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TELEMATICS
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# THE KEY TRENDS IMPACTING AUTOMOTIVE TECHNOLOGY IN 2016

Preview to share with your colleagues, clients and partners

- **A concise overview of the automotive technology space**
- **7 key industry trends: your review of the main industry themes and topics addressed**

By Susan Kuchinskas

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# 1.

# Overview

Disruption and new horizons continue to be the key drivers for the connected automotive industry right now.

Thilo Koslowski, vice-president, analyst and founder of Gartner's Automotive Practice, has laid out the important trends for the coming year:

As OEMs become even more aggressive about equipping vehicles with connectivity, automotive will become the fastest-growing mobile device category.

The software and IT defined automobile will provide differentiation among brands and models.

Ultimately, the car will become a node in a much bigger network. This will create new intermodal opportunities and become part of a smart city environment.

Car-to-car infrastructure is a huge new opportunity being enabled by connected vehicles – and will see the most investment and strategic decision-making.

In 2016, connected-vehicle features will become a critical buying consideration for the average consumer in mature markets.

# 2.

# Key Industry Trends

## Autonomy: top of the hype

Gartner's Koslowski has placed autonomous vehicles at the peak of the hype cycle. Right now, he says, consumers have inflated expectations. Now, we have to reset those expectations. You won't be able to sleep while your car drives you to work for many years. He also promised that self-driving cars won't linger too long in the trough of disillusionment.
He cited a recent Gartner consumer survey. When asked: 'Do you want a car that can drive itself?', 27% were very interested, and 41% said, "maybe".

He reiterated that fully autonomous vehicles will be on the road by 2020, with significant penetration by 2030. "By 2020, 10% of today's vehicle owners in mature markets will give up vehicle ownership for on-demand access," he says.

Autonomy is now a given. You can already see it in action on highways and city streets. So it's very easy to forget that really major problems have yet to be solved. However, plenty of challenges remain.

One of the greatest challenges is the machine-to-human handoff. It's unreasonable to let drivers do other tasks and then expect them to take over quickly in an emergency.

"When you tell people we'll drive for you but you have to supervise the car at all times it's unlikely to be perceived as real customer value," says Jim Mazurek, senior vice-president of automotive sales and business development at Neusoft.

Olaf Preissner, head of UX automotive and innovations at Luxoft, notes: "When systems get more reliable, takeover skills get worse." This is an established problem in commercial aviation, and pilots are required to take training to maintain their skills. Will drivers be willing to do the same?

"The system has to deliver the right amount of engagement at the right time to keep driver's mind from wandering," Preissner says.

It's not only a human-machine interface (HMI) problem. It's also a people problem – and everyone is different.

"We can design the tech but how do you tune it to deal with the behaviour of individuals?" asked Mazurek.

Now that automakers have firmly planted in everyone's mind – including National Highway Traffic Safety Administration's (NHTSA's) – that autonomous driving will progress through several levels before true driverless driving, experts have started to talk about skipping level 3.

"Level 3 is the tricky one. You have a thing that encourages you to delegate driving but you can't, because if something happens, it's your fault. Level 2 systems are amazing and will radically improve the commutes of most Americans. We would like to leapfrog from 2 to 4," says Anders Tylman-Mikiewicz, general manager of the Volvo Monitoring & Concept Centre.

Meanwhile, Chris Heiser, CEO of Renovo Motors, says the industry should stop dithering. Autonomy may not be perfect; self-driving cars may still get involved in crashes. Yes, there's a level of risk, he says, but they'll still be better than human drivers.

Roger Lanctot, associate director of the global automotive practice of Strategy Analytics, posited that fully autonomous vehicles, such as the Google cars without steering wheels or pedals, might be best deployed in places like Las Vegas, where automotive and pedestrian congestion are expected to soon exceed capacity.

## The infotainment of tomorrow

Infotainment may not be top-of-mind for consumers but it certainly still is for OEMs and their partners and vendors who are coming up with many new innovations in this space.

Steve Banfield, CMO of Inrix, cited some of his company's newest innovations, including a Road Weather service that can provide information on actual conditions based on data from crowd-sourcing and third parties. Inrix also provides its data to smart cities and countries to help them understand things like traffic patterns over time, where more parking is needed or the best sites for new restaurants.

Martin Kristensson, director of connectivity strategy for Volvo Car Group, says Volvo's third iteration has a focus on usability, with a large touchscreen as the key feature. Volvo has sectioned the screen into four different parts, while eliminating many physical controls. There remain seven physical controls, including the defroster, emergency lights and volume control. Everything else is available via the touchscreen.

Volvo is building its apps in-house, in partnership with suppliers such as Pandora. He sees a place for having some media applications integrated into the main system, instead of posted as icons.

David Taylor, director of connected services for Panasonic Automotive, says Panasonic, too, is moving away from the display of app icons. "That's a ten-year-old experience," he says. "When you have a lot of screen, you need to use it more efficiently. We're thinking about information, content and services independently from apps."

Jan Stinson, CTO of Renovo Motors, says the industry could be doing much more with the multitude of sensors aboard vehicles. He notes that the smartphone industry has built amazing services with relatively few sensors. Why can't OEMs do the same?

Renovo is a start-up taking a platform approach that begins with a "clean sheet." Its architecture treats many things as apps on the underlying platform, including navigation, infotainment, and battery-system controls. The advantage of this approach, Stinson says, is that it allows developers to access the car's systems in a safer way, via APIs. "If you want to allow people to play with data from the car, the fundamental platform has to change," he says.

Taylor agreed that the overall industry structure of the OEM, Tier 1 and the supply chain has to change. "The supply chain will go through a massive shakeup," he says. "The winners will be the ones that can reinvent that successfully."

## Google and Apple … and Amazon, and who's next?

"The auto industry is facing an oh-s**t moment," says Lanctot. Anyone can make a car. Will the rumours of an Apple car become at least 'vapourware' this year? Maybe. What is certain is that the giants of consumer electronics and services will increase their incursions into the auto industry.

John Ellis, managing director of Ellis & Associates, discusses the pros and cons of automakers letting the Silicon Valley giants into the dashboards – perhaps even over-riding their proprietary systems and HMIs. The central question: do consumers want a unique vehicle experience or a copy of their smartphone platform?

Jaguar Land Rover (JLR) is willing to be everything for everybody, according to Paul Wiles, technical specialist for CE devices for JLR and group lead for GENIVI. "The amount of different media that various customers can bring in is enormous," he says – as many as ten different items. JLR's thinking is that individual preferences are important. For example, some people will use the car's navigation, while others are already used to the navigation on their phones. Therefore, JLR supports both.

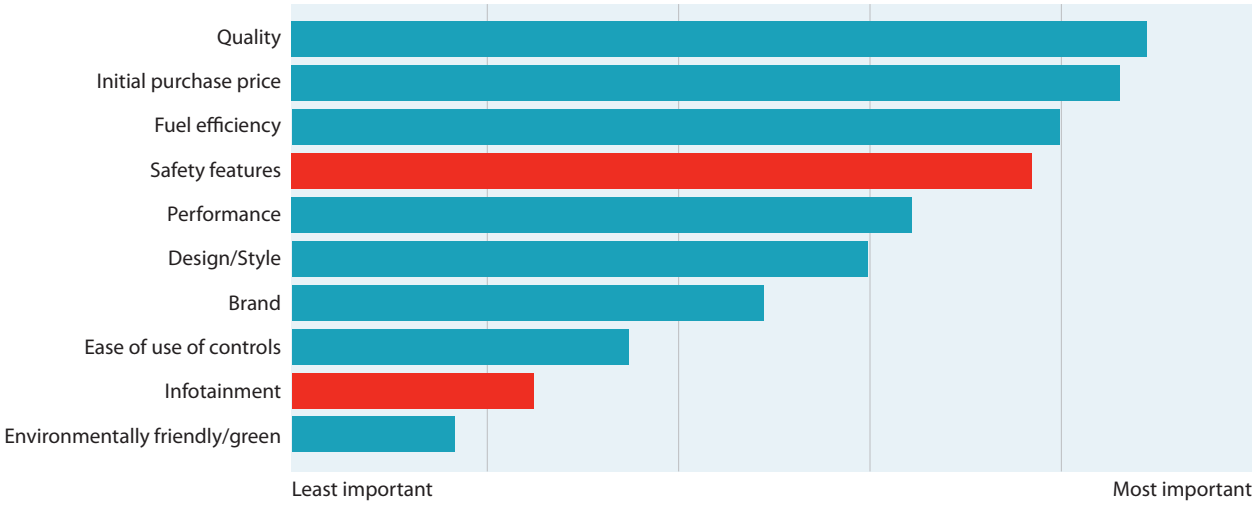
Chip Goetzinger, senior manager for vehicle connected services at Nissan, predicts that no single company will dominate. Instead, there will be major players for different chunks of the infotainment system, including content delivery, the operating system, data management and utilisation. "You can't cut the OEMs out. You will always need to have the vehicle itself," he says.

David DiMeo, director of connected car innovations at FordDirect, agrees. "The infotainment system is not the end-all," he says. "Horsepower, miles per gallon and the seats still are what power the brand."

This was validated by a Strategy Analytics consumer survey, showing infotainment almost at the bottom of the list of consumer desires.

**What do consumers want (US)?**

***Safety features ranked higher on average than infotainment as a priority in vehicle purchase***




*Source: Strategy Analytics*

However, accepting Apple and Google into the dashboard can create new problems for OEMs beyond loss of brand, says Mykhail Bykov, managing director of automotive solutions for Luxoft. He asked: "If we have cars with multiple platforms – for example, he likes Apple and she likes Android – how do you troubleshoot that?" It's vital that the automotive brand doesn't get a black eye because of the failures of partners in the ecosystem, he adds.

Goetzinger agrees. "How do you support quality in the vehicle if you have different software for every customer?"

The answer will be better collaboration with the OEM from every platform and service provider – along with some tough love from Bykov. He says: "OEMs will have more responsibility for troubleshooting. If they think [a third-party platform] will not work perfectly, they should cut it off their ecosystems."

## The mysterious consumer

Koslowski promises that connected-vehicle features will become a critical buying consideration in mature markets. A panel discussed whether connectivity really sells.

Henry Bzeih, chief technology strategist at Kia Motors, notes that Kia's values are product leadership, operational excellence and customer intimacy. "If you mirror those into the connected vehicle, there has been a lot of maturity in the first two. The missing point is customer intimacy – and the biggest opportunity is to garner this," he says.

Opportunity, yes. But so far, this has not proved easy. John Morel, senior manager of business intelligence, strategy and analytics at Honda, says: "We see tremendous opportunity in the space. But the difficult question is, how can we make this in a way that appeals to customers and they find it trustworthy? The technology side wants to move very quickly; the customer moves much more slowly."

Moreover, Morel points out that consumers differ greatly in their appreciation for technology. Somehow, OEMs must design cars that appeal to traditionalists and early adopters – and everyone in between.

When it comes to customer relationship management (CRM), the ideal scenario is using data from connected cars to predict failures and bring drivers into the dealership before the fail. "The technology solutions are do-able and not a concern. The issue is how do we make the customer enjoy the connected vehicle experience?" Bzeih asked.

Tom Sexton, vice-president of strategic sales for Urgently, provider of roadside help for stranded motorists, says his company, too, is still exploring the best way to work with OEMs to notify drivers that, for example, a tyre is getting low.

When it comes to usage-based insurance, Nino Tarantino, CEO, North America, of OCTO Telematics, says insurers also are interested is creating a higher frequency of communication with their end customers.

In Europe, Tarantino points out, insurers already have the ability to detect crashes or minor accidents and understand what needs to be done, whether sending emergency services or initiating the claims process.

So, there is strong interest from insurers and OEMs in using the connected car to increase intimacy with customers but what do consumers think?

Andrew Hart, director of innovation and customer relations, SBD, and Bryan Krulikowski, vice-president of automotive and technology research for Morpace, cites their market research panel of six consumers who had seen videos of connected-car features.

"Consumers aren't always logical," Hart says. "Companies might develop feature sets but consumers don't use spec sheets when they purchase cars. They go by their guts."

Of the panel of five women and one man, owners of recent-model cars, only one of them mentioned connected features. Stacie, owner of a Ford Expedition, was on her third Ford, and she said the Sync system was a primary reason she is sticking with the brand. The rest of the panel mentioned traditional vehicle qualities as driving their purchase decisions: fuel mileage, size and dependability.

The panel had seen videos demonstrating autonomous driving; a personal assistant at home; and connecting the car to the home. They were enthusiastic about a personal assistant that would, for example, send a text if the refrigerator door was open or there were toxic fumes in the garage.

Anne, for example, appreciated the scenario where someone was cooking and had a question about a recipe. Instead of stopping to search online, she could just ask the question of the digital assistant. Still, she said, this wouldn't be on the top of her list to buy.

The consumer panel also had concerns about data safety. For example, a hacker might be able to find out when everyone had left the house and break into it.

They were highly enthusiastic about not only autonomous driving but also about the ADAS products already on the market. Joe said that automatic emergency braking had saved a family member's life. What better endorsement could automotive tech get?

In fact, OEMs will be happy to hear that safety features are so highly regarded that this is one thing consumers are willing to pay extra for. Jamie said she'd pay an extra $10,000 for collision avoidance. Joe said: "Price is almost irrelevant."

## Security takes the pole position

In the race to autonomy, someone forgot about security. Okay, not someone – almost everyone.

Back in September 2014, security researcher Chis Valasek told TU-Automotive that modern cars were loaded with "attack surfaces." But it wasn't until July 2015, when Valasek and fellow researcher Charlie Miller demonstrated they could disable the accelerator pedal on a Jeep – doing 70mph on a highway – that the industry started to take security seriously.

It's serious now. Most experts now agree the need for better security. They also acknowledge that securing the connected car might take revamping every aspect of the design and manufacturing process.

It's no longer necessary to try to drum up awareness, says Joe Fabbre, director of platform solutions, Green Hills Software. Even though over-the-air (OTA) can be used to issue quick security patches, as we saw with Tesla, the industry should not be lulled into a false sense of security, he says.

Most security defects are the result of software bugs, according to Fabbre, and some bugs are security vulnerabilities. If an automobile meets the software-industry standard of one to 25 defects per 1,000 lines of code, over five years, its software could have 2,500 discovered defects – and 7,500 that are not discovered but could have the potential for zero-day attacks.

He proposes a solution that separates safety-critical components in the system from untrusted code while enforcing strict access control.

This isn't always possible, says Chip Goetzinger, senior manager for vehicle connected services at Nissan. For example, because the infotainment system is often the best way to deliver information about the car's systems to the driver and to deliver OTA software updates, the distinction between critical systems and infotainment is starting to blur.

Standardisation of platforms could relieve some of the security pressure. Matt Jones, head of future infotainment and senior

technical specialist at JLR, highlights the GENIVI project, which is about to release its next platform. "It makes sense for organisations to standardise the bits customers don't pay for," he says.

In addition to two-thirds of an IVI stack, GENIVI is working on Automotive Message Broker, a framework for accessing vehicle information via an application instead of directly. The plan is to extend it to control the car's heating, ventilation and air

Many experts suggest the auto industry needs to stop dithering about standards. In the first place, there are security standards already that could be applicable to automotive. The problem with standards consortia in general, though, Goetzinger says, is that most companies are already too invested in their own systems. The common response to attempts at standardisation is, "Standards are great. Let's use ours!"

Andrew Poliak, global director of business development for QNX Software Systems, says automakers will need to rely on their vendors for security as standards are developed – a process that could take 20 years.

Still, security is always a race against hackers, says Dirk Reimer, vice-president of sales and marketing for Telit Automotive Solutions. What makes the difference, he says, is 'different' is how much effort companies put into assessment and validation to make the frequency of hacking as low as possible.

Jonathan Allen, a principal and director of Booz Allen Hamilton, is also executive director of the Auto ISAC, an industry group that will share information about threats and attacks. He gives kudos to automakers for creating the ISAC before a catastrophic attack.

He adds that disaster planning is crucial – and needs to be continual. After the Jeep demonstration hack, he says: "Every OEM should have started their incident response planning that afternoon."

Koslowski delivers a chilling prediction: by 2019 two automotive companies will be fined for vehicle software design negligence that results in inconsistent technical performance or cybersecurity attacks.

He says: "Automakers can no longer say it's not their problem. OEMs must create an end-to-end technology approach that takes security into account."

## Regulations for the constantly updating car

The issues around insurance and liability for self-driving cars sees experts digging further into the legal ramifications of over-the-air software and firmware updates to vehicles. As OEMs initiate OTA updates, how will insurance companies and regulators keep up with these changes? Over the life of the car, when does it become not the same vehicle that was initially insured? And what if owner refuses the update?

Theoretically, the vehicle becomes safer and more reliable with each update. Joe Fabbre, director of platform solutions for Green Hills Software, says that, ideally, updates could be broken down into levels, from the most critical to the least. "If the vehicle architecture is set up correctly," he says, "critical components won't need to be updated. Those that are less critical will tend to be the ones that we want to update."

However, if the current recall environment is any indication, there will indeed be critical components that will need to be patched or updated. With other kinds of software, consumers expect to opt in to the updates; in Canada, it's the law, according to Sven Andén, a cyber security consultant for Sandab.

So, if a driver declines a software update and then is involved in a crash, who's responsible?

The most likely scenario, according to Gail Gottehrer, a partner in the law firm of Axinn, Veltrop & Harkrider, is that manufacturers will warrant the software in the update. "It could be argued that the consumer took on the responsibility. Essentially, you have refused something that the OEM was willing to warrant was safe appropriate and necessary for your car. You could have criminal liability as well," she says.

Gottehrer added that it's unclear whether, in that case, the driver's insurance company would pay the claim.

Andén notes a trend of OEMs, led by Volvo, saying they will take responsibility for damages caused by autonomous vehicles. "But what insurer would take that on?" he asked.

Gottehrer does not think that such initiatives will stop litigation. Instead, they will shift it from consumers suing OEMs to OEMs suing their suppliers "all the way down the chain." Traditionally, she notes, vendor agreements are short-term and indemnification agreements don't cover cyberattacks, nor do they require certificates of insurance. "In the past year, they are

taking a much closer look at these vendor agreements," she says. "Everybody is making sure there is insurance behind the promise."

As with the issue of liability for crashes involving autonomous vehicles, the conclusion was that these questions will sooner or later be answered by litigation. But Mariel Devesa, head of innovation at Farmers Insurance, is optimistic that the insurance industry will be able to develop insurance products to meet the demands of ever-updating vehicles. She points to the private/public collaboration that created sample legislation for transportation networking companies – the taxi alternatives like Lyft, Uber et al.

She says: "Consumers were demanding [ridesharing], so the legislation changed very quickly from the industry fighting each other to coming together."

Ian Forbes, head of the Centre for Connected and Autonomous Vehicles of the UK Department of Transport, says this was the better approach for autonomous and updated vehicles, as well. He adds: "Placing government right in the forefront is probably a mistake. You'd hope that the industry would be able to come up with a method for handling these issues that the government could sign off on."

## Smart mobility

Gartner's Koslowski, notes that, by 2020, there will be 22M connected vehicles, which will allow transportation to become part of something much bigger in the future.

But smart mobility will require new solutions for authentication and identity, says Tim Evavold, director of connected car and dealer ecosystems for Covisint: "We have to deal with multiple personas now," he says. For example, the car's owner and driver might not be the same person. Moreover, there may be additional users of the car's WiFi and other programs. (Covisint provides identity relationship frameworks.)

In an ideal system, individuals could authenticate themselves to different vehicles, carrying their permissions and preferences with them.

Interoperability within the ecosystem is another important factor, he adds, allowing connected devices to not only exchange data but also deliver business value.

Finally, he says device lifecycle management and a many-to-many relationship model would enable ecosystem partners to capture the entire history of a thing and its ecosystem. They could "replay" a thing's history, simulate events and do comparative analytics across the data.

Lanctot brings home the value of integrated mobility with some alarming predictions for the crowded city of Las Vegas: key corridors within the core area are already 9 to 27% over capacity, he says, while overall, they are currently running at 98% of capacity. In 20 years, every key corridor will exceed its capacity. And that goes for pedestrian corridors, as well as roads.

A workable mobility plan for Las Vegas could solve this challenge but it would take many parts. His recommendations are:

- Enhance visitor mobility between McCarran International Airport, the resort corridor and Downtown;
- Improve pedestrian safety and mobility along Las Vegas Boulevard;
- Improve connections between convention and event facilities;
- Improve connectivity between the core area and workforce population centres;
- Improve core area access from I-15;
- Improve Downtown circulation and access;
- Support transportation infrastructure coordination and implementation.

Lanctot sees a role here for the Google "bubble-car", the one with no driver controls at all. While admitting he has been sceptical about the "bubbles", he now says it made sense to have a fleet of them endlessly circling Vegas, allowing people to hop on and off wherever they wanted.

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# Conclusion

The connected car industry clearly is kicking into high gear. While tech still is ahead of consumer demand, the industry, with its long development cycles, is at the right place at the right time.

Gartner's Koslowski gives a nice metaphor for the changes in the industry. "Data is the new fuel. Algorithms are the new engines, and intelligence is the new horsepower," he says. His advice: "Prepare for a new industry order and define your role in it."

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TU-Automotive is the reference point and communications hub for the evolving automotive technology segment as it converges with consumer electronics, mobile and IoT to re-define connectivity, mobility and autonomous use-cases.

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