OEM SUPPLIER 2013 | **Research and Development**

The Software-Factory concept for Driver Assistance systems

The increasing complexity of Driver Assistance system software poses considerable challenges to software developers. A Software-Factory solution is the answer – it's a concept that homogenizes processes and tools and optimizes continuous testing and data management.

Today's vehicle systems are becoming increasingly complex. Driver assistance systems, in particular, are associated with a disproportionately high increase in complexity. One single control device has to cope with vast volumes of data and signals from sensors made by different manufacturers. Results or output signals often affect safety-critical functions such as steering or braking, so development and extensive testing for compliance with effective standards is essential.

These days, the standard for a premium OEM is 50 software functions, comprising 200 modules for ten ECU platforms manufactured by five different suppliers. In addition to pure development activities, i.e. writing the code for the functions, is the generation, integration and testing of the correct functions from the correct software modules for the correct platform in the right configuration and the right version is increasingly challenging. Conventional software engineering methods and standard environments can barely cope with this complexity therefore EB Automotive developed the Software-Factory concept to solve this challenge which has already been used successfully in projects.

**Continuous software development**

The Software-Factory concept initially defines standard processes for all participants. At the same time, the tool environment is homogenized and 'continuous integration' with automated continuous testing is introduced. A sophisticated data management concept optimizes the evaluation and administration of all data generated on the 'production lines'. A production line generates the software stack for a control device in all necessary variants so driver assistance functions are continuously created for the production processes. Despite the many different control devices and variants, the Software-Factory guarantees consistency and high quality.

The Software-Factory's hardware and tools can be used for several control devices in a virtual tool environment. The production line generates faster amortization from the initial investment. Not only does virtualization improve capacity utilization, it also takes care of the long-term archiving aspect

Transferring software production to the Software-Factory has other benefits in addition to the positive impact on cost and quality already mentioned. The OEM or supplier's specialists can immediately begin the next innovative feature after implementing a new function instead of having to adapt an existing function for other vehicles. On the one hand, this reduces the OEM or supplier's team to a manageable size. On the other, it ensures the 'masterminds' remain motivated. Ultimately, the concentration on core activities leads to greater commercial success. The OEM defines the brand-typical 'driving experience on four wheels', the supplier can optimize a function in the overall system and the software supplier can use the Software-Factory for efficient implementation in different vehicles.

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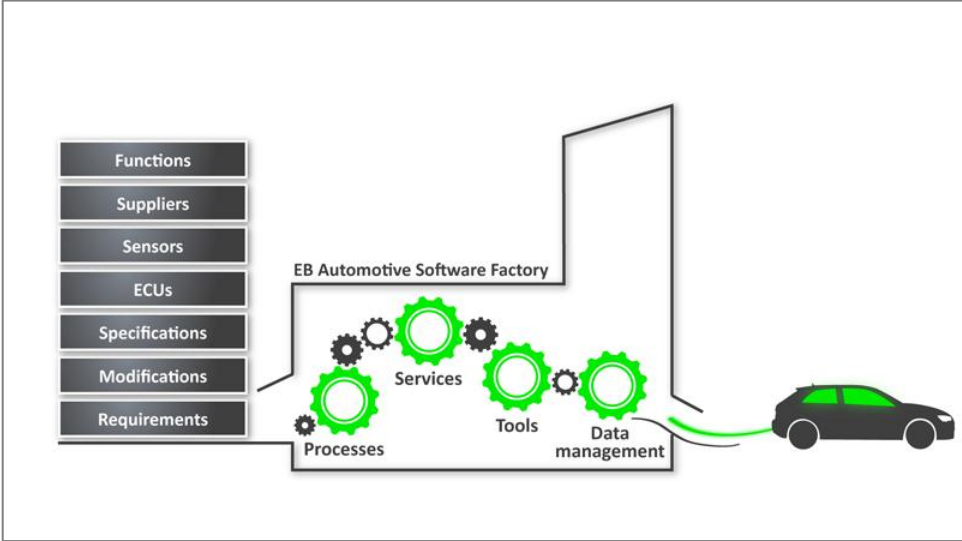
The Software Factory concept enables the efficient management of many complex software packages

Patchwork software

The software used for innovative driver assistance systems increasingly incorporates modules from very different sources. Conventional driver assistance systems consist of a closed package of a sensor, processing unit and display or actuator. As a result of the diversity of influences, such as sensor data fusion, modern driver assistance systems uses information from completely different types of sensors. In addition to data from conventional sensors, there is card data (electronic horizon) and data from other vehicles (Car2x).

What's more, OEMs are increasingly developing their own functions for integration in the control device. This is the only way they can implement 'hallmark' customer functions which differentiate them from competitors and provide a competitive advantage.

However, proven software modules should be re-used if possible to save development resources and enhance quality. For example, if the electronic horizon is used in several control devices, it is better to procure the software module (ADASISv2 eHorizon Reconstructor) from one supplier and to implement it in all the control devices. Independent implementation by the Tier 1 suppliers can lead to deviations in behavior despite conformity to specification. The coordination becomes more complex and the effort increases if changes occur.

A driver assistance control device contains OEM software modules, Tier 1 software modules and software modules developed by technology specialists in conjunction with proven "old components". Creating a robust overall system from this kind of a patchwork takes considerable effort – or a Software-Factory. Like a real factory, the raw materials 'supplied' have to meet specifications. Software modules also have to satisfy a defined level of quality or software metrics. These are verified in the Software-Factory, with the functions built in the necessary variants and all functions and side effects are tested.

Summary and outlook

EB Automotive's Software-Factory concept was rolled out in the automotive industry several years ago and has been very successful. Initially, the critical factors were resource shortages and the challenges associated with increasing complexity. Today's critical factor is commercial advantage, due to economies of scale. The entry into the described new software world is also possible through the use of proven software modules such as ADASISv2 eHorizon Reconstructor or Predictive Curve Light by EB. Processes and responsibilities can then be gradually outsourced to free up internal resources for innovation.

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