NUM@TEC AUTOMOTIVE

edona

SYSTEM@TIC PARIS-REGION Pôle de compétitivité

Open Development Platform to Automotive Standards - *www.edona.fr*

About EDONA
A national tooling project by all the main industrial actors.

Gathering at the national level the totality of the main and large industry actors of the field of automotive embedded software, EDONA is a project of the "System@tic Paris-Région" world class cluster. EDONA aims at facilitating the assembly of seamless tool chains for the development of automotive embedded systems. Modular, interoperable and adaptable to the various needs of the actors and trades of the car industry, it integrates from the start the requirement of compliance to automotive standards, with a particular focus on AUTOSAR (www.autosar.org).

The project is lead by Renault and the form chosen is (1) the creation of a technological platform of reference and then (2) its specialization on business processes of the field. Each specialized development tool chain will result from the following sequence:
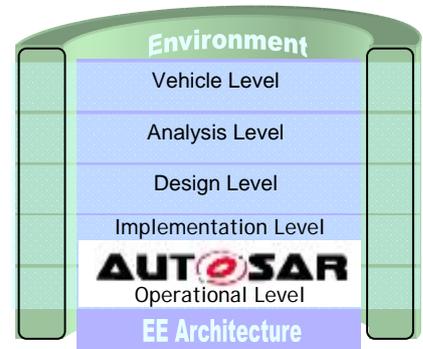
· an expression of needs controlled by a main industry actor particularly interested by the technology and an activity of technology transfer jointly carried out by both research and industry

· a coherent integration allowing to support, by improving them, the existing work processes. Integration uses the platform and extends it with various modules provided by the laboratories and SMEs

· a full-scale experimentation carried out by at least one industrial company for each development tool chains.

See: *EDONA: an Open Integration Platform for Automotive Systems Development Tools.* F. Ougier - Renault, F. Terrier - CEA LIST. In proc. 4th European Congress Embedded Real Time Software (ERTS), Toulouse, France, 29/01/2008

Some of the technology provider projects

• *MeMVaTEx* an ANR national project (www.memvatex.org). Methodology for requirement modelling and traceability.

• *SysPEO* a Eureka European project. Validation tools for Matlab based model and implementations (www.numatec-automotive.com).

• *Gene-Auto* an ITEA European project. Open Source framework for qualified code generation from Matlab/Simulink models (gforge.enseeiht.fr/projects/geneauto).

• *TIMMO* an ITEA European project (www.timmo.org) on specification of timing properties required to design AUTOSAR applications.

More projects and details in our next issues…

What's happening outside?
EAST-ADL 2, a language to describe functional architectures.

The *ATESST* project of the European Community (www.atesst.org) is focussed to support the modelling process from functional description to software component architecture design. Is has developed the EAST-ADL 2 language taking as input the initial proposal issued by the EAST-EEA project, in parallel to the launch of the AUTOSAR initiative. It provides a layered view of the modelling process adapted to the automotive domain.

Environment
Vehicle Level
Analysis Level
Design Level
Implementation Level
AUTOSAR
Operational Level
EE Architecture

EAST-ADL 2 concepts are consolidated and aligned to AUTOSAR compliant designs. This is realized through of a UML profile implemented in Papyrus, an open source Eclipse modeller (www.papyrus-uml.org).
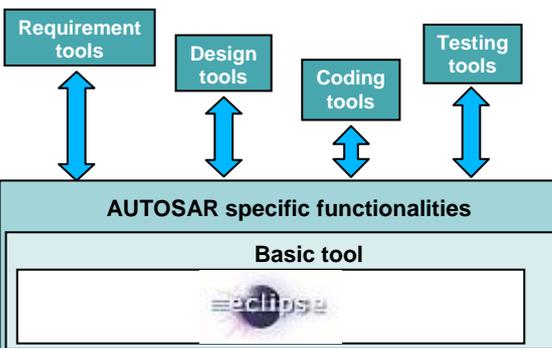
Ongoing works are namely on timing information integration, safety concerns modelling and analysis, and Matlab/Simulink interoperation.

See: *Managing Complexity of Automotive Electronics Using the EAST-ADL.* Ph. Cuenot et al. In proc. 1st IEEE-SEE International Workshop UML and AADL, Auckland, New-Zealand, 2007

The EDONA platform: *A layered architecture based on Eclipse*

Requirement tools
Design tools
Coding tools
Testing tools
AUTOSAR specific functionalities
Basic tool
eclipse

To reduce integration efforts and harmonize modelling features and interaction mechanisms, EDONA is built upon Eclipse.

A set of basic Eclipse components are reused such as EMF model repository, ATL for model transformation, etc.

On this layer, automotive dedicated technologies are integrated: namely, an AUTOSAR reference meta-model and various facilities such as multi-file storage of AUTOSAR models and model validation.

High level tools (either open source or commercial) are integrated at the layer corresponding to their use. They cover the whole development process (incl. requirement, design, coding and testing).

Focus on some results

First continuous tool chain for component development

From WP1, Component based modelling:

Continuity of component based development processes is now ensured thanks to the integration of three elements: (1) functional architecture modelling and refinement with EAST-ADL 2 and Papyrus; (2) AUTOSAR configuration with Artop meta-model; (3) translation of EAST-ADL 2 component architecture into AUTOSAR descriptions with the ARGateway. They provide a first tool chain integration from high level modelling down to AUTOSAR software component description, ready for code generation and deployment. It is ensured by:

- conceptual alignment of the lowest level of EAST-ADL 2 modelling with AUTOSAR meta-model and their implementation in Eclipse components, respectively, in the Papyrus UML modeller and in Artop basics.
- model transformation between EAST-ADL 2 descriptions and AUTOSAR implemented using the ATL component of Eclipse.

Technology use case
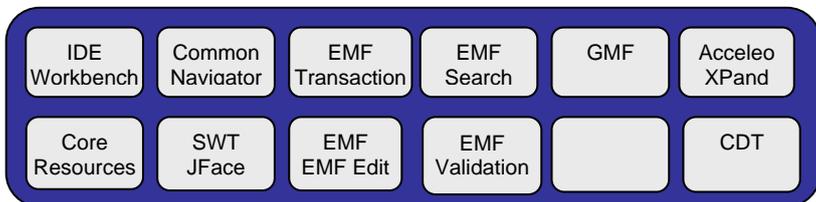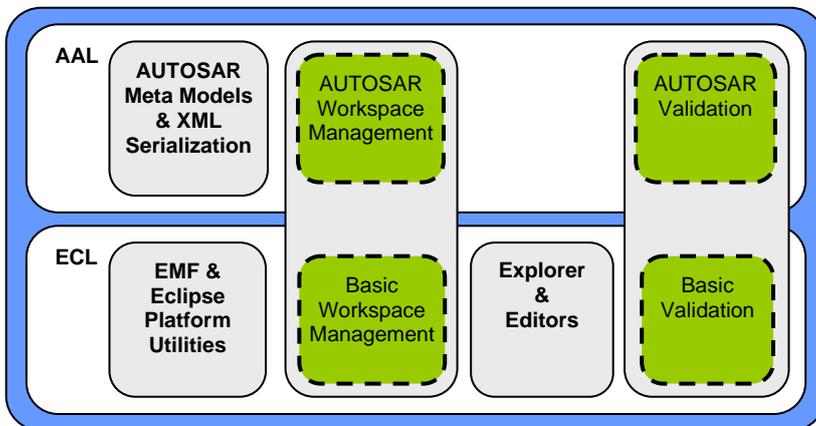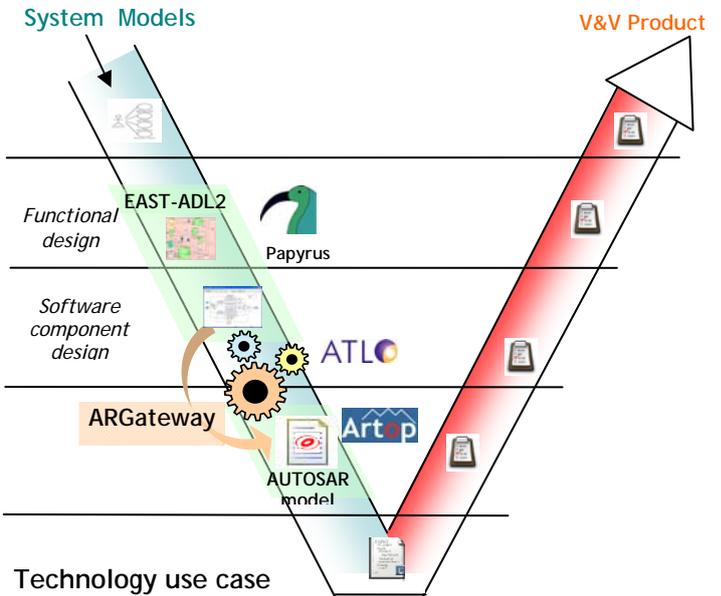
From WP5, Interoperability platform:

What about **Artop**?

Nowadays, if you build an Automotive system using a model-based approach, your software is likely to end up as a collection of AUTOSAR components.

Therefore, an interoperable platform like EDONA must be able to handle AUTOSAR objects. This means representing them in an Eclipse workspace as an instance of the AUTOSAR meta-model, and being at least able to edit them, save them, and check them against some set of rules.

These features represent an essential part of the EDONA WP 5 deliverables. They have been shipped as a part of the Artop 1.1 release, which is available since March 31, 2009. Artop is managed by the Artop User Group where several EDONA members are actively participating in.

See details at www.artop.org

Events - *An EDONA component receive an Eclipse award*

Largely supported by EDONA development activity, the Acceleo code generator builder has received during the last EclipseCon conference the award of the best Open Source tool based on Eclipse technologies. Acceleo implements the MOF to Text standard, MTL, and joins the Eclipse foundation as reference implementation of this standard.

www.eclipse.org/org/foundation/eclipseawards/winners09.php