiple tools
- Not included in this test case:
  - Very large model
  - Performance
  - Diagram interchange

# Source Model

- Active Phasing Experiment (APE) SysML model
- Produced by the INCOSE “MBSE Challenge” team
- Available under GPL licensing



# Source Model Characteristics

Model Organization	
MagicDraw version	17.0.5
UML version	2.4.1
SysML version	1.3
MagicDraw project files (.mdzip) (not including MagicDraw model library files)	APE System Model, APE_PartsCatalogue, RequirementsBoilerPlates, SE2Definitions, SE2QFTP, SE2Profile
MagicDraw-provided model libraries/profiles used	QUADV, SIDefinitions, SI ValueType Library, SimulationProfile, SysML Profile, UML Standard Profile, Free Form Elements Profile
Additional MagicDraw customizations used	SysML, Requirements, ViewsViewpoints
Model Statistics	
Total number of model elements	18,560
Number of SysML requirements	114
Number of SysML blocks (not constraint blocks)	224
Number of SysML constraint blocks (parametrics)	53
Number of SysML value types/quantity kinds	75
Number of SysML flow specifications	19
Number of UML use cases	18
Number of UML classes (not blocks or requirements)	191
Number of UML associations	328
Number of UML enumerations (not value types)	5
Number of UML Interfaces (not flow specifications)	6
Number of UML state machines	2
Number of UML activities	57
Number of UML interactions	20

# Model Development

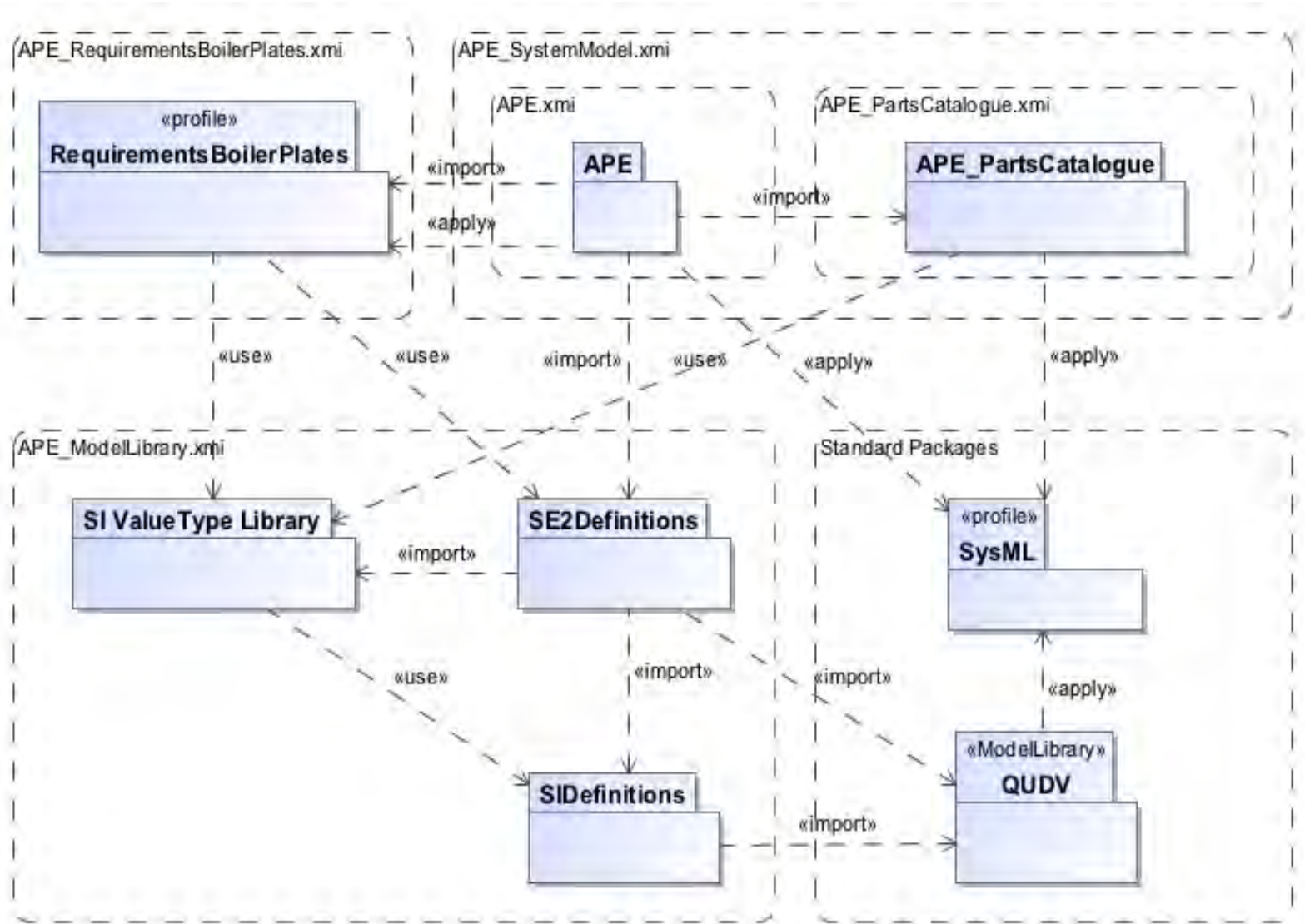
- Migrated to UML 2.5 / SysML 1.4 (MagicDraw 18.3)
- Removed MagicDraw specifics
- Moved diagrams into a separate package
- Exported model (other than diagrams) to multiple "clean" XMI 2.5.1 format files



# Model Development Issues

- MagicDraw-specific customizations for SysML
- Non-normative XMI IDs in MagicDraw versions of standard model files
- Behavioral diagram ownership
- Exporting multi-file models

# Delivered Model Organization



# Delivered Model Characteristics

Model Organization	
XMI version	2.5.1
UML version	2.5
SysML version	1.4
Individual model files (.xmi) (not including standard model library/profile files)	APE_SystemModel, APE, APE_PartsCatalogue, APE_RequirementsBoilerPlates, APE_ModelLibrary
Model libraries/profiles used	QUDV, SysML, StandardProfile
Model Statistics	
Total number of model elements	15,989
Number of SysML requirements	81
Number of SysML blocks (not constraint blocks)	209
Number of SysML constraint blocks (parametrics)	52
Number of SysML value types/quantity kinds	108*
Number of SysML flow specifications	19
Number of UML use cases	18
Number of UML classes (not blocks or requirements)	175
Number of UML associations	239
Number of UML enumerations (not value types)	8*
Number of UML Interfaces (not flow specifications)	6
Number of UML state machines	2
Number of UML activities	57
Number of UML interactions	20
*These numbers increased due to the inclusion of SIDefinitions and SI Value Type Library in APE_ModelLibrary.	

# Possible Test Scenarios

- ü Import entire model, including all modules
- ü Re-export entire model, as separate modules
- × Modify module in one tool, import into another tool
  - Demonstrate re-integration with other modules
  - Demonstrate re-integration with diagrams
- × Export module with tool-specific extensions, import into another tool, re-export
  - Demonstrate ignoring of unknown extensions
  - Demonstrate preservation of extensions for original tool

# Initial Tools Tested

- No Magic MagicDraw 18.3
- Eclipse Papyrus 1.1.4
- Sparx Systems Enterprise Architect 12.1

# Interoperability Issues

- Import and export of multi-file models
- Clean re-export of modified files
- Resolution of normative URIs to files on the OMG server
- Constructs disallowed in XMI 2.4
  - xmi:version in header and xmi:type on hrefs
- Canonical XMI support

# Some Questions to Consider

- Can modeling tool interoperability be achieved using current model interchange standards?
- If so, how do we resolve the issues with current tooling?
- If not, what might be a better approach?
- In either case, what other kinds of testing would be helpful?