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For the Good of Humankind

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An autonomous car avoids an obstacle. So far, so good. But what if the evasive manoeuvre was triggered by faulty data? What if there was no obstacle and the car’s sudden swerve endangers other road users? “If we give control of the wheel to robots, we should make sure they react sensibly.” For jurist Taeger the main question is whether our legal system is ready for autonomous vehicles in everyday use. “The legislators have to adjust existing laws and create new regulations.” The traffic laws have been adapted for the semi-autonomous driving that is already possible (see the interview on p.16). But the integration of the physical world of machines, systems and devices with the virtual world of the Internet and cyberspace to create an autonomous and intelligent, self-organizing network. The first applications are already in operation today, for example in navigation devices that analyse traffic data as well as the movement profiles of road users in order to suggest alternative routes. The cyber-physical systems of the future will go far beyond this and lead for example to highly efficient “smart factories”. As part of an intelligent power grid, a CPS can control energy networks or connect doctors and patients to enable remote diagnoses and home medical care.

A brave new world

For Taeger and Tepe these are fundamentally positive advances because of the huge potential of automation and networking processes to increase social prosperity. This sounds like a brave new world. “But as scientists, we can’t simply let things happen. Someone has to deal with the question of responsibility.” He notes that the first signs that this is being taken seriously are beginning to emerge, for example the Federal Government has set up various panels of experts – including a “high-tech forum” where representatives from business, science and social groups discuss the issue, as well as an ethics committee appointed by the Federal Ministry of Transport. However, so far, Taeger says, the reports of these committees have been very vague about the social consequences and legal implications of the new technologies. For jurist Taeger the main question is whether human decisions and the legal person (a joint-stock company for example) is under consideration, says Taeger. “This “ePerson” would then logically have to be able to conclude legal transactions and be endowed with liability.

Who should be allowed to create the algorithms?

“Who should be allowed to create algorithms that are able to make decisions, and on what basis?” Here there is no consensus, and legal experts are divided on this issue. In any case, the German legal system is ill-equipped for what is being discussed, and is lagging far behind international developments. “An international law is required,” says Tepe, who is working on this topic at the University of Münster. “An international law would have to regulate which algorithms and sources of data are acceptable and how they are to be used.”

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nal Court. “Weighing up human lives against one another would be incompatible with our legal system,” he says.

So how should the algorithms be designed? In Tepe’s view, technology poses a challenge here that requires a normative decision – making this above all a task for the politicians. But so far, he says, they have been very slow to react. “There is no broad political discourse on this issue at the moment,” the researcher says. He adds that the Pirate Party tried to put the topic of how to deal with artificial intelligence on the political agenda, but the discussion, like the Pirate Party itself, has disappeared almost entirely from public debate. “So far this is just not an issue you can win elections with,” Tepe observes.

According to Taeger the situation becomes particularly tricky once autonomous robots start evolving on their own, as self-learning systems. Could these systems one day become so independent that we no longer understand how they work?

Algorithms are generally anything but transparent, he notes, and if in doubt are even treated as trade secrets. “In my opinion,” he says, “we need independent institutions to scientifically assess whether or not these algorithms comply with ethical principles or are potentially anti-democratic.”

Tepe has similar fears. He explains that if on the one hand technological advances radically change society, but on the other many people no longer understand them, the result could be a kind of “expert democracy” – in other words a political system in which a large part of the population is excluded from decision-making processes. At the same time, however, cyber-physical systems is a highly complex field, and this, he explains, poses the question of how to generate a meaningful discussion among the general public about the critical issues at stake. “It’s a balancing act,” says the scientist, “and I would like to analyse how the political parties and public interest representatives position themselves here.”

Tepe also wants to find out more about the public’s views on the new technologies and their social repercussions. He cites the example of ride-sharing service Uber: “In terms of creating a shared economy this is a sensible idea because it puts unused resources – like the empty passenger seat of a car on its way to the city – at the public’s disposal.” But what a first glance appears to fulfil a social purpose is currently undermining working standards in the taxi sector, Tepe points out. Do users see it this way, too? Or are they just happy to get a cheap ride? He plans to examine these aspects more closely with the help of surveys and decision-making experiments.

Even if Markus Tepe and Jürgen Taeger cannot yet predict how the rapid technological advances will change the laws and society over the next few years, they are confident that their research can help to make the process of automation more socially compatible. Technology that truly benefits mankind – based on scientific research. (bb)