

EV startups are keen to have a disruptive impact on the industry. But can they really change the way things are done?

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"I think in the automotive industry in general, we're ripe for some disruptive technologies to come in. I think maybe in the niches, that's where things could be interesting"

Mark Vinnels, head of engineering, McLaren



Illustration: Sean Rodwell



German manufacturer Daimler uses the term 'CASE' to summarize the four big challenges facing established OEMs. The acronym stands for connected cars, autonomous driving, shared mobility and electric vehicles.

Speaking at the recent FT Future of the Car Summit in London, Daimler's head of strategy, Wilko Stark, told delegates, "All four have the potential to be completely disruptive for the automotive industry, so we have to balance our investment. This is a very, very difficult task. Because we as a company – and this applies to all OEMs – have to be self-disruptive. And to be self-disruptive is the most challenging management task."

Ripping up your own rulebook is hard for any company, but the alternative is to risk being supplanted by somebody else. Business history is littered with toppled giants.

"Nokia had 80% market share and then they were gone, two years later," observes Lewis Horne, chief executive of Swedish automotive startup Uniti, noting the impact of Apple's 2007 iPhone. "I have friends and advisors and teammates that were at Nokia and Sony at the time," he adds. "They were in those discussions where they had rooms of people saying, 'Well, we like the plastic-button interface.'"

Horne founded Uniti in January 2016 to try to bring iPhone-like disruption to the car

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Wilko Stark, head of strategy, Daimler



"At the end of the day, it's very easy to set up one vehicle, and make a single product type. The secondary issue is to make a company out of them"

Stefan Juraschek, head of electric powertrain, BMW

market. The company is deliberately avoiding traditional automotive approaches, aiming to create cutting-edge, highly computerized processes to build a city EV in the European L7e quadricycle category. Last December it crowdsourced €1.2m (US\$1.3m) in seed funding to pursue its goal.

Of course, Uniti's budget is a sliver of the €10bn (US\$11.2bn) Daimler is spending to develop a platform for its future EVs, but Horne argues billions aren't necessary. "We avoid huge amounts of nonsense. If you came along today and gave me a billion dollars and said, invent the stupidest electric car possible, I don't think I could come up with anything worse than today's futile EVs."

As Horne explains, Uniti is targeting the L7e category not for cost reasons, but because the

rules governing M1 vehicles are a straitjacket. The more lightly regulated quadricycle niche gives Uniti freedom to reexamine everything including design and construction, drivetrain, materials, safety measures, instruments and controls. "We need to free ourselves from the old machine," Horne explains. "I'm sure that Volkswagen and Daimler and everyone else think they use human-centric design, but that's nonsense. They're designing around the mechanical properties of the machine. If we remove the mechanical limitations, you can actually design around the driver. That's fundamental to our whole project."

In the business of disruption

It remains to be seen if a small startup like Uniti can create the shockwave its founder envisages. For now, the disrupter troubling OEMs is Tesla. At the time of writing it has a stock market capitalization of almost US\$62bn, having surpassed General Motors and BMW to become the world's fourth most valuable car maker. This is despite losing money on a turnover of only US\$7bn last



"The concept of Tesla is really clever but it's actually conventional technology for low-volume production. I think this can be done by many [companies] but they did it at the right time, at the right place with the right products, targeting the right people"

Alain Raposo, Renault-Nissan global VP, powertrain and EV engineering

year. BMW, by contrast, made profits of almost US\$7bn on revenues of US\$94bn.

"The stock market evaluates what will happen in the future – or it tries to," notes Dr Timo Möller, head of the Future Center for Mobility at consulting company McKinsey. An engineer by training, Möller has guided OEMs and Tier 1 suppliers in their response to the four CASE challenges.

As Möller explains, Tesla's valuation reflects the belief that the electric vehicle market will become huge in the future, and that Tesla will claim a considerable chunk.

A roster of other startups aims to follow suit, focusing on the high-value niches of supercars and luxury vehicles. Prototypes from the likes of Faraday Future, Lucid Motors, NIO, Rimac and Vanda Electrics have grabbed headlines and secured investment cash. It seems unlikely that all can succeed, however.

"We have to recognize that Tesla did a great job, because they pushed the whole industry into electromobility," concedes Daimler's Stark. "But in the long term I think it will be quite tough for Tesla because all other OEMs will

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Timo Möller, head of the Future Center for Mobility, McKinsey





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Padmasree Warrior, chief development officer and US chief executive, NIO

come up with electric cars that have a similar driving range to Tesla, which will have a similar power to Tesla. So Tesla, for the time being, really has a USP in the market, but in a few years this USP will no longer exist."

However, Möller suggests that simply parking on Tesla's lawn is unlikely to scare it off. "In the traditional world, you always needed a highly complex powertrain in your vehicle, which relatively few companies could create from scratch," Möller says. "An EV is obviously much less complex ... so the entry barriers are less. Secondly, getting closer to the customer and having a better customer understanding is becoming more important. There's a shift from powertrain engineering to marketing and customer understanding, and there might be companies out there who have that more in their DNA than traditional OEMs."

A customer-centric ethos is the first topic raised by Padmasree Warrior, chief development officer and US chief executive of Shanghai-based NIO. "We start with the user," she asserts. "Cars are no longer a mode of conveyance; they are becoming people's living space on wheels. As a startup, we are manically focused on this vision. And unlike other auto makers, we're unencumbered by legacy, allowing us to both execute and evolve quickly as the market transforms."



"[Startups] have a clean sheet advantage, for sure, but they don't have the experience of what it actually means to be an established car manufacturer in the automotive industry"

Rolf Frech, head of engineering, Bentley

While legacy can be a hindrance, it's also a strength, Möller counters. "You'll still need a vehicle to go from A to B, even if it's connected, even if it's shared," he observes. "Those guys are not at all in a bad position. They have 100 years of experience in bringing a high-quality product to the street. They have a huge customer base and surveys show there is quite some loyalty to traditional OEMs when it comes to innovation. People say they really want to sit in an autonomous vehicle from a traditional OEM, but they're not so sure if it's from a tech player."

But Warrior predicts such advantages will be short-lived. "As more EVs hit the roads, many of the issues and concerns – real or imagined – will fade away," she argues. "There is a big transformation happening in the automotive industry where the car of the future is really going to be a computer and a robot. Like other industries, there will be winners and there will be losers."

Power struggle

While OEMs hope to dominate via muscle and economies of scale, startups will fight



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back with low overheads and agility. "More important than anything is our culture and our governance structure and our lack of hierarchy," says Horne. "The team has a lot of experienced people, but we are new-ideas dominant, not old-experience dominant."

Hugo Spowers, founder of British hydrogen vehicle startup Riversimple, believes that modest scale can be a blessing. "We can break even at a tiny fraction of the volumes of an existing manufacturer," he notes. "That allows you to not give a monkey's about what 95% of people want; if you've got a product that meets the needs of 5%, you're in business."

Like Uniti, Riversimple is rethinking a lot of fundamental assumptions. It plans to lease rather than sell its vehicles, with all costs including fuel and insurance covered by a monthly fee. This is a fundamental shift, because the costs of wear and tear, the impact of fuel efficiency and questions of residual value all move from the customer's lap into the supplier's.

"People won't pay extra for efficiency, but it costs you as a manufacturer to make the car more efficient," Spowers observes. "Therefore the only driver for efficiency is regulation, and as we've seen that's a very blunt instrument."

By contrast, Riversimple's business model means it benefits directly from investment in efficiency. "That aligns our interests not only with regulators, but also with customers," Spowers says. While OEMs profit from obsolescence and maintenance costs, mobility service providers will profit from longevity and minimized maintenance. "We are rewarded by resource efficiency rather than resource churn," Spowers notes.

As long as entrepreneurs come up with new ways of seeing the world, no amount of spending by OEMs will shut out the threat from startups. "Nobody knows which specific companies will be successful in the long run," notes Möller. "But there is a good opportunity for newcomers in the EV segment to be successful, and to really establish themselves among the top OEMs." 

INSIDE A STARTUP



Dr Nico Sergent is the powertrain architect of Riversimple's Rasa, a hydrogen car under development in the UK. With a background in F1 engineering at Williams, he joined the startup in 2010.

The two-seat, carbon-bodied Rasa resembles a gnat next to the elephantine fuel cell cars from established OEMs. "We're trying to design a vehicle that will be as efficient as possible," says Sergent. "A fuel cell provides the core power and it's sized for cruising, and we have a buffer of supercapacitors that provide the power to accelerate and get energy back under braking, and also to provide energy to go up hills and get energy back downhill."

Off-the-shelf JSR supercapacitors store a modest 0.5kWh, while a Hydrogenics fuel cell designed for forklifts provides only 8.5kW. Toyota's Mirai fuel cell, by comparison, offers 114kW. "The fuel cell output is only linked to top speed, and not to acceleration because that comes from the supercaps," Sergent says. "Each motor is about 15kW, so overall we have 60kW (81.5ps) in a 580kg car. That's quite fun." Rasa can go from 0-60mph (96.6km/h) in about 10 seconds, using about a third of the supercap capacity in the process.

Light weight enables a virtuous circle, Sergent says. The low mass of the hub motors, bespoke designed by Printed Motor Works, helps them shrug off pothole shocks, for example.

Sergent notes that none of Rasa's components are cutting edge – it's their combination that delivers a breakthrough. "We don't need to push to the extreme limits of lithium batteries or supercaps or motors or fuel cells. The car is already more efficient than lots of others, so the process of optimization – the stage that really costs a lot – doesn't need to be done now."



"As engineers, we always like competition, and these new products that come into the market show us that we should never believe in the constraints we give ourselves"

Gerald Killman, head of powertrain, Toyota Europe