Carmakers Consider Open Source and Commercial Solutions

Software is the means by which a carmaker can stand apart from other carmakers. Carmakers who get software development right are able to bring new and better features and functions to the market faster and at lower costs than those who don’t. And as software complexity increases, early testing and verification is imperative. If errors are found after the vehicle launch, carmakers could be liable for absurdly high warranty costs.

Commercial software tool vendors have responded to automakers’ need to handle increasing software complexity and increasingly integrated vehicle systems with some very helpful tools. Most of those tools, however, address only parts of the development process, and they are not easily connected to each other.

The market for software development tools is growing significantly faster than the automotive electronics market. Today there are roughly 20 major tool sets available to automotive software developers. There are requirements management tools, modeling tools, design tools, simulation tools, implementation tools, validation tools, integration tools, verification and testing tools, coding tools and many more. Each tool handles and stores data differently from the others. Importing and exporting data from one tool to another is problematic and time consuming.

The tool chain the automotive industry is looking for is seamless. It is one that spans the complete software development process described in the V model, one in which systems engineering tools work with algorithm engineering tools, and with software engineering tools, and one spanned by the complete software development life cycle.

Because it takes too much time to develop new infotainment features and functions, embedded systems today tend to cost more than they should be, but also lacking in the most up-to-date technologies.

Embedded infotainment systems, with their big displays and driver-safe user interfaces, need to be periodically updated to keep pace with the latest portable consumer electronics they are supposed to complement. “One of the key issues we face is we have to change software on a regular basis to make sure [Bluetooth] phones work with every vehicle,” explained Graham Smethurst, general manager of BMW infotainment. “We have a number of head units across our range of vehicles, which we buy from multiple vendors and Linux users to collaborate, share solutions and contribute code for a new category of Internet-centric devices including in-vehicle infotainment devices, mobile Internet devices and other types of portable and embedded devices.

Linux is a trademark for a non-proprietary, open source version of the UNIX operating system. Moblin.org: A community website for software vendors and Linux users to collaborate, share solutions and contribute code for a new category of Internet-centric devices including in-vehicle infotainment devices, mobile Internet devices and other types of portable and embedded devices. Moblin is a trademark of Intel.

Early Champions, Platform Developers
BMW, Intel and Wind River

Key Elements of the Platform

- Based on the Linux operating system and related open source components
- Optimized for the Intel Atom processor, introduced in April 2008. (For more on the Intel processor, see The Hansen Report, March 2008.)
- The scope of the automotive-hardened platform includes system infrastructure, media and graphics support, consumer electronics connectivity, networking, Bluetooth, mobile office, CAN bus functionality, MOST connectivity, automotive diagnostics framework, power state management and fast boot.
- Wind River expects to deliver the open source specification and code to the Moblin.org in-vehicle infotainment community in August 2008.
- A product development kit will be made available for building test applications.

Benefits

- Enables much faster time to market for new features and functions.
- Closer ties through Linux and the open source ecosystem to the latest Internet, portable device and PC technology.
- More competition: a new industry of third-party software suppliers, tools and service providers will lead to improved features and lower prices for embedded infotainment.
- Carmakers can customize their HMI within the platform.
- Open-source peer review will improve software quality.

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Infotainment...

suppliers. So even though the functions are similar, we need to go through the validation process with every head unit and with every supplier. A s a result, we spend far too much time in validation.”

Phone connectivity is just one example of the enormous software development hurdles automakers face. Future infotainment systems must provide connectivity to portable devices brought into the vehicle as well as to the latest multimedia products and services available on the Internet. A nd the infotainment system must be capable of handling software updates throughout the life of the vehicle.

Starting with a simple radio and moving up to a full-blown premium system with large display, top-end connectivity, 3D navigation, Internet and much more, BMW engineers must produce a new head unit every two or three years for each of its four category classes. A further difficulty, according to Magneti Marelli, one of two tier-one suppliers working with BMW on the new infotainment platform, is that software content is mushrooming. The amount of software in a typical radio navigational system will grow from 1.2 million lines of code in model year 2008 to 2.8 million lines of code in MY 2010.

The Solution: A New Business Model

“Everybody in the industry is feeling the same pain and realizing maybe this is a point in time where the automotive industry ought to consider transitioning,” observed M r. Smethurst.

Daimler A G, having tried a similar effort a few years ago with Microsoft, who at the time chose not to proceed because the payback on its investment wasn’t sufficient, has decided that it will now cooperate with BMW in this infotainment platform initiative.

Peter Haeussermann, director of electrical/electronics and telematics for Mercedes-Benz Cars Development, explained what he is looking for. “We want a software framework that is closer to the PC world and to portable devices. An nd the infotainment software, then our traditional tier-one suppliers could concentrate on creating, with their engineering power and ours, new innovations. Since more people will be using and testing the software [in an open source initiative] I expect an increase in quality.” Intel has established a new in-vehicle infotainment segment within the open source Moblin.org community website for software vendors and Linux users to share solutions and contribute code.

BMW, who in effect is proposing a complete realignment of the value chain, started work on this initiative with Intel in 2006 and brought in Wind River a year later. A ccording to Christoph Grote, BMW vice president for information and communications systems, the carmaker initiated the project in order to “increase the synergies with the PC ecosystem and enable large scale reuse of open source code.”

BMW presented plans to create a standard open source infotainment platform this past June to an influential audience at the A dvances in Automotive Electronics conference in Ludwigsburg, Germany, and says the presentation drew a great deal of interest from the global industry. BMW and its partners now seek to broaden the collaboration in an effort to encourage competition and create alternatives to the present offerings.

“Before Ludwigsburg we were already in conversation with other carmakers, but the Ludwigsburg session strengthened their response,” said Graham Smethurst. “In general, everybody sees the same problems we see, and they are very interested in coming up with a viable solution.”

“People are pretty excited,” said Reiner Duwe, regional director for Wind River. “This is a huge change to the market. We have been very busy answering requests from potential customers.” Wind River products include an optimized Linux runtime operating system in an open source framework as well as testing and development tools.

Even though Microsoft software has already penetrated nearly 20% of in-vehicle navigation systems, and many industry players are still unaware of the Linux open source initiative, one top software executive who took a straw poll of fellow carmakers at a recent Autosar event concluded that Linux would end up with two-thirds of the global market for embedded infotainment software platforms. The initiative, which would lead to significantly less expensive in-vehicle infotainment systems, seems likely to succeed, particularly considering the success BMW has had pioneering such industry standards as FlexRay and A utosar.

A utosar

What is driving the Linux infotainment initiative is the same force that is driving A utosar: the opportunity to produce software much more economically by creating common software parts and interfaces that everyone can share. Indeed, many people thought that the A utosar standards should also be applied to the infotainment domain. But those who wanted a different approach argued that any infotainment framework must fully embrace the latest PC, portable electronics and Internet trends. The dissenters were given free rein when the A utosar executive board voted in A pri to delay the standardization of multimedia architecture.

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THE HANSEN REPORT
ON AUTOMOTIVE ELECTRONICS

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Tools...

in which all the tools can operate on the same “golden” set of data. Tool interoperability is most critical where vehicle domains interact with each other and with the world outside the vehicle. The carmakers’ ideal seamless tool chain would have a common user interface, which would allow engineers to work more quickly in a familiar environment.

Engineers working in the aerospace industry face very similar challenges, as can be seen in this excerpt from a proposal published by the Boeing Open System Engineering Environment (OSEE) project.

Each large program that develops systems and software is currently required to assemble a wide array of software products that provide piece meal capabilities necessary for completing different stages of the engineering lifecycle. Once installed, the daunting task of configuring and gluing them together begins. A few years of effort, the program may have a toolset that is adequate for its current needs, but is ill-suited for growth and is far from optimized. In addition, the resulting tools are disconnected, sporadically maintained, and use an overwhelming array of disjointed user interfaces to access partially redundant data. Additionally, such a toolset often carries with it multimillion dollar software licensing, customization, configuration and maintenance costs.

OSEE is an open source development project under the Eclipse Foundation, a consortium of major software vendors, corporations and academia focused on developing a universal platform for software development tools.

Carmakers facing the enormous challenge of disconnected software development tools are considering two possible solutions: 1. Participate in an Eclipse Foundation open source project to develop an integrated tool chain, or 2. Purchase a new tool environment for managing the engineering process, for example, Vector Informatik’s eA SEE.

Eclipse Foundation Open Source Tool Integration Project

Ralf Müller, the Eclipse Foundation’s director of Ecosystems Europe, has been talking to carmakers and suppliers about forming an automotive core group that would develop an open source framework for an integrated tool chain based on pre-viously developed Eclipse technology. A systems engineer, Mr. Müller has worked for IBM and also for Vector, so he is very familiar with the problems automotive software engineers struggle with.

“In those jobs I was always concerned with the integration of the artifacts along the tool chain. Artifacts are what the tools help software developers produce—the work output, for example, documents or pieces of software code,” he said.

Mr. Müller has talked to software engineering tools managers at Bosch and General Motors, who asked him to visit other companies and see who else might want to participate in an Eclipse tool-integration project. Toyota has agreed to be listed as an “interested party” but is still in the early stages of its investigation into whether it will go with the open source collaboration or with a commercial solution. Bosch is in the process of building an ECU development tool chain in-house.

One compelling reason to go with Eclipse is that the work done by Boeing to create its integrated environment (OSEE) could be applied to the automotive project under the Eclipse public license. Integrated around a simple, user-definable data model, OSEE provides bidirectional traceability throughout the development V model.

Benefits of Cooperating on Eclipse Open Source Tool-Framework Projects

- Projects can progress even as team participants change.
- Participants collaborate on infrastructure technology where they don’t necessarily compete.
- No royalties are due.
- Lessens the need to rely on a proprietary tool from a company that could go out of business, taking the intellectual property with them.
- Tools built to run on the platform are far less expensive to integrate, and they have the same look and feel.
- Standardizing by actual implementation is a faster, more direct path than first writing standards.
- Lowers entry barriers so more suppliers can participate.
- Makes use of the Eclipse ecosystem of suppliers and service providers.
- A majority of the toolmakers serving the auto industry already use aspects of the Eclipse platform.

When you start a project with Eclipse you start with a foundation,” said Mr. Müller. “You get all the parts that are concerned with modeling, all the parts that are concerned with graphical editors, all the C and C++ things and more.”

A nother very good argument for Eclipse is that an open source implementation is a much quicker path to standards. “We don’t standardize by writing standards,” said Mr. Müller, “we go directly to the implementation. When you create a standard you can never write up the best possible standard, you must always compromise between the various competing interests. That’s what happened to the Autosar standard; they had a delay of one year before they had the first implementation that proved that the standard needed to be fixed.”

The Autosar consortium has decided to take on an Eclipse project to implement an Autosar development tool platform. According to Harald H. eini n ecke, an Autosar’s most prominent advocate, IBM, G e n s y s, PSA, C ontinental and BMW will probably work together on a common Autosar tools platform using Eclipse.

“Each tool company has different expertise, but you can divide some Autosar infrastructure elements that each tool must fulfill and share them. It lowers the initial hurdle for each tool developer. They can then more easily design the tool extensions they need,” he explained. Dr. H. eini n ecke heads BMW’s C ar & IT subsidiary.

In a paper delivered at the Embedded Real Time Software Congress in Toulouse, France, January 2008, Dr. H. eini n ecke and his coauthors had high praise for Eclipse: “Eclipse is one of the most successful open source projects around. … [It] is such a convenient starting point for developing applications, more and more people use it, extend it, and themselves contribute their extensions back to the community so that the Eclipse core grows in functionality and quality. Those success factors of Eclipse could be applied to an open Autosar tool framework as well.”

But Autosar will not take the classic open source approach. Rather, it will limit some of the intellectual property associated with the tool to Autosar members, because only Autosar members are legally attached.
Tyco Electronics

Corporate Background
Initially part of Tyco International, Tyco Electronics was formed through a series of acquisitions from fiscal 1999 through fiscal 2002, including AMP Incorporated and Raychem Corporation in fiscal 1999, and the electrochemical division of Siemens and the OEM division of Thomas & Betts in fiscal 2000.

Tyco Electronics was separated from Tyco International on June 29, 2007, when it became a public company. The company's stock is traded on the New York Stock Exchange and the Bermuda Stock Exchange under the symbol TEL.

Tyco Electronics' Electronic Components business segment accounted for 78% of company FY 2007 sales. Connectors account for 70% of the Electronic Components segment's sales—about $7 billion worth of connectors. That represents 18% of the $40 billion global connector industry. Tyco says it is the number-one connector producer in the automotive, computer and peripherals, and industrial markets; it is number-two in the telecom/data communications market. Most of the electronics components made by Tyco Electronics are passive, non-semiconductor devices.

Institutional investors own 90% of Tyco Electronics stock. The largest individual stockholder is Juergen Gromer, who holds 2,231,681 common shares (roughly 0.5% of outstanding shares). Dr. Gromer, retired president of Tyco Electronics, joined the board of directors in June 2007, immediately following Tyco Electronics' separation from Tyco International. Well known to the German automotive industry, Dr. Gromer was a top official at AMP Inc.

Global Automotive Division
Global Automotive is the largest division in the company's Electronic Components business segment. The automotive industry accounts for 31% of Tyco Electronics' sales. Tyco Electronics' automotive division has been profitable for the last 25 years, and will be profitable again in fiscal 2008, despite the financial dif-

According to Bishop, Tyco Electronics has a market research firm that closely tracks the connector industry. and Associates, a market research firm that tracks automotive connectors, citing data from Bishop and Associates, a market research firm that closely tracks the connector industry. The company maintains 26 automotive design centers support the engineering and design centers support the automotive division.

Mr. Donahue has served in a variety of positions at A M P and Tyco Electronics for the past 26 years, except for a 12-month period in 2006 when he was a group vice president at Valspar Corporation. He is also responsible for Tyco Electronics’ Application Tooling division, a $200 million business. Mr. Donahue was stationed in Asia from 1990 to 1994 and opened Tyco Electronics’ first Chinese manufacturing location, in Shanghai.

The company maintains 26 automotive manufacturing locations: 18 in Europe, three in North America, one in South America, and four in Asia. Thirteen engineering and design centers support the automotive division.

Tyco Electronics claims to have the number-one market position in automotive connectors, citing data from Bishop and Associates, a market research firm that closely tracks the connector industry. According to Bishop, Tyco Electronics had a 29.7% share of the $9.7 billion automotive connector market in 2006, followed by Yazaki with a 12.2% share, and Delphi with 11.2%. FCI had 7.2% of the market; Sumitomo had 7.0%.

Tyco Electronics sees its automotive market as stable, growing annually at the rate of 2% to 4%, with its own automotive sales growing over the next several years at the rate of 4% to 6% per year, considerably faster than the market. Between fiscal 2004 and fiscal 2007, Tyco Electronics’ automotive business increased at the rate of 4.8% per year.

A utomotive Strategy

Despite its spin off from Tyco International and a change in top management—Thomas Lynch, former CEO of Motorola’s personal communications sector, was named CEO of Tyco Electronics in January 2006—the company’s automotive strategy will remain mostly intact with some changes in emphasis and organization. For example, Tyco Electronics added a layer of managers with global responsibility to complement the existing regional organization. These are managers for each of the four regions served: Europe/Middle East/Africa, North America, South America/MidEast/Africa, 55%

Source: BigCharts.com

A merica and Asia Pacific. M r. Donahue, in charge of Global A utomotive, explained: "A vice president of global engineering was hired, the first really global assignment outside of finance. Since then we have added someone to run global operations, someone for global human resources, someone to run global environmental health and safety, global engineering and global sales and marketing. We are recruiting for someone to run global quality.”

Another change initiated by Mr. Donahue is an advanced engineering group, with 30 engineers reassigned from regional roles. They now report to the vice president of global engineering. "This is our attempt to get more focused on the long term. We are looking to solve industry-wide issues instead of exclusively responding to RFQs,” noted M r. Donahue. “In the past we were able to develop terminal and connector systems that became standards across the automotive industry. We went out to customers, understood their problems and developed solutions that were better and less expensive. I think we need to balance between doing the RFQs and driving the industry and the technology.”
Don’t look for big changes in Tyco Electronics’ product portfolio; no major acquisitions are in the works. Rather, look for growth to come organically, from in-house product development and from projects carefully aimed at squeezing more profits from existing products. The company is looking for returns on its investments that significantly beat today’s 8.5% to 10.5% cost of capital.

Why Tyco Electronics?

What distinguishes Tyco Electronics from its competitors? “We are a stable supplier with a long history in the automotive industry,” responded M. r. Donahue. “We are financially sound. We have a much broader product line than any of our competitors, and we service all regions of the world. On top of that we have leading edge technology.”

A mong the company’s leading edge technologies, M. r. Donahue cited a high-power relay originally developed for military applications that is now used in hybrid vehicles. Leveraging its experience serving the consumer market, Tyco Electronics has produced automotive versions of U SB connectors to connect M P3 players and Flash drives to vehicle infotainment systems.

A nd finally, Tyco Electronics points to its close relationships with German and Japanese carmakers, who challenge the company to stay on the forefront of automation and assembly technology and to develop manufacturing processes that integrate molding, stamping and assembly.

Serving Japan

“We have been operating in Japan since the 1950s,” pointed out M. r. Donahue. He explained how the company has managed to accomplish what very few Western parts suppliers have accomplished: win meaningful parts business with Japanese carmakers. “We’ve grown up and matured with the Japanese auto industry. We’ve been serving very demanding customers like Toyota, Honda and N issan for many, many years. Our organization in Japan is really a local company, not just a Japanese face on a Western company,” he said.

The Competition

According to Tyco Electronics, it offers more types of automotive connectors than any of its competitors, namely:

- Yazaki
- Molex
- Delphi
- Amphenol
- Sumitomo
- FCI

Tyco Electronics makes a significant portion of the electronic module connectors used by the Japanese automotive manufacturers in engine controllers. The header connectors are shipped to the module suppliers who make the ECU; the harness-side connectors are sold to wiring-harness makers including Yazaki and Sumitomo.

These module connectors, designed and built in Japan for the local manufacturers, have very dense pin counts. They are hybrid connectors containing multiple-size contacts, ranging from 80 to 216 positions. The connectors must be as small and light as possible, so the pin-topin spacing is as tight as any connector in the vehicle. The challenge is to design the header connector so it doesn’t warp as the temperature in the engine compartment changes, something that is particularly difficult in high-pin-count components. A connector that warps exerts forces on the printed circuit board, which could create reliability problems.

Despite the challenges, two years ago Tyco Electronics was able to reduce the size of its engine control module connectors by 35%.

Products

Terminals and connectors account for two-thirds of the Global Automotive division’s sales. “Terminals and connectors were, are and will be core technology for Tyco Electronics,” declared Eric Kueppers, vice president, global sales and marketing for automotive. Many of the company’s connectors have evolved from two principal families. M Q S (M icro Quadlock System), widely used by Western carmakers, provides a four-point contact accommodating wire diameters from 0.14 to 0.75 mm². The 050 connector system is widely used by Japanese carmakers. With two contact points, the 050 accommodates wire diameters from 0.13 to 0.50 mm².

High-Speed D ata C onnections

Among the many product segments served by Tyco Electronics, Mr. Donahue is particularly optimistic about infotainment applications for high-speed data connectors and cables, a global market that in a few years is expected to blossom to between $150 million and $200 million per year. The connections cover everything from the head unit to the antenna, to portable devices, to the navigation device, to displays and to the loudspeakers.

Tyco Electronics’ product lines that will most benefit from high-speed infotainment applications include M O S T optical networking components; the Fakra RF coaxial connectors and cables, which go from the antenna to the head unit with a transmission rate up to 3 gigahertz; and the H S D (high-speed data) and LV D S (low-voltage differential signaling) high-speed data connectors linking camera and monitor via twisted-pair copper.

According to M. r. Kueppers, the M O S T optical system currently in use has a transmission rate of 25 megabits per second, which suffices for audio and low-resolution video. That will be replaced by M O S T operating at 150 megabits per second, which is fast enough to handle high-resolution video.

But M O S T, which was developed by the automotive industry, will not own the entire automotive video market. A more and more cameras find automotive applications, many of those applications will make use of twisted-pair copper links based on technology from the consumer electronics industry, with a physical layer based on IEEE 1394.

Distinctions Claimed by Tyco Electronics

◆ World’s number-one passive components supplier
◆ Number-one share of the worldwide automotive connector market
◆ Tyco Electronics’ automotive business (and AMP’s, which Tyco International purchased in 1999) has been profitable every year for the last 25 years.
◆ Approximately 75% of Tyco Electronics’ sales are in products where the company is the market leader.
◆ Broadest line of automotive connectors

8 mm or 16 mm in diameter. Connectors based on round contacts measuring 6 mm, and on the market for several years, is finally for fuel cell applications in Europe power contact systems, developed originally for high-power connector market will reach somewhere between $50 million and $100 million in the same timeframe.

But unlike LVDS, HSD connections operate using just one twisted-pair channel; four channels are required by LVDS. So HSD connectors, with just four terminals (two for the twisted pair, plus two for the power supply), will be smaller and significantly less expensive than LVDS connectors, which have 10 terminals.

BMW, Daimler, Volkswagen/Audi, PSA, GM and Volvo are already using Tyco Electronics’ LVDS connectors for video applications, but in very small volumes. “Due to the cost-effectiveness of HSD, each carmaker will very likely go with the new connectors, which will be especially attractive as volumes increase,” suggested M. R. Kueppers. Tyco Electronics has already booked four separate production programs for its HSD connectors.

High-Power Connectors for Hybrid Vehicles

A nother promising product category for Tyco Electronics is high-power connectors for use in mild and full hybrid vehicles. “In North America we see clearly the trend toward plug-in hybrids, and we expect to see that region develop into a $100 million market by 2014 or 2015, just for high-power terminals and connector assemblies,” said M. R. Kueppers.

“We do not see a trend in North America for fuel cell or diesel applications. We are less certain about Europe, where there is still discussion about plug-in and other hybrids, mild hybrids, micro hybrids, diesel fuel cell vehicles,” he added. Tyco Electronics expects Europe’s high-power connector market will reach somewhere between $50 million and $100 million in the same timeframe.

The first of Tyco Electronics’ two high-power contact systems, developed originally for fuel cell applications in Europe and on the market for several years, is based on round contacts measuring 6 mm, 8 mm or 16 mm in diameter. Connectors using those contacts can handle up to 400 volts or up to 500 amps, and temperatures up to 170 degrees C. North American carmakers and some European carmakers will use that system.

Tyco Electronics is in the process of developing a new contact system for German carmakers that will handle the same power and temperature range, but will use flat contacts that measure 6.3 mm or 9.5 mm in width. A 12 mm contact will be available in mid-2009. Each hybrid vehicle will typically have about 15 or 16 pairs of male and female contacts.

Orders for its high-power connectors have already been booked with GM, BMW and Daimler. Depending on the program, those shipments will start sometime between 2009 and 2011.

Tyco Electronics expects the number of full hybrid vehicles produced annually to reach 3.5 million to 4 million units by 2011. The majority of the vehicles will be produced by Toyota and Honda.

M/A-COM Divestiture Announced

On May 13, 2008, Tyco Electronics announced the sale of its M/A-COM Radio Frequency Components and Subsystems business to Cobham Defense Electronic Systems. Not part of the deal, however, was M/A-COM’s automotive radar sensor business, which Autoliv will acquire for $42 million. The transaction should be completed by September 2008. M/A-COM produces 77 GHz and 24 GHz radar sensors used in adaptive cruise control systems.

Cobham Defense Electronics Systems, the U.S. division of the U.K defense contractor Cobham Plc., bought M/A-COM for $425 million in cash, a multiple of about eight times estimated 2008 EBITDA. In its 2007 fiscal year, M/A-COM produced an operating margin of 7.9% and EBITDA margin of 13.2% on $477.7 million in sales. Cobham will keep the aerospace and defense part of the business (about 40% of sales) and put the remaining, commercial part of the business up for sale, including the multiband microwave antennas used in GM’s OnStar system. M/A-COM recently lost future OnStar business to a Chinese supplier.

“M/A-COM was divested because it is not strategically aligned with our core business,” noted M. R. Donahue. “We are a component business and that business was not.” M/A-COM was acquired by AMP in 1995. At the time of the sale to Cobham, it was part of Tyco Electronics’ Wireless Systems segment.

While Tyco Electronics could decide to spin off other businesses, it presently has no plans to divest anything nearly as big as M/A-COM.

Tyco Electronics Automotive Products

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*Not yet in high volume production

The Company Profile Continued
Open Source According to Eclipse

Companies or individuals collaborate on a piece of software and each of them grants an open license to use, change or extend the software. Once given, the license cannot be withdrawn. If a company decides it no longer wants to continue development of a particular software component, anybody can pick it up and continue the development from where it was left.

permited to commercially exploit the Autosar specification. However, other parts of the tool— for instance the model-driven software development layer, which includes model editing and validation—can be shared.

“Despite the Autosar project’s limitations, it is a far better approach than before, when every company was building its own version of the platform,” wrote Mr. Müller in an email. “Now at least the ‘insiders’ will base their tools on one platform. That will lead to a more robust platform that will get developed in less time with considerably less cost.”

It should be pointed out that the Eclipse-based Autosar tool platform will cover only a small portion of the software tools carmakers would like to integrate.

Vector’s ea SEE

A nother path to software tool integration is commercial. For example, a number of carmakers and suppliers are looking at, and some are already using, the ea SEE tool environment from Vector Informatik.

With ea SEE, carmakers and tier ones can set up a universal data backbone that stores and manages all the required engineering data.

Before creating ea SEE, Vector looked at today’s landscape of tools and found much that is wanting. Thomas Beck, CEO of Vector, noted: “Suppliers use a patchwork solution that has many drawbacks: the OE or tier one has to maintain the patchwork, he has to buy all the licenses, he has to upgrade, and he has to provide interfaces between all the different tools, each with their independent databases. This leads to many complications in the workflow. So the basic idea behind ea SEE is an integrated solution.

“Within ea SEE we can integrate design tools like Matlab or Simulink from The Mathworks. We can integrate simple XMI editors or we can integrate Word and other Microsoft Office products. We can integrate engineering tools like CANoe and CANape and CANalyzer from Vector, or tools like INCA or ASCET-SE from MAN in the ea SEE environment. Vector plans to bring this new product, called the Systems Data Engineering module, to market on behalf of Volvo. BMW is also interested in the module.

Infotainment...

“That opened the possibility for us to say, okay, if infotainment doesn’t fit comfortably in an Autosar framework, then maybe we should look at an alternative organization, something that gets the OEMs together,” noted BM W’s Mr. Smethurst. While a Autosar was initially a German-centered organization, BMW is taking a global approach with the Linux infotainment platform. “We need appropriate representation from each of the major regions: Japan, the United States, Europe and the rest of Asia,” he said.

That’s good news for one top engineer from a U.S. carmaker. “I had no interest in getting in the game I was in at Autosar, where BMW and Mercedes and Continental kind of set the tone before they let anybody else in, and then you had to fight them to make the standard what it needed to be. I’m getting in [the infotainment initiative] early. I’m going to drive it and make sure I have as clear a voice as anybody else.”

Infotainment Suppliers Must Alter Their Product Strategy

A substantial part of what infotainment suppliers presently get paid to do involves software development and verification. If the open source initiative is successful, suppliers will no longer be able to charge carmakers for developing and verifying software that exists on the platform, and they will no longer have a lock on every software-derived feature. Applications designed to fit the platform could be sourced from third-party software suppliers. The industry will essentially shift from a reliance on vertically integrated suppliers of customized solutions to a more horizontal, PC-like supplier ecosystem. Still, there will be plenty of work for infotainment suppliers who focus on systems integration, application development, application integration and hardware development.

Happy with the old business model, BMW W’s top four infotainment suppliers, Harman, Continental, Alpine and Visteon, haven’t been as supportive of the new framework as some other suppliers have been. “Delphi and Magneti Marelli have taken this very seriously,” said BMW W’s Mr. Smethurst. “We are also talking to some Japanese tier ones who see the benefit and the need to change the way they do business.”

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