Who’s in the driving seat?
How the rise of autonomous vehicles will transform the relationship between man and car
Self-driving cars may soon be a common sight on our roads. The industry is working at breakneck speed and investing billions in pioneering technology to create cars that can run safely without human intervention. The question of whether robotic cars will spoil people’s pleasure in driving is no longer even an issue. Individual drivers will have the freedom to choose when to let the “autopilot” take the strain (in congested city streets, for example) and when to take the wheel themselves (perhaps on an inviting stretch of open highway or an alpine pass).
Evolving scenarios: the road ahead

The transition to autonomous vehicles (AVs) will take place in several steps. They are not expected to be part of everyday life before 2035.

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### 5-10 years
- Controlled, AV-only environments
- Moderate level of automation
- Low to medium speeds

### 10-20 years
- Less restricted environments
- High level of automation
- Medium to high speeds

### Beyond 20 years
- Large, connected vehicle networks; no constraints
- On-demand mobility and fleet services
- Customized consumer AVs

Are we ready for driverless cars?

It is rather surprising how receptive people are to the subject of autonomous driving even though almost nobody has actually experienced it to date. This was confirmed by an EY survey of 1,000 drivers in Germany: more than 4 in 10 could imagine letting an autopilot steer their car. The proportion increased to 66% if they were given the added option of taking over the wheel in an emergency. Only 12% would categorically refuse to use a self-driving vehicle as a means of transport.

This vote of confidence is likely to become stronger over time. Three quarters of drivers aged under 45 could imagine handing the steering wheel to a robot, while only half of those above of 65 would consider this option.

The option to intervene is important

Can you imagine traveling in a self-driving vehicle that negotiates traffic without human intervention?

What if you were able to intervene in the case of an emergency?

If we leave the technical and legal details of autonomous driving aside for a moment to focus on the real challenge posed by this subject – the interaction between man and car and therefore the wider man-machine relationship – the fundamental issue becomes clear. The question is not whether machines will replace people in the future and take away their work, thereby destroying jobs. Rather, the question is to what extent people are willing to entrust their lives to a machine.
One of the key motivations for developing autonomous vehicles is to improve safety: avoiding traffic accidents and fatalities by eliminating human error from the driving process.

**Trendicators**

95% of road accidents caused by human error

8th leading cause of death globally: road accidents

2x increase in delay hours due to congestion by 2050

6.3 billion urban dwellers accounting for 70% of population by 2050

Despite all the technical advances since the invention of the car, there are still one million deaths on the roads each year. And completely eliminating traffic accidents presents an enormous 21st century challenge. The car of the future could learn a lesson or two from autopiloted planes and trains that all but drive themselves. Even if dozens of fatalities result from a single plane crash or a serious train accident, global statistics show that cars are by far the most dangerous mode of transport because they are controlled by people. Simulating or copying the human brain by means of artificial intelligence is not enough. To make a machine trustworthy, it has to be better than man — without emotion, consciousness or creativity, but instead equipped with 100% reliability that cannot be undermined by any distraction.

Global statistics show that cars are by far the most dangerous mode of transport because they are controlled by people.
Many unanswered questions

As soon as we hand over the steering wheel – and responsibility – to an autopilot, we give a machine control over subsequent events. The question that arises as a result is how much room for error we are prepared to allow a robotic car. In this case, it helps to distinguish between critical errors and other errors. A defective ATM or a faulty television set may be annoying, but they are not critical to our survival. When we get into a self-driving car, however, we are entrusting our own and our family’s lives – to bits and bytes, knowing full well that there is no such thing as absolute safety.

In the case of a plane being flown on autopilot the situation is quite different: the technology is critical to our survival because we are not capable of piloting the plane ourselves. When traveling in an autonomous car, however, the driver has freely chosen not to be in control.

Who will be liable in case of an accident?

So, if a driverless car malfunctions, who will be at the receiving end of our disappointment and anger? Should we be furious at the developer of the autopilot, the car manufacturer or the software programmer? It is illogical to be angry with a machine, and the car itself cannot apologize or make amends. What, therefore, will be the consequence for the relationship between man and car?
Advantages and disadvantages for the driver

54% expect that self-driving cars will lead to better flow of traffic.

48% expect increased safety.

58% are concerned that the fun of driving will be spoiled.

46% are concerned about unresolved liability issues in case of an accident.

For decades, a car’s worth was dominated by emotional considerations, with it serving as both a status symbol and treasured possession. Man and vehicle formed a close bond because the car represented a valuable asset that needed protection. But can this continue to be the case? Trends toward integrated mobility concepts such as car sharing may lead to an estrangement between man and machine or, at the very least, a more pragmatic interaction. On the other hand, the bond of trust may deepen when control is relinquished to an autopilot. A completely new type of relationship between man and car may well emerge.

In your opinion, what are the advantages of self-driving cars?

- Better flow of traffic: 54%
- Increased safety: 48%
- Reduction in consumption and emissions: 40%
- Greater convenience: 32%
- Time for other things: 31%

Note: Figures in percent
More than one reason may have been selected

In your opinion, what are the problems associated with self-driving cars?

- Spoils the fun of driving: 58%
- Unresolved liability issues in case of an accident: 46%
- Too unsafe: 44%
- Lack of capacity to deal with large volumes of data: 28%

Note: Figures in percent
More than one reason may have been selected
From being a status symbol to running on autopilot: the changing relationship between man and car

While in the past people took responsibility for maintaining their cars in top condition, it is now cars that will take responsibility for the safety and well-being of their passengers. This role reversal will transform the way cars are viewed in future: superficial features such as design or engine power will take a back seat, and more intrinsic values such as safety, reliability and connectivity will come to the fore. Other industries, such as music and photography, have already experienced this shift from a purely “extrinsic” product orientation to an “intrinsic” benefit orientation such as functionality.

Source: EY analysis

* Connectivity includes vehicle-to-device, vehicle-to-vehicle, vehicle-to-infrastructure and vehicle-to-home
Remember the paradigm shift within the music industry; with the emergence of digital technology and internet downloads, physical delivery mechanisms such as the CD and the vinyl record became obsolete. Music remains, but companies have radically altered their products in line with market demands. Those that failed to recognize and embrace the shift toward user-centeredness in good time saw their business fizzle out. The automotive industry is now facing a similar painful transformation.

Ultimately, autonomous driving describes a totally new tension between man and car: the relationship between freedom, common sense and life is shifting. Logically we know that we should drive at a maximum speed of 30 km/h to avoid accidents, but in reality we often exceed safe limits, impelled by impatience or a desire for excitement. As motorists, we constantly have to follow a middle path between these two extremes. Autonomous driving, however, will remove the need for this balancing act. It will transform the journey into a time for other activities such as reading, working or sleeping. Ultimately, the lines between commuting, work and leisure time will become blurred.

What is the upshot for the automotive industry with its 129-year-old roots? The shift to autonomous driving will ultimately force car manufacturers – in a symbolic sense – to relinquish the steering wheel while still being in charge of the vehicle. In effect, the automotive industry must find a whole new business model that intensifies the experience of the intrinsic value of the car and replaces the old attractions of design and horsepower. This will require a new set of skills, and innovative collaborations between car manufacturers and companies from the IT and internet industries.

Here, developments are already afoot. New links between automotive manufacturers and digital players are being forged on a monthly basis. While these organizations have avoided close cooperation in the past, they are now increasingly recognizing the win-win potential for both sides. The greatest challenge remains the differences in development cycles between the traditionally long-term oriented automotive industry and the fast-moving digital industry. It still requires a great deal of synchronization on both sides before the two industries harmonize perfectly.
Rinspeed “Budii” redefines human-machine interaction

Reach out to robots

The vision of autonomous driving will soon become a reality and will fundamentally change the interaction between man and automobiles. While the research centers of the automotive industry are still feverishly working on the technical solutions, progressive thinkers such as the Swiss idea factory Rinspeed are already giving concrete thought to how automated private transport will transform the car and the man-machine system. Besides fundamental conceptual changes, this will also have to involve issues of ethics and society.

In the past, the robots in the factories merely assembled cars for people. In the new “Budii” concept car from Swiss automotive visionary Frank M. Rinderknecht, the machine now literally reaches out to man: if the occupants of the autonomously driving electric vehicle feel like having some fun at the wheel on a twisty country road or off road, a robotic arm will hand the steering wheel to the driver of front passenger as desired, thereby transferring command. The sensitive 7-axis unit from Augsburg-based market leader is more than merely a steering column, however. In theory, it will make endless adjustment options possible: for example, during automated driving in the daily commute it parks the steering wheel in the center with minimum space requirements or it serves as a table or attentive personal valet. This is made possible by the unique and multi-redundant “steer-by-wire” technology from Paravan.

For the automotive idea factory Rinspeed the robotic arm in “Budii” is a symbol and food for thought at the same time. Rinspeed-CEO Rinderknecht puts it as follows: “The autonomously driving car will require more than solving technical problems and legal issues in the next two decades. We not only have to redefine the interaction of man and machine, but must also raise questions about responsibility, tolerances and expectations.” According to Rinderknecht, autonomous driving will undoubtedly offer the opportunity to make traffic more people-friendly and reduce the number of traffic accidents worldwide. “But even the best technology will not be perfect, albeit less prone to error than humans. That is something we will have to accept,” says...
Frank M. Rinderknecht. “We should not develop a blind, but rather a healthy trust in the new capabilities of the hardware and software.”

“In the future, cars will do just as we do: they will keep learning every day, and as a result will get better and better at mastering the complex challenges of modern-day private transport.” To this end, “Budii” will take information from its surroundings, its own “experiences” and those of other vehicles along its route into consideration. The long-term result will be a cognitive and intuitive autopilot. The Swiss company demonstrated what such a “friend on wheels” could look like with the trans-urban SUV “Budii” at the 2015 Geneva Motor Show.
The onus lies on us to face the challenges of this revolutionary invention on the roads.
How EY can support you

EY is actively involved in the development process for autonomous driving. We act as an intermediary between relevant industries and support the economic modeling of new business concepts. We also help in searching for partners and facilitating collaborative projects, including those in the fields of risk management and IT.

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