



INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT



ITEA 2 – 06005: TIMMO Timing Model

The TIMMO Project

STANDRTS'2009
Tuesday, 30 June 2009

The TIMMO Project Team



- **Three important projects / concepts:**
 - TIMMO
 - AUTOSAR
 - EAST-ADL2

- **The Big Picture:**
 - How do these parts fit together

- **TIMING IS A CHALLENGE IN IN-CAR EMBEDDED SYSTEMS**

- Innovations in the automotive industry are largely based on complex distributed embedded systems with real-time constraints.
- System communication is a complex undertaking because of different nature and urgency of signals.
- Today, timing behaviour is mostly addressed by measuring and testing late in the development process - results are hard to predict.
- New complex and innovative features in vehicles require a predictable development process including timing constraints from the very beginning.

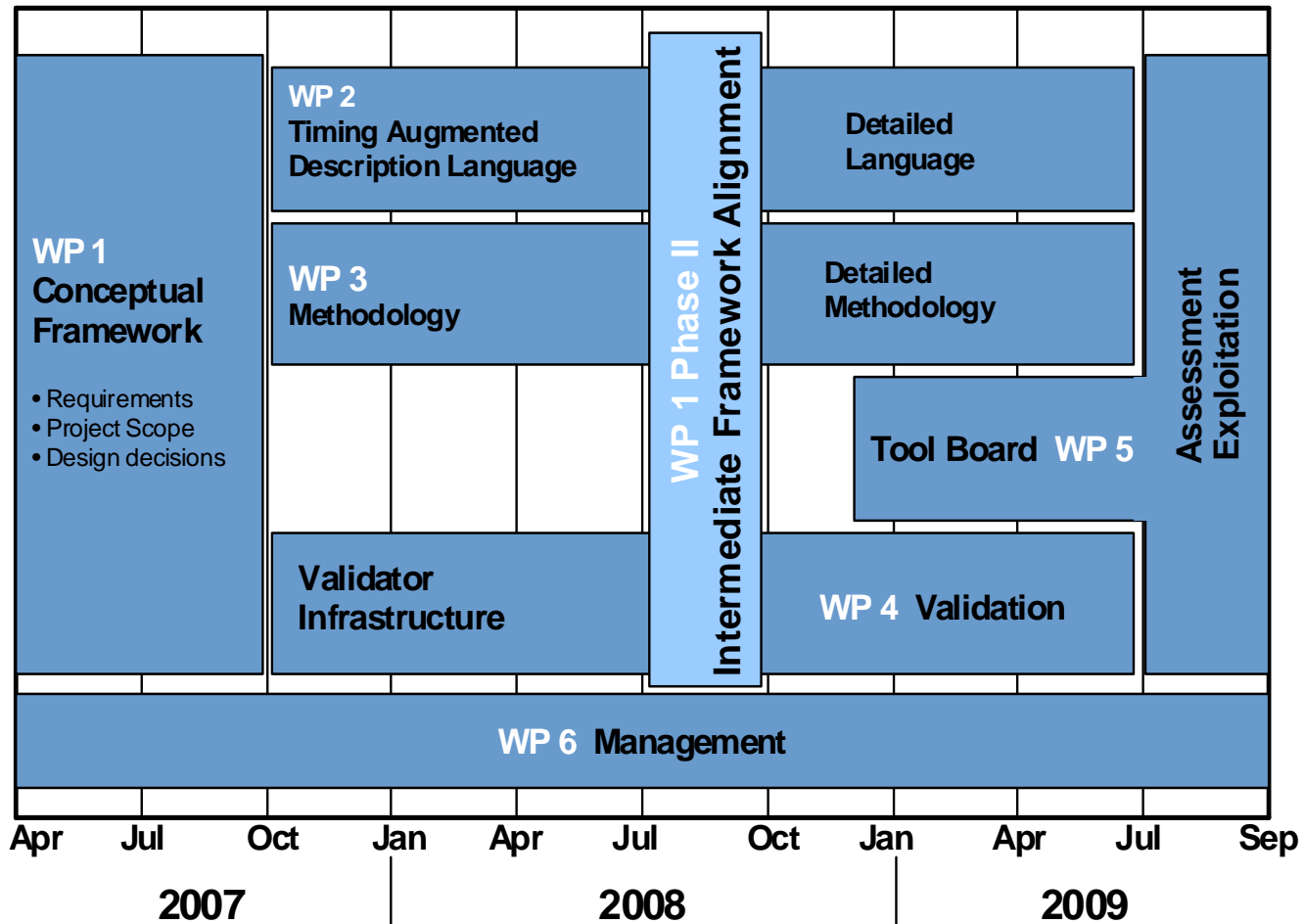




- **Formal and standardised specification, analysis, and verification of timing constraints**
 - across all levels of abstraction and
 - across all development phases
- **Improved and predictable development cycle**
 - timing can be addressed early in the development process

- Modelling Language for Timing
 - for modelling aspects like hardware resources, time consuming elements, relationships between such elements, and timing constraints
 - Timing Augmented Description Language (*TADL*), based on EAST-ADL
- Methodology
 - describe the steps that have to be followed during the different design stages and on the different levels of abstraction
 - developed with Eclipse Process Framework (*EPF*)
- Validation
 - show the applicability of language and methodology
 - prototype developments of use cases and scenarios

Work Plan



Project Facts



- **ITEA2 Project**
- **Project Duration:**
 - April 2007 – September 2009
- **Consortium:**
 - Audi, Volvo Technology, VW/Carmeq
 - Bosch, Continental, Denso Europe, ZF
 - ETAS, Mentor Graphics, Symtavision, TTTech
 - CEA-LIST, Chalmers University, C-LAB
- **Countries involved;**
 - Austria, France, Germany, Netherlands, Sweden
- **Budget: 8,6 Mio €**
- **Website: www.timmo.org**

Results so far

WP2



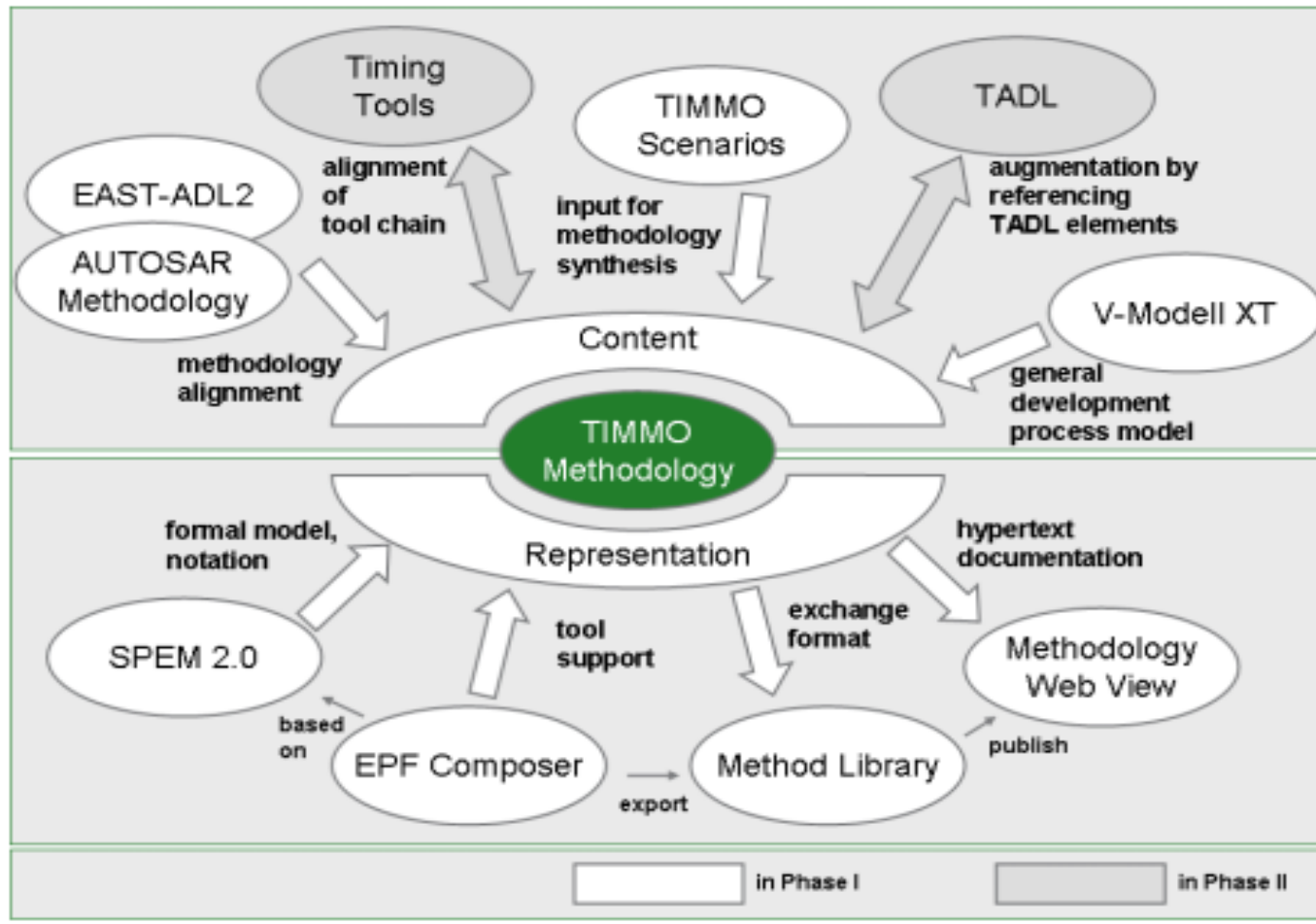
- 1st Version of the TADL officially released July 2008 (UML meta model)
- Language modelling: Enterprise Architect Tool
- User modelling: TADL Model Editor provided by Mentor Graphics

Results so far

WP3



Context of TIMMO Methodology development





6 Demonstrators developed by different partners:

- Anti-lock Braking System
- Steer-by-Wire and Active Damping
- Engine Control
- Transmission Control
- Cruise Control & Security System
- Vehicle Dynamics Control

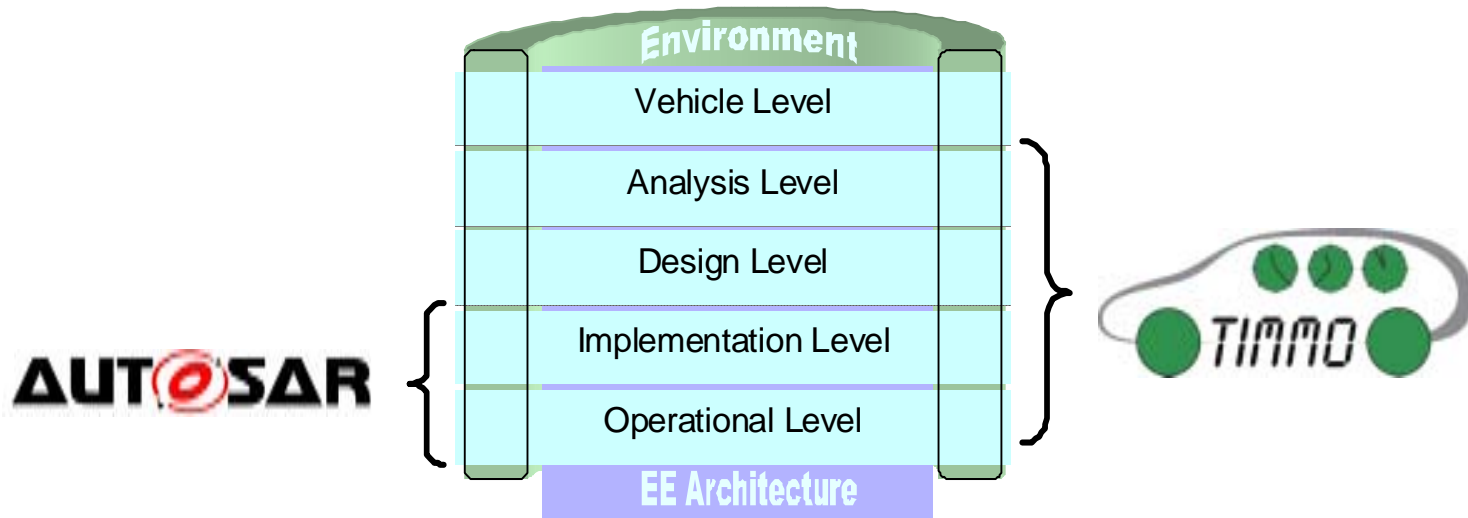


- AUTOSAR
 - TIMMO Timing Model aligned with AUTOSAR
 - AUTOSAR Timing Model (for R4.0) developed in cooperation with TIMMO
 - TIMMO Partners worked in the AUTOSAR Timing Subgroup
 - TIMMO Methodology aligned with AUTOSAR
 - Interest of AUTOSAR Methodology group to cooperate with TIMMO
- ATESST2 / EAST-ADL2
 - TIMMO Timing Model to be part of EAST-ADL2
 - TIMMO Methodology and ATESST2 Methodology shall be aligned

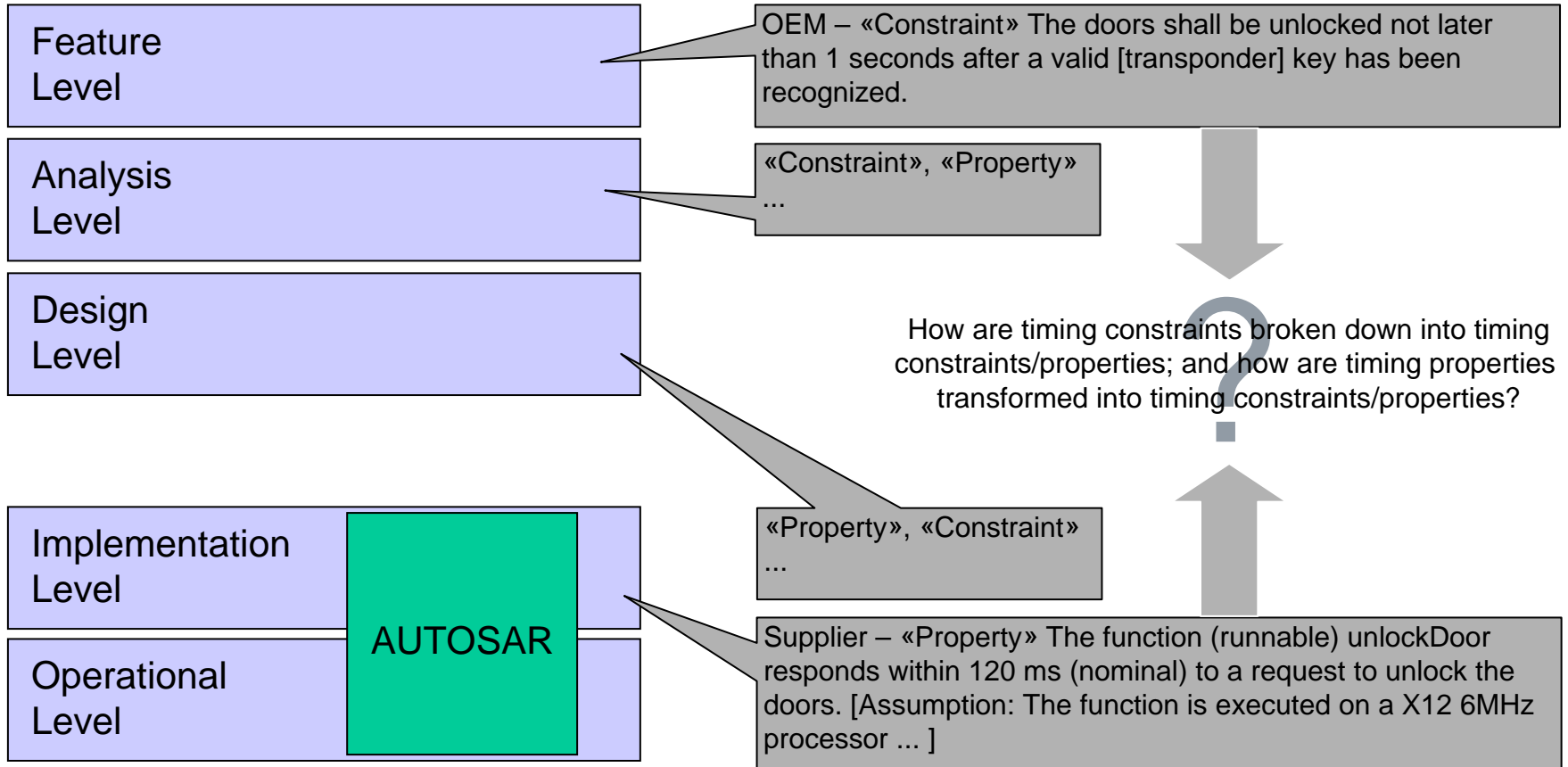
TIMMO, EAST-ADL2, and AUTOSAR



TIMMO covers all abstraction levels of the EAST-ADL2:



AUTOSAR and TIMMO



Level of abstraction

Overall Picture

