

## Model-based analysis & engineering of novel architectures for dependable electric vehicles

### Motivation and Objectives

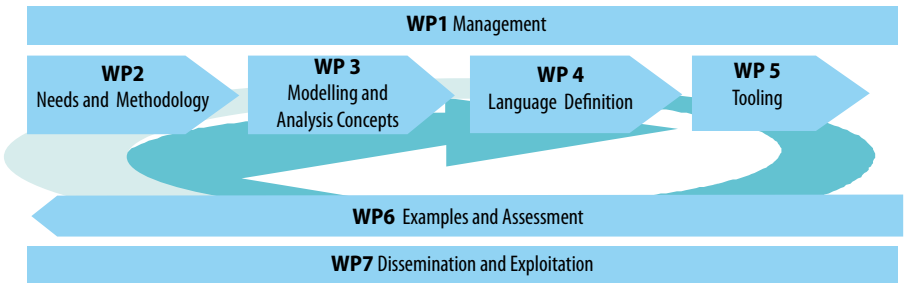
Fully Electrical Vehicles (FEV) pose new challenges to the engineering of electrical and embedded systems. Chassis and powertrain systems will have **more authority, share common resources, and rely less on mechanical backups**. Complex **power management** and **optimization** algorithms are needed to ensure durability of components, high performance, range of travel and low energy consumption. To succeed in meeting these challenges, appropriate engineering support is required.

The objective of MAENAD is to:

- Assist the safety process defined in the ISO 26262 automotive safety standard,
- Provide effective prediction of quality attributes (dependability and performance),
- Provide tool support for the automated exploration of design spaces (dependability, performance and cost optimization).

### Project Plan, Milestones and Deliverables

The project will provide modelling concepts and tooling based on identified engineering needs and a methodology defined in the project. An electrical vehicle will be used to assess and provide feedback on project results.



### Technical Approach

- Identifying engineers' needs regarding **development, verification and validation** of FEV systems.
- Definition of a **methodology** for using EAST-ADL in the context of FEV.
- Refining **EAST-ADL** to meet identified engineering needs and methodology.
- Definition of an EAST-ADL domain language metamodel according to **AUTOSAR**.
- Definition of an EAST-ADL **UML profile** and AUTOSAR compliant **XML exchange format**.
- Development and refinement of **tools** for supporting EAST-ADL.
- **Validation** of concepts and tools on prototype electrical vehicle.

## EAST-ADL



### Achievements

- Identification of requirements for modelling support for ISO26262 and relevant FEV standards.
- Identification of methodology elements supporting ISO26262 in an EAST-ADL context.
- Tool development for EAST-ADL based on Papyrus UML, SystemWeaver and MetaEdit+.
- Analysis and synthesis tooling including FTA/FMEA, ASIL decomposition and AUTOSAR generation.
- Modelling examples illustrating FEV and safety concerns.

Budget	4 M€	Funding	2 M€
Duration	36 months	Start	September 2010
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