AAA Research Differs with NHTSA over Dangers of Speech Interface

Insights from Automotive Cognitive Distraction Expert and Study Author, David Strayer

The auto industry’s headlong rush to keep drivers connected by means of speech interfaces seems to have the blessing of NHTSA, the U.S. National Highway Traffic Safety Administration. While NHTSA’s distraction guidelines rightly warn against visual and manual distraction, they advise that “many of these in-vehicle device tasks [not related to driving] may be suitable for performance by the driver while driving, if performed via an auditory-vocal interface.”

However, NHTSA’s position is diametrically opposed to the findings of the AAA (American Automobile Association) Foundation for Automotive Safety’s authoritative new study, Measuring Cognitive Distraction in the Automobile, published in June 2013. The study concludes that “the adoption of voice-based systems in the vehicle may have unintended consequences that adversely affect traffic safety.”

According to the AAA press release:

“Hands-free technologies might make it easier for motorists to text, talk on the phone, or even use Facebook while they drive, but new findings … show dangerous mental distractions exist even when drivers keep their hands on the wheel and their eyes on the road. The research found that as mental workload and distractions increase reaction time slows, brain function is compromised, drivers scan the road less and miss visual cues, potentially resulting in drivers not seeing items right in front of them including stop signs and pedestrians.”

AAA claims this is the most comprehensive study of its kind to look at the mental distraction of drivers. Based on its findings, the organization mounted a multimedia public relations campaign in June to convince the public that voice-activated, in-car technologies dangerously undermine driver attention.

The idea for the study came from discussions between David Strayer, Professor of Cognition and Neural Science at the University of Utah, and AAA. Dr. Strayer was the lead author of another study done in 2006, which asserted that “drivers on cell phones are as bad as drunks.”

AAA Cognitive Distraction Scale

<table>
<thead>
<tr>
<th>Activity</th>
<th>Scale</th>
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<tbody>
<tr>
<td>Speech to Text*</td>
<td>3.06</td>
</tr>
<tr>
<td>Hand-Held Phone</td>
<td>2.45</td>
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<tr>
<td>Passenger**</td>
<td>2.33</td>
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<td>Hands-Free Phone</td>
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<td>Audio Book</td>
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<td>Radio</td>
<td>1.21</td>
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<td>Single</td>
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</tbody>
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*The speech-to-text equipment used was designed to perform significantly better than equipment presently installed in vehicles.
**Passenger wasn’t permitted to help with the task of driving.

Source: AAA

Probably the most important finding from the study is that interacting with the speech-to-text system was the most cognitively distracting. Similar to the Saffir-Simpson scale used for hurricanes, the levels of mental distraction are given numbers on a linear scale. The single task of driving was given a 1.0. In-vehicle activities while driving such as listening to the radio (1.21) or an audio book (1.75) were associated with a small increase in cognitive distraction. Talking to a passenger who wasn’t permitted to help with the driving task (2.33) or conversing with a friend on a hand-held (2.45) or hands-free cell phone (2.27) were associated with a moderate increase in cognitive distraction. The speech-to-text condition (3.06) had a high cognitive distraction rating.

Harald Kröger oversees the development of interior electrical and electronics systems in Mercedes vehicles, including networks and architecture. He is also responsible for e-Drive components including traction motors, batteries and power electronics. Forty-six years old, with a master’s degree in electrical engineering from Stanford University, he sits on the board at electric vehicle maker Tesla Motors. From 2008 until he took his present position in 2012, he was the quality chief for Mercedes-Benz cars.

We spoke to him in June about the new SClass, about standards and about what he would like to see from suppliers.

On standards Mr. Kröger said: “I totally believe in Ethernet, and CAN FD is a no-brainer.” CAN FD supports bit rates up to 4 Mbit/s vs. about 800 Kbit/s for CAN. Mr. Kröger is also an advocate for Autosar. Nearly all of the 70 CAN- and 10 FlexRay-connected ECUs in the new S-Class are equipped with Autosar 3.1 software.

While the SClass came to market without out a 48-volt bus, Mr. Kröger believes the 48-volt architecture has important advantages and eventually will come into production. “We are definitely thinking about 48 volts, but you always have to ask what are the customer benefits of something like that and is it cost efficient. With the architecture in the new SClass we were able to equip the vehicle with the most advanced systems in the market,” he said.

We asked Mr. Kröger how suppliers can best serve Mercedes. “Suppliers need to offer three things: innovation, quality and value. Suppliers need to have a vision of where things need to go. This is important to us. Suppliers also need to be very stable in terms of their own development and production processes and have good quality figures. Suppliers with quality issues are a no-go. And lastly, suppliers need to be cost efficient in every respect.”

Turn to Mercedes, page 3
I spoke with Dr. Strayer about his research on behalf of AAA. At their initial meeting AAA asked what research he would propose to study distraction.

“While over the last decade or so my team has looked at the level of distraction produced by things like radio, audio books and talking with passengers, those were all one-off studies. It was never comprehensive research in the sense of looking at different kinds of tasks performed by the same set of subjects, using the same independent measures and the same driving scenarios. So that’s what we proposed. We did half of this study on a simulator and the other half in an instrumented vehicle.”

Thirty-two participants ranging in age from 19 to 36 were used in the simulator experiment. Thirty-two participants ranging in age from 18 to 33 completed the instrumented-vehicle experiment.

Dr. Strayer’s team measured brainwaves, eye movement and other metrics to assess what happens to drivers’ mental workload when they attempt to do multiple things at once. Cameras inside the vehicles tracked drivers’ eye and head movements. A detection-response-task device was used to record reaction time in response to triggers of red and green lights added to their field of vision. A special electroencephalographic (EEG) skull cap was used to chart participants’ brain activity, so that researchers could determine mental workload.

Where NHTSA and Strayer Differ

In April 2013, NHTSA released the results of a new naturalistic driving study, The Impact of Hand-Held and Hands-Free Cell Phone Use on Driver Performance and Safety Critical Event Risk. The study showed that visual-manual tasks associated with handheld phones and other portable devices increased the risk of getting into a crash by three times. But the study did not find a direct increased risk from the specific act of talking on a cell phone. NHTSA’s conclusion was based in part on the study’s finding that drivers unintentionally crossed the lane markings less often when they were talking on their phones.

According to Dr. Strayer, the reason NHTSA can assert that talking on a cell phone while driving is acceptable, which is opposite of his position, has to do with which proxies are relied upon to correlate with crash risk. “If you are trying to use a surrogate instead of a crash, you need to be careful what the surrogate is. For example, if you are visually distracted, lane maintenance gets worse; if you are cognitively distracted it gets better. While talking on the phone or otherwise cognitively distracted, you tend to stare straight ahead. You stay in your lane better, but you don’t scan intersections as well, and you are more likely to have inattention blindness, where you look but fail to see a pedestrian, a cyclist or a traffic light.”

Comparison to Aviation

A cognitive scientist, Dr. Strayer has a background in aviation psychology and worked on the initial design of the Apache helicopter when it was in prototype to help make sure that the pilot wasn’t being overloaded. “Aviation developed the sterile cockpit rule, where you shouldn’t be texting or using a laptop or talking on the phone,” he said. “They have check lists; they try to get rid of these types of distractions. What would you think if your pilot was updating Facebook while landing your plane? It’s unthinkable. … We drove fatalities to zero for commercial aviation in the U.S.; we are not there yet with driving.”

Until the crash of an Asiana Airlines passenger jet at San Francisco International Airport this July, airlines operating in the U.S. had gone four and a half years without a crash.

Running Through Intersections

Some of Dr. Strayer’s newest evidence that talking on the phone while driving is dangerous comes from a study organized by the University of Utah Center for Distracted Driving. The research is being implemented by professor-supervised college students from around the country who have been observing how drivers in the real world behave at intersections with four-way stop signs or traffic lights. “The drivers are people in their own cars who have driven to that point of their own volition and have chosen to use their phone while driving,” he said. The students report their findings to the University of Utah’s cell phone study website.

Thus far, a sample of 57,000 observations shows that one in four drivers fails to make a legal stop at a signed intersection. “The people who were on their phones were 2.21 times more likely not to make a legal stop when they came to an intersection. Every time you fail to make a legal stop it puts a pedestrian or bicyclist or a car at risk,” Dr. Strayer cautioned.

This observational study is confirming previous estimates that more than 10% of drivers on U.S. roadways use their cell phones during daytime hours. According to Dr. Strayer, with such a high percentage of drivers engaged in distracting behavior, the risk to public safety is great.

Advice to Automakers

I asked Dr. Strayer what advice he would offer to automakers who are moving quickly to implement voice-controlled features in their vehicles. “Be cautious. A lot of the technologies aimed for the car are going to be mentally demanding; some things just don’t belong in the car when it is in gear.”

Further, in their paper Cognitive Distraction and Its Neural Basis, authors David Strayer, Nathan Medeiros-Ward and Jason continued on page 8
Mercedes...

If there is one technology where Mr. Kröger would like to see progress, it is in high-voltage batteries. “The single most important part is the high-voltage battery. Our e-Drive engineers at Mercedes are working hard on this, and I think that is where the biggest improvements will be seen.”

Mercedes’ New S-Class

By any measure—be it cost, sophistication, safety, comfort, complexity, number of components, length and number of wires, lines of software code, number of sensors, number of optional extras or the degree of networking and interoperability between ECUs—the 2014 Mercedes S-Class is truly a remarkable vehicle. And since much of the electronics that is commonplace in vehicles today first appeared in vehicles like the S-Class, we are curious to learn all we can about each new iteration of Mercedes’ flagship. Each time a new S-Class comes to market we get a glimpse of the future, a look at what is possible.

S-Class models equipped with Distronic Plus with Stop&Go Pilot can practically drive themselves in stop-and-go traffic using the car ahead for reference if lane markings are unavailable. Not fully autonomous, the degree of networking and interoperability between ECUs—the 2014 Mercedes S-Class is truly a remarkable vehicle. And since much of the electronics that is commonplace in vehicles today first appeared in vehicles like the S-Class, we are curious to learn all we can about each new iteration of Mercedes’ flagship. Each time a new S-Class comes to market we get a glimpse of the future, a look at what is possible.

Yet another world’s first, the 2014 S-Class cockpit features two eye-catching, high-resolution 12.3-inch display screens, side by side. One acts as the cluster and the other, part of the center column, is capable of split views, for example a navigation image for the driver and TV for the passenger. Harman International supplies the infotainment system; the operating system is QNX.

The 2014 Mercedes S-Class by the Numbers

- Maximum network ECU connections: 10 for FlexRay, 73 for CAN and 61 for LIN
- Approximately 200 microprocessors
- Up to 65 million lines of code, 30 million for the multimedia system alone
- Four network gateways: EES, the emissions ECU; CPC, the central powertrain controller; the telematics head unit; and ESP, the electronics stability program ECU
- Base vehicles employ 1,376 wires with a total length of 2,474 meters. A fully optioned vehicle requires 2,385 wires, with a total length of 4,293 meters.
- 500 LEDs are deployed, no light bulbs
- 100 motors in the interior
- 156 buttons and switches in the interior
- The price for the S 350 BlueTEC short wheelbase diesel S-Class starts at €79,789.50.
- Equipped with a gasoline engine, the long wheelbase S 500 starts at €107,635.50.

Pedestrian safety is aided by an optional night view function that spotlights vulnerable pedestrians from a controllable light module that’s part of the LED headlights.

The stereo camera is employed in another world’s-first feature that Mercedes calls Magic Body Control. The camera monitors the road surface up to 15 meters ahead, scanning for unevenness and bumps, and feeds that information to a control unit that adjusts the vehicle’s active suspension control strategy accordingly. Magic Body Control works best in the daytime.

Including the stereo camera, the S-Class can have as many as seven cameras: two night-view cameras, one near and one far, plus four surround-view cameras.

As many as six radar sensors could be called for: two short-range units at the front (with a range of 30 meters and a detection angle of 80 degrees), one long-range radar at the front (60-meter range, 60-degree detection angle), two short-range radar units on each back corner (30 meters, 80 degrees) and one multimode radar unit at the rear (30 meters/80 degrees and 80 meters/16 degrees).

Another world’s first, and a good indication of what the automotive future holds, the new S-Class has not a single light bulb. Instead Mercedes has made a complete switch to LED technology. The S-Class uses nearly 500 LEDs: up to 56 in each headlamp, up to 35 in each taillight, plus four in the rear fog lamp. The interior can have approximately 300 LEDs.
The Company Profile... Magneti Marelli

**Background**

The company was founded in 1919 with backing from Fiat and a company owned by Ercole Marelli. In the 1930s, Magneti Marelli produced magnets, electrical devices, batteries and radios, initially for the automotive industry and later for submarines and aviation. Fiat acquired the company in 1967.

Our profile focuses on Magneti Marelli’s electrical and electronics parts businesses; not covered here are the significant suspension system, exhaust system, plastics, aftermarket and motorsports segments, which together account for more than a third of total sales. Electronics systems from Magneti Marelli are manufactured in Corbetta, Italy; Chatellerault, France; Barcelona del Valles, Spain; Kechnec, Slovakia; New Delhi, India; Guangzhou, China; Teportontlan, Mexico; and Hortolandia, Brazil.

**Corporate Overview**

From 2007 to 2012 Magneti Marelli sales grew at the rate of 3.1% per year. Sales for 2013 are also growing at that rate, perhaps a percent or two faster, despite weak car sales in Europe. Europe accounted for 68.1% of Magneti Marelli sales in 2012. According to CEO Eugenio Razelli, "Our electronics product lines are growing, especially instrument clusters, infotainment, telematics and body controllers. And we have electronics content in our powertrain, and even our shock absorber business." Key drivers of electronics demand are CO2 reduction mandates, connectivity requirements, including eCall, and new safety features. "Electronics has become essential to all automotive domains," he said.

"Our main areas of focus are always lighting, powertrain and electronics," declared Mr. Razelli. That is evident in the way R&D expenditures are allocated. As a whole, the company will invest nearly 6% of sales in R&D in 2013, but that investment is not distributed equally among the businesses. For example, developing a new infotainment system for BMW required R&D investments in the electronics business equal to 15% of that business’ sales. Powertrain will spend 8%-10% on R&D; lighting, 5%. The suspension and exhaust businesses will spend 1%-2% on R&D.

Magneti Marelli is not at all acquisitive. Rather the company relies on a significant number of partnerships.

**Automotive Lighting**

By far the company’s largest business segment, Automotive Lighting accounted for 33.7% of sales in 2012.

Distinctions Claimed by Magneti Marelli

- World's first supplier of xenon front lighting, in 1991
- World's first supplier of headlight with active infrared module
- World's first mass-produced LED rear light, in 2005
- World's first full-LED headlamp in series production, Audi R8 in 2007
- Number-one supplier of flexible-fuel systems in Brazil (43% share)
- World's first tier-one company to supply infotainment systems based on the Genivi Linux software platform

Some Customer Engagements Involving Electrical or Electronics Parts

- Full-LED headlamp: Mercedes CLS
- Full-LED headlamp and LED taillights: Audi A7 and A8
- IR for night vision: Mercedes S-Class
- Telematics box: PSA Group
- Blue&Me: Fiat Group Automobiles
- TFT instrument cluster: Renault Scenic
- Instrument cluster: Audi A4
- Instrument cluster: Ferrari
- Radio navigation: SAIC
- Infotainment system: PSA
- SmartNav: Kenworth

The company produced 22 million headlamps and 22 million rear lights in 2012. The world’s third-largest automotive lighting producer, the company maintains 23 sites (production facilities and R&D centers) in Germany, Italy and the United States.

Arguably the world’s most innovative automotive lighting company, Magneti Marelli Automotive Lighting was first to supply xenon front lighting in 1991, first to mass-produce LED rear lights in 2005 and first to put full-LED headlamps into production in 2007. LED headlamps from Automotive Lighting are featured on the 2014 Mercedes S-Class. Magneti Marelli is well positioned to win a significant share of business as carmakers worldwide transition from halogen to LED headlamps.

Mr. Razelli is confident that LED lighting is the future. LEDs consume much less energy than their alternatives and have a long operating life. LED headlamps emit light that’s identical to daylight, require little installation space, and can be assembled into appealing designs.

“In three or four years our LED revenues will account for half of automotive headlamp revenues,” predicted Mr. Razelli. “In terms of volume, that may be only 20% to 30%. Rear lights are even more impressive: 75% of rear-lighting revenue will come from four- or five-function lamps that are LED based; 50% of volume will be LED.”

Magneti Marelli is petitioning the European Commission to treat lighting as an “eco-innovation,” which would allow carmakers a reduction of 1.0 to 1.5 grams of CO2 per kilometer for models fitted with LED headlamps, for example. If carmakers can begin using LEDs as part of their strategy to meet stringent CO2 targets, the switch to LED headlamps could be faster. The EC’s decision is expected in six months to a year.

Infotainment

“Our infotainment business is booming,” exclaimed Giuseppe Rosso, who heads the infotainment business unit at Magneti Marelli. Approximately 50% of infotainment revenue is related to head units; 30% comes from smart radio, a growing product line, and 20% of infotainment sales are connection boxes. Between 2010 to 2013 infotainment system sales have risen at the annual rate of 49%, from €90 million to €300 million. Those numbers don’t yet fully account for Magneti Marelli’s most impressive infotainment win to date: In November 2013 the company expects to begin shipping to BMW the world’s first infotainment system based on the Genivi/Linux open source software platform.

Having done the exceptionally hard work of pioneering Genivi as a tier-one supplier, Magneti Marelli is now well positioned to support future Genivi projects, assuming BMW’s launch is successful and relatively glitch free. According to Mr. Rosso, “Bringing this product into production with the quality level and performance required by BMW was a good challenge for us. Once other carmakers see a real Genivi product enter the market they will be more inclined to follow BMW and PSA with infotainment systems based on Genivi middleware and the Linux operating system.” (See Genivi article on page eight.)

The mid-level infotainment system developed by Magneti Marelli will first appear on the new BMW 6 Series, sources tell the Hansen Report.
An open platform, Genivi can incorporate navigation modules from a number of different suppliers, including Harman, Elektrobit, Nokia and TomTom. Because its other infotainment systems are from Harman, BMW chose Harman’s navigation module, which Magneti Marelli as the tier-one supplier validates, tests and guarantees.

Today, Magneti Marelli’s biggest infotainment customer is PSA, a customer it has served since 2000. Magneti Marelli supplies 90% of PSA’s connected radios, which is a radio and display that can link to the driver’s smartphone via Bluetooth. For PSA’s mid- to high-end platforms, the system can include navigation with text to speech and a 7-inch touch screen display. Connected to the CAN bus, the system can also display vehicle systems information and diagnostics.

Already a player in both the cluster and infotainment businesses, Mr. Rosso believes Magneti Marelli is well positioned as these two markets converge. “Carmakers are interested in integrating the infotainment system, instrument cluster, climate control and rear seat entertainment systems into a single domain ECU. That ECU would consolidate all the driver interfaces related to those systems under the control of a single multicore microprocessor running virtualization software. One operating system will manage the connection with the car systems, another will manage consumer apps and a third will manage the graphical user interface in the cluster and the head unit’s display,” explained Mr. Rosso. “The vehicle’s interface to the driver has become a key selling point.”

The ECU will connect to a separate telematics box for communications with the cloud. “However, the telematics box will remain separate to gain more scale and thereby minimize its cost, and because phone technology is rapidly changing,” he noted.

Telematics
Since the end of 2010, Magneti Marelli has shipped one million telematics boxes to PSA and plans to leverage that experience to win a 20% share of eCall business, once the EU mandate is implemented. In June 2013, the European Commission announced the adoption of proposals to equip all new cars sold in Europe after October 2015 with eCall. Each eCall unit combines a GPS receiver and cellular modem with access to the vehicle bus, so the vehicle can automatically make a call to 112 (the emergency number) in the event of airbag deployment. Depending on features and volume, an eCall box will cost carmakers between €55 and €90, according to Magneti Marelli. “Some customers are asking for 3G connectivity while others want 2.5G,” noted Paola Carrea, in charge of Magneti Marelli’s telematics. “This will limit economies of scale and affect price.”

Magneti Marelli says it has already won an order for eCall “from a very important customer,” who can’t yet be named. The company also expects to win a significant share of the telematics box business in Russia once ERA-GLONASS, the Russian equivalent of eCall, is finalized. GLONASS is Russia’s satellite navigation system.

AMOLED Displays
In 2009 Magneti Marelli began a partnership with Samsung to develop AMOLED (active-matrix organic light-emitting diode) displays for automotive applications. Such displays could be used in the cluster, the center column, in rear seat systems and as part of, or a replacement for, the rearview mirror. “Compared with LCDs, AMOLED displays are faster reacting, brighter, more color accurate, and have better contrast,” said Pietro Toselli, who is responsible for Magneti Marelli’s electronics and powertrain business lines.

AMOLED displays from Samsung are already used in Samsung tablets and smart-phones but they don’t yet meet automotive specs. At 85 degrees C they age too rapidly, and they are expensive. Working with Samsung, Magneti Marelli expects to have AMOLED displays ready for applications in D- and E-segment vehicles by 2016.

Clusters
Magneti Marelli produces seven million clusters worth €360 million annually. Cluster prices range widely, from €15 for a limited-function stepper-motor cluster to €300 for a multifunction LCD cluster. The bulk of Magneti Marelli’s cluster business is in the C- and D-segment vehicles, but it also produces high-end clusters for Porsche and Ferrari.

Today, multifunction or reconfigurable displays represent just 2% to 3% of clusters made globally each year, but with display prices coming down, the numbers are expected to climb, reaching 10% of the cluster market by 2020.

Demand for so-called hybrid clusters, which combine a multifunction display and stepper motor driven instruments in the same cluster is also growing. Today these hybrids account for nearly half of all clusters sold but penetration is expected to reach 60% to 65% by 2020. Demand for pure stepper-motor clusters will decline from nearly half today to 25% to 30% of the total in 2020, according to Magneti Marelli.

Magneti Marelli produces the multifunction cluster, now in its second generation, for the 2014 Renault Scenic, introduced this spring. The TFT LCD is from Samsung. Magneti Marelli also produces the
multifunction cluster used in the new Citroen C4 Picasso due this fall in Europe. Magneti Marelli’s main cluster customers are Fiat, Chrysler, Audi, PSA and Renault. Cluster business is picking up with the Volkswagen Group and with Suzuki.

**Powertrain**

The powertrain business unit will reach €1 billion in sales in 2013, with 75% of sales from engine control systems and 25% from transmissions.

**AMT—Magneti Marelli** has been producing its automated manual transmissions, derived from Formula 1 racing, since 1997. In its fourth-generation, demand for AMT is still growing, from 380,000 units produced in 2012 to 800,000 units expected following year.

**DCT—While AMTs are especially well suited to A- and B-segment vehicles, dual-clutch transmissions are well suited to the C and D segments. More expensive than AMTs, Magneti Marelli will ship 100,000 DCTs in 2013. That number could grow sharply, to as many as 400,000 units in 2017, says the company.**

**GDI—“Magneti Marelli is investing heavily to bring our current generation 200-bar gasoline direct injection system up to 600-bar technology,” said Mr. Toselli. Ready in a couple of years, 600-bar technology will help carmakers meet CO2 emission reduction targets in Europe (120 grams per kilometer by 2015, 95g/km by 2020). The company is developing 600-bar fuel injectors capable of multiple injections for each engine cycle.**

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### Magneti Marelli

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Reporting from Automobil Elektronik Kongress, Ludwigsburg, Germany

Genivi: What’s Next after BMW, PSA and JLR?

At the Automobil Elektronik Kongress last month I talked to a lot of people about Genivi, the open-source infotainment software platform based on Linux and championed by BMW. After BMW’s first Genivi implementation goes into production this coming November, it is widely understood that PSA will be next, followed by Jaguar Land Rover. PSA’s general manager for cockpit, safety, and infotainment EE modules, Philippe Gicquel, is president of the Genivi Alliance, replacing Genivi’s main champion, Graham Smethurst of BMW.

The German Five usually cooperate fully to promote standards globally but BMW is the only German carmaker committed to Genivi, despite its promise to significantly lower the cost of infotainment system development through software reuse. According to a presentation at Ludwigsburg by Dirk Hoheisel, member of the board of management at Bosch, the benefits of Genivi’s cost savings start with the system’s second generation, when software development costs decline to 75% of generation one’s cost. Generation three’s development costs decline even further, to just 40% compared to generation one.

After the presentation I talked to top EEs from Volkswagen, Audi and Daimler, who remain unimpressed and not likely to adopt Genivi any time soon. But Bosch is all in.

Bosch to Base All Future Infotainment Offerings on Genivi

“We decided to base all future platforms being developed by ADIT, our joint venture with Denso, on Genivi. Over time, all Bosch Car Multimedia customers will become Genivi users because we have no plans for platforms other than those from ADIT,” wrote Andrei Zahiri in an email to The Hansen Report. Mr. Zahiri is senior vice president of engineering for automotive navigation and infotainment systems at Bosch and a Genivi board member. ADIT (Advanced Driver Information Technology) is a 50-50 JV founded in 2003.

The first Linux platform developed by ADIT was begun before the first Genivi standard was released and therefore is only approximately 90% Genivi 1.0 compliant, according to Bosch. Products based on this first platform currently shipping were not tested for Genivi compliance. The second generation ADIT platform is already Genivi 2.0 certified and will likely be upgraded to Genivi 4.0 before start of production in 2014. Bosch has booked business for the second generation ADIT platform with several OEMs in all major regions of the world. A third generation Genivi-compliant ADIT platform is due to go into production in 2016. Including the first generation “nearly” compliant version, Bosch has booked business for more than 20 million Genivi units through 2020.

Bosch was GM’s development partner for GM’s CUE infotainment system, the first ever Linux-based system customized for in-vehicle applications. At the time of CUE’s introduction in January 2012, the GM engineer in charge of the project told me that he decided to go with a Linux platform knowing that Genivi was Linux-based and, “we could easily migrate to Genivi as it matures.” If BMW’s first Genivi implementation is successful, GM could become a Genivi adopter.

Whether and how quickly more carmakers gravitate to Genivi head units will depend on the success of BMW’s Genivi implementations. According to a well-placed source, Volvo is planning a Genivi implementation, but in an email to the Hansen Report, Volvo Car’s top EE, Thomas Müller, wrote that a decision on Volvo’s next-generation infotainment system will be made in 2014. He did point out that Volvo is a Genivi member.

BMW’s first Genivi head unit will debut on a new 6 Series car. Magneti Marelli supplies the hardware, and along with Wind River, some of the middleware for this mid-line infotainment system. The CPU is from Nvidia. The navigation and connectivity applications are from Harman. BMW is committed to rolling out Genivi infotainment systems across its entire product line. Alpine, who won the order for BMW’s next-generation Genivi head unit, is cooperating to make it fully Genivi compliant.

Infotainment Suppliers

Markus Schupfner, vice president infotainment solutions and automotive software at Elektrobit, sees a clear and growing trend among OEMs to separate infotainment hardware sourcing from infotainment software sourcing, undermining the traditional role of tier-one suppliers such as Harman. “Tier-one hardware providers will become exchangeable while software stacks developed in close cooperation with OEMs can be reused, allowing higher grade innovation and significantly shorter time to market,” he said.

Harman, who has been a dominant infotainment supplier in Germany, is seeing more competition, particularly at Daimler, who selected Mitsubishi Electric as the infotainment supplier for the next-generation S-Class coming out in several years. Harman’s infotainment unit is in the 2014 S-Class, just introduced.

Infotainment Suppliers to the German Carmakers

- Alpine
- Continental
- Harman
- Magneti Marelli
- Mercedes-Benz
- Mitsubishi Electric
- Panasonic
- Aisin Seiki
- Continental
- Delphi
- Harman
- Panasonic

Distraction...

Continued from page 2

Watson provide this advice: “A theoretically sound and methodologically rigorous technique should be developed to determine the distraction potential of a device before it is used while driving. We suggest that it is unwise and unethical to integrate a device into the vehicle without first proving that it does not cause harm.”

For more on driver distraction from David Strayer and his team, please visit www.psych.utah.edu/lab/appliedcognition or contact him at David.Strayer@utah.edu.