

More than one path to autonomy – Level 3 sceptics opt out

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One of the biggest challenges for advanced safety systems is ensuring that the driver pays attention. For some companies, it's too much to ask. By Megan Lampinen

One of the big debates surrounding autonomous drive technology today centres on the role, if any, of a human driver. The progression from Level one autonomy through to Level two, three and four is running into hiccups at the Level three stage, and some OEMs have decided to skip it entirely.

Cheat sheet

Jeff Blecher, Senior Vice President of strategy at Agero, offers a cheat sheet for thinking about the different levels of autonomous capability. “Someone once described it to me as ‘feet off, hands off, mind off’,” he told *Automotive World*. “With Level one technologies you can have cruise control, so that’s feet off. Level two is combining adaptive cruise control with lane keeping assist or advanced versions of autopilot, where it’s feet off and hands off. At this point you are still responsible as the driver so you can’t take your mind off and you have to be cognisant of everything that’s going on around you. These systems are just assistive.”

It is with Level three that the ‘mind off’ capability kicks in. “The theory is that when you enter into a highway situation where the car is comfortable moving into that level three zone, it will alert the driver that this type of capability is available. The car can take over and be responsible for that period of time,” said Blecher. “The car will give a significant amount of warning back to the driver before the driver has to take over. There will be a countdown time – now you have one minute left, 30 seconds left, are you ready to take over? Yes. And you take over.”

The National Highway Traffic Safety Administration classifies Level four as complete autonomy, in some cases even without the steering wheel. The SAE differentiates between ‘high’ automation and ‘full’ automation with separate Level four and Level five classifications.

Level 0 No automation	Level 1 Function-specific automation	Level 2 Combined function automation	Level 3 Limited self-driving automation	Level 4/5 Full self-driving automation
Driver is in complete control of vehicle	Automation of one or more control functions	Automation of two or more control functions	Driver able to cede full control of all safety-critical functions under certain conditions	Driver able to cede full control of all safety-critical functions for an entire trip
				

Source: Delphi

Two different camps

“Different automotive manufacturers are approaching this with really different theories,” observed Blecher. “Ford is focused on Level two capabilities today in the field. Its plan is to go to Level four and actually skip level three.” In August, Ford announced that a fully autonomous vehicle for ride share fleets would be ready by 2021, and it won’t have a steering wheel. “Ford’s focus today is really on Level two because it is sceptical about the Level three transition,” added Blecher.

So are others, including Google. It’s autonomous vehicle won’t feature any driver controls. Software specialist FiveAI’s Chief Executive Stan Boland told *Automotive World* that this approach “is the only safe option for autonomous vehicles” because it eliminates the problem of ‘overtrust’ with features that allow for a human to take over control.

On the other hand, others like Audi are steadily pushing ahead towards level three. “Audi has some Level two-like capabilities in the field today but by 2018 it expects to have level three in the field,” Blecher added.

GM also appears to be taking this approach, exemplified with its Super Cruise system. Pam Fletcher, Executive Chief Engineer, Autonomous Technology & Vehicle Execution, touched on GM’s plans at the Citi Global Technology Conference in New York earlier in September, telling analysts: “All the layers of driver assistance features, which can go up to full autonomous driving, provide increasing safety and convenience. We’ve not talked about much of it in detail but we are well on the way to rolling out layers of this increasing driver assistance globally. It is something to look forward to.

Tesla is perhaps one of the best known proponents of this approach, which it is pioneering with the Autopilot system. However, a fatal crash possibly involving Autopilot has thrown the approach under the spotlight.



Tesla recently made a number of improvements to its Autopilot system

“There is a lot of confusion from consumers about these capabilities and different levels,” said Blecher. “Tesla has a Level two system. It’s an advanced Level two system but it’s still a Level two system. However, many consumers, and most of the press, actually think about it as a Level three technology. It is not. You can’t take your mind off it. This is hands off, feet off, and it’s not even necessarily hands off. Even the Tesla indicators will say keep your hands on the wheel but effectively it will drive in a hands off manner. You still need to pay attention. It’s an assistive system, it’s not truly an autonomous system.”

Blecher suggests this is where the technology could run into serious challenges.

Keep the driver in the loop

For those that are pushing through Level three, the big challenge is keeping the driver alert and aware of the situations. Jeff Owens, Chief Technology Officer at Delphi, touched on the difficulties it has encountered in doing just that. Speaking at the recent Citi conference, he observed: “Where you see Level three there is a point where the car turns over control, and then you want to know that the driver is in the game. Some OEMs declare that’s undoable, and say they won’t do that at all. It is really hard to know if the driver is in the loop.”



Nissan's ProPILOT requires hands on the wheel

The common response at the moment is to require the driver to touch the steering wheel every so often. This is the strategy used with Nissan's ProPILOT system. "You have to have your hands on the wheel," a Nissan spokesman clarified for *Automotive World*. "A sensor measures torque resistance against the steering wheel. If you have a hand or a finger against the wheel it will sense some resistance when it tries to turn the wheel."

However, as Owens commented: "That's no fun. It kind of defeats the purpose." Delphi recently carried out extended road testing of its autonomous vehicle technology, in which a driver was positioned behind the wheel though the technology performed all the driving tasks. "We had to switch our test driver every two hours – they were wasted. It is almost more taxing to worry about staying in the game than being in the game," he said. "The only way to solve that is to have some way of assessing if a driver is in the game – like a driver manager system, looking at head pose and blinking. If it determines that the driver is not in the game the system needs to be able to bring him back. There is a path to think about that but I don't think anyone has that figured out for sure."