

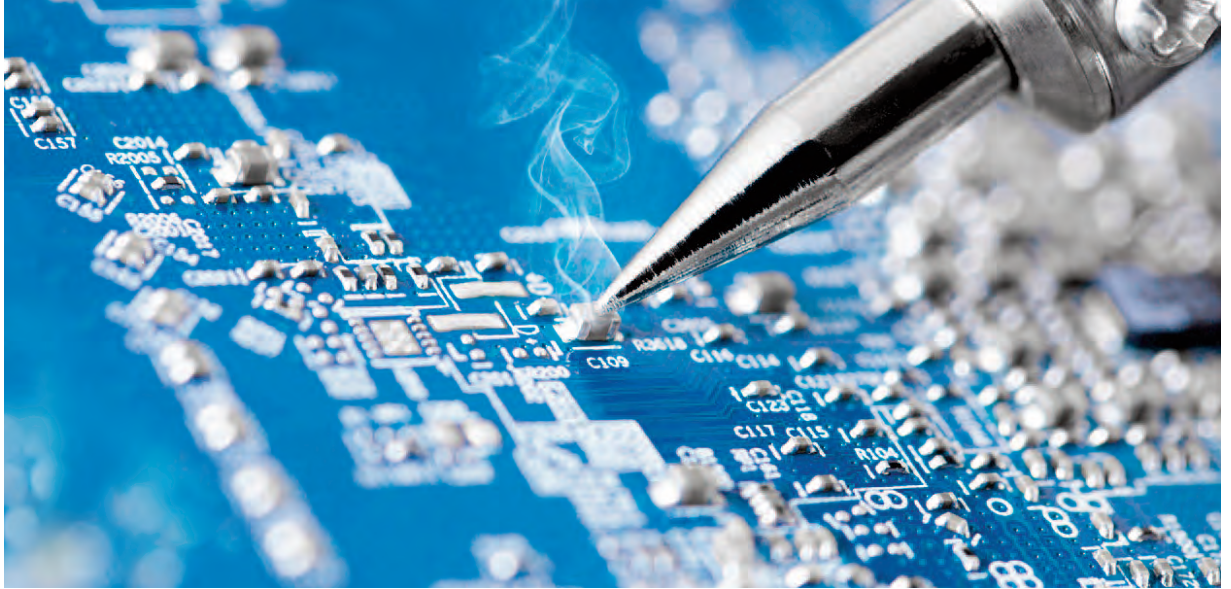
# Automotive World MAGAZINE

Issue 15 | March 2021

## Chip crisis raises red flags for new mobility requirements

**Ford** and **Google** forge global partnership | **Semiconductor** shortage threatens industry recovery | **Flying taxis** prepare for takeoff | **Brazil** braces for CV boom | **Sony** jockeys for 'Japanese Apple' title | **SPACs** flourish as start-ups seek alternative funding

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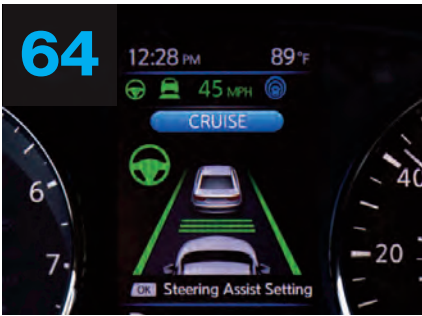
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# The software-loaded car hit hard by microchip shortage

**The automotive industry's increasing reliance on electrical content is causing problems in the wake of a global shortage of semiconductors. By Megan Lampinen**

**T**he digital revolution has been pushing the automotive industry in a new direction over the past decade, with software content in vehicles growing exponentially. Some estimates suggest that electronics and semiconductor materials could account for as much as 45-50% of the value of a car by 2030. Driven by demand for connected content and electrification, the shift has proven a technical and financial challenge for automakers and suppliers—but a manageable one. Then came COVID-19, which not only interrupted the smooth running of factories and shipments, but also unearthed flaws in the supply chain which threaten an already vulnerable industry.

have experienced a boom in demand as lockdowns and travel restrictions drive sales of phones, game consoles and laptops. Increased orders for medical equipment like ventilators is also eating into supply. At the same time, vehicle demand has started to pick up.

“In January 2021, the sector saw itself confronted with a large gap between ordered and produced vehicles, coupled with a higher demand for 2021 than scenarios foresaw and much lower stocks than usual,” commented Thorsten Muschal, Secretary General of European suppliers association CLEPA in a February editorial. “In addition, demand for electric vehicles (EVs) started soaring, driven by

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## The semiconductor (microchip) shortage is disrupting automotive production and may delay a recovery of new vehicle sales and profitability in the sector

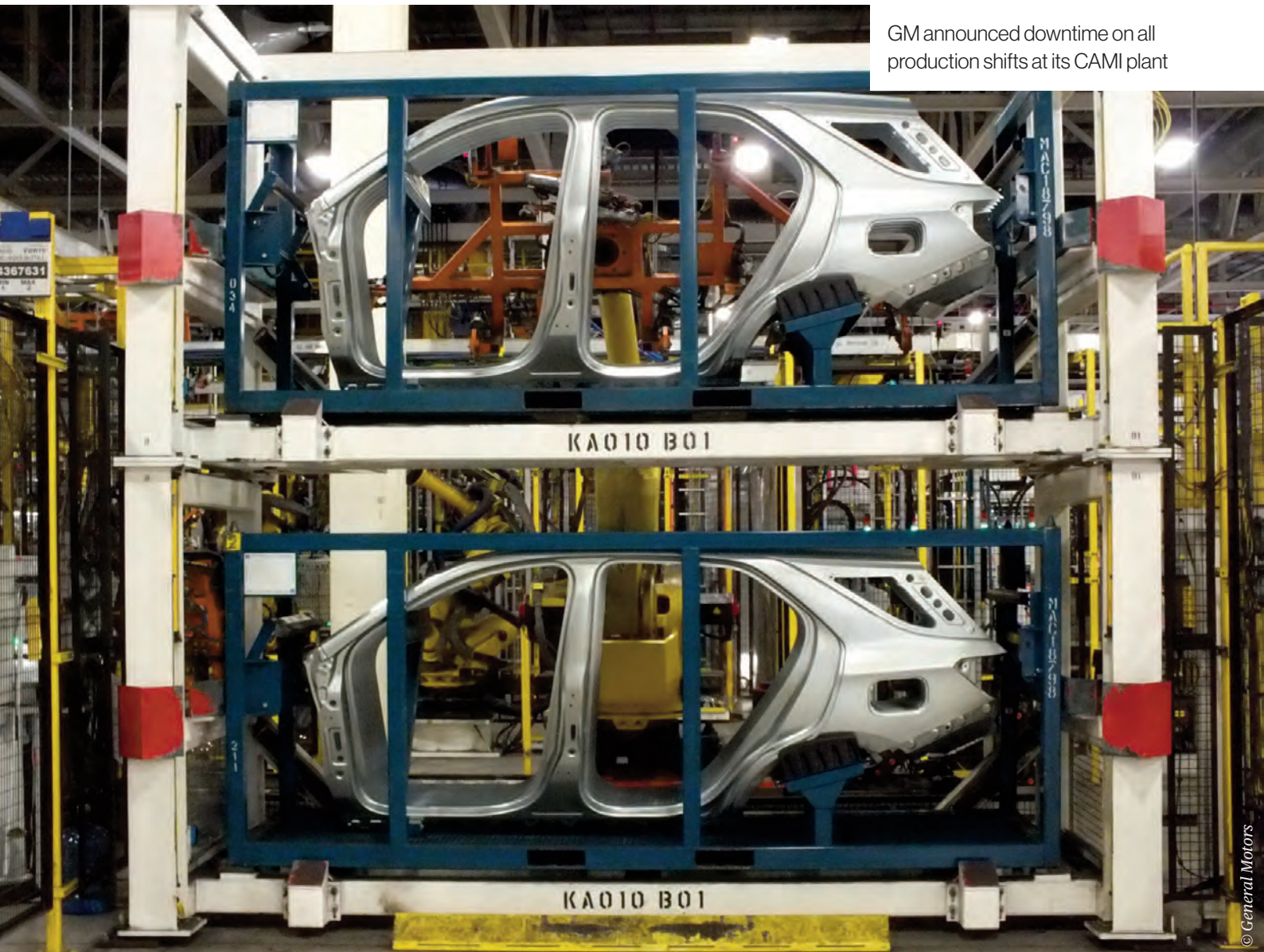
### Semiconductor supply

At the heart of the supply crisis is a shortage of semiconductors. Globally, the automotive industry consumes around 10% of the semiconductor supply. Some of the other industries competing for these semiconductors, particularly consumer electronics,

acceleration of the green transition, increasing pressure on semiconductor demand.”

Suddenly there was not enough to go around. “The automotive supply chain for advanced chips is typically long and this added complexity,” Muschal pointed out. The impact on

GM announced downtime on all production shifts at its CAMI plant



automakers has been considerable in some cases. Those with more inventory in their supply channel will feel less of an immediate impact, but others have already been forced to scale back vehicle production. General Motors, for instance, has extended production cuts at three facilities in the US, Canada, and Mexico through mid-March. “Semiconductor supply remains an issue that is facing the entire industry,” a company statement reads. “GM’s plan is to leverage every available semiconductor to build and ship our most popular and in-demand products, including full-size trucks, SUVs and Corvettes for our customers.” Ford,

which has also warned of slowed output, has said that the shortage could take between US\$1bn and US\$2.5bn off its full-year earnings.

“The semiconductor (microchip) shortage is disrupting automotive production and may delay a recovery of new vehicle sales and profitability in the sector,” states Fitch Ratings. “Car-makers are reducing output and selectively idling plants until the shortage eases, which we expect to take several months.” Some reports suggest potential lost production across the industry of 500,000 vehicles in the first quarter this year,

representing about 2% of global output. Others are more pessimistic: IHS Markit puts the Q1 damage at nearly 1 million units and warns that “eventually all OEMs will be impacted” by the supply constraints.

“The automotive supply chain is beginning to look increasingly like an electronics supply chain, characterised by an increasing proportion of small, high value components such as semiconductors,” observes Tom Fairbairn, Distinguished Engineer at software company Solace. “This drives increasingly tight supply chain management, which in turn can make supply chains more brittle if timely and accurate information on their state is not visible and actionable”

semiconductor chips so they can have the right to order them and send them to their Tier 1s,” suggests Laura Baucus, leader of the Supply Chain group at law firm Dykema. “Or it could be the Tier 1s ordering in bulk. I don’t know exactly what that will look like but it will certainly look different than it does today.”

Bolstering local semiconductor capacity is another route, which both the European Union and the US are exploring. Governments in these regions, which rely on imports for the majority of their semiconductors, want to build up localised manufacturing. To do that, though, incentives may be needed. “Many foreign competitors offer incentives for production that the US does not,

“

When your supply chain is dependent on forces you cannot control, it creates vulnerabilities

### Range of approaches

Muschal warns that the sheer scale of the semiconductor shortage “and the complexity of solving both short- and long-term issues requires rethinking of supply chain options by both industry and policy makers.” But what are those options?

Building up stockpiles is one route. “Some automakers may reserve more

so it’s attracted some of that manufacturing overseas,” explains Andy Buczek, advisor in Dykema’s Government Policy Group.

US Congress had flagged concerns on this front last year with the National Defence Authorization Act, which explores incentives that would help attract more domestic production. “This is not a quick fix,” Buczek tells *Automotive World*. From a policy

perspective it is a multi-stage process. The Authorization bill authorises funding but requires the Appropriations Committee to appropriate the dollars necessary to create the incentives that would attract new domestic production. Even with incentives in place it takes a long time to create new manufacturing facilities.

Policy makers in other markets lacking a sizeable domestic production base are also looking into their market vulnerabilities and trying to figure out how to reverse it. After all, damage to their local automotive industry could have a serious economic impact. “The semiconductor events underline not just the attention required for the diversification and resilience of the supply chain, they also raise strategic questions for Europe,” argues CLEPA’s Muschal. He notes that these questions will be partly addressed by the European Commission through a Microelectronics Alliance for Europe, which should launch in March 2021. The German and French governments have also indicated they will be increasing industrial activity in this area.

## In the short term

All of these things take time, though. One of the more immediate steps companies are taking in the wake of the shortage is to examine their supply contracts. “When a supplier finds that it cannot meet an order, you need to look at the contract to determine your rights and obligations going forward,” says Baucus. “There may not be something immediately

that can be done to expedite the current 26-week lead time, but you want to make sure you are reserving all your rights.” That could include determining whether there is a force majeure option at play; this applies to extraordinary events like epidemics and wars, that are beyond the control of the parties involved but that impact their ability to fulfil obligations. In the wake of COVID, this came to the fore as many automotive manufacturers were forced to halt production during lockdowns and contractual obligations in some cases became impossible to meet.

At the same time, each company will want to ensure it receives its fair share of the available supply. “Even with a limited supply an automaker can receive a certain percentage from its supplier or its supplier may be working with the semiconductor manufacturer to ensure it is getting its fair share under the contract or the law,” she adds. In the US and certain other countries, this is covered under the legal concept of allocation. In this case it essentially means that the semiconductor producer cannot pick its favourites—the supply has to be sold equitably.

So far, everyone seems to be playing nicely. “We don’t expect to see large lawsuits out of this,” says Baucus. “It’s always possible that a couple companies don’t come to an agreement but at this point what we see is cooperation.”

## Outlook

The immediate impact on vehicle manufacturers and Tier 1s will hopefully be short lived. IHS Markit



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## The semiconductor events underline not just the attention required for the diversification and resilience of the supply chain, they also raise strategic questions for Europe

expects the situation “to hit bottom” around the end of March, although supply chain constraints will likely persist through the third quarter. There are also warnings of price rises, which will invariably hit automaker bottom lines. However, the underlying problems with the established industry approach to supply chain management could cause further problems in the future.

“Industry sources also warn that similar patterns may occur throughout 2021 in the sourcing of other materials needed to build cars as well as industrial goods and consumer products,” notes Muschal. “A continued, marked volatility in demand, driven by uncertainty around the containment of the pandemic, regional variations, and difficulty in predicting purchasing behaviour may cause disturbances in the supply of essential resources. Logistics may be vulnerable too, with demand soaring in China taking away capacity from elsewhere.”

For semiconductors in particular, the general trend is that automotive demand will only increase as more automated features appear in the vehicle and electrified powertrains take over from internal combustion engines. This trend could even raise issues around other components and raw materials. “With the transitioning to EVs, there are inputs involved in battery making like cobalt, graphite and lithium, where the US supply chain depends on foreign suppliers,” says Buczek. “We see from what’s happening with semiconductors that when your supply chain is dependent on forces you cannot control, it creates vulnerabilities.”

While Buczek is hopeful that changes in government policy will address those vulnerabilities before they turn into serious problems, others will be examining their near-shoring options and stockpiling. “Everyone is trying to determine how to make this shortage go away as soon as possible,” he concludes.

# The Ford-Google tie-up is a sign of the times

Ford and Google's big announcement was light on detail, but further cements the much-expected integration of big tech and automotive.  
By Xavier Boucherat

A recent special report from *Automotive World* asked, could tech giants become automakers? Since publication, one name has told *Reuters* it remains interested in exactly that: Apple is reportedly developing a vehicle for consumers, with a new battery design that could dramatically reduce costs. However, as things stand—and assuming the news is true, which the company has not confirmed—Apple remains an outlier. Rather than Microsoft grilles or Baidu hood ornaments, most big tech players will continue to pursue in-vehicle opportunities dependent on software, AI and connectivity.





## The deepening integration of automotive and big tech continues to raise questions over sustained automaker dominance of the value chain

Increasingly, the relationship between the sectors appears symbiotic, with both employing strengths to deliver the connected mobility experiences which will keep brands relevant. Ford and Google's February 2021 announcement was arguably the clearest sign of this yet. The companies have announced a six-year partnership which according to Ford will "accelerate [the company's] transformation and reinvent the connected vehicle experience." The collaboration hopes to touch on everything from front-office operations and in-vehicle functions to factory-floor efficiency. The announcement comes just weeks after GM and Microsoft announced they would team up on digitalisation efforts including AI and machine learning.

### Stay tuned for substance

The companies were scant on specifics, particularly on the topic of commercial agreements and whether money will change hands, but at least one thing is clear: from 2023 onwards, "millions" of Ford and Lincoln vehicle infotainment suites will be powered by the Android Automotive operating system, with Google apps and services built in. This will include Google Assistant for voice-activated features,

and Google Play for access to personal media. Speaking in a press conference, Ford's David McClelland, VP for Strategy and Partnerships, said this would take place on a global scale, with the exception of China.

Meanwhile, a new collaborative group dubbed 'Team Upshift' will spear several development projects. McClelland declined to outline specific projects, but suggestions in a press release hint at "new retail experiences when buying a vehicle" and "creating new ownership offers based on connected vehicle data."

"It's the coming together of the team in Google and the team in Ford to create new experiences for our customers," said McClelland, adding that Ford would be bringing its own apps to table as well as leveraging Google expertise to create unique experiences for the Lincoln brand.

Ford also announced that Google Cloud would become the automaker's preferred cloud services provider, although what this means in practical terms is not clear. In 2019, Ford announced a partnership with Amazon Web Services (AWS), another major cloud services provider. The rhetoric used then was similar to what has been used this time round: "to create innovative mobility services and



Now in its fourth iteration, Ford SYNC is the company's infotainment and connectivity platform. Its future after 2023, when Ford will adopt the Android Automotive OS, is unclear

differentiated customer experiences,” said AWS Chief Executive Andy Jassy. Speaking in conference, McClelland said that for now, work with other cloud providers will continue, adding that this latest partnership with Google was distinct for the breadth of its focus.

Google Cloud Chief Executive Thomas Kurian agreed, stating that the partnership was a first for the company. Projects such as an ongoing collaboration with Renault, he said, have been limited in scope. “Our work with Renault is focused on manufacturing and Industry 4.0,” he said. “The work we’re doing with Ford moves beyond manufacturing and optimisation of the supply chain into experiences in the car, which

includes bringing Google Automotive Services in the vehicle.”

The companies’ joint goal, said Kurian, was to transform the technological foundation of the automotive industry. He declined to comment on whether the deal with Ford would be exclusive. Other automakers which have said they will integrate the Android Automotive OS into their vehicles include Renault-Nissan and Volvo.

## **Business model remains unclear**

The deepening integration of automotive and big tech continues to raise questions over sustained automaker dominance of the value

chain. The lack of transparency on the terms of the deal, and whether the deployment of Google services in vehicles would bring revenue share or similar models into play, means it is unclear just how the industry will be reshaped. However, incumbent automakers are adamant that their expertise will remain pivotal to success in mobility, and that they will not be reduced to the status of contract manufacturers.

“Ford will not be a new Foxconn,” said McClelland. Asked by *Automotive World* whether the deal represented

also important is the experience we can produce for our customers, such as making map solutions even more intuitive, and keeping people’s eyes on the road. I’m excited about what can be done with Google, and at the same time it allows our engineers to deliver their attention to improving vehicle performance and safety.”

Google’s world-class maps, he added, were a key draw for the automaker.


Sync, Ford’s own integrated infotainment system, will remain in vehicles at least until 2023, but McClelland declined to comment on

“

Performance remains important for our vehicles, which are built with internal combustion engines, and increasingly, electric drives... I’m excited about what can be done with Google, and at the same time it allows our engineers to deliver their attention to improving vehicle performance

the shift from vehicle performance and revolutions-per-minute to ‘experiences per mile’, he explained: “Performance remains important for our vehicles, which are built with internal combustion engines, and increasingly, electric drives. What’s

whether it would continue once Android Automotive arrives in vehicles. McClelland was also keen to emphasise that a shift to Google would not mean users of rival technologies—such as Apple iPhone, or Amazon Alexa—being frozen out of the vehicle.

The image is a composite. The top right shows a city skyline with a body of water in the foreground. The middle right shows a futuristic flying taxi with a transparent canopy and blue and orange accents. The bottom right shows a futuristic ground vehicle with a transparent canopy and blue and orange accents. The background is a dark, semi-transparent overlay of a city skyline and a futuristic ground vehicle.

# Will infrastructure block the flight path to urban air mobility?

**Flying taxis may be the future, but only if there is supporting infrastructure in place.  
By Megan Lampinen**



**F**or increasingly crowded urban centres, air mobility could make a big difference to congestion problems.

Flying taxis may have started out as science fiction but developments over the past few years have brought the segment much closer to reality. At the moment, more than 250 companies are developing urban air mobility (UAM) vehicles, with some launch dates targeted within the next few years. McKinsey estimates that this UAM market could be worth “hundreds of billions of dollars a year” when it reaches its full potential. Hyundai, one of the more active automakers investing in UAM, expects the air mobility market to be worth nearly US\$1.5tr over the next 20 years.

But that will only happen with the right infrastructure in place. Infrastructure can make or break any new form of mobility. Motor cars required roads, bike culture thrives in cities with bike lanes, and scooter providers are now calling for scooter lanes. UAM will be no different. “There is often a strong

focus on the vehicles, but without coordination and investment in other parts of the ecosystem, UAM is just a flying science project,” comments Pamela Cohn, Chief Operating Office of Hyundai Air Mobility.

But what does that infrastructure look like and how will it fit in the city of the future?

## More than a bus stop, less than an airport

The UK will unveil one interpretation of an UAM hub in Coventry later this year. The £10m (US\$13.7m) project, a collaboration between Urban-Air Port Ltd and Hyundai Air Mobility, envisions an ultra-compact port for air taxis and delivery drones that will transport people and cargo across cities. “It is more than a bus stop and less than an airport,” explains Ricky Sandhu, Founder and Executive Chairman of Urban-Air Port. “It’s something which hasn’t been seen before.”

© Hyundai

Air-One® site with a Hyundai Motor Group eVTOL (electric vertical take-off and landing) in the centre of Coventry



Audi, Airbus and Italdesign have been testing a flying taxi concept

The Urban-Air Port design has a 60% smaller footprint than a traditional heliport, as space is at a premium in urban locations. “Like airports, heliports are quite space-hungry,” Sandhu tells *Automotive World*. “Traditionally helicopters land on the circle with the big H, and then taxi over to a parking region to allow another helicopter to land. That sort of layout takes up a huge amount of area, which cities don’t necessarily have.”

The exact size of any specific UAM hub will depend partly on the city it is serving and the number of vehicles using it. Coventry’s location will be a medium-scale port, with a 17-metre diameter take-off and landing pad. Multiple vehicles can occupy the space at the same time. A modular flat-pack structure allows for a relatively easy and quick setup in any city location.

The challenge is to devise something that works well with the built environment as well as existing modes of transport. UAM is not designed to replace other forms of transport so much as to supplement them. “It might replace some cars or delivery vehicles,” he suggests. “We’re hopeful, after all, that it reduces congestion, but it has to be a complementary green sustainable mode of alternative transport.”

The ‘green’ bit is pivotal: the electric hub can go completely off-grid if necessary, with the integration of hydrogen or electric renewable energy to power the vehicle and the





Logistics drones services hubs will be pivotal to urban air mobility

© Hyundai

building. With the industry’s shift towards electric vehicles, there are concerns that the grid could become stressed. “What we don’t want to be is another burden on the grid,” Sandhu says. “Off-grid capability is going to be needed in the early years of this sector.”

## Just the start

The Coventry hub will serve as a full-scale prototype for live demonstrations of how flying vehicles and infrastructure can—and need to—work together. It will start with showcasing cargo drones, which will take off at one end of the site and land in a controlled area where goods will be transferred to customers or last mile journey providers. Those drones will then fly back to the starting point in the guise of returning to an urban airport, having delivered their cargo.

Later it will also handle flying taxis, and project partner Hyundai aims to have its first UAM vehicle on the market by 2028. In the beginning these flying taxis may need to be manned by a human but in the long

run they will operate autonomously. This is essential for the business case to work, as the vehicles don’t seat many and the space taken up by the pilot will need to go to a paying customer. The infrastructure is mirroring that: starting with humans at the ground facility but eventually becoming fully autonomous zero-touch unmanned infrastructure.

The aim is to build a network, so one day the drones and flying taxis will travel from hub to hub. Urban-Air Port is providing the regulated landing locations and working with partners who are building regulated air corridors. The challenge of the air traffic management piece shouldn’t be overlooked. In fact, it was partly due to obstacles in this area that Ford backed away from plans for a flying car back in the 1950s. A study conducted by the automaker at the time found that shifting road vehicles into the air would stretch traffic control’s capacity.

For the UK, though, there is strong backing for the project from the Civil Aviation Authority and the government. “They are very much behind this entire sector with their

Infrastructure expert Ferrovial is working with aviation company Lillium to develop a network of vertiports in the US



© Lillium

Future Flight Challenge,” claims Sandhu. “They can see the real value in easing congestion, cutting pollution, and helping build a mobility ecosystem that will be carbon net-zero and meet our targets for 2050, if not sooner.”

## Infrastructure first, then vehicles

As with many new technologies, UAMs raise the question of what comes first: the flying vehicles or the infrastructure. Sandhu comes out firmly on the infrastructure side. “We absolutely believe that before you see an air taxi services you will see lots of urban airport infrastructure paving the way. That supporting infrastructure is something which has been completely overlooked in the whole discussion of UAM so far.”

UAM vehicles and drones will both need to be charged and maintained, with repairs conducted as and when necessary. They will also

need to be loaded, either with passengers or cargo, and then unloaded. All these services must take place at some sort of hub.

The Coventry project will help shape future hubs. Urban-Air Ports has already received orders from Europe. Hyundai is working with the city of Los Angeles in the US to map out challenges to UAM in the city, including a blueprint for a vertiport. “China is going to be another leading country for UAM,” adds Sandhu. “Some of the main automakers are based in Europe, the US and China. The regions where vehicles are being developed happen to be big markets for us.”

The type of hub that works best for one region may look very different to the type of hub that works best for another region. In Scandinavia, for instance, where there is a lot of water, explorations are underway for rooftop hubs and offshore floating infrastructure. The final cost of the infrastructure will

vary on the substrate (roof, water or ground), the size and the capacity.

If Sandhu is right and the infrastructure needs to be in place before the vehicles launch, things could move quickly. Hyundai’s UAM may not launch for another seven years but some players in Europe, Japan and the US are looking at a 2023 launch. “In the next year or so we will be moving much closer to getting certain passenger air taxi vehicles certified. Once they are certified, they will need the infrastructure immediately to board their passengers and take off,” he points out.

Meanwhile, cargo drones are already in operation. “The key with the urban airport is to provide interoperability, so when it’s not being used as a passenger air taxi hub it can be used as a mini fulfilment centre, and vice versa,” he says. “That will allow us to realise the maximum value out of what it can deliver.”

# Are SPACs the real deal for future mobility investors?

Caution is rife among industry observers, but the trend for 'accelerated IPOs' looks set to stay. By Freddie Holmes

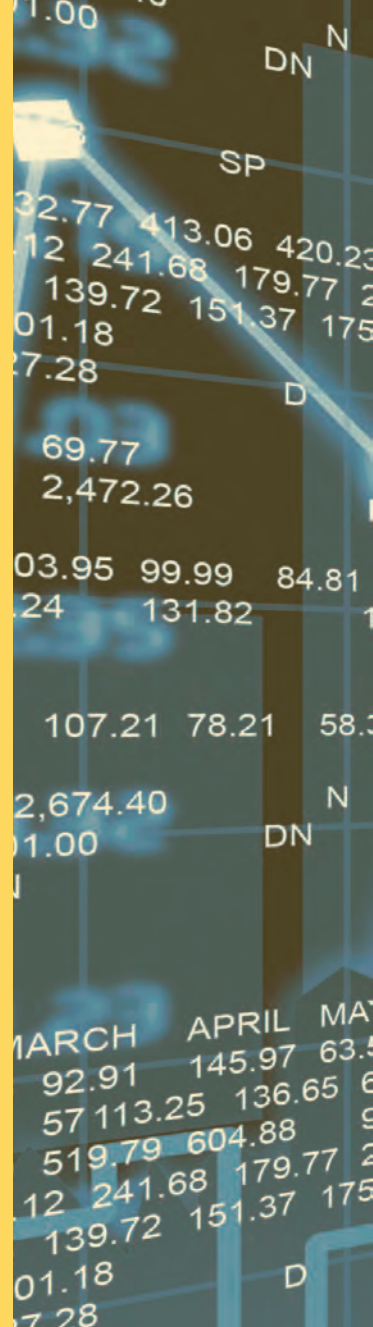
Start-ups are flooding the automotive sector, and it has never been easier for retail investors—members of the public with cash to spare—to grab a slice of the action. Corporate investors including automakers, large Tier 1 suppliers and Internet giants are also putting hundreds of millions of dollars behind these new entrants in a bid to get ahead of the competition.

Many of these start-ups will have gone public after years of grafting in the field of venture capital (VC), raising progressively larger rounds of funding and making the most of the

networking opportunities afforded by an established VC firm. But the ease with which some start-ups have made an initial public offering (IPO) has raised eyebrows within the analyst community, and attentions are turning to the use of special purpose acquisition companies (SPACs).

## The reverse merger

Special purpose entities (SPEs) are a legitimate means of managing financial risk and provide an avenue for companies to hold funds at arm's length. SPEs are common devices employed by most large businesses





Arrival is one of many EV companies to go public through a SPAC



the age of ‘hype stocks’ where even pre-revenue start-ups can garner billion-dollar valuations, a start-up can become flush with cash practically overnight.

“Increased market volatility and expectations of a bumpy economic trajectory following the COVID-19 pandemic has forced many entrepreneurs to look for alternative ways of raising funds, leading to the boom of SPACs in 2020,” observed Vishal Sridar, Financial Services Analyst at the Economist Intelligence Unit (EIU). “Last year was a banner year for SPACs,” added Swarup Gupta, Industry Manager at the EIU. Investment bank Renaissance Capital reports that around 200 firms went public in this way during 2020 alone, raising US\$64bn in the process.

A SPAC also means that start-ups are able to quickly capitalise on gaps in the market, gaining an early lead in hotly contested sectors such as electric vehicles (EVs), autonomous

driving and shared mobility. “We could rattle off a very long list of SPACs that have happened in the electrification space alone,” observes Quin Garcia, founder and Managing Director of Silicon Valley-based venture capital firm Autotech Ventures. That list would already include the likes of Nikola, Canoo, Lordstown Motors, Fisker, Arrival and Faraday Future. Recent reports suggest Byton and Lucid Motors are also considering a SPAC. Many other start-ups offering charging solutions and battery technologies have already gone public through a SPAC.

## Too much, too soon

Garcia cautions that a SPAC deal can take place before a company has even begun generating cash flow. In some cases, a company that is yet to make any money can be valued higher than a company that has been operating for decades. In June 2020, electric truck company Nikola hit a

Fisker's second stab at car making has come through a SPAC deal




US\$28.799bn valuation, exceeding Ford's market cap by US\$5m at the time; Nikola's revenue in the second quarter of that year totalled just US\$36,000. What's more, the Financial Times first reported that this came through "solar installation services" provided to its founder Trevor Milton—he had bought solar panels for himself.

Budding retail investors could make a lucrative windfall if a start-up comes through on its promises; they might also lose it all if the company struggles. This is true of any publicly traded company, but some believe a SPAC makes it possible for start-ups to go public before they are truly ready. It is a bubble waiting to burst, Garcia suggests. "These are start-ups that have early-stage start-up risk-return profiles. In many cases they are pre-revenue, and years from generating meaningful revenue let alone profits," he emphasises. "It feels like the SPAC mania cannot last forever."

"Personally, I don't see much upsides for retail investors," noted the EIU's Sridar.

Shauna McIntyre, Chief Executive of LiDAR developer Sense Photonics, agrees that many companies in the future mobility space appear to have jumped on the 'hype train', adding that it is more of a "bullet train" at this stage. "There really has been a flurry of activity, and frankly I have been surprised to see some companies go through a SPAC," she said. "You have to build a sustainable company, and that starts with credible technology that will scale. I see plenty of folks that are just throwing cash at bad ideas." Sense Photonics has not announced plans to go public and remains a private company.

"SPACs have become incredibly popular," observes Jagdeep Singh, Chief Executive of solid-state battery company QuantumScape, which went public through a SPAC with Kensington Capital Acquisition in

A silver Faraday Future electric SUV is parked on a paved path in a wooded area. The car is sleek and modern, with large wheels and a distinctive front grille. The background is filled with trees and foliage, creating a natural setting. The car is the central focus of the image.

Faraday Future recently leveraged a SPAC to go public. The company has been trying to launch an electric car for years

November 2020. Kensington itself went public in June 2020 with the specific purpose of “effecting a merger... or similar business combination with one or more businesses.” QuantumScape’s largest investor is Volkswagen Group, and a joint venture between the two aims to put QuantumScape cells into new EVs by 2025. The New York-based company has been in operation since 2010.

Singh believes that when used correctly a SPAC is a “useful tool”, but he is not naïve to the risks that can come with such a deal. He draws parallels with the dot-com boom, where in the late 1990s many investors made and then lost significant sums off the back of huge interest in Internet-related companies.

“When you have this much activity in a sector, without a doubt some of that capital will end up in companies that

aren’t necessarily ready or deserving of public capital,” he said. “That’s going to result in a bad outcome, but there will also be good results: Amazon came out of the dot-com boom, and it is now one of the most valuable companies in the world. The trick is to make sure that you are ready to be a public company.”

A SPAC might be deemed necessary to scale a company rapidly. Norwegian battery maker Freyr, which is in the process of a SPAC IPO, will use the cash that comes from the deal to begin construction of its first factories. It has licensed existing technology from a US company, 24M, which has developed what it calls ‘SemiSolid’ battery cells. The aim is to get production up and running to capitalise on Europe’s rapidly growing EV market. The reverse merger is with Alussa Energy, an entity registered in the Cayman Islands in 2019.





## Increased market volatility and expectations of a bumpy economic trajectory following the COVID-19 pandemic has forced many entrepreneurs to look for alternative ways of raising funds, leading to the boom of SPACs in 2020

“We saw that the quantum of capital, combined with the fair valuation that stood behind it, matched with our ambition to build at scale and get rapidly into the market,” explains Tom Jensen, Chief Executive of Freyr. “For us, a SPAC deal is just a rapid version of an IPO—it’s a sensible way for us to access large pockets of capital, which is required in order to be relevant in the battery industry.”

### Nowhere to hide

One of the challenges of going public is the need for sustained growth, or at the very least, stability. The stock market is incredibly volatile even for established companies, and it can be much worse for so-called ‘hype stocks’. Lower than expected revenue or missed production milestones can lead to a sharp downturn in stock price.

Bollinger’s Chief Executive has reportedly knocked back approaches for a reverse merger so far, arguing that it would bring unwanted pressure

at a time where the company remains at the very early stages of growth. Public companies must report detailed accounting information at the end of each quarter, advising investors and equity analysts of any rise or fall in key metrics such as debt and income.

Public companies can also become the target of short sellers: investors that believe a company is overvalued and seek to gain from a decline in a company’s stock price. In September, Nikola stock tumbled from US\$50 to below US\$18 after [a scathing report by short-seller Hindenburg](#) alleged the company had misled investors. At the time of writing, the stock remains below US\$24 a share.

It is not to say that start-ups should avoid a public float. Indeed, this is the common goal for most entrepreneurs, spurred on by VC partners or with the help of early investors from within the industry. The Nikola saga in particular has made industry observers place closer scrutiny on the ambitions of new start-ups coming to market, and while successful companies may win big, many could be in for a reality check.

# Tesla pins growth on new factories and new models

**The EV maker's performance in the fourth quarter was slightly below analysts' expectations, but sentiment remains broadly positive. By Freddie Holmes**



**W**ith its first full calendar year of profitability in the bag, Tesla is eyeing further growth through new model updates, new factories and possibly new sectors such as vans and trucks. Robotaxis also remain firmly on the agenda, with perhaps the most bullish timeline put forward of late.

always going to be hiccoughs along the way,” noted Philippe Houchois, a Managing Director at equity research firm Jefferies, which described Tesla’s Q4 results as “mixed” in an investor note.

“Tesla’s latest earning report wasn’t as strong as many analysts wanted, but

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## We do take these kinds of comments from the industry with a pinch of salt

The company reported its fourth quarter (Q4) 2020 financial results on 27 January, and while earnings of US\$0.80 per share (EPS) were about US\$0.20 lower than expected, revenue growth was strong—up 45% year-over-year. It is worth noting that based on generally accepted accounting principles (GAAP), an industry standard when reporting financial results, EPS were US\$0.24 in Q4, down from US\$0.27 in Q3.

Automotive gross margin—gross profit divided by total sales—was 24.1%, down from 27.7% in Q3.

“The blip in the margin is a reminder that Tesla is not just building a digital business. We are still talking about an industrial company, and there are

the overall movement of revenue and sales continues in the right direction,” says Karl Brauer, Executive Publisher of CarExpert.com. Musk is more upbeat on the company’s performance and is confident that the year ahead will bear fruit. “2020 was a turning point for Tesla in terms of profitability,” he said in the call on 27 January, “and we believe 2021 is going to be even more exciting.”

On 1 February 2021, Piper Sandler analyst Alexander Potter set a staggering new target for Tesla’s share price: US\$1,200, more than double his earlier target of US\$515.

Investment bank Morgan Stanley had previously set a ‘bull case’—the most optimistic scenario—of US\$1,232 per



The new 'Plaid' interior of the Tesla Model S

share on 1 January. At the time of writing, shares in Tesla hover around the US\$840 mark.

## Expansion plans

Speaking in the call to analysts, Musk took a moment to highlight some recent and upcoming landmarks.

Production of the company's latest EV, the Model Y crossover, has almost hit "full speed" at the Fremont factory; more than 5,000 Model 3s are being produced each week at the Shanghai factory, a plant that is continuing to "grow rapidly"; and

construction of two new gigafactories in Berlin and Texas are both scheduled for completion in 2021. The company expects to see 50% annual growth in vehicle deliveries over the next few years. "Tesla should be able to reduce costs as production capacity expands," added Brauer, "which should help offset the government credits that continue to play a crucial role in Tesla's profitability."

A battery cell factory is also being built close to its Fremont plant in the Bay Area. This will serve as a 'pilot plant' to see how well the company can vertically integrate its battery supply chain. In effect, it is a trial to gauge whether Tesla can serve its own needs on the cell front. "Despite being a pilot plant, its capacity is large enough that it would probably be in the top ten battery cell factories on earth," said Musk. By 2021, this line should achieve annual cell production of around ten gigawatt-hours.

[Through a new in-house design](#), these cells should support a 16% increase in range and six times more power than previous cells.

"Tesla continues to outpace competitors," says Anila Siraj, Head of Data Strategy at energy consultancy Kalibrate, "delivering on its promise of supply, still having a backlog of orders, and making sure it keeps this edge by building more gigafactories to increase production and meet demand."

“

It does seem like the rest of the market is coming in hot right when the Tesla product pipeline is at its most vulnerable

### **Old dogs, new tricks**

Musk also took time to detail updates to the Model S and X, which have been refreshed under the 'Plaid' label.

Three electric motors—one more than usual—will propel the new Model S from zero to 60mph in “under two seconds”, and a completely new interior sports a futuristic steering wheel that would not look out of place in a commercial airliner. The huge vertical touchscreen long associated with the Model S has been replaced with a subtler horizontal unit akin to the Model 3. The new Model S is so significant, said Musk, that a separate call with analysts is planned to go into even greater detail on the various improvements. “We think it’s probably the best car of any kind at any price available in the world today,” he emphasised. This contrasts with views shared in October 2019, when Musk described the Model S and Model X as having

“minor importance for the future” of the company: “We’re continuing to make them more for sentimental reasons than anything else.”

Edmunds’ Executive Director of Insights, Jessica Caldwell, says a spotlight has been placed on the Model S to help spur volumes. “Given that Tesla has launched the Model Y and doesn’t have any high volume vehicles to be introduced in the near future,” she explained, “it has to concentrate on hyping what is currently in the lineup and making it as competitive as possible in light of all the new products that will be hitting the market in the next 12 months. Model S might have been low priority in 2019 but every model needs to count for Tesla to continue its dominance.”

Another key talking point of the call was the viability of using a Tesla as a robotaxi. Musk suggested a driverless Tesla could offer a “five times increase

in utility.” His thinking is these vehicles could be used for 60 hours a week instead of today’s average of 12: owners would drive them when needed and rent them out like an Uber or Lyft when not. He also theorised that, assuming a Tesla becomes “merely twice as useful” as it is today, this would “double the revenue of the company.” Musk has pushed this idea for years, often posing near-term deadlines for such a service to begin operating. These deadlines—often issued in off-the-cuff remarks—have been continually delayed or simply overlooked. At Tesla’s Autonomy Investor Day in April 2019, the prediction was that Tesla robotaxis would be on the road in 2020.

In the Q4 earnings call, Musk expressed confidence in Tesla’s ability to achieve Level 5 driving automation at some point in 2021, a timeline that most other industry observers are hesitant to forecast beyond 2025, if not 2030. “We do take these kinds of comments from the industry with a pinch of salt,” noted Jefferies’ Houchois. “Musk has made similar claims in the past and they have not materialised, but it is not just Tesla. GM said it would launch an autonomous Cruise service in 2019, but we’re not quite there yet. Even Waymo is still operating in a geo-fenced area.” Houchois added that even if Level 5 technology is deemed viable by an automaker, there is no guarantee that it will be implemented immediately.

Musk emphasised the importance of Tesla’s supercomputer ‘Dojo’ in realising its AV strategy. The computer uses advanced labelling software that can recognise and tag video recordings, with the idea being that it can ‘train’ cars to recognise more objects and better handle rare hazards.

“We think it may be the best neural net training computer in the world, by possibly an order of magnitude,” he suggested, adding that self-driving car training could be monetised and offered to other AV developers as a service: “We’re very open to licensing our software to third parties.”

Tesla’s approach to automation relies primarily on camera sensors. Musk says that based on road testing so far, including more than 1,000 ‘beta’ vehicles being driven by select members of the public, this strategy shows promise: “It looks like a very clear and obvious path towards a vehicle that will drive 100% safer than a person. I really don’t see any obstacles here.”

## Increasing competition

Despite pressuring itself to commercialise a robotaxi, Tesla is looking increasingly like a conventional automaker. Sustained profits and increased volumes are key and distance the company from prior concerns about cash flow. The Model Y is now being mass produced and updates to the Model S and Model X bring welcome tweaks to the product portfolio. However, some believe the company is under pressure as new EV makers enter the market: Tesla is no longer the only scrappy upstart with new, exciting technology on offer.

China’s NIO and Xpeng are already mounting an assault on Europe, and the US is soon to follow. Fisker recently went public through a special purpose acquisition deal, with Lucid and Faraday Future (which itself has teamed with Geely) also expected to hit the stock market this year. Volkswagen’s ID.3 is now being produced both at Zwickau and

Production of the Model Y is ramping up



© Tesla

Dresden, and in December became the second best-selling car in Europe. The Renault Zoe was the best-selling EV on the Continent in 2020, ahead of the Tesla Model 3. Edmunds.com expects the number of fully electric models on the US market to grow from 17 in 2020 to 29 in 2021. Clearly, competition is heating up.

“Although there has yet to be a true ‘Tesla killer’ in the EV arena, a bigger pool of contenders eligible for federal tax credits could have the power to sway some Tesla shoppers,” observes Edmunds’ Caldwell. “And since Musk has already launched the Roadster and Cybertruck to much fanfare, it does seem like the rest of the market is coming in hot right when the Tesla product pipeline is running a bit dry and is at its most vulnerable. The pressure is on for the company to keep innovating if it wants to keep its EV crown.”

Pressed by analysts on opportunities outside of passenger cars, Musk advised that there are other sectors on the table. “I think Tesla is definitely going to make an electric van at some point,” he advised. Delays to the electric semi-truck have been put down to the limited availability of cells—the Semi would need five times the number of cells used in a passenger car—but optimism remains that it will materialise soon.

Musk also clarified past remarks he had made about stepping down as Chief Executive of Tesla in future. While he expects to remain at the top for “several years” he did confirm that a rough succession plan is in place that will eventually see him transition into more of a design-oriented role. “Nobody is or should be CEO forever, so I don’t expect to be,” he said. “The sheer amount of work required to be CEO of Tesla is insane.”



# **Brexit camps emerge: double down or up stakes?**

**One month on from the new trade agreement, there is now greater clarity into automaker and investor strategies. By Megan Lampinen**





**A**fter years of negotiation and uncertainty, and then a one year transition period, post-Brexit trading rules kicked in as of 1 January 2021. Despite years to prepare, the deadline came with something of a scramble for a trade deal, resulting in a situation that most agree is less than ideal for the automotive sector. While the eleventh hour Christmas Eve announcement on a final EU-UK Trade and Co-operation Agreement (TCA) allowed some players to breathe a sigh of relief, it was far from a celebration.

## Where do things stand now?

Industry analysts, automakers and suppliers have now had a month now to wrap their heads around the changes and assess the current trade situation. “It is a relatively thin agreement

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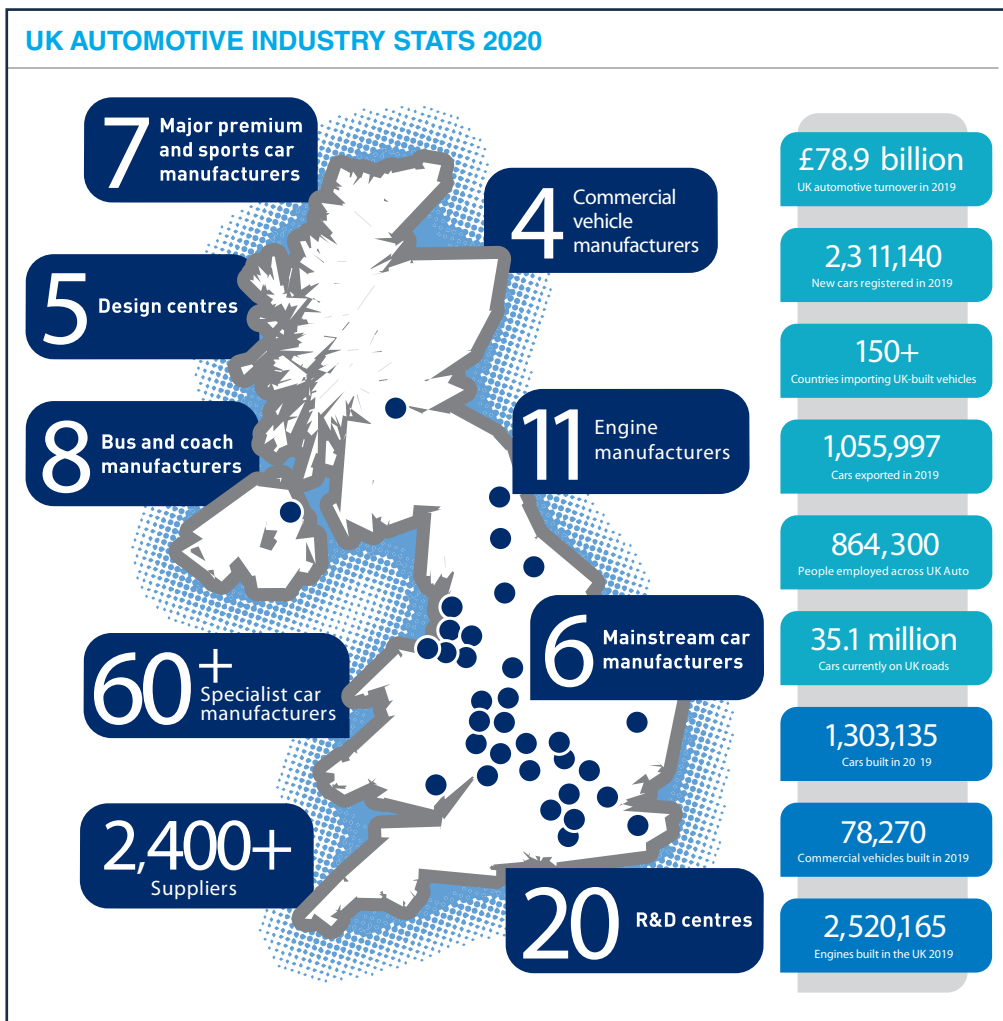
There is friction. It is beyond teething problems. But this is the new reality

compared to EU market membership,” concluded Ana Nicholls, Director of industry operations at the Economist Intelligence Unit. With changes taking effect just one week after the TCA was announced, businesses did not have much time to prepare.

Regardless, most automotive industry members welcomed the clarity it offered. The UK’s Society

of Motor Manufacturers and Traders (SMMT) had been warning of the dangers of an uncertain business environment and urging a deal that allows for frictionless trade. “The TCA delivers some of the things we wanted but not everything,” SMMT Chief Executive Mike Hawes told media. “The deal proposed under [former Prime Minister] Theresa May called for a much closer relationship with the

## UK AUTOMOTIVE INDUSTRY STATS 2020



© SMMT

EU, but with the current government, sovereignty became more important. As a consequence, the type of deal that could be negotiated became narrower. Within that, the auto industry did reasonably well.”

Hawes is particularly grateful for the avoidance of tariffs and quotas, though they hinge on rules of origin requirements. Those requirements become tougher as the industry shifts towards electrified vehicles, but there is a phase-in that is more generous than what some had expected. “We are in a better position than we were fearing just a few weeks before deal was signed,” Hawes added.

While the TCA removes some of the uncertainty about the future of the relationship between the UK and the

EU, the clarity it provides isn’t good news in all cases. The UK type approval scheme, which takes effect from the end of this year, is one example. “The days where you just test something once and can then sell it in the UK and the EU are over,” he noted.

At the same time, it becomes much harder now to move people around between countries. There has also been considerable friction at the border between Great Britain and Europe, with some manufacturers resorting to air freight to keep supplies moving. The cost of shipping has increased due to the level of demand and the tales of nightmare paperwork for hauliers and logistics companies are enough to keep C-Suites up at night. “There is friction. It is beyond teething problems,”



emphasised Hawes. “But this is the new reality. There are increased costs and there will be for the foreseeable future. That ultimately affects our competitiveness. The pressure is now on automakers in the UK to improve productivity to overcome those costs and maintain competitiveness.”

## Double down or up stakes?

What does the new normal mean for automakers with UK operations? The biggest fear was that new investment would dry up and manufacturers would gradually allocate new production to facilities elsewhere, leading to a decline in UK manufacturing. Carlos Tavares, Chief Executive of the newly merged Stellantis, recently warned that the combination of Brexit and the UK’s coming internal combustion engine (ICE) ban threatened the viability of Vauxhall’s Ellesmere Port plant. “Tavares has been clear from outset,” said SMMT’s Hawes. “There is a future for Ellesmere Port providing it can

maintain competitiveness, which depends on the UK maintaining its competitiveness.”

Tavares told media that a decision on future investment for the facility would be made in the coming weeks, but that any new funding would likely go towards electric vehicles (EVs). The UK recently fast-tracked plans to ban the sale of new ICE-only vehicles after 2030.

On the other hand, Nissan is embracing the UK’s EV push, and in January reiterated its commitment to maintain production at Sunderland, “for the long term under the business conditions that have been agreed,” said Chief Operating Officer Ashwani Gupta. Sunderland rolls out the Qashqai, Juke and Leaf EV. Notably, Nissan is investing in UK battery production as well to avoid future tariffs that would apply under the post-Brexit trade deal.

From now through 2024, companies can benefit from free trade on vehicles built in the UK providing they can



demonstrate that no more than 60% of the vehicle is imported. For EVs, the biggest component by value is the battery, so that 60% threshold will allow OEMs to import the battery. But not for long. The allowed proportion of imported parts drops to 55% in 2024 and by 2027 goes down to 45%. “By then, the majority of the EV has to originate in the UK or EU,” confirmed Hawes. “Given the importance of the battery to the total EV, that would make it almost impossible for EVs to qualify for zero tariff unless the battery was produced within the UK or EU.”

For now, it looks like Nissan is upping its UK investment with a hefty focus on EVs while Stellantis is reviewing any role for its UK operations.

Nicholls sees a trend here. “In any sector where you have a substantial production base but one not easy to shift, companies will have to decide to double down on the UK or to quit,” she told *Automotive World*. “To some extent that decision depends on what they see others doing in their sector. If you are already in a leading position in UK, the incentive is to double down and hope some of the smaller players find it too onerous to withdraw.”

UK production is already on the decline—plunging 29.2% in 2020, though that was largely due to the pandemic. However, the trajectory should continue even after COVID’s impact abates. “Manufacturing will become a smaller sector, but at the

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## While the eleventh hour Christmas Eve announcement on a final EU-UK Trade and Co-operation Agreement (TCA) allowed some players to breathe a sigh of relief, it was far from a celebration

same time the auto sector in the UK is undergoing a huge amount of disruption with the shift to EVs,” Nicholls added. “That opens up some new opportunities to develop a base within the UK for EV production, which then it is successful could become a substantial export industry.”

### Innovation

The UK is actively jockeying for a leadership role not just in zero-emission propulsion but also connected and autonomous vehicles and even flying cars. In late January the London-based Smart Mobility Living Lab (SMLL) became the first Connected and Automated Vehicle (CAV) test bed to fully open its doors to customers. Coventry is also busy preparing to open the first Urban Airport for flying vehicles. While efforts like this keep the country in the mobility race, it won't make up for the potential loss in traditional

manufacturing. “While our R&D investments and tech offering put us on the map, these are mostly demonstration projects,” Hawes told *Automotive World*.

That said, he does believe that Brexit could offer the UK government the chance to move more quickly around new technology advances, particularly regarding automated driving. “It will be operating independently rather than taking 27 other member states with it,” he explained. Hawes points to the recently finished consultation on automated lane keeping as an example: “The UK wants to be one of the first to allow that on the road. We tend to embrace technology. Just look at online shopping—we are world champions at that. We take to new technology and we are an affluent market. In terms of Brexit, innovation investment won't allow us to overcome the immediate hit but it keeps us in the game.”



© Sony

# **Sony's ADAS expert bullish on the sector's future**

**Jack Hunsley speaks with Almotive's Founder and Chief Executive Laszlo Kishonti to learn more about the ADAS supplier's unique partnership**

**F**ounded in 2015 in Budapest, Hungary, Almotive is not the most well-known player in the automated driving sector. It is, however, a stakeholder in one of the industry's most intriguing projects. As announced in January 2021, it is working with Sony on the technology giant's elusive Vision-S prototype.

12-months on from the initial unveiling, an updated Vision-S returned to 2021's virtual CES show. Alongside updates of Sony's continued public testing was a shout-out for its ADAS expert: "Almotive brings excitement to the automated driving industry, creating scalable and reliable automated systems," said Izumi Kawanishi, Senior Vice President of Sony Corporation and head of its AI Robotics Business. "Working with them to further develop technology for the Vision-S concept is a decision that we believe will contribute to the future of mobility."

"We are super excited to be working with internationally respected Sony," Laszlo Kishonti, Almotive's founder and Chief Executive, echoed in response. "This is a great collaboration for us, helping us better understand the key challenges in developing and integrating advanced ADAS technologies from well-respected industry leaders."

*Automotive World* sat down with Kishonti after the show to learn more about Almotive's valuable tie-up and his view on the ADAS market.

## Complete portfolio

From the outset it's clear Kishonti is enthused with his company's partner—"I see Sony as basically the Japanese Apple," he told *Automotive World*. But Almotive also sees Sony as

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When someone rides in a fully autonomous car, they expect not better than average performance but almost perfect performance

more than just an entertainment technology expert. "Sony is one of the biggest sensor companies in the world, probably the biggest in optical sensors and cameras," Kishonti added. "It is one of the best battery companies in the world. When you combine that expertise in consumer electronics, sensors and batteries, I think Sony has a very good chance to enter this market successfully." Future vehicles, however, will require self-driving intelligence. This is where Almotive comes in.

Kishonti and Almotive are unwilling to divulge too much detail, but the company is providing 'Level 2+' ADAS functionality for Sony. A new version of its production-ready aiDrive software stack, which is aimed at Level 2 to Level 4 autonomy, and its development, simulation and validation tool aiSim were also teased in the 12 January announcement. Both are expected to release in Q1 2021.



Sony took the automotive industry by surprise when it unveiled its concept car at CES 2020

© Sony

Almotive also offers a product named aiWare, a neural network accelerator targeting high performance Level 2 to Level 4 automotive grade real-time AI inference. Kishonti firmly believes this whole system portfolio approach is critical for success in such a competitive market. “We founded Almotive because we saw that not every OEM will be able to build the entire software stack,” he said. “They will need independent suppliers of software for ADAS and also for automated driving.”

## Cost versus innovation

When it comes to nurturing automated technology, Almotive believes cost to be a key limiter. “When someone rides in a fully autonomous car, they expect not better than average performance but almost perfect performance,” said Kishonti. Such performance does not come cheap and developers must balance innovation with cost-efficiency. “A recent survey on how much an average consumer would spend on fully autonomous driving add-ons found the average to be around US\$5,000 dollars,” said

Kishonti. “Tesla is already asking double that. The technology which the likes of Waymo and Cruise are developing costs even more.”

This is why Almotive is eager to offer customers any and every opportunity to refine its autonomous and ADAS technology. It can do so by leveraging in-vehicle data. “What Tesla does is when the driver isn’t using Autopilot it can run codes on the sensors to see how the vehicle would behave if the technology was enabled,” said Kishonti. He believes this tactic will be critical in maturing high-level autonomy and bringing down costs. “With that data manufacturers can upgrade their algorithms, the driving functions and eventually the customer experience,” Kishonti added. “If the cost of sensor and computing set-ups in high-level autonomous cars decreases, the sophistication of automated driving features in mass-market vehicles will increase.”

Regulation is also firmly on Almotive’s agenda, with Kishonti hopeful that authorities such as Euro NCAP continue to include more ADAS platforms in their procedures. He also sees good value in over-the-air (OTA)





© Almotive

updates. “Most of the new entrants will have software updates in the future so they can continuously update automated driving features in the car,” he said, arguing that companies which master OTA can build tighter customer relationships. “Tesla has issued 400 updates in five years on its cars and I think one of the major reasons why many customers like Tesla is not because of its vehicles but because of those software updates,” he said. “I see automotive following a similar system to smartphones where three- or four-year-old models still get the latest software and functional updates.”

## A complementing triumvirate

Kishonti is bullish on Almotive’s future. The company claims to be the best-funded automated driving software supplier in Europe. In June 2020, it raised US\$20m in a funding round to bring its total funding so far to US\$75m, making Almotive what it believes to be the largest VC-backed company in this space. Investors include Robert Bosch Venture Capital and Samsung Catalyst fund. “Over the

last five years Almotive has grown into a European powerhouse of automated driving development, and its growth will continue over the coming years as automotive stakeholders increasingly recognise the enormous change that is in front of them,” Timo Tirkkonen, Chairman of the Board at Almotive, said at the time. “Almotive is the leading ADAS company in Europe,” added Kishonti.

As for its Sony partnership, Almotive is eager to continue its positive relationship with all its project partners. That includes contract manufacturer Magna Steyr which built the prototype. “There is a very good synergy between us, Magna Steyr and Sony,” said Kishonti. “We are not competing with each other, we are complementing each other. This is good experience for us because even though Sony is a global multinational company and Magna Steyr is a large company compared to us—we only have 200 employees—these new projects are usually managed by smaller teams. The Vision-S project is rather like a start-up within Sony. It’s more flexible to work with these newer entrants because their philosophy is like ours.”

# Where is location data heading?

**HERE Technologies' CTO explains his strategy on future-proofing a business case around location data.  
By Megan Lampinen**

**A**s mobility becomes smarter and more connected, the possible applications for location data are rocketing. From optimised routing to help electric vehicle (EV) drivers maximise range to high-definition (HD) maps that guide autonomous vehicles (AVs), location data already underlies numerous mobility advancements and even more are on the way.

HERE Technologies is emerging as a location data giant, drawing on new technologies to expand and improve its offering. “We enable a variety of location intelligence use cases that are empowering the mobility industry,” says HERE’s Chief Technology Officer Giovanni Lanfranchi. “The location map we provide is rich and semantically consistent, and we achieve that by leveraging artificial intelligence (AI) and machine learning (ML). That is not just to automate the map process but also to provide customers the ability to really enjoy location intelligence from our applications.”

HERE’s latest announcements suggest a handful of ways in which mobility players, and others, can benefit from this location intelligence.

## Mapping-as-a-Service

Maps contain information that is useful for many people, but some transport and logistics companies may want to create maps and map datasets that are only useful to their own operations. For these players, HERE has a new mapping-as-a-service offering that draws on the specific company’s own map data in combination with HERE map data on the HERE platform.

Lanfranchi describes this as a “bring your own data” approach and notes that it is particularly appropriate for transport and logistics players. Imagine a logistics company with a fleet of couriers delivering packages. On top of the general city map they could add a private layer that introduces specific characteristics of value for the company but not necessarily anyone else.

With HERE Premier 3D Cities, last-mile delivery drivers can navigate dense cities with maps that highlight precise building dimensions and entry points along their delivery routes

At the moment, private mapping is bundled as part of a professional services engagement, and the first use cases relate to industrial yard mapping. Some customers have huge manufacturing facilities or mine sites, and they want a map of their facility to offer a better view of where things are located. They can leverage all the usual location services in terms of search and routing, but simply focused on their own plant. According to Lanfranchi, early customers have reported back “dramatic benefits and efficiencies” thanks to this.

## HD maps move beyond AVs

HERE's private mapping offering has already attracted interest from German railway company Deutsche Bahn, which is contributing proprietary data to create HD maps for its Sensors4Rail digital rail project. The pilot aims to test sensor-based train localisation and environment recognition, with the aim of improving efficiency. These are the same sort of capabilities required by self-driving cars, which rely on HD maps for centimetre-level precision in navigation.

“We are working on HD maps with numerous automakers as it is the cornerstone for any Level 2+, Level 3, Level 4 type of autonomous driving use cases,” Lanfranchi tells *Automotive World*. “But with Deutsche Bahn, it was evident that an HD rail map would be



important to improve the overall railway system efficiency.” The project has spurred talks with other railway companies as well. “To be candid, this was not something that we had planned but it looked like a good use of integrated mapping.”

## 3D mapping

While HD mapping is designed for use by machines, 3D mapping is targeted for use by humans across a range of industries. HERE recently unveiled 3D models of 70 city centres around the world. This introduces geospatial data around building dimensions and entry points, which could prove incredibly helpful to logistics and transport companies as well as urban planners.

“Whether we are talking about HD maps for machines or 3D maps for the vehicle, they are all semantically consistent,” clarifies Lanfranchi. “There is always a clear link that this is a building, this building is exactly on a specific road, this road is so far

The HERE Consent Manager and HERE Anonymizer allow enterprises to deliver personalised data services with confidence



from that place, etc. They are not two separate databases but always congruent and consistent. This is easy to say but it is not easy to do.”

The Audi A8 is one of the earliest models to feature the 3D technology within its modular infotainment platform (MIB2+). For other in-car applications, HERE has been working with Leia and Continental. Continental’s automotive display system depicts HERE’s 3D images of buildings and topography by harnessing Leia’s Lightfield software. This software allows for the visualisation of 3D maps for extended periods of time without the need for adaptive eyewear or eye-tracking sensors. The idea is not just to introduce a new ‘wow-factor’ to the HMI but also to create a more intuitive, and safer, way for drivers to interact with the vehicle.

Outside of the vehicle, HERE suggests that these maps could be used by emergency responders to better prepare for disaster situations or by telecommunications companies to optimise their 5G network rollout.

## Marketplace expansion

HERE could find itself working increasingly with telecommunication companies from another angle: data provision for its Marketplace. AI Telekom Austria Group, a major provider of digital services and communications solutions in Europe, recently joined the HERE Marketplace, marking the first telecoms company on HERE’s global hub for location data exchange. The telco will use the Marketplace as a new distribution channel, offering location and mobility analytics based on anonymous movement data sourced from its cellular network. It’s a notable win for HERE and strengthens the Marketplace by expanding the available datasets. “The value will be mostly around the analytics that other data consumers can leverage,” says Lanfranchi. “For instance, this can help to better understand movement of people, to figure out the best way to open a shop or to provide some particular targeted advertisement.”



A1 Telekom Austria Group is the first telecoms company on the HERE Marketplace

© HERE

Data like this carries privacy concerns which HERE is now addressing through some powerful anonymisation technology and techniques. “We want to make sure the provider-in this case A1 Telecom Austria-does not have any liability risks, that they do not expose anything that could be conflated with other types of data sets,” explains Lanfranchi. “You wouldn’t want to be able to conclude the data came from a specific person, John Smith, who was at the bar at 6pm and not at the office.”

Marketplace is also getting a consent manager. With location data, it’s important to guarantee not only user privacy but also the user’s ability to control his or her own data. The HERE Consent Management allows enterprises to collect personal data while the provider retains control over third party data access. The system enables the authorisation and usage of personal data to deliver a range of transport services like maintenance, road safety alerts, on-demand parking and EV charging services.

For example, an insurance provider may want to access sensor data from vehicles to more accurately inform its policies. That insurance provider can go to HERE Marketplace and see that

certain automakers provide this sort of sensor data. The data from the automaker, though, may come from an individual owner of the car. Through the Consent Manager, that driver is allowed to provide explicit consent for his data to be collected for that specific purpose. At any point in time, he has the right to change his mind.

Notably, it harnesses blockchain technology. “We use a blockchain open ledger fabric that guarantees, by design, trust across players who do not necessarily trust each other,” he adds.

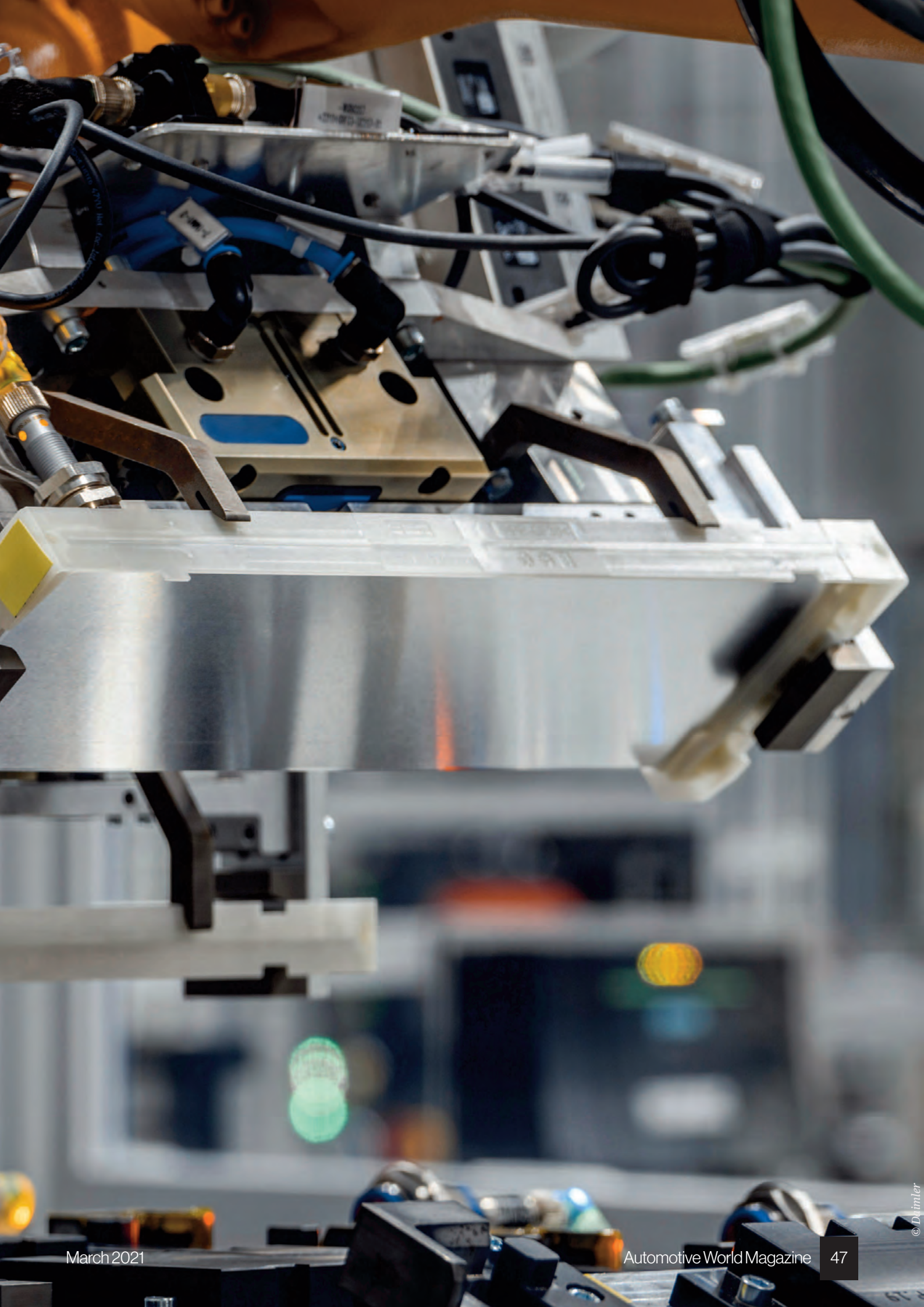
## Where next?

This sort of portfolio represents a steep growth curve and considerable diversification from HERE’s Navteq roots in the mid 1980s, and the company has proven adept at future-proofing. Under Lanfranchi’s watch, positioning for the future means further pursuit of AI and ML along with 5G and edge computing. Exactly where these technologies lead is still to be determined, but if HERE manages to maintain its recent pace of development, answers can be expected shortly.

# EU battery legislation could set global benchmark

**The bloc's proposed battery laws cover EV batteries, and could influence policy worldwide whilst handing EU manufacturers an advantage. By Xavier Boucherat**





**S**ales of electric vehicles (EV) in Europe are in the ascendent: despite the disruption and uncertainty of COVID-19, sales of battery electric vehicles (EV) and plug-in hybrid electric vehicles (PHEV) saw annual growth of 137% in 2020, with 1.4 million new registrations. That figure is higher than in China, where sales of new energy vehicles—EVs and PHEVs—reached 1.34 million units. By 2030, the EU wants 30 million zero-emission vehicles on the road.

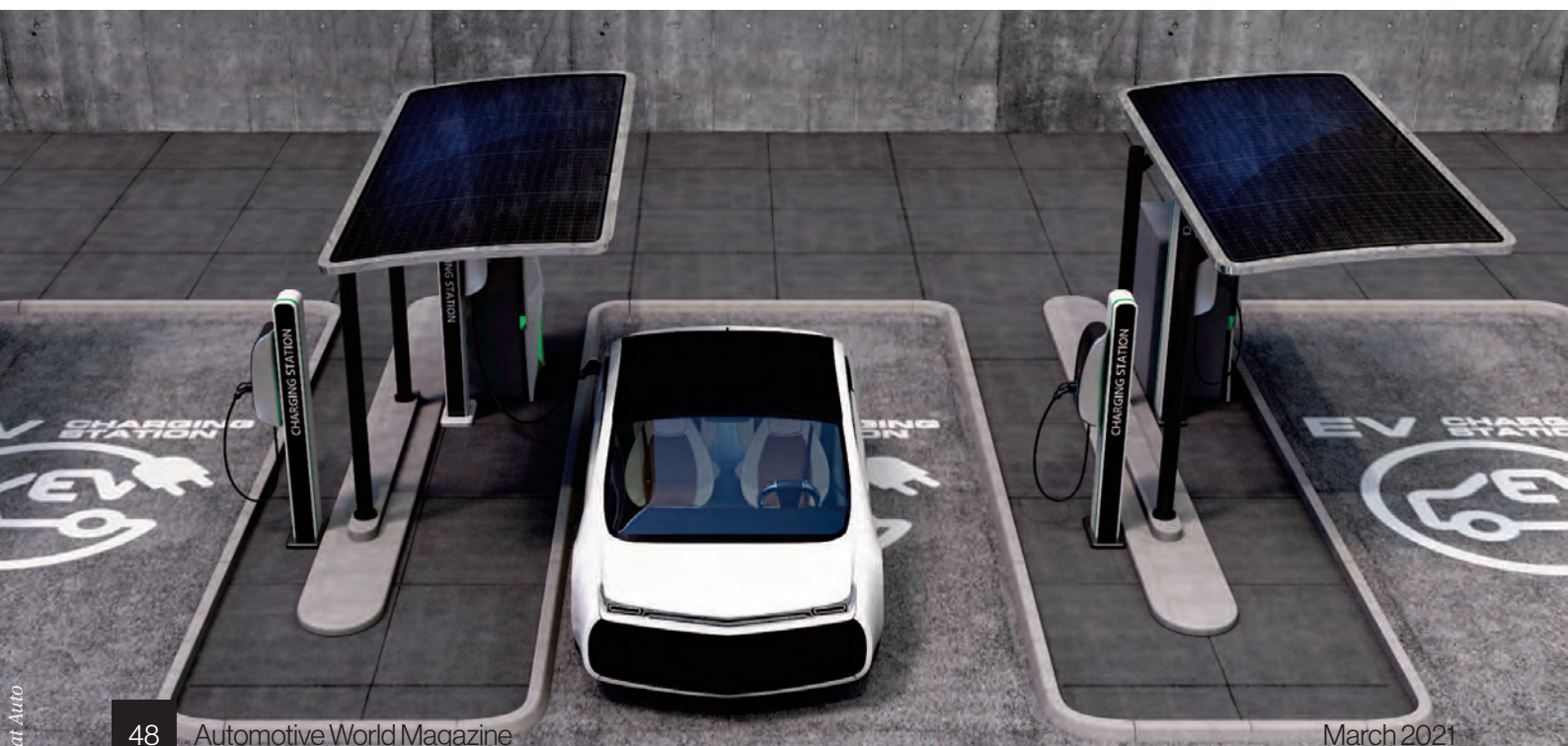
Accompanying this is a boom in investment for EU lithium-ion battery production. A grand total of 22 gigafactories have been announced so far. Production capacity in 2020 stood at 49GWh: all going to plan, this will jump almost tenfold to 460GWh by 2025, and 730GWh by 2030. Battery giants such as LG Chem have expansion plans, as do collaborations such as VW's venture with Sweden's Northvolt and PSA's tie-up with Total-owned Saft. It is a promising moment for the EV sector, but a continued scale-up of the ecosystem will require

regulators to create a legal framework around batteries that ensures fair and sustainable EV manufacturing.

“The ramp-up shows how important it is to get rules in place now which ensure all batteries used here are ethically sourced, produced with clean energy, and re-used and recycled at the end of their lives,” says Alex Keynes, Clean Vehicles Manager at Transport & Environment (T&E). “We need clear rules and standards as soon as possible to drive this money towards the best sustainable technologies.”

## Sustainable framework

To that end, the European Commission (EC) is now turning its attention to battery law. As Keynes explains, existing legislation does not specifically address the challenges of e-mobility: the current Battery Directive predominantly concerns the recycling and end-of-life management of lead acid batteries.







## The changes included go a long way to creating a framework and common set of requirements which allow for European member states and suppliers to plan accordingly

As a result, there are no harmonised rules on lithium-ion battery production across member states, a situation the EC acknowledges as inefficiency within the single market. A proposal published in Brussels in December 2020 noted that the uneven implementation of the Batteries Directive and the lack of reliable, comparable information across the EU had led to diverging regulatory frameworks, and in turn a lack of incentives to invest in sustainable battery production capacity.

Other issues noted by the EC included the sub-optimal functioning of recycling markets and closed material loops, limiting the bloc's potential to mitigate raw material supply chain risks, and the social and environmental problems surrounding battery production. The lack of transparency around raw material sourcing, for example, has prompted concerns of child labour and 'artisanal' mining, in which informal workers dig up materials by hand and sell them on to traders.

Such practices can be extremely dangerous, yet account for significant output. In 2018, 70% of the world's cobalt—an essential metal in battery production—came from the Democratic Republic of the Congo. Congolese officials estimated that of this, as much as 30% was the produce of artisanal miners, with a late 2017 rally in the price of cobalt driving a surge in the practice. Recently the Congolese government announced it would seek to bring authorised artisanal miners under the control of state-owned Gecamines, as well as clamp down on child labour practices.

The EC's proposed shift from a directive to a regulatory framework will spur quicker harmonisation across the bloc, with detailed rules and requirements for operators levelling the playing field. Along with a separate classification for EV batteries, preferred policy options include mandatory supply chain due diligence, a new reporting system for EV battery collection rates, mandatory declaration of recycled content levels and mandatory carbon footprint declarations for EV battery manufacturers.



## A boon for industry health

For the industry, the proposal brings some much-needed clarity. “The changes included go a long way to creating a framework and common set of requirements which allow for European member states and suppliers to plan accordingly,” said Doug MacAndrew, Chief Operating Officer at InoBat Auto. For instance, he said, the planning and investments required to meet recyclability targets are now that much clearer, as are “the mechanisms that will be used to incentivise adoption.”

The manufacturer is among those eyeing expansion, with plans for a 10GWh factory in Voderady, Slovakia. Critically for an EU-based manufacturer like InoBat, the regulation could lend local companies adopting green practices a competitive edge over competitors

from dominant markets including China, where a largely coal-fired power grid means battery production comes with a significant carbon footprint. UK-based consultancy IDTechEx said that emerging battery producers in Europe may have “an advantage, having designed-in sustainability strategies from the start, over companies such as LG Chem, CATL or Samsung.”

“All regulations have the ability to help or hinder an industry,” said Justin Lane, Business Analyst at InoBat Auto, “but what has been proposed seems to set up a framework that can allow Europe to really lead in the growing EV space, and help to challenge other regions in a healthy, ethical and sustainable way. So long as the final proposal keeps in mind where the industry will be in ten years, and not just where it is today, it will likely be a very successful policy for the European battery ecosystem.”

InoBat announced one of its own sustainability initiatives in November, signing a memorandum of understanding with Primobius, a battery recycling joint venture between SMS group and Neometals. Close partnerships between manufacturers and recycling specialists could help to streamline the process, delivering raw materials including nickel and cobalt back into the supply chain.

In a statement, Primobius Managing Director Michael Tamlin said the EC proposal was a fantastic development for the company: “An increase in



Enforcement of the new rules will be crucial, and this will be a job for market surveillance authorities. In addition, third party verification of company reporting on emissions, supply chain due diligence and more will be an important part of making sure there are no loopholes

recycling and the mandated use of recycled content in new batteries supports the notion of a circular economy, allowing more efficient use of materials and reducing dependency on non-domestic sourcing. This development bodes well for Primobius's commercialisation aspirations."

### **Enforcement critical**

The EC's proposals will require approval from member states before they come into law, but if successful, they could set a benchmark for beyond the bloc's borders. As T&E's Keynes explains, the reach of regulation will be global, affecting all battery imports into the EU.

"It is likely that these rules will be gradually adopted around the rest of the world," he said. "It is important to

remember that this is the first product legislation of its kind and should provide a blueprint to use with other products, including oil, which is far less sustainable than batteries and is linked to human rights abuses."

However, he added, the EU must be prepared to follow through on legislation and ensure that the appropriate mechanisms are in place to enact it. "Enforcement of the new rules will be crucial," he said, "and this will be a job for market surveillance authorities. In addition, third party verification of company reporting on emissions, supply chain due diligence and more will be an important part of making sure there are no loopholes." The EC has proposed third party verification for supply chain diligence, but this has not been confirmed for emissions verification, where details will be worked out in delegated acts.

# CV supplier uses tech incubator to spur e-mobility progress

Knorr-Bremse is investigating how its conventional portfolio may be reshaped by zero emissions trucks and buses.  
By Freddie Holmes

**C**ommercial vehicle (CV) supplier Knorr-Bremse has created an in-house think tank to accelerate its preparations for the next generation of electric CVs. The aim is to find new ways for the business to adapt and thrive as vehicle architectures are overhauled.

[Electric trucks and buses are becoming more common in a number of applications](#) and are expected to capture a growing share of the new CV market over the next decade. Technology suppliers will have to meet the changing needs of truckmakers not only with respect to the powertrain but also with other crucial systems related to traction, braking and steering.

The Knorr-Bremse eCubator opened on 8 February 2021 and will operate at arm's length from the main company. It is expected up to 60 in-house and external specialists will work within the new unit once fully operational. Rather than working with a conventional corporate structure, the aim is to foster an "agile working environment" with cross-functional teams. The company has described it as taking innovation "back to the garage"—a nod to the humble beginnings of many successful start-ups.

Peter Laier is Member of the Executive Board of Knorr-Bremse AG and is responsible for the Commercial Vehicle Systems unit. He explained that the eCubator will serve as a boutique research arm that will allow the company to prepare for zero emissions CVs. "We have decided to create such an incubator for two reasons," he told *Automotive World*. "On one side we want to concentrate on adapting our existing product

portfolio to the needs of e-mobility, but we also want to investigate wider business opportunities in the e-mobility arena."

Suppliers that have built their business around conventional ICE trucks are having to reshape their portfolio. Knorr-Bremse is one of the truck sector's biggest names in braking and steering systems, and has already electrified certain vehicle components in preparation for zero emissions powertrains. A new electric compressor was revealed in 2018, which is lighter and quieter than conventional piston compressors. These are used to power various pneumatic components such as air brakes, door mechanisms and air suspension systems. Other components and systems will also be electrified and designed in a way to optimise how energy is used—crucial for extending the range of electric trucks and buses.

The eCubator is not just a means of defending the company's leading industry position, says Laier, but also a way to "open up new business areas, partnerships and alliances" in the field of electric mobility over the next three years.

To simulate the start-up environment, the operation will be run from offices in Munich and Budapest, away from any of Knorr-Bremse's corporate campuses. "It is important that we set up the incubator away from the headquarters," says Yves Compera, a systems architect at the eCubator. "We are a small team, and it brings us closer together." In Munich, the eCubator is four kilometres from the Knorr-Bremse Group's corporate headquarters. This, says Laier, is "just the right distance—far enough away to facilitate an independent approach

E-mobility is forcing companies across the supply chain to reevaluate their product portfolios

with flat hierarchies, yet at the same time keeping these innovators close enough to the nerve centre of head office.”

A flat hierarchy is common within companies that emphasise a need for agility and innovation, often with more creative job titles that make it difficult to gauge seniority. Team members are given greater freedom, have fewer superiors to report to, and are more closely involved in the decision-making process.

## The impact and wider connotations

Knorr-Bremse is an established supplier of conventional vehicle systems, and with no direct link to electric powertrain systems. The fact that it has deemed it necessary to create a dedicated unit highlights how e-mobility is beginning to impact more and more areas of the supply chain. It also highlights how creating an electric truck is about more than simply substituting an internal combustion engine (ICE) with an electric powerplant; there are a raft of downstream changes that impact other crucial systems, from steering and braking to chassis control.

In-house technology incubators have become common in recent years, with other automakers and suppliers taking similar steps to become more agile and catalyse innovation in emerging fields. Some of these



incubators will have an in-house team of creative minds, devising new solutions and passing them along to senior management. Other units may choose to bring in entrepreneurs and early-stage companies with existing ideas, and possibly bring them to commercialisation.

Mahle's Start-Up Space was formed in 2017 to come up with new business ideas and create its own start-ups. Jörg Stratmann, Chairman of Mahle's board of management, has described the incubator as a "crucial element" to its innovation strategy. At Robert Bosch, the supplier operates an



© Knorr-Bremse

acceleration programme for early-stage tech start-ups called Startup Harbour. Continental AG runs a similar organisation called co-pace, which allows the supplier to scout emerging companies and, if suitable, provide venture capital funding. Many other suppliers including Cummins, Dana and BorgWarner have also spoken of a need to prepare for the next generation of electric CVs that are nearing commercialisation.

Incubators such as these are seen as vital instruments for large organisations. It is a means for rapid investigation, a process which might

otherwise be drawn out if conducted through the parent company. Ideas can be tested quickly, expanded upon if deemed suitable and discarded if not.

With the onset of e-mobility comes the greatest technological evolution that established suppliers such as Knorr-Bremse have ever faced. The agility of an incubator is seen as a useful way to catalyse innovation. And although diesel and natural gas trucks will rule the roost for the foreseeable future, it is clear that suppliers are not resting on their laurels when it comes to electrification.

# Robo-shuttles suit MaaS better than robotaxis

The gradual rise of the robotaxi means that Mobility as a Service will embrace self-driving vehicles, but their exact role is still a work in progress. By Xavier Boucherat





**A**utomaker visions for autonomous vehicles (AV) have changed through the years: any suggestion that consumers will soon be able to own a fully capable, Level 5 AV before 2030 have been muted in favour of advanced driver assistance systems (ADAS) and limited, geo-fenced robotaxi rollouts. Only Tesla continues to push the narrative of an AV in your garage with its 'Full Self-Driving Capability' offer, a US\$10,000 extra which, despite the branding, offers no hands-off or eyes-off functionality.

availability of operator data and APIs for software developers.

It is often said that the industry's CASE megatrends (connected, autonomous, shared, electric) are moving in tandem. The role of electrification in integrated mobility is clear: cities want to leverage MaaS to reduce emissions, and zero-emissions vehicles will be looked upon far more favourably. But is the integrated mobility business model dependent on autonomy, which removes driver costs? And what can autonomy deliver which existing transport modes can't?



**It will be another two to four years before we see sizeable autonomous shuttle fleets working in multiple cities, but by 2030, we are fairly certain of a sizeable penetration of these vehicles**

Though the robotaxi space remains in a developmental phase, the proliferation of trials—including fully driverless trips in Phoenix, courtesy of Waymo—hints at where the real AV business case may lie. At the same time, Mobility as a Service (MaaS) is an increasingly attractive and viable prospect in urban locations, spurred on by increased connectivity between riders and operators, and the

### **Shuttle run**

Kersten Heineke, Partner, McKinsey, says that the shape of the AV market will depend heavily on urban regulation. As things stand, he explains, robotaxis emulate traditional vehicles, with four to six seats. Long-term, advocates might argue that autonomous ride-hailing could become cost competitive with private vehicle



The EU-backed FABULOS initiative wants to put shuttles to work in a number of EU cities, including Helsinki

© FABULOS

ownership, but even if that is the case, says Heineke, the issue of single-occupancy journeys and the resulting congestion remains thoroughly unattractive for cities. Uber and others have previously shown that ride-hailing services actually create more traffic, and so heavy regulation of robotaxi services is a possibility.

Instead, says Heineke, cities may look to robo-shuttle services. Higher occupancies combined with widely available, on-demand coverage has the potential to massively reduce personal car usage, he says, “so long as a service is actually convenient, and there is a certain feeling of privacy onboard.”

The other benefit of shuttles is that they are infrastructure light, with small vehicles not requiring the space that busses do. What’s more, robo-shuttles could prove much easier to scale down for operation in smaller cities: other forms of shared mobility, including ride-sharing and car-sharing, only make economic sense in densely populated areas.

ViaVan and Volkswagen’s Moia are examples of the flexible services which Heineke has in mind. The

question, he says, is what shape the vehicles will take: in VW’s case, the automaker already uses purpose-built minibus vehicles, modified to provide passengers as much privacy as possible. Meanwhile others like Navya have developed entirely new concepts, with seated and standing room. “Whether services will hold four, five or 12 seats will depend partly on the geography and density of respective cities,” says Heineke.

In terms of timeframe, Heineke believes that work remains to be done on both the regulatory and technical sides of the equation. “It will be another two to four years before we see sizeable fleets working in multiple cities,” he says. “By 2030, we are fairly certain of a sizeable penetration of these vehicles.”

## Competing with the car

Sampo Hietanen, Chief Executive of MaaS Global, says that whilst MaaS will gain prominence in cities before any major AV rollout, the eventual cost-effectiveness of self-driving vehicles coupled with convenient, personalised and pleasurable

“

## When AV fleets really hit the roads, that's when private ownership of vehicles really starts to die

experiences could sound the death knell for private ownership. “When AV fleets really hit the roads, that's when private ownership of vehicles really starts to die,” he says.

However, he adds, integration with public transport networks will be key. Failure to integrate will put fleets of extra vehicles on the road, worsening congestion and potentially nullifying the benefits being offered by autonomy in the first place, i.e. convenience and comfort. Without this, there will be little incentive for people to ditch their private cars.

“Cities need to turn the interchange people hate into one they love,” he says. “The truth is that people do not behave the way in which transport engineers want them to: whilst things may improve if everyone did as we said and used public transport, it does not work this way. There is something called freedom.” High integration and high levels of service quality will therefore be essential.

### Location

In Helsinki, a city which has pioneered MaaS, a number of AV trials have gone ahead, including the EU's FABULOS project, an autonomous shuttle programme that aims to

provide first and last mile solutions for riders. Moving forward, the project has ambitions to launch services in Estonia, Greece and the Netherlands. A focus of the project has been to integrate services into public transport systems.

Juho Kostianen is Project Manager at Jatkasaari Mobility Lab, an initiative of city government. Helsinki's extreme weather makes it an ideal proving ground for autonomy, he says, making it attractive from a developmental point of view. However, in terms of operations and what benefits AVs can provide, the question has been one of location, he suggests.

“This is a difficult question,” he continues. “From a public transport point of view, we can say that vehicles will clearly need to be bigger and faster than the relatively slow, eight-person shuttles we've seen so far. But in addition, there really needs to be a suitable, last-mile connection where the service will make sense, and provide some financial benefit.” Data will no doubt play a role in this, identifying gaps in the public transport network, usership and density at transport hubs, and routes which can simultaneously provide a large catchment area whilst offering flexibly to bring people as close to their doors as possible.

A large, blue, 3D sculpture of the word "GEELY" is positioned in the foreground. The letters are thick and blocky, mounted on a metal frame. In the background, a modern, multi-story building with a grid of windows is visible under a clear sky. The entire scene is overlaid with a semi-transparent blue rectangle containing text.

# Geely flurry spotlights pressure to position for new mobility

**The Chinese OEM announced separate partnerships with Baidu, Tencent, Foxconn and Faraday Future all in the month of January. By Megan Lampinen**

Last year was a tough one for automakers as they grappled with the double challenge of a global pandemic and an ongoing mobility revolution around connected, autonomous, shared and electric (CASE) mobility. While health concerns temporarily halted vehicle manufacturing facilities and squeezed liquidity, industry players showed no signs of straying from their long-term CASE strategies. In fact, some are now upping the pace.

“The global automotive industry is probably on the longest lasting tipping point of its entire history,” observes Axel Schmidt, Automotive Global Lead at Accenture. “The changing customer requirements in terms of more sustainable transportation modes—in particular the car—as well in areas such as connectivity, are demanding unprecedented resources. It goes without saying that the very best way, in terms of efficiency, is to pool both financial and engineering capabilities in order to deliver the best possible product at the lowest possible costs.”

Stellantis, the result of a merger between FCA and PSA, is a recent example of two incumbents doing just that. After months of negotiations, the company officially launched in mid-January. “Things are ramping up,” adds Schmidt. That’s not just down to the Stellantis launch; there are numerous other collaborations in various forms that are currently lined up, mainly in the area of R&D. “What comes on top of that is obviously COVID-19 and its economic impact, which resulted in a 15% downturn in terms of global sales and fewer earnings,” he notes. “At the same time carmakers across the globe are forced to carry on with their efforts in terms of digitisation and electrification. These circumstances are fuelling the trend.”

## Spotlight on Geely

While overall industry activity has been high, few individual companies have been as active as Geely. The Chinese company opened the year by announcing a partnership with search



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Geely and Foxconn will set up a JV to provide consultancy services around intelligent drive systems, automotive ecosystem platforms and the electric vehicle value chain



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engine giant Baidu on 11 January. The plan calls for Baidu to establish a company that will collaborate with Geely on the production and design of smart electric vehicles (EVs). The idea is that the new company will draw on Baidu's developments around autonomous driving technology and internet connectivity while Geely offers its car manufacturing expertise and EV platform.

Just a few days later the automaker came forward with plans for an equal-parts joint venture with Taiwan's Foxconn. Through this arrangement it aims to provide contract manufacturing for other automakers as well as consulting services for EV technologies. Then came the Tencent Holding announcement on 19 January, a move that will see the partners jointly develop smart car cockpits to have more mobile and mobility service applications, and explore testing of autonomous driving. It then finished off the month with an agreement with Faraday Future. The two companies will co-operate in

technology and engineering support and will explore the possibility of using the Geely-Foxconn JV's contract manufacturing services.

"It would appear Geely's Chairman, Li Shufu, made some new year's resolutions in respect to EVs, autonomous vehicles and smart technology," observes Jonathan Storey of Automotive Reports. "Unlike most of us, he has managed to tick all the boxes in the space of a month."

## Getting ready

The January announcements, while with different partners, are all designed for one purpose: to better position Geely for the mobility of the future and the sort of technologies expected from new vehicles.

"Geely sees these as ways to improve its competitive advantage in several automotive areas," suggests Pedro Pacheco, Senior Director of Research for Automotive and Smart Mobility at

Gartner. “The partnerships with tech companies like Tencent and Baidu are similar to what other western automakers are already doing... The investment in Faraday Future is again similar to what other OEMs have done in the past by investing in start-ups.” Geely itself has done this itself through its 2019 investment in Volocopter.

As for the EV related collaborations with Baidu and Foxconn, Pacheco suggests these carry more significance for the technology companies than for Geely, in that the partnership will help them build a stronger presence in the automotive market and leverage growth in EV penetration.

Historically, Geely has been pretty active on the M&A and investment front. It acquired Volvo Cars from Ford and bought the London Taxi Company assets when it fell into trouble. It also took over flying car start-up Terrafugia and acquired a 49.9% stake in Proton, a 51% stake in Lotus, a 51.5% stake in Danish bank Saxo Bank, as well as smaller stakes in AB Volvo and Daimler. But that was over a period of years, not a single month. “For Geely, this is a clear step up in terms of activity,” observes Pacheco. “Even if in the past it has been quite active in acquiring several automotive companies, these latest moves signal deeper tie-ups with the tech world which, in the end, is now seen as a necessity for most automakers.”

## Now what?

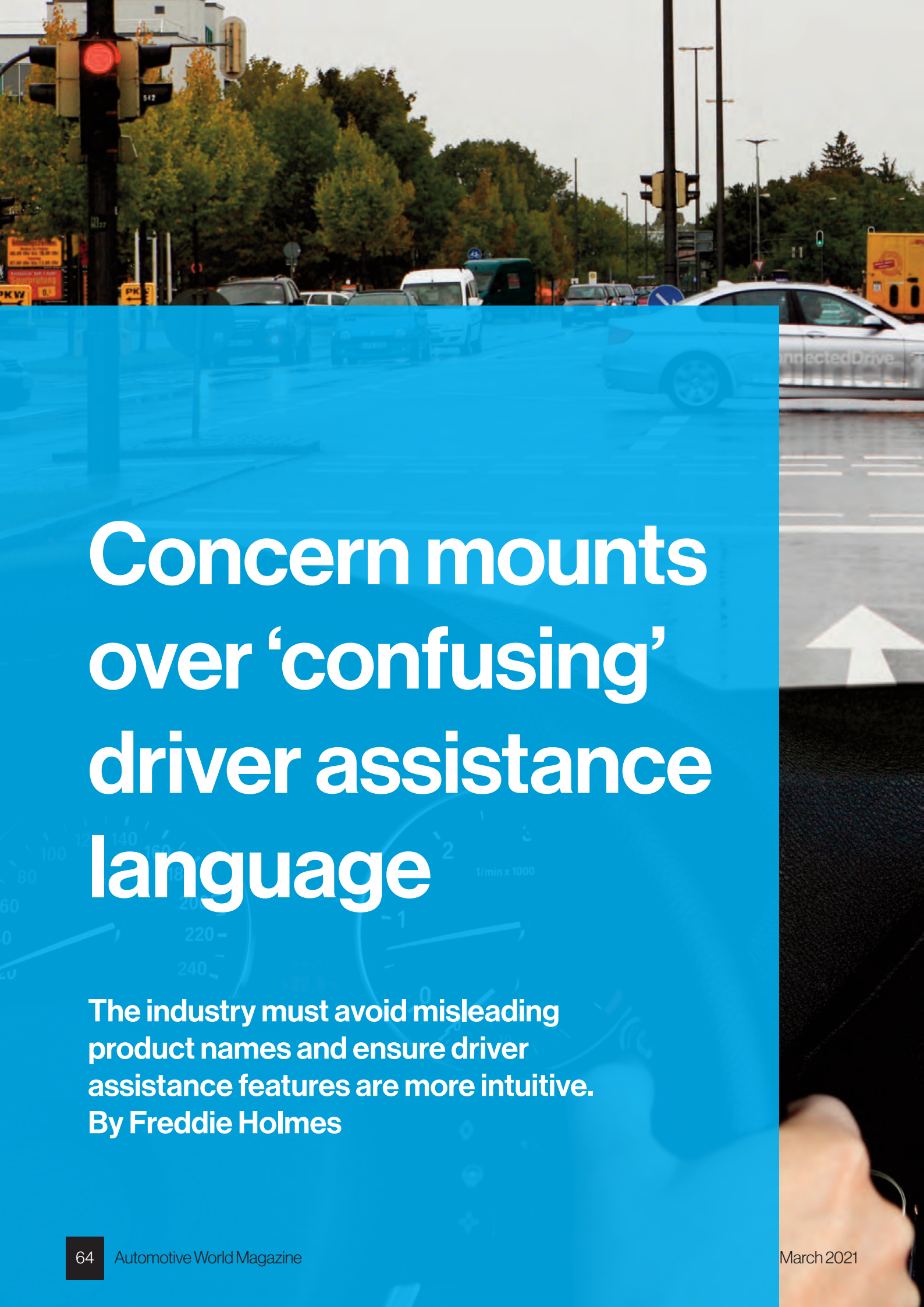
So how have these recent investments left Geely positioned on the global stage? “The company looks to have brought itself up to speed, having perhaps lagged some of its larger

rivals in key areas,” Storey tells *Automotive World*. However, he cautions that the automaker still remains a relatively small player, with sales last year of just 1.32 million units (excluding Volvo Cars). If Geely makes its 2021 target, annual sales will still be only 1.53 million units. In comparison, Toyota Motor Corp sold about 9.5 million.

That said, the company has made its ambitions clear. “With previous deals such as the acquisition of Volvo Cars and stakes of nearly 10% and 15% in Daimler and AB Volvo respectively, we should no longer be surprised at the scale of Geely’s ambition, nor its ability to tap sources of finance to fund that ambition,” Storey points out.

Where and how effectively it directs that ambition will be pivotal to its long-term success. “The company’s recently forged cooperation with Tencent, China Railway Investment, CASIC, and China Telecom to build a ‘tri-dimensional mobility ecosystem’ covering land, air and water is definitely interesting and shows the company’s boldness in going beyond car manufacturing,” says Pacheco. “However, as we have seen by past examples of other carmakers, investing in many forms of mobility and forging broad partnerships are not necessarily a guarantee of success.”

At the end of the day, Geely is an automaker, and the bread and butter of its business is vehicles. Should it be forced into a difficult choice, vehicle sales will likely take priority, leaving other projects compromised. “The big question is whether Geely will be able to approach its broad mobility ambitions in a different way,” Pacheco concludes.



# Concern mounts over ‘confusing’ driver assistance language

The industry must avoid misleading product names and ensure driver assistance features are more intuitive.

By Freddie Holmes





13:17 BMW Research (ZT-4)

DAB 802.11p

Tuning Settings

Buddy 1 Buddy 2 Buddy 3

online

8 sec

A digital dashboard interface. At the top, it shows the time '13:17' and 'BMW Research (ZT-4)'. On the left, there are four menu items: 'DAB', '802.11p', 'Tuning', and 'Settings'. In the center, a silver car is shown within a circular area. Surrounding the car are three 'Buddy' icons: 'Buddy 1' (a motorcycle), 'Buddy 2' (a car), and 'Buddy 3' (a car). Below the car is a yellow 'online' indicator. On the right, there is a traffic light simulation with the red light lit and a '8 sec' timer below it.

**A**dvanced driver assistance systems (ADAS) are becoming more common in everyday vehicles. But are consumers using them, and more importantly, do they understand their limitations?

There are many ADAS features available today. Some provide driver

and can react faster than a human in emergencies. However, [some features are unintuitive or communicate poorly with drivers](#). A lack of familiarity can even lead drivers to deactivate ADAS functions, while others might overestimate their capability. Unclear terminology can increase the risk of ADAS features being abused.



## Some owners feel they are fighting the system

alerts while others can help to steer, brake and accelerate in certain conditions. More advanced highway pilots—which can drive the vehicle in defined situations under driver supervision—are also becoming more common. These were first popularised by Tesla’s Autopilot feature, but similar Level 2 systems are also available from General Motors, Nissan and Volvo Cars. These systems offer hands-off, feet-off driving, but some drivers have wrongly assumed that eyes-off driving is also possible.

When used correctly, studies have shown that ADAS does improve driving safety. These technologies keep drivers better informed while behind the wheel

“The best safety technology supports drivers, without giving the impression that the system can take over while you have a snooze,” notes Matthew Avery, Insurance Research Director at Thatcham Research. “It’s a tricky balancing act that not all carmakers get right.”

### The growth of ADAS

ADAS has come as part of a wider evolution in vehicle safety, moving from passive technologies such as crumple zones, airbags and seat belts to new electronic features that aid stability and avoid loss of traction. Systems such as ESC (electronic stability control) and ABS (anti-lock brake system) can now be found in

The capabilities of some ADAS features can be difficult to understand

practically every new vehicle sold globally. These are known as ‘active safety’ features as they help to prevent an accident from occurring in the first place.

ADAS takes this to the next level, with electronic steering able to help keep a vehicle in its lane and automatic braking that can activate in the event of an emergency. Many other features such as blind spot detection and forward collision warning have no direct control over critical vehicle functions, but do provide audible and visual alerts to help drivers avoid danger. These technologies first appeared in luxury vehicles but are now available on entry level models. Increasingly, ADAS is becoming a standard fit as automakers seek top safety ratings. Multiple features are often bundled as part of a ‘safety package’.

Some of the more bullish outlooks in this market suggest a compound annual growth rate (CAGR) of 19% through to 2025, valuing the market at more than US\$67bn. Even cautious forecasts suggest a CAGR of more than 11% over the next five years. Research firm SBD Automotive says that collision avoidance, lane departure warning and automatic headlight dimming will see the



highest penetration in the US market by 2025. Experts at Cox Automotive Mobility expect that almost all new vehicles will come with “an abundance” of ADAS features and functionality by 2022.

## ADAS frustrates some drivers

With ADAS increasingly common, consumers must be made aware of how these technologies work. Features cannot simply be sold as an added extra in the way that an infotainment app or bespoke cargo holder might: drivers need training. With most major automakers advocates of [the Vision Zero initiative](#), there is a moral duty to ensure these systems are in fact being used, and in the correct manner.

“

## Most consumers are confused by ADAS—what it means, when it works and how to compare functionality

Drivers that do understand ADAS speak highly of it, says Jim Heffner, Associate Vice President of Product at Cox Automotive Mobility. “The majority of consumers love the convenience of ADAS features and functionality, and many people understand that ADAS was designed to automate and enhance aspects of the driving experience to increase safety and safe driving habits,” he explains.

“Consumer desire for ADAS has been growing for many features,” adds Kristin Kolodge, Executive Director, Driver Interaction and HMI at J.D. Power. The company’s consumer research has found that blind spot warning, rear cross traffic warning and back-up cameras are particularly sought after, partly due to the fact that they are easy to use and offer everyday usefulness.

However, ADAS features seem to become less desirable as they become more advanced. For example, some drivers have described lane departure warning as “nagging”, while certain lane-keep assist systems make the

vehicle “ping-pong” between lanes. “Some owners feel they are fighting the system,” explains Kolodge, which might be “nagging them to use a turn signal or have a preference for hugging one lane versus another. Ultimately, the owner is looking for technologies to partner with their driving experience.”

### Is terminology an issue?

The problem is that drivers can rarely tell if ADAS features are functioning as intended by the vehicle manufacturer; there is a particular lack of clarity as to whether the camera or other sensors are working properly. This opens the opportunity for abuse of these systems, which intentional or not is a dangerous practice.

“The reliance on this technology is becoming more prevalent,” says Heffner, “as well as habitual trust that the vehicle technology can provide a more desirable experience and reduce the chance of an accident.”  
Lea Malloy, Head of Research &

Drivers are encouraged to keep their hands on the wheel, but some systems can allow for extended periods of hands-free driving



Development at Cox Automotive Mobility, adds that “most consumers are confused by ADAS—what it means, when it works and how to compare functionality.”

Part of the reason why ADAS leaves some drivers confused is the industry’s parlance around autonomous driving. With Level 1 (assisted automation, feet off), Level 2 (partial automation, hands off) and Level 3 (conditional automation, eyes off)—[not to mention the emergence of Level 2+](#)—there are plenty of grey areas in which consumers can get lost. “The SAE levels are really designed for engineers, not consumers,” observes Thatcham Research’s Avery.

“A majority of consumers find it hard to differentiate or understand the distinction on those autonomous vehicle capabilities,” explains Heffner.

Malloy adds that “terms matter, because today’s L2+ functionality still requires the driver’s hands, head and feet in the game.” J.D. Power’s Kolodge shares similar concerns, noting that “the risk of confusion regarding ADAS names is real.”

J.D. Power has partnered with the American Automobile Association (AAA), Consumer Reports, the National Safety Council, independent AV education group PAVE and the Society of Automotive Engineers (SAE) to create [a document](#) called “Clearing the confusion.” This encourages the standardisation of ADAS names and definitions. The aim is to reduce driver confusion and define ADAS functionality in a consistent manner, rather than using different names for the sake of differentiation among competing automakers.



Take automatic emergency braking (AEB) as an example: Audi calls this multicollision brake assist, Mercedes-Benz calls it active brake assist, while Nissan goes with intelligent emergency braking. BMW bundles AEB as part of packages like 'active guard' and 'active driving assistant pro'. Avery notes that there are currently more than 60 different brand-specific names given to AEB systems by automakers.

Clear and standardised terminology is "critical to ensure that drivers are aware these systems are designed to assist, not replace an engaged driver," says Kolodge. The list included in the joint document is "not meant to replace automakers' proprietary system or package

names, but rather to help identify key functions within those packages and provide clarity to consumers," she explains.

But for some, proprietary ADAS names are exactly the problem. In July 2020, a German court banned Tesla from using the term 'autopilot' following allegations that it misled consumers into thinking a Tesla could drive itself. The automaker has argued otherwise, despite [instances where drivers have died](#) at the wheel after overestimating the ability of the system. Following a well-publicised crash involving a Model S in the US, [a federal investigation](#) concluded that drivers need to be more aware of their responsibility while operating the vehicle.



# Education, awareness and engagement with the motoring public is needed across the industry

## Raising awareness

The human-machine interface (HMI) of new vehicles is undergoing a complete revamp. Digital screens have become a standard-fit in most cars, but automakers are taking things to the next level with super-wide displays that sweep around the cockpit; digital assistants that interact with the driver; and new means of relaying crucial driving information through augmented reality (AR), heads-up display (HUD) and haptic feedback. This could help to make ADAS features more intuitive, but automakers still need to do a better job of educating drivers of the limitations.

“Education, awareness and engagement with the motoring public is needed across the industry to highlight the significance of ADAS, its evolution and our need for regular confirmation that the ADAS and future autonomous driving functionality is working as intended,” emphasises Malloy. “Most consumers value safety so I believe they are more willing to explore ADAS and invest time to learn.”

Reducing the risk of confusion is important for multiple reasons, says Kolodge. Terminology might suggest

a system is more capable than it is, and it can be difficult to understand certain systems in general. Drivers might have prior experience with another manufacturer’s system, but they need to understand if their next vehicle has equivalent capabilities. Limiting confusion is also key for consumers to “simply understand if the vehicle has a technology,” Kolodge concludes.

“With the plethora of more technology, comes more confusion,” agrees Avery. “Never has there been such a need for standardisation and naming conventions that aptly describe the level of support offered. The end result is lost lives as drivers unwittingly let go of the controls in the belief that the system can cope in all situations.”

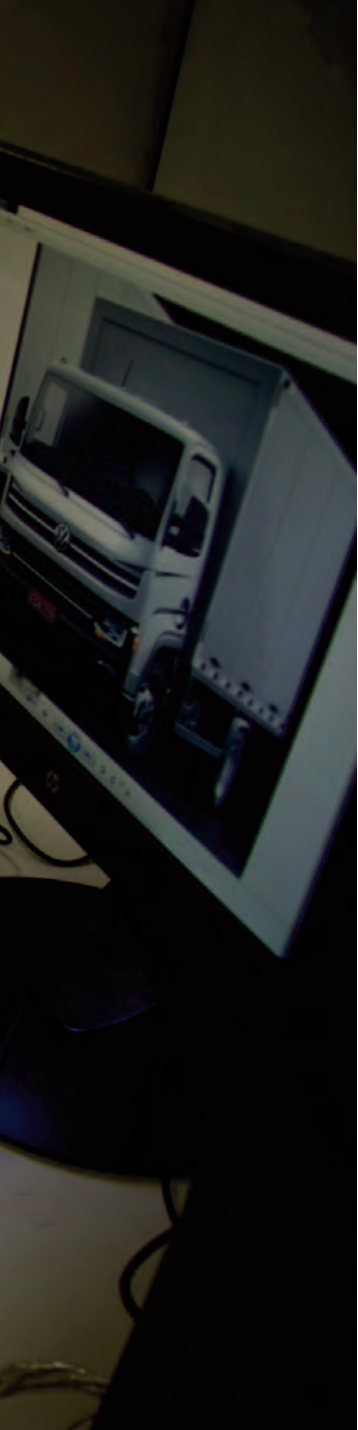
With wider goals for self-driving vehicles, the industry must foster a positive experience with these lower levels of automation. This will help to build trust as vehicles become increasingly automated. With many functions today leaving drivers frustrated and some systems already linked to fatal road collisions, it could be argued that there is already an uphill struggle in this regard.



# **‘Huge opportunities’ ahead for truckmakers in Brazil**

**GDP growth’s strong correlation to truck sales means that as Brazil resumes economic growth, truckmakers can expect full order books. By Xavier Boucherat**





**B**razil remains the only significant truckmaker in South America. 2019 saw 7.5% annual growth in heavy-duty truck production, from 105,534 units to 113,476 units. Figures from OICA lay bare the disruption of COVID-19, with production over Q3 2020 down 33.6% from 87,452 units to 58,075 units. However, in relative terms, truckmakers have escaped the fate of the passenger car segment, where the impact has been so dramatic that some operations, such as Ford's, have been shuttered entirely. What's more, with the country's long recession coming to an end, a return to GDP growth will only fuel demand for heavy-duty vehicles.

That's according to Roberto Cortes, Chief Executive at Volkswagen Caminhões e Ônibus, which along with Daimler is one of region's big trucking names. Currently the company is launching its new Meteor heavy-duty truck, the largest vehicle to ever wear the VW brand.

Cortes is not alone in his assessment. After a historic contraction in GDP growth of 9.7% in Q2 2020, due in part to the pandemic, the World Bank expects Brazil to rebound over 2021 and 2022. Things could already be underway, with Deloitte reporting growth in real GDP of 7.7% for Q3 2020, following a strong rebound in domestic demand after initial lockdowns and COVID-19 restrictions. Moving forward, this is something the Brazilian trucking sector will seek to take full advantage of.

"This year the projections put GDP growth in the neighbourhood of 2.5% to 3%," says Cortes. "The correlation between GDP and truck sales remains

very high, and so VW believes that there are huge opportunities ahead." The same opportunities will exist in export markets, he adds, including Argentina, Mexico and Chile. In other words, there are reasons to be hopeful, including some specific growth spots both in and out of Brazil.

## **Out in the fields, down in the mines**

"Currently there are some sectors in Brazil undergoing extraordinary growth," says Cortes. "This includes the agriculture sector, which demands a lot of trucks. This year the sector has experienced a record harvest, and with the large majority of transport in Brazil done by road—61% of goods are delivered by truck—the business is very dependent on trucks for both exports and internal consumption."

Conab, the country's agricultural statistics agency, said the 2019/20 season delivered a record output of grains and oilseeds—258 million tonnes—as well as soybeans, Brazil's main crop, with a total output of 125 million tonnes, 4% higher than the 2018/19 season. It is expected that these records will be broken again this year: Conab says soybeans could go as high as 133 million tonnes.

Along with the agriculture sector, commercial vehicle manufacturers will be eyeing activity in the mining sector, which produces huge quantities of iron ore exports. Mining research association Ibram expects that mining capex in Brazil will reach US\$38bn by 2024, and this could rise further depending on the post-COVID recovery. Along with iron ore, Brazil has significant deposits of bauxite, from which alumina is extracted.

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In 2011 the trucking market in Brazil rolled out 172,902 units. During the course of the recession this fell at one stage to 50,506 units, a reduction of 71%. Since then we have entered a recovery period, but the gap remains significant

*Roberto Cortes*  
*Volkswagen Caminhões e Ônibus*



More generally, with the country exiting recession, Cortes expects demand will be buoyed by activity in the construction sector and the resumption of various infrastructure projects. Cortes highlights one figure which underlines the poor state of Brazil's road infrastructure, and the work to be done: there are over 1.72 million kilometres (1.05 million miles) of highway in Brazil. Of this, only 213,000 are paved, equating to around 12%. For comparison, the figure in some EU states including Germany approaches 100%.

One final benefit to which Cortes points is pent-up demand. "Recent years have lacked growth, meaning that fleets have not replaced their vehicles," he says, "and so along with new demand, truckmakers will need to replace those fleets which should have already been replaced." Some fleets have average ages as high as 18 years old, he says, and such vehicles are no longer economically viable. Provided interest

rates remain low, he says, now will be the time for fleets to make new investments.

## Measured optimism

However, whilst there are positives on the horizon for truckmakers in Brazil, Cortes emphasises that Brazil's economy remains far from its pre-recession strength. "In 2011 the trucking market in Brazil rolled out 172,902 units. During the course of the recession this fell at one stage to 50,506 units, a reduction of 71%. Since then we have entered a recovery period, but the gap remains significant."

As for COVID-19, Cortes believes that of all vehicle segments, trucking has suffered the least, and that VW's involvement in industries such as agriculture and mining, which have remained largely operational, has shielded it further from the crisis. A quick return to normal, he adds, is

The VW e-Delivery will be built in Brazil, with beer-maker Ambev pledging to put 1,600 units on the road

unlikely, but with vaccine rollout now underway in Brazil, the belief is that growth in the market will resume in 2021.

## Electrifying South America

An economy on the mend will free up resources for a segment which, like the passenger car segment, is coming under increasing pressure to clean up its act. To date, low- and zero-emission truck deployments have largely taken place in developed markets such as the EU and the US, close to global truckmaker expertise and suitable infrastructure.

But with the industry moving in a clear direction, says Cortes, these conversations are just as relevant for the Brazilian market. There are limits when compared with the EU: a lack of charging infrastructure means that for mid- to long-haul applications, electrified powertrains don't make the grade. But in the short haul sector, VW is already actively participating in projects.

"For urban distribution, where we can run the truck in the day and charge at night or vice-versa," says Cortes, "VW sees big potential, and has already closed an intention of purchase order with the beverage company Ambev." The Brazilian beer-maker, a subsidiary of Anheuser-Busch, plans to put 1,600 electric trucks on the road, in efforts to make 35% of its fleet electric by 2023. The VW e-Delivery has a range of 200km, and will be manufactured in Brazil.



© VW Caminhões e Ônibus

"In our calculations, VW sees that in terms of maintenance and operational costs, one electric truck in urban applications consumes 50% less in costs," he says. "After three or four years the higher price pays for itself. This is normal for any new innovation, and we see more and more clients looking for total cost optimisation, as well as environmentally friendly solutions."

Whilst electric trucks may see faster rollouts in Europe and the US, Cortes believes that when it comes to connectivity and digitalisation, Brazil's truck fleets will not lag far behind: connected truck solutions are already helping to drive down total cost of ownership in the region, through vehicle monitoring and reduced fuel consumption. Connectivity will also power wider optimisation of the logistics chain, with up to 40% of Brazil's three million plus truck drivers carrying empty loads at any one time.