

Tooling with EAST-ADL : Overview

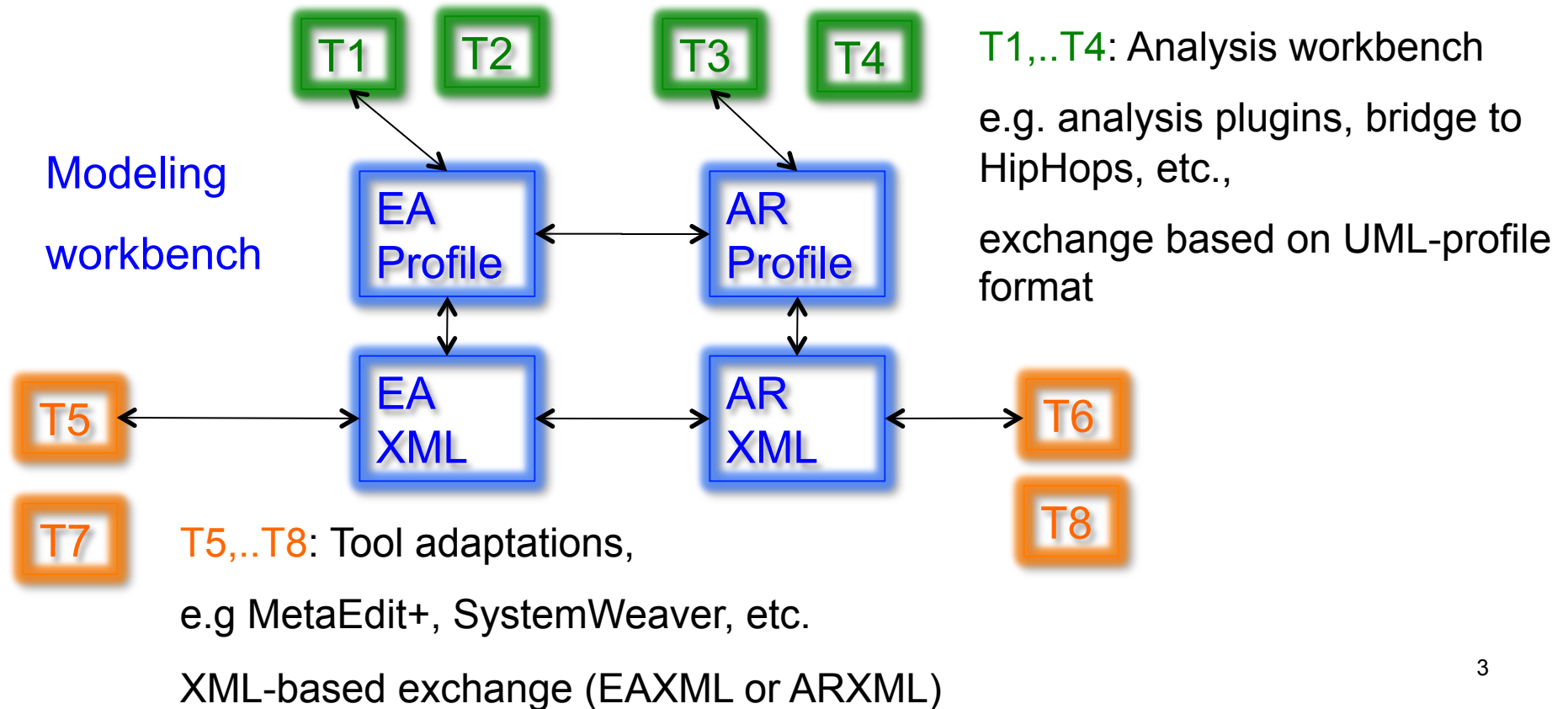
Outline, tooling with EAST-ADL

- Modeling workbench
 - UML-modeling with Papyrus and EAST-ADL profile
- Analysis workbench
 - A set of extra plugins to deal with specifics
- Tool adaptations
 - MetaEdit+
 - System Weaver

Modeling workbench and tool organization

Modeling workbench: provides core modeling functionalities + formats,
mainly UML-profile based+ extra XML format with additional tools

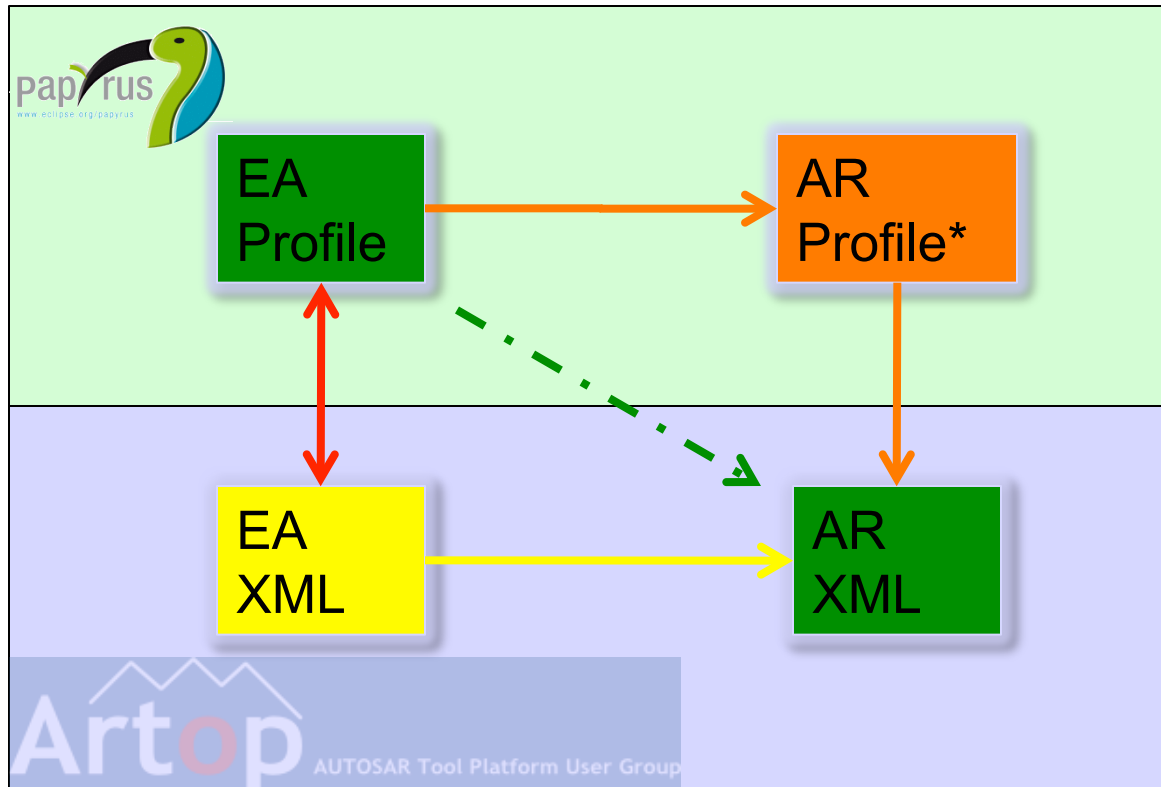
Various entry points are foreseen: either to/from UML+profile or to/from XML



Detailed view of the core modeling workbench

UML+Profile front-end is Papyrus MDT

XML front-end is ARTOP



Green is available

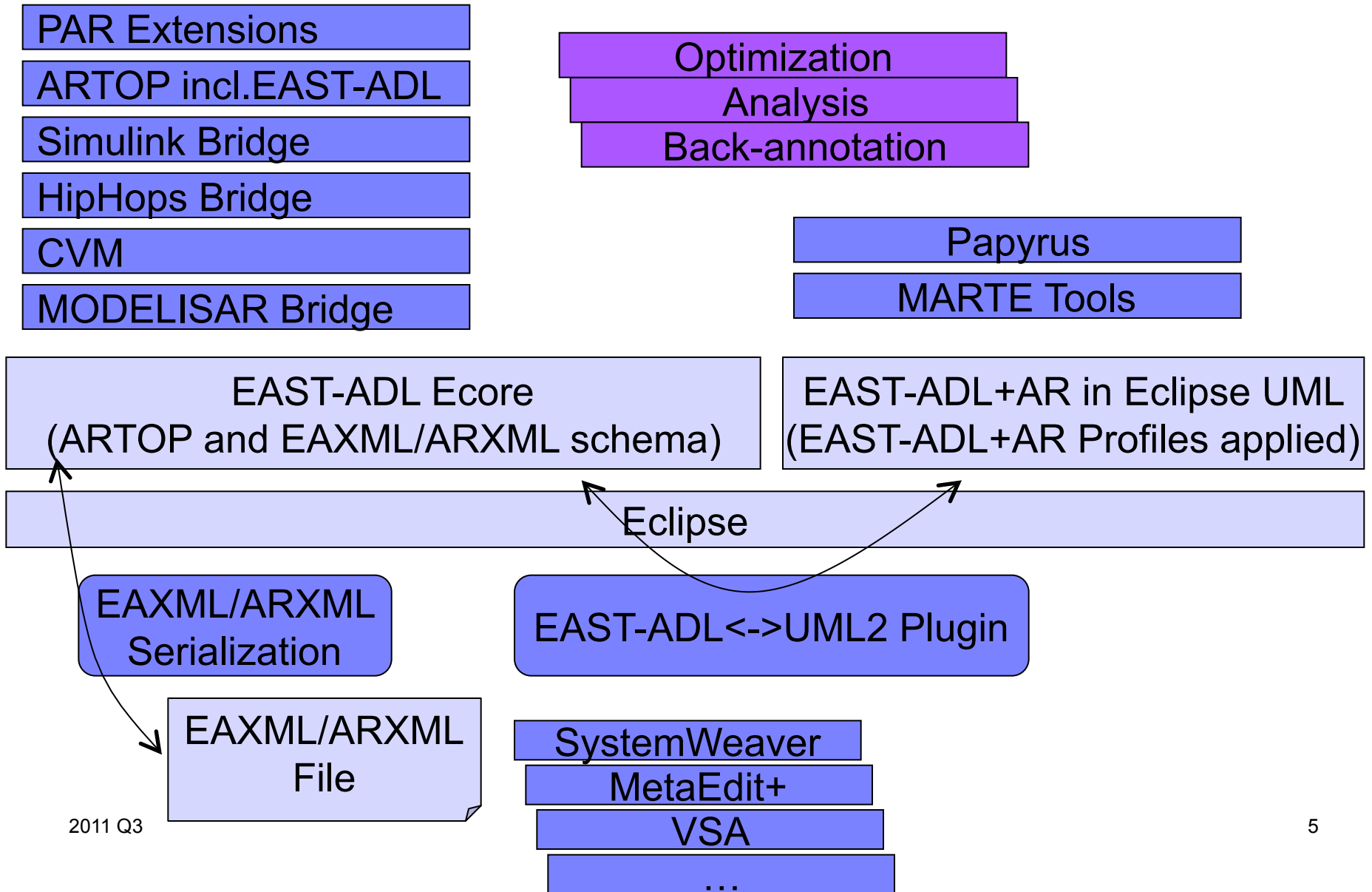
Orange restructuring of AR Gateway (see MAENAD analysis workbench): in addition to EA Profile -> AR XML (dashed green link), we have a two-step transformation relying on AR profile

-Yellow using ARTOP extensions to provide dedicated editor for EAXML and bridge from EAXML to ARXML

-Red is bridge from EA profile to EAXML: **joint effort planned for year 2**

* restricted coverage of AR, to be defined

Satellite plugins and background techno



Papyrus UML tool for EAST-ADL

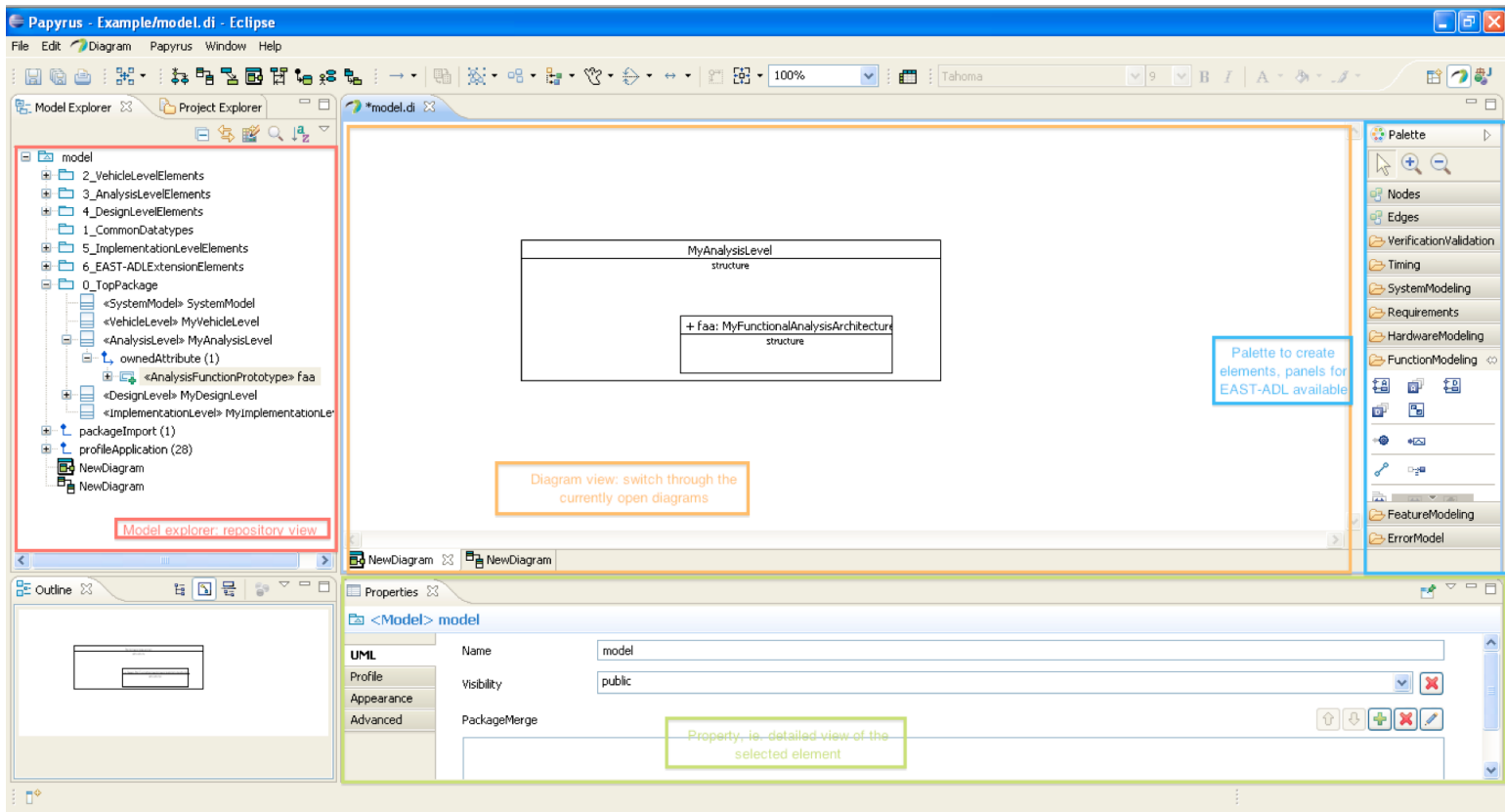
Now an Eclipse MDT project

- Eclipse UML2 compliance
- Full respect of the UML2 standard as defined by the OMG
- Full respect of the DI (OMG Diagram Interchange) standard
- Extendable architecture of Papyrus that allows users to add new diagrams, new code generators, etc.
- Profile development support

Ask MAENAD contact for :

- Complete zip bundle, ready to use
- Tutorials for modeling, plugin development, etc. available

The most important views of a papyrus model



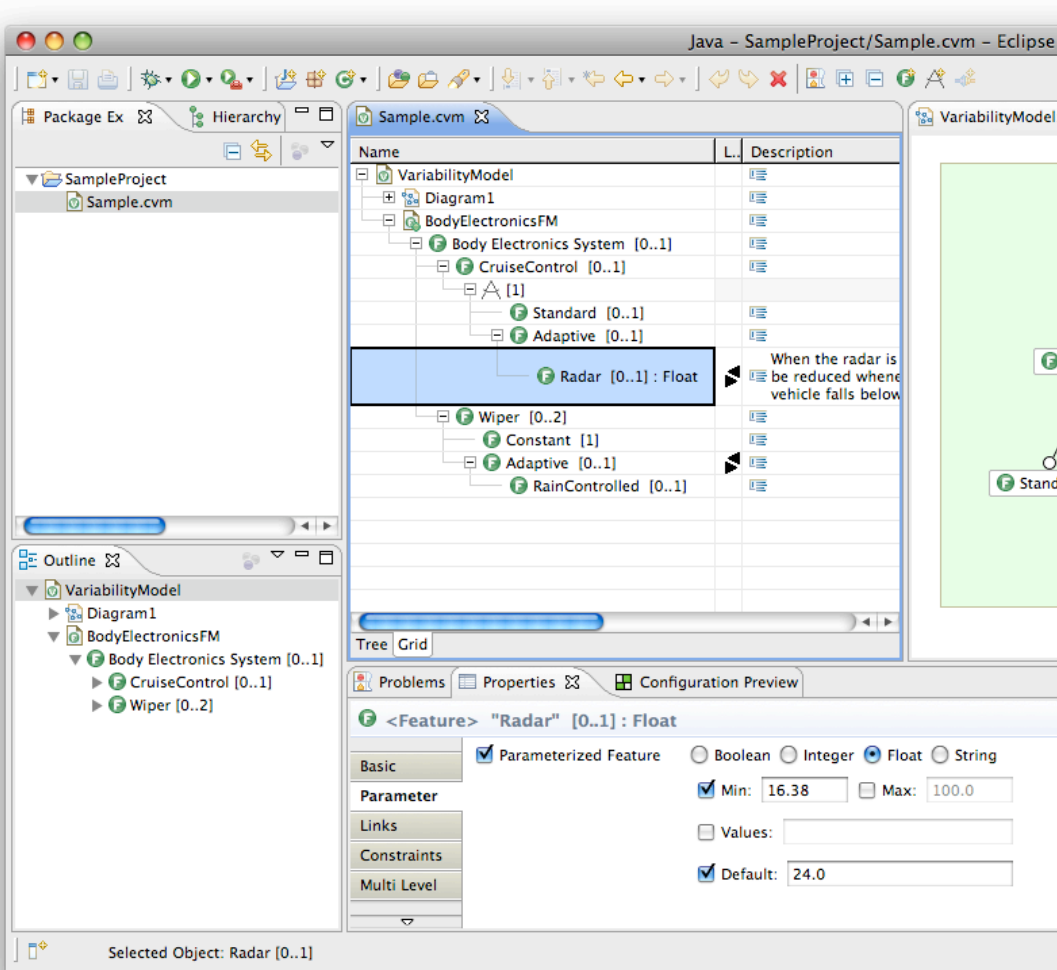
The screenshot displays the Papyrus IDE interface with the following components and annotations:

- Model Explorer (Repository View):** Located on the left, it shows a hierarchical tree of model elements. A red box highlights this view with the annotation "Model explorer: repository view".
- Diagram View:** The central workspace shows a UML class diagram with two classes: "MyAnalysisLevel" (structure) and "+ faa: MyFunctionalAnalysisArchitecture" (structure). An orange box below the diagram is annotated "Diagram view: switch through the currently open diagrams".
- Palette:** Located on the right, it contains various toolbars for creating elements. A blue box highlights it with the annotation "Palette to create elements, panels for EAST-ADL available".
- Properties View:** Located at the bottom right, it shows the properties of the selected element. A green box highlights it with the annotation "Property, i.e. detailed view of the selected element".

MAENAD Analysis workbench (preview)

- A set of dedicated plugins to deal with
 - Modeling issues:
 - e.g. Feature/Variability
 - Model transformation to/from analysis tools
 - e.g. Fault tree analysis with HipHops
 - Model transformation for other design steps
 - e.g. Autosar architecture generation
- ✓ See dedicated concept presentation

Feature/Variability modeling



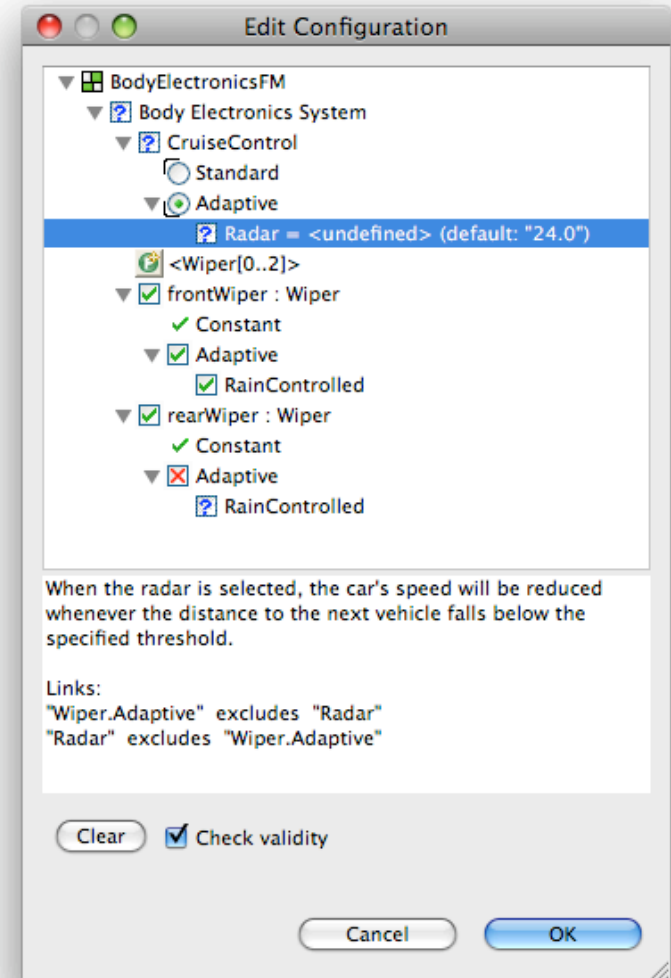
The screenshot shows the Eclipse IDE with a project named 'SampleProject' containing a 'Sample.cvm' file. The main editor displays a 'VariabilityModel' diagram with a tree structure:

- VariabilityModel
 - Diagram1
 - BodyElectronicsFM
 - Body Electronics System [0..1]
 - CruiseControl [0..1]
 - Standard [0..1]
 - Adaptive [0..1]
 - Radar [0..1] : Float
 - Wiper [0..2]
 - Constant [1]
 - Adaptive [0..1]
 - RainControlled [0..1]

The 'Properties' view for the selected 'Radar' feature shows:

- Basic: Parameterized Feature, Boolean, Integer, Float, String
- Parameter: Min: 16.38, Max: 100.0
- Links: Values:
- Constraints: Default: 24.0
- Multi Level:

The description for the Radar feature is: "When the radar is selected, the car's speed will be reduced whenever the distance to the next vehicle falls below the specified threshold."



The 'Edit Configuration' dialog box shows the configuration for the 'BodyElectronicsFM' system. The 'Adaptive' configuration is selected, and the 'Radar' feature is highlighted with a default value of '24.0'.

- BodyElectronicsFM
 - Body Electronics System
 - CruiseControl
 - Standard
 - Adaptive
 - Radar = <undefined> (default: "24.0")

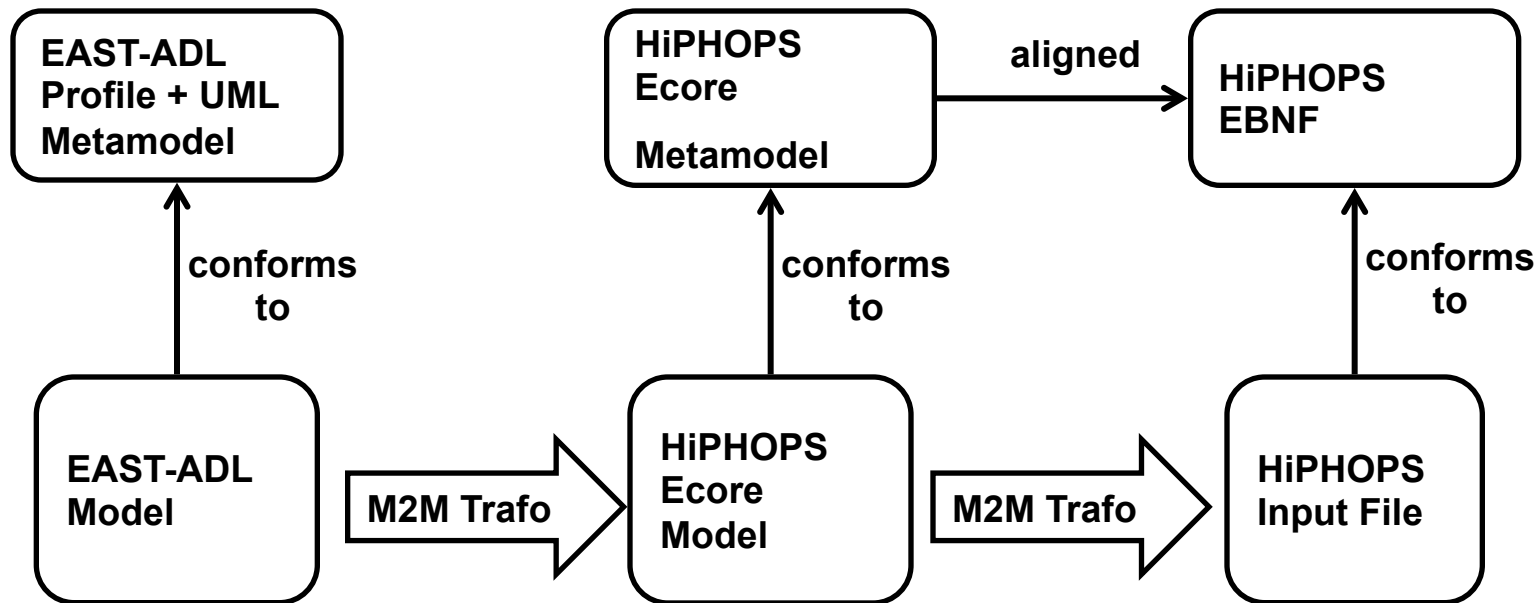
Below the configuration tree, the description for the Radar feature is repeated: "When the radar is selected, the car's speed will be reduced whenever the distance to the next vehicle falls below the specified threshold."

Links:

- "Wiper.Adaptive" excludes "Radar"
- "Radar" excludes "Wiper.Adaptive"

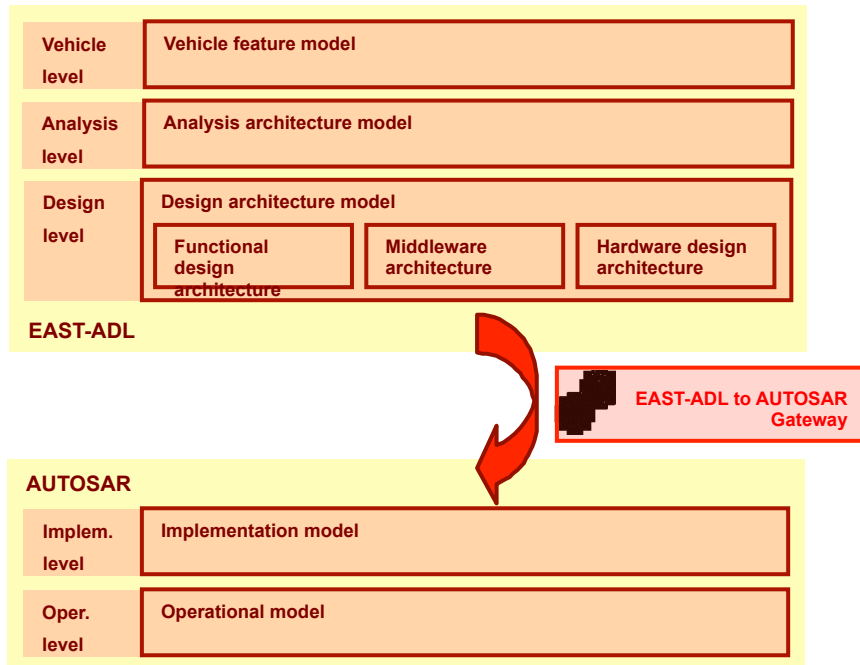
Buttons: Clear, Check validity, Cancel, OK

Safety analysis plugin



- Enable safety analysis with HipHOPS engine

Autosar gateway



- Updates from ATESS2 and EDONA (French System@tic cluster) results

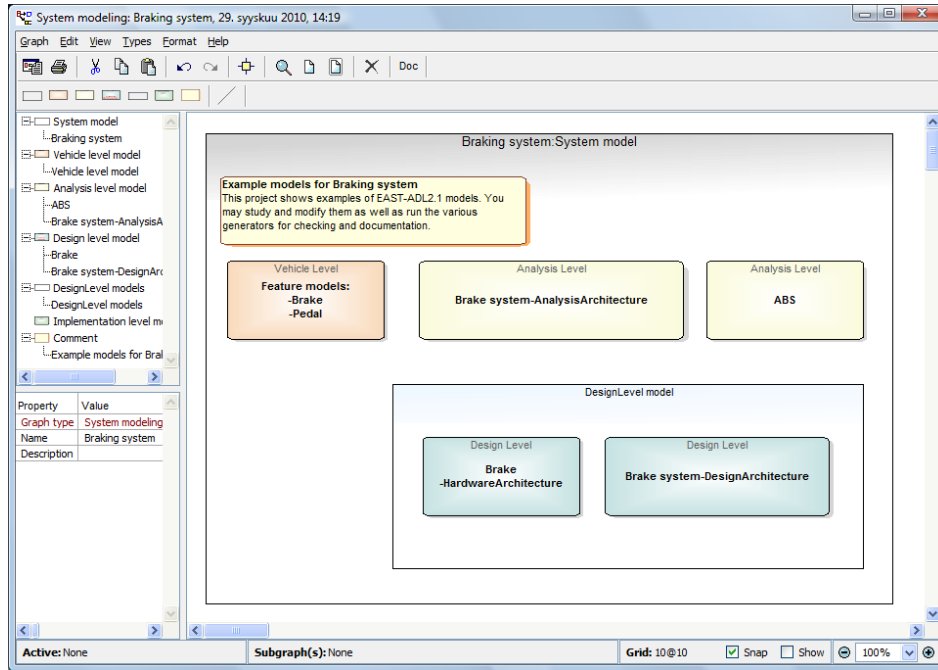
The refinement activity between EAST-ADL and AUTOSAR is:

- Tedious and Repetitive
- Error prone
- Time consuming
- Uneasy as it is necessary to manage AUTOSAR consistency and to make mapping (function / software) choice at the same time
- Automated mapping taking into account allocation constraints and hardware architecture.

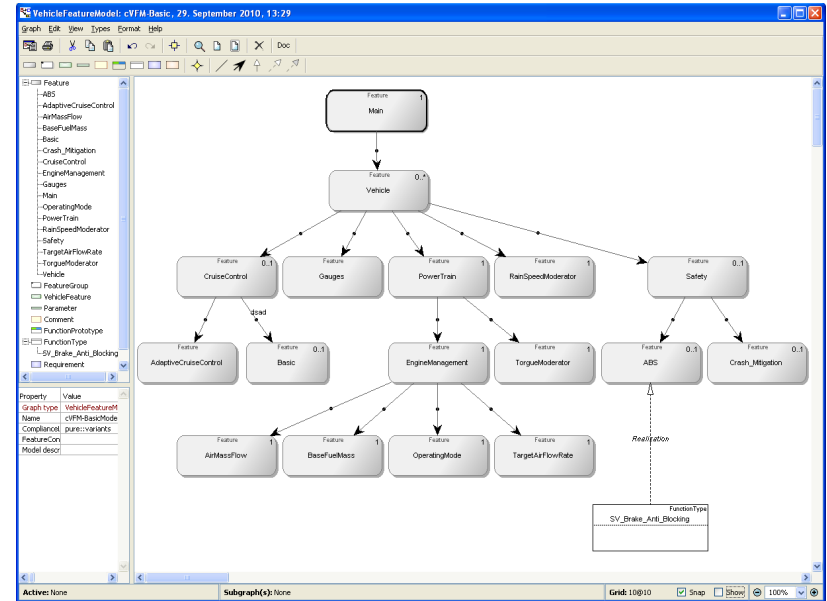
Tool adaptations (preview)

- Tool vendors commitment for EAST-ADL promotion
- Adaptations of existing commercial tools: MetaEdit+, SystemWeaver
- Interoperability based on EAXML format for EAST-ADL models
- Prototyping tool to
 - perform exchange between Modeling workbench and tool adaptations
 - Allow use of analysis workbench outside modeling workbench
- Benefits are:
 - Verification of consistency between profile and metamodel
 - Broaden community use
- ✓ see dedicated concept presentations

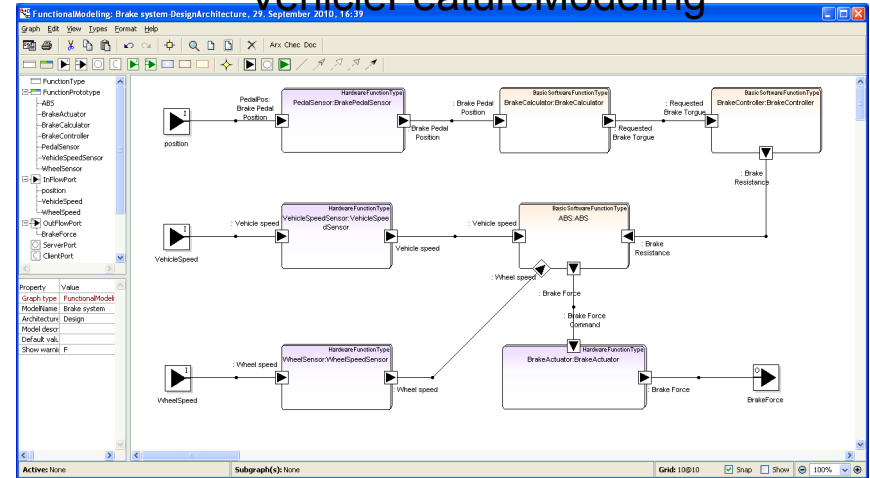
EAST-ADL with MetaEdit+



SystemModeling

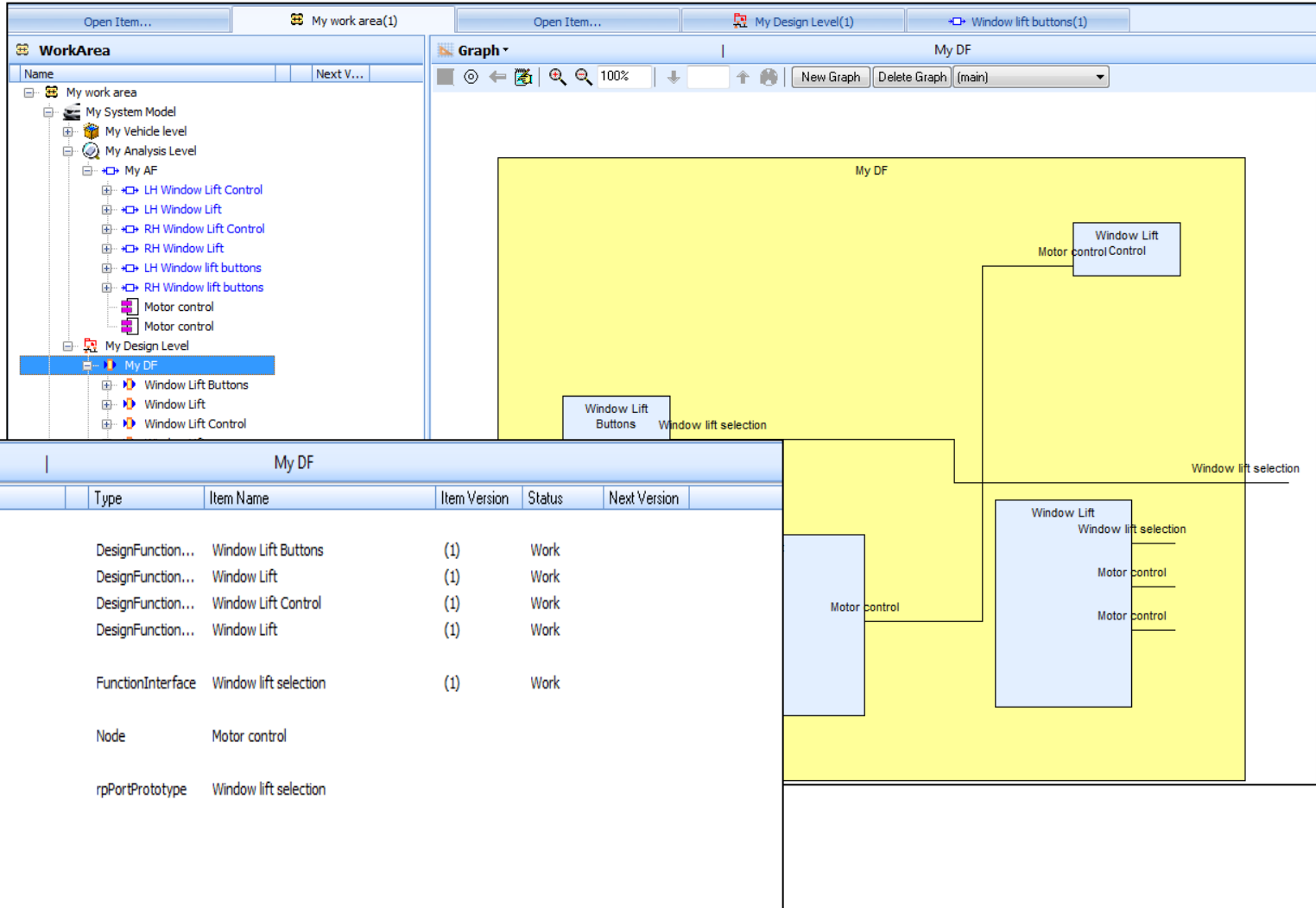


VehicleFeatureModeling



FunctionalDesignArchitecture

EAST-ADL with SystemWeaver



The screenshot displays the SystemWeaver interface with three main panels:

- WorkArea:** A hierarchical tree view showing the project structure. The selected item is 'My DF' (Design Function), which includes components like 'Window Lift Buttons', 'Window Lift', 'Window Lift Control', and 'Motor control'.
- Graph:** A graph view showing the relationships between components. It features a yellow background and several blue boxes representing components: 'Window Lift Buttons', 'Window Lift selection', 'Motor control', and 'Window Lift control Control'. Lines connect these components, indicating their interactions.
- Parts:** A table listing the components and their properties.

#	Part Name	Type	Item Name	Item Version	Status	Next Version
designFunctionPrototype						
1	Window Lift Buttons	DesignFunction...	Window Lift Buttons	(1)	Work	
2	Window Lift	DesignFunction...	Window Lift	(1)	Work	
3	Window Lift Control	DesignFunction...	Window Lift Control	(1)	Work	
4	Window Lift	DesignFunction...	Window Lift	(1)	Work	
rpPortPrototype						
1	Window lift selection	FunctionInterface	Window lift selection	(1)	Work	
assembly FunctionConnector						
1	Motor control	Node	Motor control			
delegation FunctionConnector						
1	Window lift selection	rpPortPrototype	Window lift selection			

Conclusion

- EAST-ADL supports automotive embedded systems modelling “starting” with needs and requirements and “ending” with an AUTOSAR SW architecture
- With maturity of language comes maturity of tools
- New priorities with MAENAD:
 - Interoperability: UML-profile, XML format
 - Analysis and design scenarios with various sets of tools
- ✓ See other concept presentations on Analysis workbench and tool adaptations