Beyond Autosar: Challenges and directions

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Embedded systems model based (integration) approaches

All in one ~ multi-paradigm modeling

E.g. UML2 and profiles

Architectural design

Model and tool integration approaches

Mechanics

E.g. co-simulation, transformations

Information/configuration management approaches

E.g. PDM/SCM+new tools

Hardware

Software & hardware: Component based development

Integrati

E.g. AADL, Autosar, …

Immature; Convergence?

Timing and safety/reliability

Timing issues
- Researched intensively - still open issues
- Key issue: adapt and transfer techniques to industry

Safety and reliability issues are more open
- Safety is system related
- Reliability is related to components
- Division of responsibilities: Architecture / components
  o Error detection, error diagnosis, error handling
- Design assumptions
- Hardware/software dependencies
- Test profiles
- Requirements& properties to state for components?

Has to consider functional level for design & reuse
- SW component level is insufficient

Concerns related to Autosar

Lack of systematic modeling and analysis
- Non-functional aspects: e.g. timing, fault-propagation, other design assumptions – required and actual behavior
- Functional reference architecture
  - To enable functional integration and to avoid feature interaction

Structured information management including software
- A fundamental enabler for analysis
- Development/production/maintenance, PDM/SCM
- Domain tool integration

Elaborated design methodologies
- Optimization, dependencies/trade-offs in the design-flow
- Systematic analysis

Dynamic configuration
- Modes, fault tolerance, upgrades, integration

Directions towards solutions

Open up Autosar

This is the time to join forces between academia and industry to incorporate timing models into Autosar

Needs to consider solutions e.g. from

- MARTE, AADL, timing analysis communities

Different timing requirements for different automotive applications/domains have to be considered

Handling of timing:

Timing requirements established/derived from system (functional) level requirements

Implementation requirements/design can be established through synthesis or

by implementation design followed by analysis, and subsequent iterations