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Safely Racing Toward Autonomous Vehicles

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The future of the automotive sector and human mobility will depend on the deployment of autonomous vehicles. The secret is the unlocking of SAE level 4 and 5 autonomous vehicles[1] for the next generation of road users. Whichever company, and country, reaches this first will set to gain from a massive first mover advantage with the ubiquitous uptake of fully autonomous vehicles in the marketplace.

So far, players in this race have been Google through its subsidiary, Waymo; the Elon Musk brainchild Tesla; and the market-disruptor Uber. Each of these companies use hardware to gather data and test their autonomous vehicle technology. To do so, individual states in the United States have established regulatory sandboxes to allow road testing. To date, each of these companies have clocked up millions of kilometres of data to accurately measure driving conditions. But the approach has also met some controversy with a string of fatalities due to autonomous vehicle recorded in 2018.

▶ **Europe Out of the Starting Blocks**

The automotive industry is the Crown Jewels of European manufacturing. It sustains millions of jobs across the continent and pumps billions of euros into the economy.[2] It is within the interests for Europe to accelerate its efforts to catch up to their US counterparts. Yet, in Europe there are currently no rules in place to safely test and market an autonomous vehicle. Thus, even if a company were to have a SEA level 4 or 5 vehicle ready, its ambiguous how this would be brought to market.

Recognising this, the European Commission in May 2018, presented a dedicated [Communication on connected and automated mobility](#) to pave the way for autonomous vehicles testing. One deliverable of the Communication is to ensure proper approval of automated vehicles. Today, each Member State issues type-approvals for new vehicles. This, regime ensures that vehicles meet a minimum set of safety requirements. Autonomous vehicles will not require this system to radically change, only that the range of systems tested be expanded or adapted for the specific case of autonomous vehicles.

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[1] Society of Automotive Engineers (SAE) is a US based standards body producing standards for the automotive sector. In 2018, SAE produced a standard [SAE J 3016-2018](#) articulating a "Taxonomy And Definitions For Terms Related To Driving Automation Systems For On-Road Motor Vehicles". This standard sets out a common vocabulary for autonomous vehicles.
[2] European Automobile Manufacturers Association, *'Employment Trends in the EU Auto Industry'*, June 2018; European Commission, Eurostat, *International trade in cars*.

To allow national authorities to type-approve automated vehicles, the Commission has worked together with Member States on guidelines so that type-approval of automated vehicles is now permitted with an EU exemption procedure in the period until EU rules have been adopted.

The EU is the first region in the world to combine vehicle approval rules with market surveillance rules. Building on this, the Commission will work on developing a new approach for certifying the safety of automated vehicles focusing less on design specifics and more adapted to the evolutionary nature of automated vehicles.

The European Commission will also work with international partners in the framework of the United Nations through the Vienna and Geneva Conventions to ensure that traffic rules and infrastructure are adapted for automated driving.

▸ **Getting to the Finish Line Safely**

With that said, it is still unclear what would make an autonomous vehicle safe. Although many have highlighted the social benefits of autonomous driving, it also has the potential for tremendous harm. One way of assessing safety is to test-drive autonomous vehicles to observe their performance. This has been the method used so far in the United States. The drawback to this is that vehicles will require hundreds of millions of kilometres, if not, billions of kilometres of test-driving before safety can accurately be assessed.

This is where simulation using artificial intelligence will be important for safety testing of autonomous vehicle systems. The benefit of this approach is that simulated environmental conditions can be run millions of times in a short space of time. This is particularly important for testing inclement weather conditions when chances for physical road testing are rarer. In other words, physical testing of say, a rainy day at dusk, might only be able to be tested in limited circumstances, whereas with simulations, the environment and conditions can be tested repeatedly.

▸ **Ongoing European Initiatives**

In Germany the [PEGASUS](#) joint project, promoted by the German Federal Ministry of Economics and Technology aims to fill key gaps in the field of testing. The initiative brings together automotive companies, suppliers, small and medium-sized companies and research facilities to develop, until 2019, a generally accepted and standardized procedure, for the testing and approval of automated driving functions.

Meanwhile, in the United Kingdom [FiveAI](#) is underway with a project to create an industry-wide framework for safety. The goal is to identify the key components of a validation, verification and certification process for autonomous vehicles. With disparate efforts taking place across Europe, it begs the question, how to coordinate these initiatives in a coherent and efficient manner?

The time is now to bring all of the relevant stakeholders around the table to help frame the regulatory environment so that Europe can take the lead in the race towards autonomous driving. Neglecting to do so would jeopardise Europe's leadership in the automotive sector and manufacturing. Racing to the finish line without firstly testing whether these vehicles are safe will be counterproductive, so it is up to the European Union, Member State governments and industry together to find pragmatic solutions.