Autonomous Vehicles And The Automotive Sector

AUTOMOTIVEBRAZIL**2025**

A FUTURE VISSION FOR THE AUTOMOTIVE MARKET IN BRAZIL

Image: Google

The driverless car is coming, but important questions remain. Will consumers actually want to cede control of their vehicles? Can autonomous cars be truly safe in a world of variable driving conditions and human error? Who is responsible for an automated car crash or accident?

Assisted driving has come very far, very fast. Almost every current vehicle model sold by the world's top manufacturers, premium category not considered, has at least some ADAS functionality, with certain features even coming standard (ESC, Start-Stop, FCW). Autonomous driving is a near future and the solution for important issues – efficiency, comfort and safety, so everyone is racing to get a piece of the ADAS market. However, even with that huge disruption in the ADAS systems, to get there are five important topics to discuss.

Who is going to produce the future vehicle?
Who has the knowledge?

Vehicle manufacturing is an industry well accustomed to collaboration. For decades now, one of the key ingredients in the success of any carmaker has been its ability to work with a large number of suppliers. That ability is going to be strongly tested from now until full autonomy with new market entrants. Even at their comparably modest level of assisted driving, today's autos carry a raft of cutting-edge solutions and technologies. Therefore, in addition to traditional parts suppliers, carmakers now must collaborate. Car manufacturers are facing new challenges. Digitalization, ADAS and new services are a "on and on" growing demand from consumers.

More important than ever in a new business model is to manage the direct customer relationship with a high degree of service orientation enabled by connectivity. Far from the traditional automotive business model, where OEMs traditionally retain the branding and the overall added value on the product, new technologies are pulling the role of OEMs away from the centre stage of the value creation in favor of solution providers, mobility integrators and in general to technology providers.

The auto industry business model will be transformed—and the collateral impact to other sectors could be significant as well. Like the Smartphone industry today, we see the auto industry reorganized into dedicated "hardware" OEMs, "software / systems" OEMs/suppliers, and integrated "experience" creators. Selling content to the occupants of the car (who now have nothing else to do) could be a significant new revenue stream.

Autonomous driving capability could change the auto industry in fundamental ways leading the industry with two paradigm shifts:

■ Shifting the "value" of the car from predominantly hardware to a software component as well, thereby allowing new players to enter and forcing existing players to reinvent themselves or cede share.

■ Introducing a new revenue model by being able to monetize the content opportunity within the car. In short term, the automotive industry structure is going towards PC/smartphone industry.

The value in the auto industry today is about the car as a holistic product. The OEM is the most important link in the supply chain as the biggest single contributor of content, which is why the OEMs have the most visible brands in the industry as well. The other parts of the value chain tend to be incidental to the automotive experience and do not usually have branding power. In a world of autonomous vehicles, we see the value in the auto industry coming from three different sources. The biggest impact within the auto industry from the move to autonomous cars is arguably going to be on the OEMs. The OEMs that have the most reliable and feature-rich autonomous capabilities in their cars are likely to be the ones that succeed, while the ones that do not will either be forced out of business or will have to reinvent their business models to be "hardware only" / assemblers while buying the autonomous systems from other OEMs/suppliers/third party players.

Even though Google is building a self-driving car, the main purpose is testing and finding out more about additional revenue streams. Consequently, Google will not compete with OEMs in building or selling cars but rather for the vehicle and consumer data generated in or by a car. This presents challenges to the new business model as traditional OEMs need to increasingly integrate hardware and software components into their vehicles.

How the consumer will react to the future vehicles?
Are they going to trust life on them?

Image: LEXUS

Automotive technology often moves faster than consumer acceptance. For example - Automatic transmissions would rob drivers the fun of driving. Now, automatic transmissions are practically standard equipment.

Consumers as drivers are just beginning to become aware of technology that will bring self-driving (autonomous) cars to the roads over the next decade. Because of this there are some anxieties about these subject.

There is a strong belief that a part of the population who will benefit most from self-driving cars are people who are physically impaired. Many people believe autonomous vehicles will provide on-demand mobility for the elderly and handicapped.

At the same time, there is concern that the technology would be unreliable. Some people believe that more technology means more can go wrong. They feel anxious to be at the mercy of a "machine", they are afraid of being guarded, because the sensors, such as cameras in the interior are there to ensure that drivers will not fall in sleep or become distracted. Millions of miles of testing to prove reliability of self-driving systems will be required to offset the concerns of many consumers.

Autonomous driving vehicles will give passengers the chance to use their time efficiently while commuting.

The ability to drive autonomously, will transform vehicles into mobile data rooms, making virtual product features and services increasingly relevant. With autonomous cars becoming present and constantly available in our daily life, the decision of choosing a car will present new priorities. Instead of being focused on brand image, total cost of ownership will become even more influential.

While a part of people say that offering a self-driving car demonstrates the auto-maker cares about their safety. Another part believe that self-driving cars represent a major accident just waiting to happen when computers fail.

More enthusiastic drivers believe that a person can become too reliant on an autonomous vehicle and that their driving skills would deteriorate. Over time, this would lead to a less skilled and less experienced population of drivers causing trouble in emergencies.

On the other hand, any one that has experienced a situation in which an automatic brake system has avoided, successfully, an accident has confidence in aid systems to the driver.

What are the technology requirement?
The technology already exists? How expensive it's?

Image: ZF

The technology to enable fully autonomous car capability already exists. Active safety systems that are commercially available today represent a basic level of autonomous driving. Fully autonomous functionality does not need much more incremental hardware.

Software and testing is where most of the work needs to be done. Autonomous cars use sophisticated algorithms to decipher the input received from sensory hardware to determine the course of action to be taken and how to execute that action. This will also need extensive testing to ensure every possible scenario has been accounted for. The first step toward getting autonomous cars on the road is to get them to work. This may not be as large a challenge as some think because much of the technology already exists. However, a few things have become quite clear.

The third topic

01 The hardware is not the hurdle. Most of the technology needed to get fully autonomous cars to work in the real world already exists today and many fully functional prototypes have already been built and are being tested (Google, ubber, Volvo…). Active safety systems, which offer a very basic level of autonomous functionality, have been on sale for a few years and are just starting to enter the mass market. Full autonomous capability only needs automakers to walk further down that path.

02 Software and LIDAR are essential. While the hardware situation appears relatively settled, much of the work development-taking place today appears to revolve around software and LIDAR sensors. Autonomous vehicles use incredibly sophisticated algorithms to interpret the sensory input coming in from the hardware to:

- Interpret the car's surroundings;
- Anticipate upcoming events and predict the necessary reactions
- Instruct the various hardware components of the car to perform necessary actions.

This exponential increase in the amount and sophistication of software needed to achieve autonomous capability is probably the biggest change in the functionality of the automobile.

03 Practical considerations are the main impediment. While the engineers put the final tweaks on the hardware and software needed to deliver full autonomous capability in labs, the long lead time to commercial implementation is likely to be the result of practical considerations. Practical considerations:

- Solving non-technical issues like liability and regulation.
- Making sure that the hardware and software have accounted for virtually every possible real-life driving scenario. (The only solution for this is extensive testing in the real world and in simulations, which takes a lot of time and resources.

"Self-driving cars will need multiple detection systems including expensive infrared "lidar" technology if they are to be safe at high speeds. For autonomous driving, we will need three core technologies: picture processing camera technology, short and long-range radar and LIDAR. Laser or infrared-based LIDAR technology will help vehicle sensors pick up contours and contrasts of obstacles which normal cameras are unable to detect, particularly in low light situations. Lidar technology is currently too expensive to be incorporated in mass production vehicles, but investments into the technology will bring economies of scale will likely lower the costs to a manageable level" - CEO of German auto supplier ZF Friedrichshafen said today.

The fourth topic

Legal issues – Who is responsible for an automated car crash or accident?
Vienna convention on road traffic. How to deal with different laws around the world?

Legislation has a significant impact on the future of the automotive business. Nobody wants to stifle innovation, much less slow the consumer's access to the benefits of innovation, but this new technology is moving faster than the government's ability to regulate its use. We are now at a tipping point.

JUST A LITTLE BRIEFING WITH RESPECT TO CYBER SECURITY AND LATER TALKING ABOUT REGULATION INVOLVING THE AUTONOMOUS VEHICLE…

Media attention has highlighted numerous security and safety issues for the connected car. Innovation no longer starts and ends with a car's mechanical components; electronic components now make up over 50% of the total manufacturing cost of a car. This clearly represents a source of worrisome security vulnerabilities.

Cars are run by networks of computers, wireless connections, and electronic control units (ECUs), offering the potential for hackers to access critical car controls including the steering and braking. Modern cars can easily connect to smart devices and the internet. This connectivity potentially exposes critical systems to hackers that could lead to remote attacks on cruise control mechanisms, braking systems, and other safety-critical operations.

It's not just new cars that should be considered vulnerable to hackers. Older cars are increasingly connected using devices that are plugged into vehicle diagnostic ports and linked to smartphones. Once a smartphone is connected to the car's network, both the automobile's fundamental safety and the driver's personal information can be compromised. Knowing this, it's obvious that security and safety should be front and center in automotive software development.

Image: Google

Connecting cars to the internet brings a host of new convenience, entertainment and safety features to consumers, but this connectivity also opens up cars to remote hackers. Automakers and their suppliers are struggling to adapt their hardware and software architectures, their code and their processes to deal with this new threat to automobiles. Automakers and their suppliers do not YET have the skills, tools or processes to make a secure car (at least not yet been proved).

The fourth topic

BACK TO REGULATORY…

Regulation and consumer acceptance represent additional hurdles for autonomous vehi¬cles. However, once these challenges are addressed, autonomous vehicles present a tre¬mendous value offering for consumers.

Many cars sold today are already capable of some level of autonomous operation and prototype cars capable of driving autonomously have been and continue to be tested on public roads in Europe, Japan and the United States. These technologies have arrived rapidly on the market and their future deployment is expected to accelerate since autonomous driving promises many benefits (improved safety, reduced congestion and lower stress for car occupants).

With the uptake of on-road autonomous driving being years rather than decades away, authorities will have to adapt existing rules and create new ones in order to ensure the full compatibility of these vehicles with the public's expectations regarding safety, legal responsibility and privacy. Issues will have to be considered at a strategic level by authorities as autonomous vehicles arrive on our roads.

Many countries signed the Vienna Convention on Road Traffic that consists in:

- Every moving vehicle or combination of vehicles shall have a driver.
- Every driver shall at all times, be able to control his vehicle.

This potential barrier to the introduction of automated vehicle is about to be overcome as the convention is in the process of being amended. It will allow a car to drive itself so long as the system can be overridden or switched off by the driver. But further change might be needed to allow automated vehicles on the roads in many countries.

Self-driving cars seem a near-term possibility but their range of capabilities is unclear. Road safety is expected to improve with vehicle automation but this effect remains untested at a large scale and may not be immediate or linear. That is why some authorities are developing regulatory frameworks for prototype testing though little anticipatory action is taking place on potential use cases.
Automated driving comprises a diverse set of emerging concepts that must be understood individually and as part of broader trends toward automation and connectivity. Uncertainty on market deployment strategies and pathways complicates the regulatory task.
Uncertainty over liability for a driverless car crash is seen as one of the biggest barriers to adoption. Regulation is also slowed by unanswered ethical and legal concerns, particularly when it comes to liability for driverless car accidents.

"So the question becomes who is responsible and we think it's unrealistic to put that responsibility on our customers. Volvo wants to remove the uncertainty of who would be responsible in the event of a crash. At the moment it could be the manufacturer of the technology, the driver, a maker of a component in a car." explains Erik Coelingh, Volvo's senior technical leader for safety and driver-support technologies. Mr. Coelingh also said that – Volvo would only accept liability for an accident if it was the result of a flaw in the car's design.

Incrementally shifting the driving task to machines and algorithms and away from people will require changes in insurance and may have an impact on what information developers and manufacturers of autonomous vehicles share and with whom. Regulators and developers should actively plan to minimise legacy risks.

The last topic

Mobility – UBER, CABIFY, BLABLACAR... How all these companies can affect the world? Do consumers prefer owning a car instead of using mobility services?

The introduction and adoption of new mobility services is related to several big-trends and push forces, such as, increasing constraints on resources, rapid urbanization, pollution and congestion. By providing more reliable, predictable, efficient, comfort and lifestyle, they are enabling a significant reduction of Total cost of ownership for the ever more sophisticated and highly informed customer (Z GENERATION) continuously striving for an optimization of his cost, time and quality of life in real-time.

The consideration of the total cost of ownership (TCO) will play the most important role in the customer's decision whether to own a car or not. In contrast to the past, where the customer paid for traditional vehicle ownership even if the car was unused much of the time, future consumers will tend to pay for using mobility on demand.

This new world in which consumers continuously strain for an optimization of their time, cost and quality of life in real-time, TCO is all that counts and both image and lifestyle only play a minor role in the heads of the consumers.

In the entire Globe, the new generation of consumers (especially Z generation) have significantly less emotions attached to car ownership. The Millennials will be the driving forces of the adoption of new mobility services. Because of their lifestyle and transportation preferences, they will account for much of the expansion of new mobility services.

Conclusion

The driverless car is coming, but important questions remain. That said, these are at the same time exciting but blur moment for the car industry, supply chain and technology suppliers associated with it. All of them have an important role in this new scenario since new ADAS features are coming in the immediate future and will require strategic alliance between IoT companies, OEMs and "mobility on demand" companies, before hands-off functionality starts to become standard. Once that happens, we will be within a few miles of true Level 5 autonomy. Therefore, although the end is still away from us (at least five to ten years), we must be patient and prudent with new features technologies and regulatory issues.

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