AMALTHEA / APP4MC

Agenda

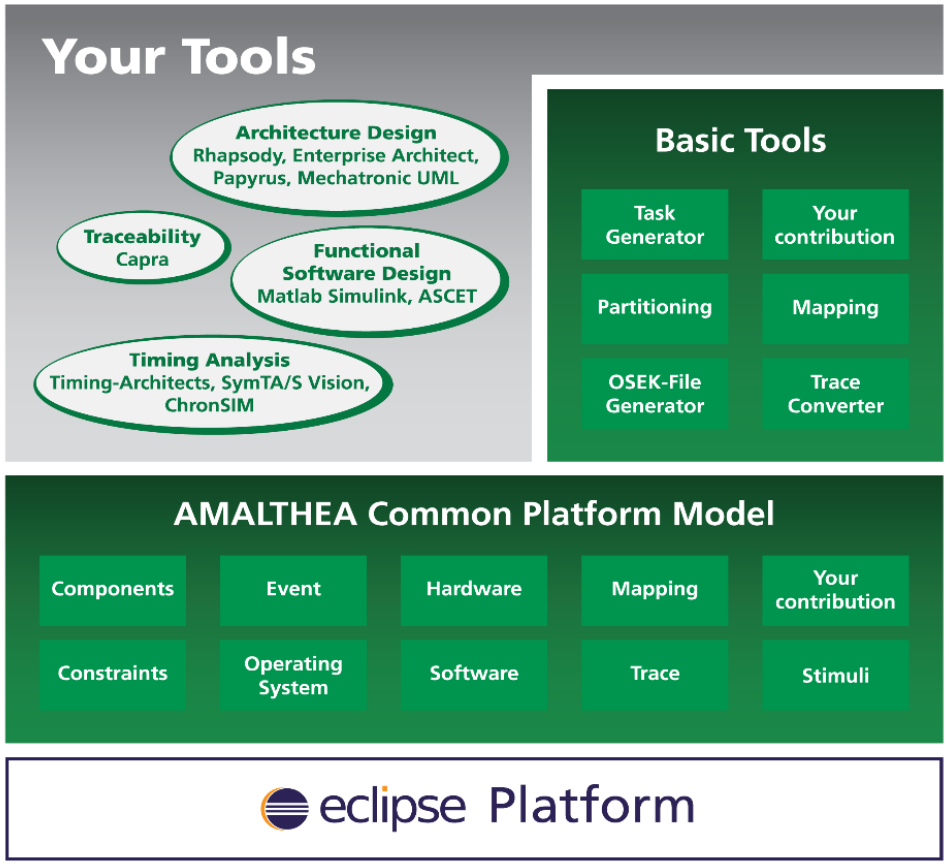
- Introduction
- AMALTHEA Tool Platform – Use Cases
- Amalthea data model overview
- Outlook

Introduction

Eclipse APP4MC
Application **P**latform **P**roject **F**or **M**ulti**C**ore

is an **open source tool platform** for engineering embedded **multi- and many-core software systems**. The platform enables the creation and management of complex tool chains based on a **common data model**, including simulation and validation. As an open platform, it supports **interoperability** and extensibility and unifies **data exchange** in cross-organizational projects.

Tool Platform AMALTHEA / APP4MC
Expandability



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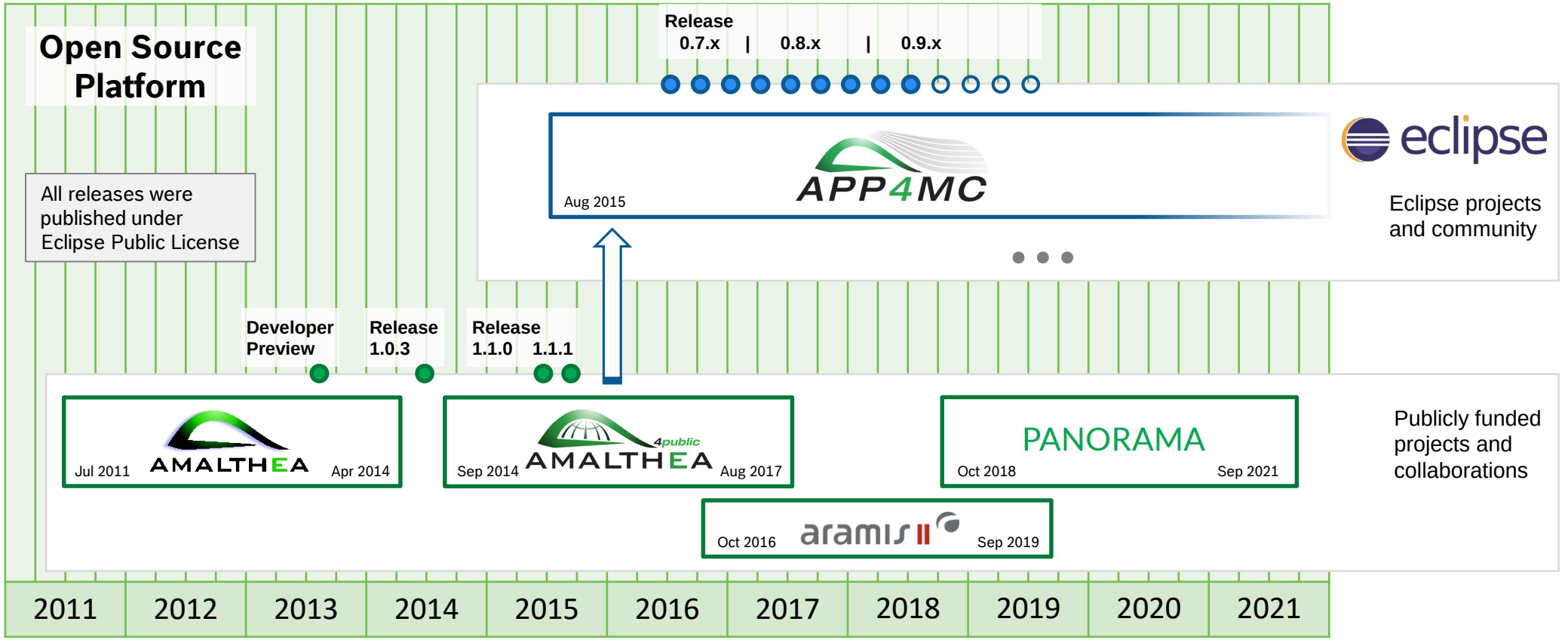
Timeline



www.amalthea-project.org/ www.eclipse.org/app4mc/ www.aramis2.com itea3.org/project/panorama.html

AMALTHEA Tool Platform

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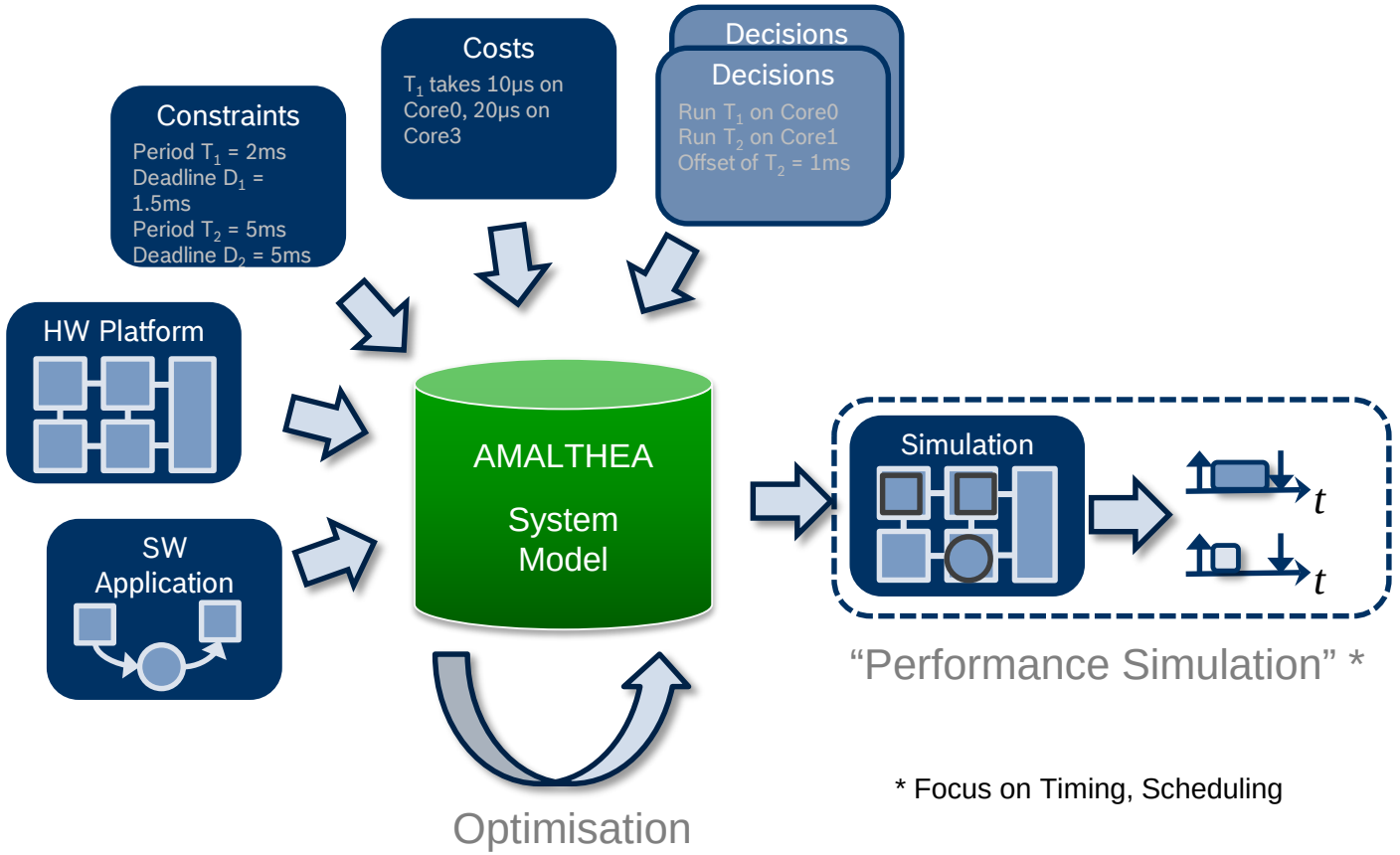
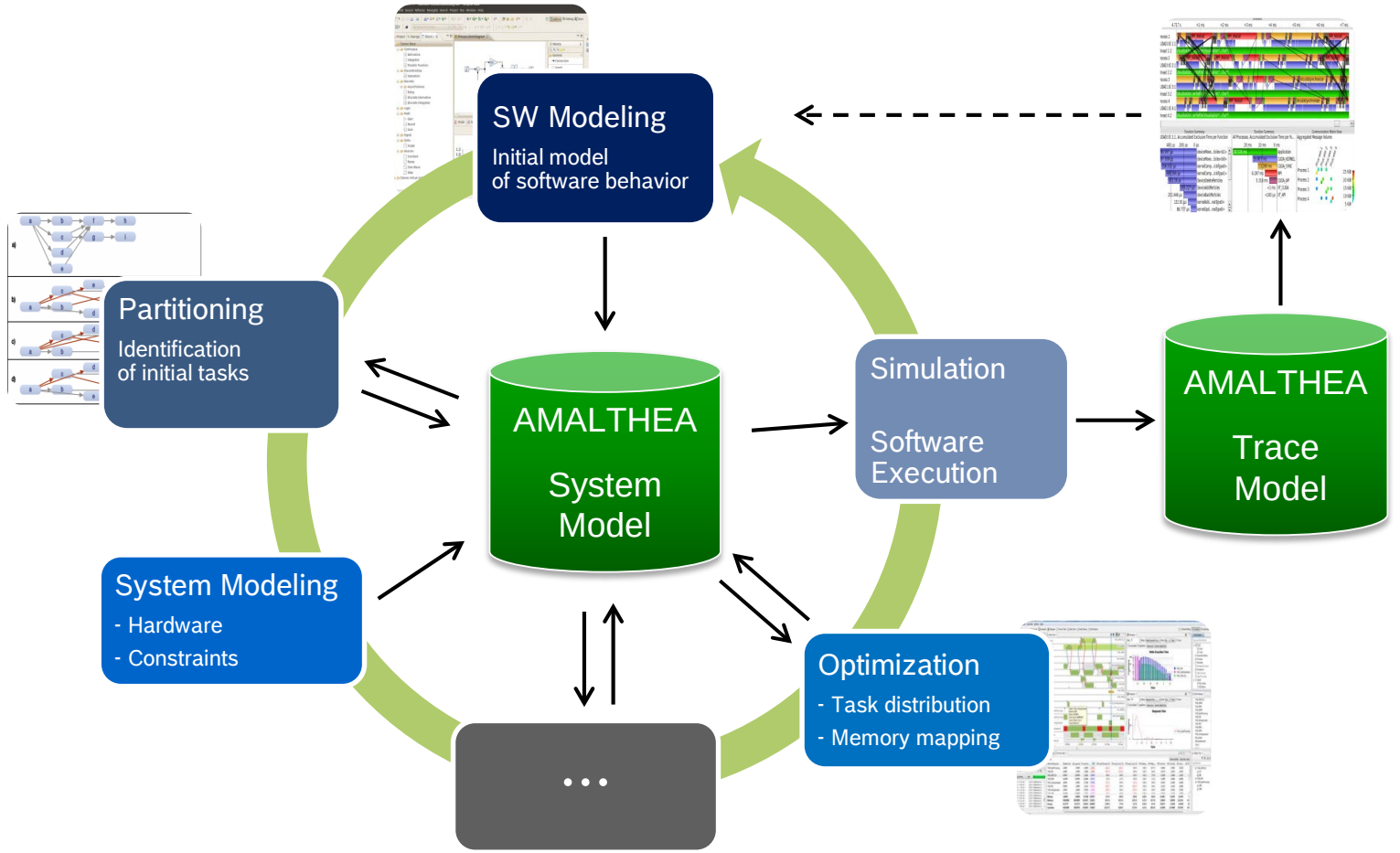
System Model



* Focus on Timing, Scheduling

Tool Platform AMALTHEA / APP4MC
Processing, Simulation and Analysis



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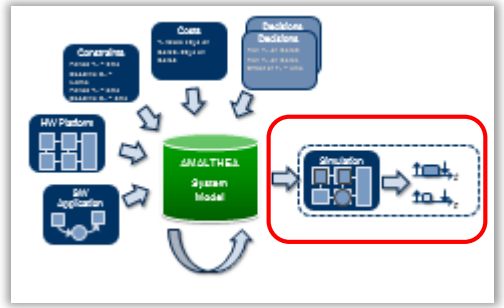
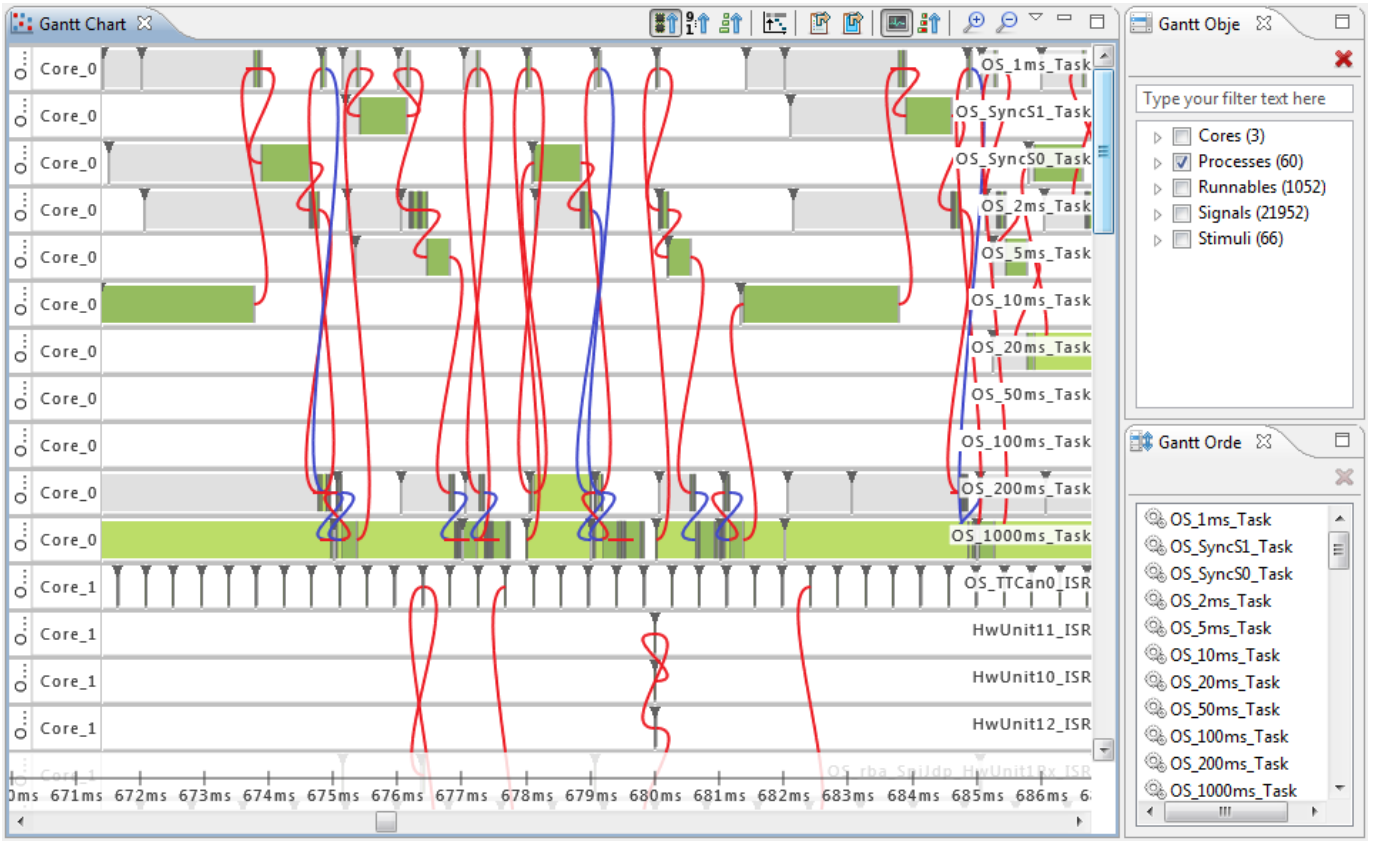
Performance Simulation

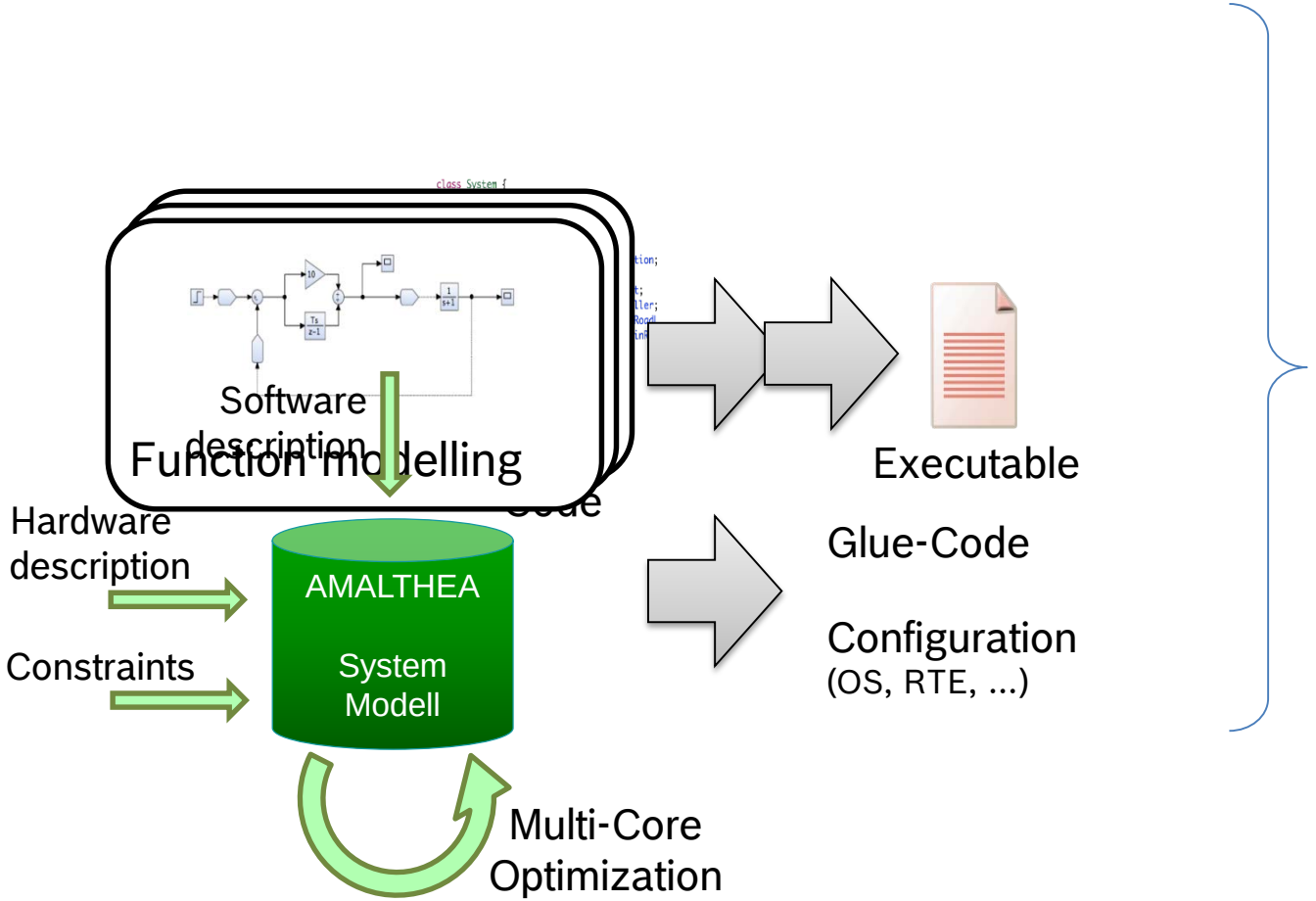




Example of a
timing / scheduling simulation*

*Commercial tool – not part of the open source project

Tool Platform AMALTHEA / APP4MC
Processing, Simulation and Analysis



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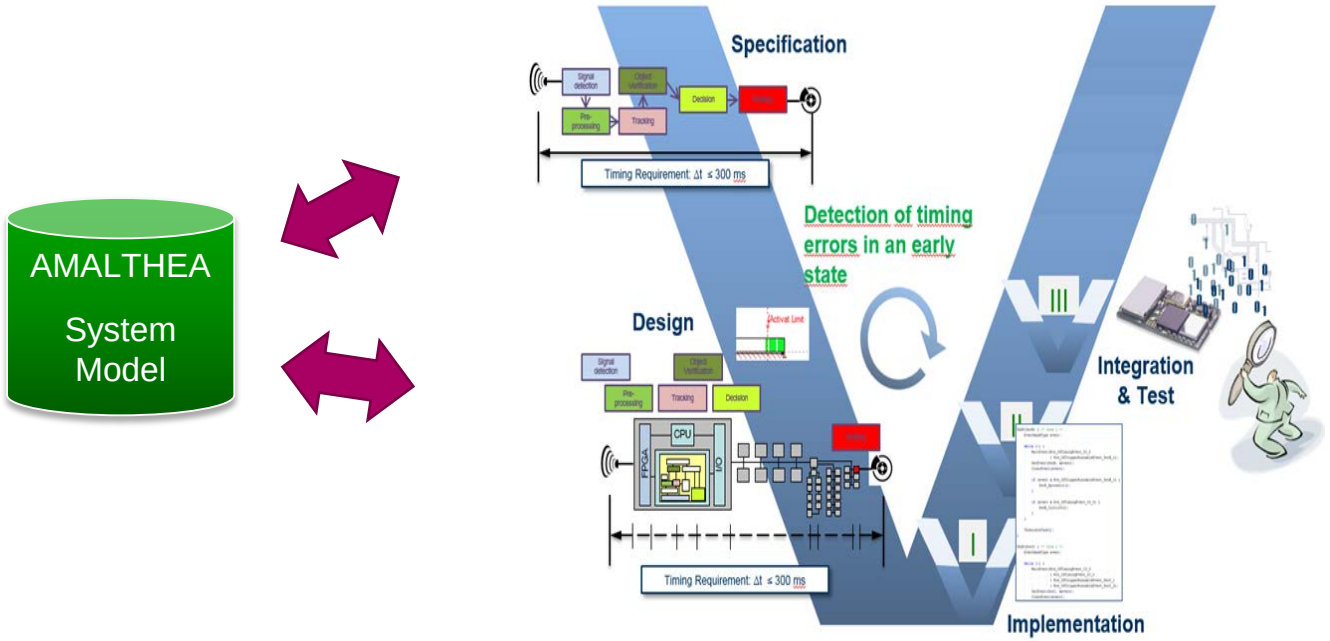
Use cases: Evaluation of alternatives

- Budget planning
- Resource adaptation (speed, interfaces, mapping, memory,…)
- Easy/fast adaptation of architecture



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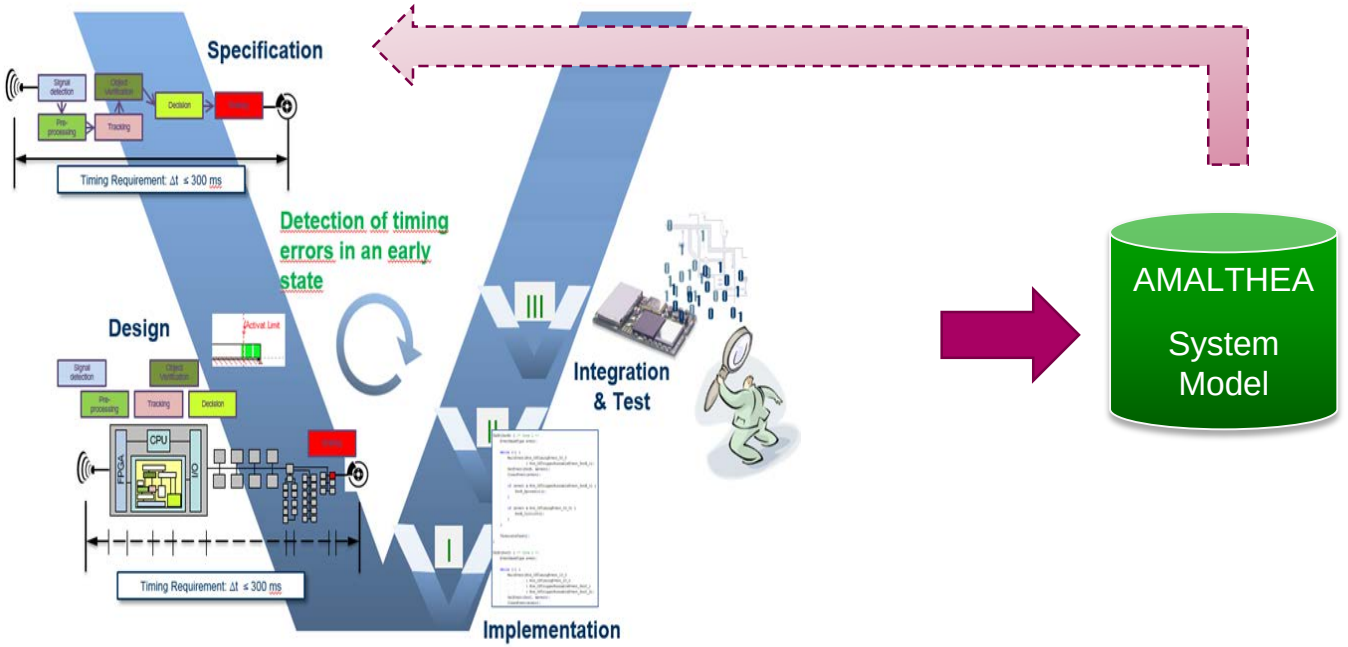
Use cases: optimization

- Performance analysis
- optimization of ECU configuration



Amalthea data models overview

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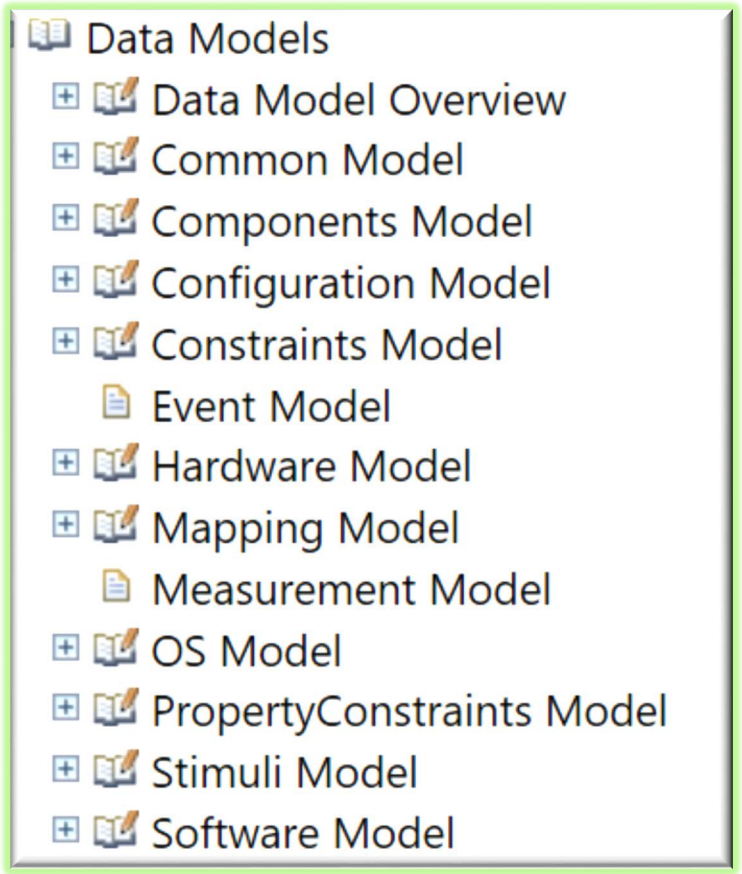
Amalthea data models



- The AMALTHEA data models are related to the activities in a typical design flow
- Focus: Design, implementation and optimization of software for multicore systems

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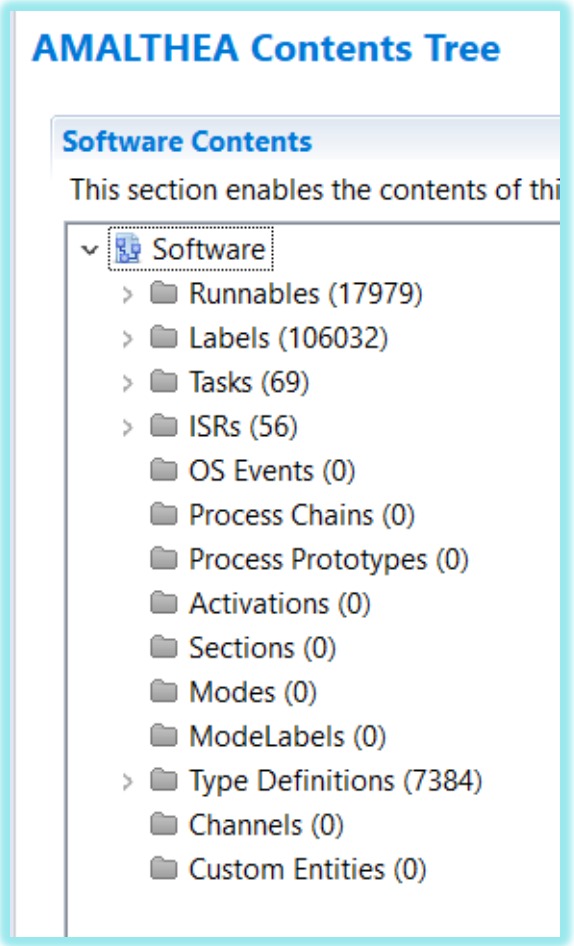
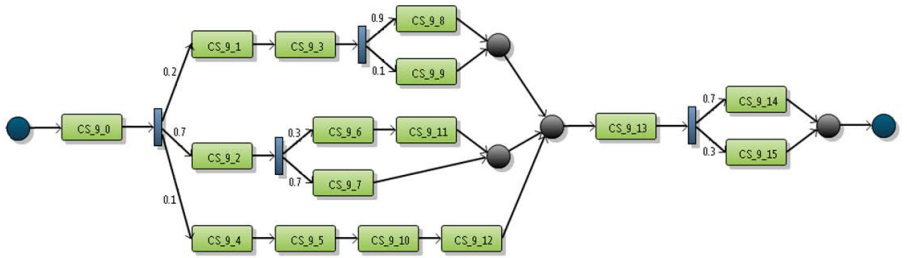
Amalthea – Software Model



- The *Runnable* element is the basic software unit that defines the behavior of the software in terms of runtime and communication. MSR: Process
- Labels are the shared data accessed within the runnable
- Tasks – Runnables are mapped to tasks which are in turn mapped to cores where they are executed
- ISRs – Interrupts

Software Behavior

- Description on different levels of abstraction
- Considering time consumption only
- Including communication statistics
- Adding detailed call sequences (with probability)



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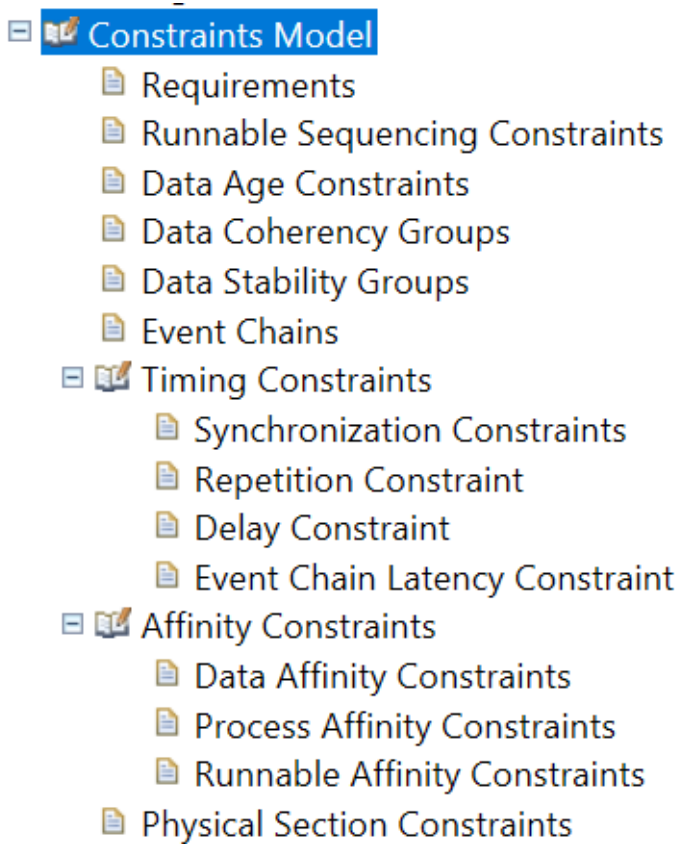
Amalthea – Constraints model



Constraints
Period T_1 = 2ms
Deadline D_1 = 1.5ms
Period T_2 = 5ms
Deadline D_2 = 5ms

- **Runnable Sequencing Constraints**
- **Timing Constraints**
  - Order Constraint
  - Synchronization Constraint
  - Repetition Constraint
  - Delay Constraint

  } based on Events

  - Age Constraint
  - Reaction Constraint

  } based on Event Chains

- **Data Age Constraints**

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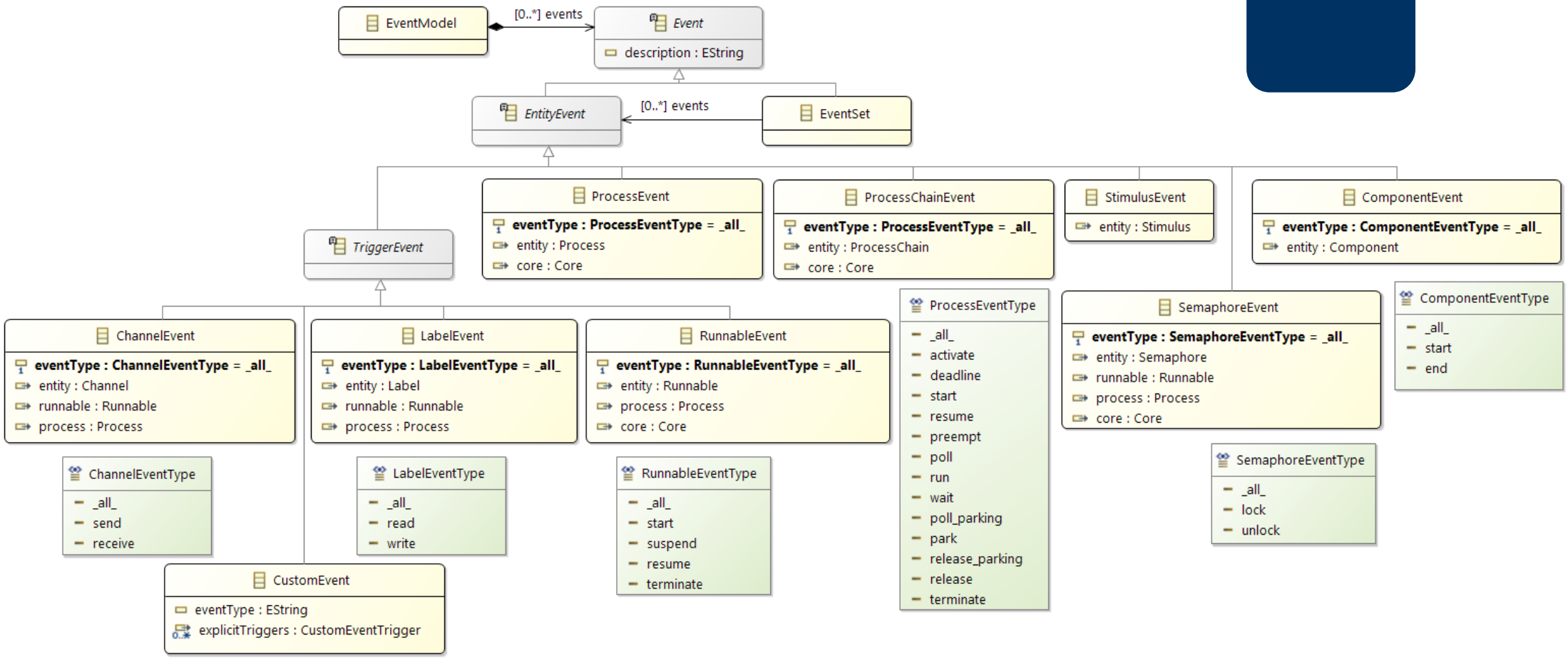
Amalthea – Event model

Events



Outlook

New Publicly Funded Project

PANORAMA

Boosting Design Efficiency for Heterogeneous³ Systems

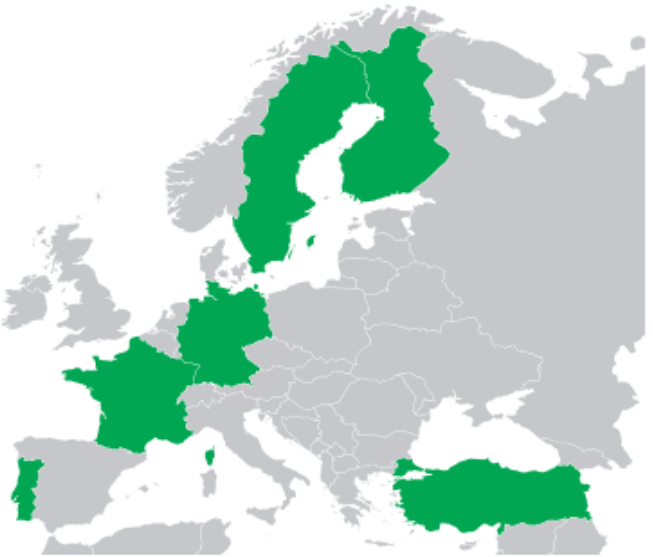
The goal of PANORAMA is to research model-based methods and tools to master development of heterogeneous embedded hardware/software systems in collaboration with diverse and heterogeneous parties by providing best practice, novel analysis approaches, and guidance for development. To that end, the main line of action is geared to extending the scope and interoperability of current system level analysis approaches, particularly by enhancing existing abstract performance meta-models. The enhanced meta-model and the related tool framework will be a common and open platform to support collaborative development.

Project information

Project name	17003 PANORAMA
Status	Labelled
Call	ITEA 3 Call 4
Challenge	Smart engineering
Partners	40
Costs	19,138 k€
Effort	173.96 PY
Countries	Finland
	France
	Germany
	Portugal
	Sweden
	Turkey

Project leader

Robert Bosch GmbH



https://itea3.org/project/panorama.html

BOSCH

Tool Platform AMALTHEA / APP4MC
Summary

Focus is:

- Efficiency increase in development of Multi/Many-core systems
- Tool chain enhancements with respect to continuous workflow, traceability and V&V techniques
- Framework enhancement for safety aspects and standards (ISO26262)
- Exchangeability/reproducibility of development data
- Provision of continuous tool chain platform
  - Open source
  - Eclipse based
  - Open for third party products
- AUTOSAR compatibility
- Establishment of development and user community

Thanks for your attention

Please visit us at:
www.amalthea-project.org or http://projects.eclipse.org/projects/technology.app4mc