

## **Bachelor Project:**

### **Assessment of Modeling Languages for Automotive Software Engineering**

In order to assess the modeling languages UML 2.1, SysML and UML-RT parts of the AUTOSAR architecture shall be modeled in each language. Based on the gained experience, the three languages shall be compared and advantages / disadvantages identified.

The project activities should be comparable to the base practices (BP) defined by the Software Process Improvement and Capability Determination (SPICE) model, to ensure that the results are meaningful in industrial practice.

- BP1: Develop software architectural design.  
Use the functional and non-functional software requirements to develop a software architecture that describes the top-level structure and all the software components including software components available for reuse.
- BP2: Allocate software requirements.  
Allocate all software requirements to the components of the software architectural design.
- BP3: Define interfaces.  
Identify, develop and document the internal interfaces between the software components and external interfaces of the software components. [Outcome 3]
- BP4: Describe dynamic behavior.  
Evaluate and document the dynamic behavior of and interaction between software components.
- BP5: Define resource consumption objectives.  
Determine and document the resource consumption objectives for all software components.
- BP6: Develop detailed design.  
Decompose the software architectural design into a detailed design for each software component describing all software units and their interfaces.
- BP7: Develop Verification Criteria.  
Define the verification criteria for each component concerning their dynamic behavior, interfaces and resource consumption based on the software architectural design.
- BP8: Verify Software Design.  
Ensure that the software design meets all software requirements.
- BP9: Ensure consistency and bilateral traceability of software requirements to software architectural design.  
Ensure consistency of software requirements including verification criteria to software architectural design including verification criteria. Consistency is supported by establishing and maintaining bilateral traceability between the software requirements including verification criteria and software architectural design including verification

criteria.

- BP10: Ensure consistency and bilateral traceability of software architectural design to software detailed design.

Ensure consistency of software architectural design including verification criteria to software detailed design including verification criteria. Consistency is supported by establishing and maintaining bilateral traceability between the software architectural design including verification criteria and software detailed design including verification criteria.

Note: BP5, BP10 cannot be done in this setting due to missing work products.

One of the following AUTOSAR parts shall be modeled:

- Diagnostic Services (low complexity)
- Memory Stack (medium complexity)
- Communication Stack (high complexity)

The corresponding AUTOSAR specifications (software requirements specifications) are available at <http://www.autosar.org/index.php?p=3&up=1&uup=2&uuup=0>

The proposed tool environment is Enterprise Architect for UML 2.1 and SysML and Rational Rose Realtime for UML-RT.