

INNOVATION REPORT

Building an open source, extendible development platform

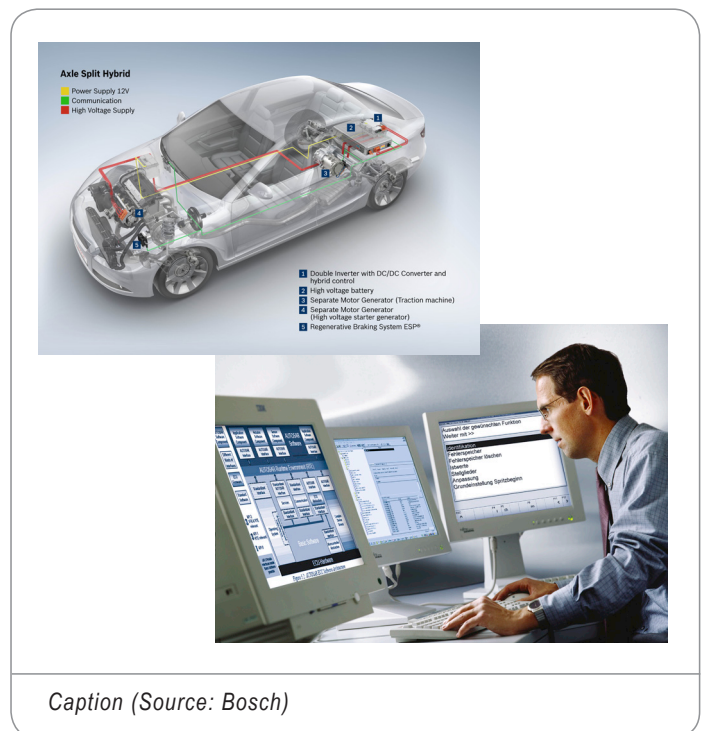


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A major stumbling block to software development is the computational limitation of single-core systems. The automotive sector is therefore increasingly turning to multicore systems for its electronic control units as the number of comfort and driver assistance systems in modern cars continues to grow and demands increasing computing power. The ITEA 2 project AMALTHEA, with its slogan 'Tune-up your software development', undertook to develop an open source development platform containing common data models and well-defined interfaces to significantly boost software development efficiency.

Facilitating data exchange

In essence, the AMALTHEA project set out to reduce the effort needed to exchange data. As a result, the consortium of 14 partners from Finland, Turkey and Germany developed a consistent, open and extendible tool platform for embedded systems focused initially on designing multicore systems for use in the automotive industry. The model-based approach supports AUTOSAR compatibility and the high level of variability found in modern motor vehicles, providing not only the capability to model multicore software and hardware but also basic editors and tools to work on and visualise these models. With a common data model containing all the information necessary for the complete development process, the data is generated at a central location and can be used and exchanged via well-defined interfaces between different tools. Eclipse provided the basis for the development environment whose plug-in mechanism enables easy integration with other tools. The AMALTHEA tool chain platform has opted to use the Eclipse public licence that allows Open Source and Commercial use, thereby making the results available to the generic public and allowing free use and access to all source codes so that tool vendors can easily integrate their tools into the AMALTHEA platform. The practical relevance and applicability of the AMALTHEA platform are ensured by the composition of the AMALTHEA consortium that consists of partners from the embedded systems industry with strong focus on the automotive domain including European automotive Tier-1 suppliers, tool vendors and research institutes.



Caption (Source: Bosch)

Key achievements

One of the major achievements of AMALTHEA is a common meta-model for multicore software and hardware modelling that enables different tools of a customised tool chain to gain easy and efficient access to the overall model of a multicore system. Not only can tools read the data required for a particular task, the model can also be enriched with the results, i.e. the quality of the model is improved. In this way, the AMALTHEA platform supports data exchange between the different tools of a customised tool chain. Another response to an automotive need was the development in AMALTHEA of a method for the combined description of the wide range variants in automotive systems that enables dependencies between software and hardware components to be checked immediately and errors prevented. This method will be integrated into a new development platform that will use the common data model. In fact, the multicore capability of the common AMALTHEA data model has already proven to be appropriate for tools simulating multicore systems. The

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combined modelling of hardware and software variants reduces effort and allows for semi-automatic product generation in which the user only has to select variants. Furthermore, this is also a simplification for the user because the evaluation of dependencies can be realised on the tool side.

The reduction in development costs and the building of a de-facto standard development environment platform will have a significant impact on car manufacturing in Europe and will also create new business opportunities around the tool platform – such as services for adopting the platform and integrating existing or newly developed extensions. The availability of an open-source development environment with AUTOSAR compatibility also opens up the automotive market for newcomers and accelerates the development of new functions for cleaner, safer and more comfortable vehicles, with the clear knock-on effect of societal benefits.

Benefits all round

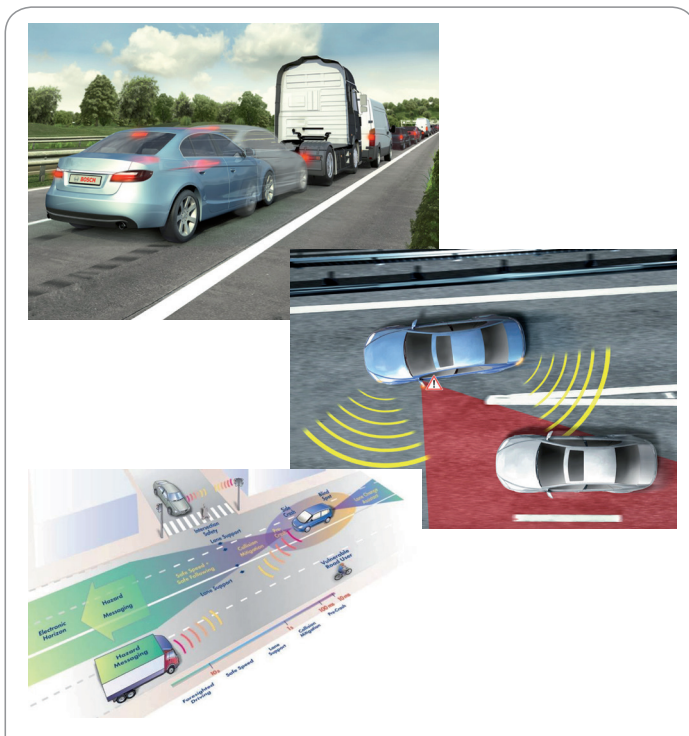
Several companies are already using the platform to create and exchange data models of their control units while others are investigating the benefits of this option compared to other solutions. As an open source tool chain platform, AMALTHEA allows efficient data exchange not only between different cooperating companies but also between different tools used by a single organisation. Car manufacturers will acquire methods and tools that provide the flexibility to develop new architectures

with a Safety-In-the-Loop approach while first tier suppliers will be able to demonstrate safety conformity and optimise development costs. In their turn, semiconductor manufacturers can develop new architectures for safe hardware components and tool vendors gain an opportunity to provide an integrated tool-chain including design and safety analysis. Finally, research organisations benefit from the possibility to subject their conceptual work to methods of analysis while certification bodies can gain accreditation for automotive certification of functional safety assessment.

Bosch sees the potential for in-house tooling combined with commercial tools, and is already making use of the AMALTHEA format to derive real benefit for development efficiency, whereby the exchange of data with customers, such as in BMW and Volkswagen, enhances collaboration and supports joint software development. The pre-release publishing of open source results is already being used in the commercial tool suite of Timing Architects for example. Itemis and ETAS, that will also provide development tools that will use this technology. Volkswagen has expressed a desire to use the results for the exchange of timing data. So as a supporting technology, AMALTHEA has a key role to play in any application with embedded control systems that have hard real-time requirements. It was extended, for example, to the telecom sector in which Finnish partners in the consortium operate. Furthermore, the results of the project provide the basis to resolve conflicts and challenges in the development of safety-critical systems. The extensibility of this open source development will take greater shape in a subsequent ITEA 2 project, AMALTHEA4public.

Efficiency impulse

AMALTHEA has provided a response to real industrial need in terms of revolutionising software development, especially in the automotive industry where the efficient use of multi-core will facilitate additional functionality to produce, for example, better safety in cars. Being the initial contributors in automated software development will give Europe an edge whereby expense is more than compensated by efficiency. The impact the results of AMALTHEA will have on subsequent related projects will add a new impulse in the industry and the market where new, model-based technologies are penetrating to make things more standardised, clear and less complex. This reduces not only the costs of development but also the complexity and organisation throughout the chain, ultimately making life easier for both OEMs and suppliers.



Caption (Source: Bosch & PReVENT)

More information:

www.amalthea-project.org