

# State of the Auto-Mobility Industry Report

By  
Siegfried Morkowitz

 Automotive

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# AUTO TECH DISRUPTED. SMART MOBILITY ENABLED.

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## Introduction

The vision of the future to which the digital disruption is taking the automotive industry has come into focus. It is the fusion of autonomous driving and mobility-as-a-service. The path to that future will transform the automobile from a gas guzzler, polluter and occasional menace to its opposite – a clean, safe and, almost certainly, electric form of mobility.

The automobile manufacturers will also be transformed, into a digital brand more focused on providing mobility services than manufacturing cars. And many of them will be working in partnership with some public agency, such as a transport authority, public transport company or traffic management system, because one role of the automobile as part of the future mobility ecosystem will be to auto-correct the social problems it has created.

In a presentation at the TU-Automotive Europe conference, held November 6 and 7 at Munich's MOC Veranstaltungszentrum München, Georg Obermayer, Operations and Logistics manager for Germany at Uber, told attendees, "When ride-hailing took off, we realized that the status quo of the transportation system is inefficient, insufficient and unequal. So, the question is, Is there an alternative to a world that looks like a parking lot and moves like a traffic jam? We think that if people start to share cars and use public transportation, we're on a pretty good path."

It is widely expected that, as a result of the transformation of the automobile and the mobility paradigm, fewer cars will be privately owned, because more people will use carsharing services and public transportation, future cities will have cleaner air, uncongested roadways and less space dedicated to parking and, therefore, more space for leisure and lifestyle activities.

As Obermayer put it, "About 95 percent of the time cars just sit there idle. This leads to 20 percent of the space in cities [being] used for parking. Not schools. Not housing. Not parks. But parking lots and parking spots."

This vision of the future may sound utopian today, but it was viable and very real to the approximately 750 executives and managers from every corner of the auto ecosystem who attended the conference.

## Car-makers Embrace the Future – at last

The penny appears finally to have dropped for the auto industry. According to a study by KPMG Consulting, cited by Juergen Daunis, vice president of Global Sales, Connected Vehicles, at Ericsson, today, 82 percent of industry executives consider major business model disruption very likely, whereas last year the number was only 12 percent.

"Auto executives agree that the digital ecosystem will generate higher revenues than the hardware in the car," Daunis said "The value of services will increase more and more and will be much bigger than traditional hardware sales. The consequence of that is that we need to change how we do business and how we prepare our systems to support this transformation."

Proof that investment in connectivity-driven technology is soaring can be found in the rapidly escalating number of patent filings for autonomous technology by automakers in the U.S. in

recent years. A study by consultancy L.E.K. showed that the number grew from a mere 54 in 2012 to 650 in 2016, a twelvefold increase in only four years.

Perhaps more significantly, it's not only the auto industry that is investing in the autonomous and service-driven future of the car. According to L.E.K., when you count all corporate filings for autonomous technology in the U.S. from 2007 to 2016, the busiest company was not a carmaker, but a tech company: Alphabet/Waymo's 2,118 patent filings in that period amounted to twice as many as those by GM and Ford combined.

Clearly, these companies expect to find a pot of gold at the end of their patent rainbow. A 2016 projection by McKinsey & Co. forecast that on-demand mobility and data-driven services could add \$1.5 trillion to the auto industry revenue pool.

"The car itself is what you monetize with connectivity," said Mark Thomas, vice president of Marketing at Ridecell. "When you take a look at where the growth is in the automotive industry, it's mobility services. That's where the growth is going to come from a shareholder perspective. That's where the growth is going to be driven from in the industry. That's why we are seeing all the companies in the industry asking, How do we get a piece of that?"

To support his point, he cited figures that, if borne out, promise a lucrative future for connectivity-driven mobility. "Overall, about 1 percent of all passenger miles driven [today] are in new mobility types of things, carsharing and ridesharing," he said. "So we are just at the very beginning. By 2030 it's expected that about a third of all passenger miles will be via new mobility services."

Of these, roughly 10 percent will be driven with a driver at the wheel, he said. "The real growth engine here comes from autonomous mobility services. That's because when you take the cost of the driver out of the equation, it brings the cost down to almost below half of the cost of individual vehicle ownership."

The ultimate goal of the new mobility services, reducing the number of privately owned cars on city streets, should not, however, have a major impact on the number of cars manufactured and sold, Thomas said.

"Automotive sales aren't going to be diminishing much. But who's going to be buying the cars is going to change the nature of the automotive industry. Somewhere between 2025 and 2030, in North American urban areas, more than half of the cars sold will be to these new mobility services, and not to private individuals."

If true, this is good news for car-makers, municipal traffic management divisions struggling with overloaded and inefficient transport systems and city residents dealing on a daily basis with pollution, endless traffic jams and a dearth of parking spots.

## New Car, New Carmaker

As Roger Giralt Bartolome, head of Car Connectivity Planning at SEAT, told conference attendees on the first day, his company has already restructured and transformed itself to prepare for the future.

“We are changing from a product-centric strategy to the user as the centre of experience,” he said. To that end, the company has restructured itself, creating what he called “a parallel structure” alongside its traditional car-making business. “We are developing and creating cars – we have to do that still – and we have created a parallel structure we call Easy Mobility Team. This is the digitalization at SEAT.”

Part of this parallel structure is the SEAT Metropolis:Lab Barcelona, which is focused only on mobility solutions. “The goal of the Metropolis:Lab,” Giralt said, “is to create an algorithm to improve the mobility of the city by using it not only in Barcelona, but also to scale it to the rest of the cities in the world, by means of providing new intelligent solutions by linking citizens, data, smart cities and cars.”

In addition, this new division includes “170 startups in one building in Barcelona, with about 1,000 employees,” he said.

According to Ericsson’s Juergen Daunis, this kind of forward-thinking activity is necessary to prepare carmakers for future mobility. He cited a forecast by Gartner that “by 2020 the value of IoT will be 1.9 trillion dollars. And 50 percent of that will be generated by companies that are less than three years old. If you think about the length [of time] for an OEM program to onboard a partner, do you think OEMs can handle the onboarding of startups that have only a year or two in the business? The startup will be out of business before they start making any money if they follow the traditional way. We need to be much more agile, faster, to do that.”

Giralt went on to explain that the Metropolis:Lab is working on three mobility projects: a parking finder, predictive navigation and traffic management. The parking finder does precisely what its name suggests – it uses connectivity to find vacant parking spots and relay the information to drivers looking for a space to park their vehicle.

He described how his company collaborated with local governments in Spain to develop its innovative in-car parking finder solution, which he described as “getting information from the city on the sensors of its parking stations, knowing the occupancy and providing that in real time to the customer.”

The solution came out of meetings between the company and the Barcelona and Catalan governments aimed at “trying to find a common approach, especially on mobility.”

In these discussions, SEAT discovered that Barcelona’s municipal administration was working with the EU on a project called iCity. The aim of the project, Giralt explained, was “to standardize an IT platform and extend it to the rest of the cities of Europe in order to connect the sensors of the city, every sensor the city has, to that platform and then expose that data to third parties for free. For us, this was great news, because it exposed the parking place sensors in Barcelona.”

The solution the company created functions via a smartphone app that is connected to the vehicle. It is supplemented by a fleet of SEAT Atecas equipped with sensors that detect vacant parking places and which sends this data to the iCity platform. Not only does this solution enable SEAT to provide more value to its customers, but it also helps solve the problem of

congestion caused by cars looking for a rare parking space, which some data suggests causes as much as 30 percent of a city's traffic tie-ups.

"It is very important that this becomes a standard," Giralt said. "Because otherwise these kinds of initiatives are not sustainable. especially for the iCity platform, where the potential is huge for other use cases."

The company's predictive navigation solution connects the car to the city and "gets data from the city, like important events such as football games, big concerts," he said. "Knowing that in advance and also in real time, you can predict the best route to go across the city and improve mobility."

Traffic management provides real-time traffic information as well as data on road construction sites that can have an impact on traffic.

## Digital Instead of Heavy Metal

The change in a car-maker's business model will also involve changing its brand image from heavy metal to digital. Digital branding was the subject of a Day 1 panel discussion in Munich. According to one of the panelists, David Karlberg, head of Product Management at WirelessCar, carmakers need to change to accommodate and adapt to a changed mobility world.

"The key part of my perspective is, how do OEM brands change from where they are right now to where they offer something in a mobility-as-a-service world?" he said. "The key is going beyond the people who own the cars to how do you provide value for everyone else and how can you go beyond the physical car and just provide services under a OEM brand?"

Tony Douglas, head of Brand, Marketing and Communications at BMW Mobility Services, put it another way. "The typical OEM business is I own the car," he explained. "Historically, it's been one customer, one car, one parking spot – that's been our business model. We are now moving into on-demand mobility where people have access to one car, so what you're effectively doing is that you're selling one car a thousand times. That's a completely different business model."

As a result, he went on, BMW launched several brands for its various mobility services, such as carsharing (DriveNow) and parking (ParkNow). "We wanted to expand the envelope and not just sell them to BMW customers," Douglas said.

He said that scalability was a problem for car-makers moving to a digital brand. "Most digital brands scale very, very fast. The Ubers, Lyfts and so on scaled incredibly fast. Most digital players have an almost infinitely scalable business model, and this is the challenge for auto-OEMs: How do you scale and be relevant in the digital age?"

However, this rebranding challenge is also a big opportunity for carmakers, he noted. "If I change my smartphone from an Apple to an Android, there's a lot of pain. But if I had to change my car, there's very little pain. Most digital players, if they get it right, they create an ecosystem where it's a joy to stay and a pain to leave. And we have to work on how do we make it a joy to stay with a platform for the user and owner."

Solving that problem will be crucial as early as tomorrow, he warned. “We have to wake up, because the next generation will expect it. My son, who is 21, has one-click access to everything, and that’s what he expects. He expects one-click access to mobility and everything else. If we want to be digital-branded, we should match what the digital generation expects.”

## Mobility-as-a-Service: Choosing How You Go

The one-click generation will want not only a seamless mobility experience, but also a choice of how to get where they are going. As Douglas put it: “What happens when you get on-demand mobility is people enter a world of mobility of choice. Traditionally, people have said, I’m a bus guy or I’m a train guy or I’m a car guy. Now you’re entering a world of mobility of choice and people are mixing and matching and the customer is choosing what mode of transport he’s using. In urbanization, there’s not a lot of space to scale one customer, one car, one parking space.”

Uber’s Georg Obermayer agreed. “Riders love combining [mobility] options,” he said, going on to describe a use case which illustrates the inherent flexibility of transportation users.

“London recently launched the Night Tube,” he said. “As soon as it was launched in London, in the city centre our business went really down, from the first day this Night Tube went live. Because Londoners finally had an alternative – maybe even a better alternative than taking an Uber – in the City. But we also saw that in the outskirts our business was booming because people combined things. They take the subway to the station nearest to their home, but for the last 1 or 2 miles they get an Uber and ride home safely.”

This flexibility is at the heart of new mobility services and the platforms that will ultimately provide them. The first such platform, produced by the Finnish company MaaS Global, has been already been live in Helsinki. The company’s director of Marketing, Sales and Communication, Esa-Pekka Nykanen, said MaaS would very soon launch a new product range, available by subscription and based on its learnings from the first version of the platform. It offers an early glimpse of what all mobility-service platforms will look like in the future.

“All transportation is included,” he said. “You have the car for one day or 30 days. you have the taxis when you’re not using the car. And you have free public transportation, plus the auxiliary services. [You pay] one fixed amount of money per month. That is educating people to think in that way: Instead of spending money on a mid-sized car, you can have all your mobility needs covered.”

All these mobility services will be available via an app, appropriately named Whim.

## Mobility-as-a-Service – Personalisation and CRM

Mobility-as-a-service will not only provide new revenue streams for carmakers, but it will also offer them a more personal way of managing their customers. In fact, with multiple people using the same automobile, as in carsharing, it is obligatory for the owner of the service – especially a carmaker – to offer a personalised in-car experience that is equal to that of car owners. It is also good business.



“Now, being connected, for the first time you have a back channel to your customer, and do upsell, cross-sell, reference-sell, increase stickiness, increase and improve the user experience around the car,” said Ericsson’s Daunis. “It’s a huge value for the OEM.”

Roger Lanctot, director of Automotive Connected Mobility, Global Automotive Practice, at Strategy Analytics, agreed. “Mobility-as-a-service equals new forms of customer acquisition, customer interaction, customer engagement and more importantly customer retention,” he said. “Embedding a device in a car is about customer retention.”

Mobility-as-a-service is of such great value to the carmaker, he said, that “the irony in our industry is that we keep trying to charge the customer for a subscription for that connection in the car when the reality is we should either be paying the customer for that connection or certainly making it free as part of the car. Because the value of the data is so incredible for changing our relationships with the consumers, changing our relationship with the car and enabling new business models and new value propositions for the industry.”

But it is up to the carmakers to proactively engage their customer and offer them mobility choices, Lanctot said. “BMW should be looking at my vehicle usage and say, ‘It doesn’t make sense for Roger to own a BMW because he’s always giving keynotes in Munich and his car is sitting in the driveway half the time or three quarters of the time’. So there must be a different ownership model that would better serve him and probably save him a lot of money and allow us to up the utilization of that vehicle.”

The technology that enables mobility-as-a service also allows carmakers to personalise those services to such an extent that the customer’s relationship with the car and the brand is even closer, potentially as intimate as that between a smartphone owner and her phone.

“Apple over time has started making more money with their services than with actually selling their devices,” said Ashley Stevenson, Identity Technology director at ForgeRock. “What they’ve done to bring that experience to their customers is Apple ID. The underlying digital identity that Apple provides in their ecosystem gives you the ability to sign on with one ID, whether it’s to your iPhone, whether it’s to iCloud in a browser, or whether it’s to your iPad, and have a consistent experience. Whether you take a picture with your phone and it shows up on your iPad – everything is synchronized and you get that single experience. A major part of that is digital identity.”

What Stephenson called digital identity, and others refer to as user profile, will be at the centre of the new mobility because it will allow carmakers or whoever manages the mobility platform to identify the owner of the personalised services if there is more than one person in a car or one person uses more than one car.

“We need digital identity so that we know who’s sitting in the driver’s seat,” he said. “So we can attribute that usage-based insurance. So we know who’s in the backseat so we can use their account for their cable services and entertainments. So we know who’s driving so we can have our targeted advertising. Identity is going to be an underlying enabler for all these mobility services.”



Digital identity will also help enable data security, especially when one connected vehicle has more than one user, as with a shared car. “How do you attribute all the data that’s coming off the vehicle to all the identities of the cars and who’s actually able to see that data?”

Stephenson asked, and answered by saying, “Having a piece of identity software running at the edge in the vehicle and communicating to the cloud backend software will allow us to tag data that’s coming off the vehicle so that we can then control who gets access to it.”

Digital identity will also enable mobility customers to manage their preferences in the cloud, he said. “So that when they get into a car, regardless if it’s one they own or not, [they can access] those things can follow them around and they can have a great experience – everything from associating your Spotify account ahead of time to your subscription services, payment information. We can allow the customer to manage their profile from their mobile device, their tablet, their browser, what have you.”

According to Timo Bauer, executive vice president of Business Development and Strategic Partnerships at Xevo, carmakers are still far from providing true personalisation to their customers. “Personalisation so far in automotive is more about the colour of the car than the functions of the car,” he said. “That has a lot to do with the fact that we really don’t have a homogenous experience in it and a lack of customer and consumer experience. I just read that a lot of luxury cars that come back to the dealer for the first time still have the original settings. So why are people paying 10 or 15 thousand dollars for everything in the car when they don’t use it?”

Holger G. Weiss, founder and CEO of German Autolabs, agreed, saying: The level of personalisation is not too high. I think we will have a multiphase evolution here that really starts with I will see a certain level of my personal experience if I get into a shared car or into my own car that I share it with others. It might get into a highly personalised experience when I get into a portal in the morning and this portal ‘knows’ I’m a Starbucks fan. I don’t think that too many people at the moment would expect this as part of a sharing platform or part of a car.”

Digital identity will enable mobility-as-a-service by providing a single-user experience across all mobility-related services, and across all vehicles. As Stephenson put it: “Connecting to services like DriveNow, ParkNow or any of these connected services, we want that to be integrated and we want the data about what their preferences are from the dealership to their online shopping experience to follow them. All of that ends up in the vehicle itself, whether it’s a car she’s driving for five minutes or it’s in a car that she owns within that ecosystem.”

Xevo’s Bauer agreed, noting that carmakers have access to data that could enable them to provide greater personalisation than mobile phone providers. “The opportunity for OEMs right now is to leapfrog them because they have more data around the transit domain than the others have, but they will also have access to the generic data around my life, calendar access etc. So they could build an experience that is a little more customised for the car and around commuting. And it should be that.”

Data is Key: BMW

Mobility-as-a-service is all about the transmission of data gathered from various sources and transmitted via connectivity to a cloud or data centre to be processed for use, whether by the customer, the carmaker or the mobility or other service provider. Much of that data is private and, Lanctot said, must be handled with great care to convince customers to let it be used for commercial services.

“The consumer owns the data,” he noted. “I believe that if there is transparency and control on the part of the customer there will be trust – and we’re going to need trust for an opt-in proposition. We want our customers to participate. The car is going to be like the phone where you’re sliding over the ‘Yes, share my data with these companies’ or ‘No, don’t share my data with these people’.”

While the data belongs to the customer, the carmaker will be charged with managing it to create value for itself, the customer and interested third parties.

“The OEM is going to take control of the vehicle data coming out of the car from the wireless connection which will be in every car in the not-too-distant future,” Lanctot said. “There’s huge value to this data.”

And there is a lot of it. “BMW is collecting in Europe on an annual basis a petabyte of data, which breaks down to about a gigabyte per car per year – and something equivalent in the U.S.,” he said.

Christian Clauss, ConnectedDrive project manager at BMW, was on hand to describe how the cutting-edge German automaker has begun to leverage all the data it is collecting via its innovative B2B CarData platform.

“For the first time we came up with an API. We call it the BMW CarData API,” he explained. “Via this interface third parties can register, connect and pull the telematics data off our data centres – if, and only if, the BMW driver says okay. You connect and then you’re free to request customer consent. You have to explain to the BMW driver the kind of data you want and what the value for the driver would be. And if he green-lights your request, then you can come up with new data-driven services.”

Clauss said that every corporation in the European Union is allowed to register and to connect via the BMW API. “You bundle the data you need in a container – for example, mileage for UBI or GPS position for location-based services – and then you ask for customer consent,” he explained. “We invite [the customers] to log on to their ConnectedDrive portal and we present them with the data request. If he agrees, we push the information out.”

This produces value for BMW customers by offering data transparency and the ability to use a broad array of third-party data-driven services. In addition, he said, connecting to the BMW CarData platform is an all-digital process. “There are no manual steps involved.”

Currently, the service is available to BMW customers in Germany, Austria, France, Belgium, the Netherlands and Luxembourg. “By end of next year we want to be live in every European ConnectedDrive market,” Clauss said. In addition, more than 50 third-party service providers from all over the EU have registered.

## The Autonomous Future

RideCell's Mark Thomas has no doubt about what the future of the automobile will be. "The future is autonomous ride-hailing," he declared. "Everyone in the industry agrees that eventually the autonomous car will make mobility-as-a-service as seamless an experience as walking out of your front door and hopping into your own vehicle."

The advent of Level 5 autonomy will simplify mobility not only by eliminating the driver but also by reducing the mobility-service business models. "When you think about autonomous mobility-as-a-service, the difference between carsharing and ridesharing goes away" he said. "Once it's autonomous, there's no need to walk to the vehicle anymore; the vehicle just comes to you."

But how far are we from the advent of the truly autonomous car? Predictions vary, but most observers seem to think 2030 is a likely tipping point. In the meantime, as Matthieu Noel, Paris manager at Ptolemus, said, "Level 3 autonomy vehicles have been recently launched on the market with Audi introducing its new A8 model in Germany. We expect the first Level 4 vehicle to be launched on the road by 2021. At Ptolemus, we expect 60 million vehicles on the road will be equipped with Level 3 or 4 technologies by 2030."

Nils Wollny, head of Digital Business Strategy & Customer Experience at Audi, explained the Level 3 autonomy available on the A8 by saying, "In a traffic jam the car can take over up to 60 kilometers per hour, stay in the lane, steer and you can do other tasks while the car is driving."

The digital ecosystem that Audi is set to launch soon around the vehicle via its myAudi app will eventually comprise a broad array of services, including access to a platform open to third-party service providers, like BMW's CarData platform. "We are focusing on a platform that will be opened up to third parties and integrates into other ecosystems," Wollny said.

One feature that will be launched with the app is a navigation service. "You plan your route on your smartphone while you're still in the office," he explained. "You type in the final address you want to go to. It shows you the first-mile navigation to your car. You enter the vehicle, you just confirm and it takes you there. You exit the vehicle and if you still have a few meters to walk, the navigation continues on your smartphone."

It is not difficult to imagine that this service will function as a platform for intermodal travel, if and when public transportation data is integrated.

"This is just the first step," Wollny said. "The myAudi app will be the starting point for our ecosystem, and you'll see it growing over the next months and years."

In addition, in April of this year, Audi acquired the premium rental car company Silvercar, the first major car rental company to allow bookings and vehicle check-in and check-out via a mobile phone, with the goal of offering mobility-as-a-service.

"Currently, Audi on demand is a separate offer," Wollny said. "But Audi on demand will definitely be integrated into the myAudi ecosystem. Imagine, you drive an A8. You fly to NY, so why not get an A8 for the time you are there? We still have a long way on this route."

Wollny noted that customer relations will be an integral function of the myAudi ecosystem, and will enable the carmaker to react swiftly to problems encountered in the car. “If something goes wrong with your vehicle, you’ll want to get instant feedback or instant support,” he said. “This is a necessity in the future. We know this already from other industries, such as retail. If you have a question or something goes wrong at Amazon, they call you back immediately. This expectation is shaped for customers, so talking about digital services in the future this is something we have to live up to. It will be different than today’s support is.”

## Driving towards Autonomy

The new technology must be tested and retested to ensure its reliability and safety. And testing is now widespread in Europe and North America. But, as Ptolemus’s Noel pointed out, while moderating a panel discussion titled Autonomous Testing: An Action Plan for Europe, “Today, testing activity is more advanced in North America than in Europe. In Europe we mainly see testing from point A to point B on dedicated roads or in closed environments, while in the U.S. we see more testing on open roads.”

The reason for the difference is regulation. According to Harri Santamala, CEO of Sensible 4, “A big issue is a lack of common regulations in Europe. Finland has a liberal approach, as do Estonia, Greece, the Netherlands. There are many places where you can do things quite openly and freely, which helps in speeding up startups and new initiatives. But the problem is that country by country things vary, and requirements vary, and I think the traditional approach of requiring type-approved vehicles, which on Level 4 [autonomy] doesn’t exist, limits innovation.”

The reason for the differing degrees of regulation in Europe is political, he said. “I think the countries that have strong local OEMs have to do what the OEMs see as the best approach to make a lot of sales. And the countries that don’t have national car brands, like Finland, can be quite open.”

While Santamala agrees that early testing of autonomous systems should be carried out in closed areas, he notes that “there are real-life things which are difficult to test in those environments and at some point you need to go open road. As a startup we don’t have the resources of an OEM, so it means that we go to the open road earlier.”

But the variance in regulations is not the only country-by-country difference impeding the testing of autonomous cars in Europe. There is also the variance in broadband network coverage.

According to Stephan Joest, account director for Device and Application Verification Services in Europe at Ericsson, “We know that we have only 3G or even only 2G, and maybe even no coverage at all. And we know that a lot of OEMs and Tier 1s now have to drive to certain places in Europe to find certain conditions – for example, for a handover scenario, going from one technology to another one, or even in a roaming situation going from one country to another.”

That is obviously inefficient. But this coverage variant can also play havoc with the testing itself. “One of the most critical elements we see today is that you find out that the system starts to

hang,” he said. “For example, when you have communication and you come from a German 4G environment to a Belgian 3G environment, you might lose all communication.”

This must first be detected and then the situation must be attended to, all of which takes up valuable time. “It can be that the system has not had any connection for 20, 30 or 40 seconds,” Joest said. “In the worst case, you need to do a reset of your TCU. That might take another 20 seconds. That means you are out of communication for one minute. The question is, can your brand afford that? Can your system, your technology, your architecture, your application, your business intelligence afford that situation?”

His solution is to recognize the problem and then retest again and again. “You drive around with the car, and maybe you have 3G here and LTE there, or maybe 2G-2G only, and test over and over again with real vehicles with a real antenna in the car, so that you can reduce the number of problems to a minimum, to come to the desired position of not only zero fatalities but also zero incidents in your own system architecture.”

Santamala’s firm is currently testing Level 4 technology – and they are taking strict precautions to make sure there is always ideal connectivity. “Our approach is there are certain situations that are really difficult to go with the technology,” he explained. “If we are talking about a shared mobility and public transportation business model, we assume it’s like an elevator business model: you take the driver out, but you still have somebody in control. For that reason, you need to have connectivity from at least two different network suppliers at all times. And if we are talking about driving from digital maps, we don’t store the map in the vehicle. We constantly download and upload the map data in the vehicle.”

But it is not only autonomous technology that is being tested; user acceptance of the systems is also being researched in Europe. Benedikt van dem Boom, project officer at FIA, was on hand to describe a specific project currently being designed for deployment in early 2018.

The project, titled Autopilot, is EU-funded and has sites in Finland, France, Italy, the Netherlands, South Korea and Spain. For the project, FIA has 44 partners from the auto industry, research, insurance associations and public authorities.

The aim of the project is to determine “whether use of the IoT can enhance or accelerate user acceptance of automated driving,” van dem Boom explained. “Put concretely, how can the IoT add some value to automated driving?”

The IoT ecosystem includes “individuals with smartphones, smart watches, even with smart glasses, and an additional number of sensors that we add [that] can all provide traffic-relevant data into the cloud and can be used for autonomous driving” he said. “We attempt to virtually recreate these objects in the IoT platform that can be interoperable across different service providers.”

Van dem Boom named two pilot sites used in the project. One of them is the French city of Versailles. “We take one-seater Renault Twizys that can be driven by tourists manually across the city of Versailles until they reach the gardens of the castle,” he said. “There they are encouraged to switch on Level 4 driving functions so that the car drives completely autonomously through the gardens of Versailles. To avoid accidents and other unpleasant

encounters, the car will pick up signals from other cars and tourists in the gardens – for example, cyclists that wear smart watches.”

Another pilot site is Livorno, Italy, where Level 3 highway driving will be done. “Using standard IoT protocols, we collect data from the road – for example, about puddles, roadworks, about vehicles that might be blocking the way,” van dem Boom said. “This data feeds into the national traffic control centre and is processed until it shows a warning indication to the driver in the car.”

Several hypotheses will be tested in the project, he noted. “One hypothesis we are very keen on testing is whether the visualization of IoT infrastructure increases the acceptance. Put bluntly, if users see which data goes where, are they more accepting of an IoT-driven automated driving function?”

Another hypothesis the project is examining is whether the cost of the IoT infrastructure is too expensive vis-à-vis the value IoT brings to autonomous driving. “That’s a very negative and pessimistic hypothesis,” van dem Boom said. “We hope to be proven wrong. It’s not clear whether we need the IoT for autonomous driving in the first place. We want to find out if it can have an added benefit on the economic level and on the usability level. This is at the heart of our evaluation strategy.”