SAFETY EXPECTATIONS FOR AUTOMATED AND AUTONOMOUS VEHICLES

Liability arising from basic technology vs. future technology

BY DR. EKKEHARD HELMIG,
ATTORNEY-AT-LAW, WIESBADEN

HELMIG@RA-HELMIG.DE.

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„Safety sells“. Nowadays, cars are bought primarily because of their safety-related driver assistance systems and less because of their other equipment. [1] Using the vehicle, however, often comes with a certain nuisance level, because, for instance, alarm signals triggered by lane departure warning systems are annoying or confusing. They are often turned off. [2] Yet, the future belongs to „self-driving" or „autonomous" vehicles for the good of relieving drivers of their driving task and increasing road safety. Driver assistance systems have substantial potential to have a positive impact on and a big part in the avoidance of accidents and damage. [3]

Almost all major vehicle manufacturers and suppliers such as Continental, Bosch or ZF have announced that their automated and autonomous vehicles will be ready to hit the road in a few years. Their advertisement campaigns today are made of the what the future of safety is supposed to look like. And indeed, studies by the Highway Loss Data Institute have shown that these systems have reduced rear-end impact accidents by 39 % and injuries by 42 %. [4] There is no reliable data for Germany.

„War of words"

Fashionable buzzwords which offer a glimpse of the future, such as "Autopilot" (Tesla), "Drive Pilot" (Daimler) or "Jam Pilot" (AUDI), are preparing the ground for new safety expectations. Volkswagen stated that the children of its 43-year-old Head of Digital Transformation probably would not need a driver's license once grown up. [5] In this "war of words", marketing strategies play a major role. [6] This kind of advertising gives rise to an idea of safety in which independent vehicles are capable of functioning automatically and autonomously on their own without the driver. [7]

This vision has already suffered a tangible setback, to name but one example, after Tesla's "Autopilot" was involved in a fatal crash in the USA in July 2016 because its "auto"-function was unable to detect a big obstacle ahead. [8] The incident caused a discussion about the driver's share of responsibility. Tesla, however, continues to use the term "Autopilot" [9], but it intends to disable its autopilot feature where "lazy drivers" who take their hands off the wheel are operating the vehicles. [10] On 20 September 2016, hackers managed to manipulate a Tesla car from afar. [11] Another Tesla vehicle collided with a bus driving in front of it.

According to a report by Automotive News, Mercedes-Benz USA has withdrawn an advertisement for the 2017 E-class due to protests that had reached the Federal Trade Commission (FTC). The commercial was touting an optional offer for the "Drive Pilot" that features, among other qualities, an adaptive speed regulation and automatic steering system said to function in flowing traffic at a speed of up to 130 miles per hour. The system could give „a false sense of security in the ability of the car to operate autonomously". [12] Mercedes USA did concede that the car was not an autonomous vehicle, but had "a host of technology that will serve as the building blocks for increasing levels of autonomy (and which will be a prominent component of our marketing)".

Ambiguous terms

The legal issues in connection with designing, manufacturing, distributing and using automated or autonomous cars still remain largely unresolved. This is not only shown by the impressive and soundly researched article by Hartmann who provides an overview of the relevant legal issues, as the title literally promises (German title: „Aktueller Überblick über Rechtsfragen des automatisierten oder autonomen Fahrens“) [13], or, among many others in the by now overwhelming plethora of publications, the conference report by Jochen Feldle and Lennart S. Lutz on the 4th Würzburg conference on technology law organized by the research center RobotRecht [14]. Hartmann rightly points out the Babylonian confusion reigning over the international terminology used within the context of autonomous driving. I adopt his useful distinction (page 115) between “automated” and “autonomous” vehicles or systems with the addition that, as I understand it, these terms also refer to different categories of vehicles and varying development stages depending on the respective design and development.

Social acceptance of risky products

It is currently not possible to predict how the legal situation, and the ethical and socio-political questions associated therewith, regarding the legitimacy of automated and autonomous cars will develop, in part because it is currently not possible to determine what kind of technologies will be used in our social context and by what kind of unavoidable risk potential, conflict of objectives and liability consequences they will be accompanied. It may be true that social acceptance of the inherent risks will change temporarily or permanently in the interest of getting closer to the invariably open – and thus undetermined – goal of increased road safety. [15]

An Ethics Committee established by the German government is supposed to give forward-looking impetus in this respect. [16] I will not address the ethical implications of autonomous vehicles in this paper. According to a survey by the Allensbach Institute (Institut für Demoskopie Allensbach, IfD), “self-driving” cars currently do not appeal to a vast majority of 73 % of Germans. [17]

Today’s sound liability regime

An examination of the future law governing automated and autonomous driving warrants a glance at the current situation first. The automated and autonomous cars which are said to roll out in three to five years are being developed today based on basic technologies that cannot be considered as safe beyond all doubt, at least not all of them. When I say “basic technology”, I am referring to the design, construction and production of conventional vehicles, including interface processes involving supplier products. The currently applicable liability regime under European and national law governing safe vehicles of the future is sound and useful, but is has to be applied more comprehensively and consistently. This is the subject of my paper.

Increasing recall numbers

News on safety-related recalls in the automotive industry have become a daily routine and lost most of their sensational value, most people have become rather accustomed to them. [18] In Germany, approx. 1.8 million vehicles were recalled over safety issues in 2015 [19], the 2016 numbers already amount to approx. 60 million cars worldwide and the trend is rising. The NHTSA has expanded the recall of faulty Takata air bag inflators to 34 million additional vehicles. [20] The total number of cars recalled due to their faulty airbags amounts to approx. 100 million. Almost all German vehicle manufacturers have been affected [21] although they had stated in 2014 that the Takata airbags were harmless. [22]

The worldwide number of publicly announced safety-related recalls per year is almost as high as the number of sold vehicles per year. [23] The root causes for safety-related defects are usually not of a technological nature, but result from general quality issues that occur for various reasons and cannot be discussed in detail in this paper. In most cases, they were avoidable; in any case, I am not aware of any recall on which the respective manufacturer commented that the underlying defect had been unavoidable.

The number of recalls due to unsafe “keyless entry” systems is growing, too. [24] These system fail on a broad scale when used in practice and are abused by hackers and thieves. [25] The probability is high that recall numbers will rise even further in connection with automated or autonomous cars as there is currently no even remotely reliable compatibility between the cars’ design and the systems or technologies installed. The Head of the Center Automotive Research (CAR) at the University Duisburg-Essen, Ferdinand Dudenhöffer, assumes that recall figures will climb due to electronic systems and interconnected vehicles. [26]

Other areas of the consumer product industry are just as prone to increasing recall numbers, even if they offer the most recent technology. [27]

Basic technology vs. future technology

With the technologies for automated and autonomous vehicles, cars are not being reinvented. They are only advanced developed, digitalized and connected based on existing designs for brakes, axles, pistons etc. and advanced platforms. This is why liability law can get by with today’s liability regime also with respect to future, always goal-oriented safety expectations, because the legal interests to be protected by it, notably life, health and environment, will not change in the future; it is more likely that general sensitivity to the need of protecting these interests will increase.

In my opinion, there are three questions of prime importance:

(i) whether the basic technologies, in light of their vulnerability that the high recall figures show, are themselves sufficiently reliable in order to be applied to future technologies. How, for instance, will automated or autonomous vehicles react in the event of a defect in the electrical wiring harness that causes the entire electrical supply to collapse or a falling rock that smashes the lens of an indispensable camera?

(ii) whether the interfaces for implementing automated or autonomous technologies are researched soundly enough and protected against interferences so as to rule out the occurrence of possible electrical and electronic or mechanic conflicts due to operating defects. How, for instance, will an automated or autonomous car react if the powertrain's actuator fails and what will it require the driver to do? Or what will happen, if a negative pressure hose blows out and disables the engine control?

(iii) What are drivers expected to do in these cases? Is there anything left that they can do? In its "Federal Automated Vehicles Policy", published on 21 September 2016, the NHTSA set out minimum requirements regarding the information drivers should receive from Highly Automated Vehicle Systems (HAV). They should be informed that the system is: 1. Functioning properly; 2. Currently engaged in automated driving mode; 3. Currently "unavailable" for automated driving; 4. Experiencing a malfunction with the HAV; and 5. Requesting control transition from the HAV system to the operator. [28]

If a prognosis on future safety is to be given, a precondition for evaluating liability in the future will be that three sets of questions be fully answered at any time in order to fulfill the generally justified expectations pursuant to Section 3 of the German Product Liability Act and Section 434 of the German Civil Code (BGB).

In practice, there is currently no reliable evidence indicating that this precondition has been fulfilled. The probability that it has been fulfilled is rather low because the design and production of automated or autonomous cars are no longer an exclusive domain of "traditional" vehicle manufacturers. Electrical and electronic components, such as cameras, sensors, radar or lidar systems etc., which are needed for these vehicles, have been and are still developed by specialized companies; originally, they had nothing to do with the automotive industry, but automakers and many suppliers depend on them. [29] Cooperations and mergers at all levels, and thus technological convergence, are only slowly beginning to evolve with a rising learning curve. [30] Google and Tesla are independent contenders in the arena of autonomous driving.

The intertwined relations and interdependencies between economic players of various provenances, cultures and languages, and completely different legal systems, in the process of designing, manufacturing and marketing automated or autonomous vehicles have to be factored into a liability situation that becomes ever more complex for the potentially injured consumer (in the following I) as well as within the supply chain

(in the following II). [31] Ideas for jointly defined objectives focusing primarily on safety are currently not in sight, although there are ample statutory provisions and binding regulations to work with.

I will elaborate on that with a simple example:

Consumer protection

Advertisements touting safety-related assistance systems, automated or autonomous cars raise certain safety expectations and are intended to do so. Where these justified safety expectations are impaired or disappointed due to electronic malfunctioning, as happened with Tesla's Autopilot, these systems are defective within the meaning of Section 3 of the German Product Liability Act leading to liability pursuant to Section 1 of the German Product Liability Act.

Failed exculpatory evidence:

Vehicle manufacturers who are liable according to Section 1 of the German Product Liability Act will in all likelihood not be able to present exculpatory evidence satisfying the requirements of Section 1 (2) No. 5 of the German Product Liability Act if they deploy the argument that the defect had not been detectable with state of the newest science and technology at the time the vehicles were placed on the market (design defect). Even where the strict requirements of ISO 26262 on functional safety in vehicles are complied with, hardware and software defects cannot be ruled out with absolute certainty. [32] Introduced in 2011, the standard seeks to reduce risks by defining acceptable risks. By the standard's definition, "safety" means the "absence of unreasonable risk". [33]

The term "unreasonable risk" is defined as „risk judged to be unacceptable in a certain context according to valid societal moral concepts". [34] The tools that the standard provides in order to evaluate a risk ("confirmation measures": audit, review, assessment) rest upon making a selection from all data that possibly comes into consideration; this evaluation, since it is always selective, is necessarily fragmentary and thus inaccurate because not all data constellations can be represented.

The manufacturer cannot refer to this basically unavoidable risk that results from individual, always subjective selection ("Whoever makes decisions also makes mistakes."). The manufacturer bears the risk of selecting accurate data which he wants to take or, due to financial reasons, already has taken as a basis. The exculpatory evidence required by Section 1 (2) No. 5 of the German Product Liability Act already fails at this point.

Prima facie evidence through successful hacker attack

This impression has been reinforced by hacker attacks on vehicles that have repeatedly caused a stir because they were launched with success shortly after the cars in question had been placed on the market. In summer 2015, hackers succeeded in taking over control of a Jeep and steered it into a ditch. [35] In early 2016, an Australian hacker managed to hijack a Nissan vehicle driving in Scotland. [36] As manufacturer, Chrysler had to recall 1.4 million vehicles at the time. [37]

The recall mechanism required by U.S. law is basically equivalent and corresponding to the legal status quo in Europe, at least since the European Court of Justice decided on 5 March 2015 that a product is also deemed defective if it forms part of a series in which defects have occurred with significant frequency, even if the product's individual defectiveness has not been evidenced. [38] This decision cannot be discussed in detail at this point.

But with regard to the liability issue discussed within the context of this paper, the following can be said: Each successful hacker attack provides prima facie evidence as to the electronic system's lack of safety at the time it was placed on the market because if the hacker, who had no part in developing the car, managed to remotely trigger malfunctioning from far away, the developer, under the current legal situation, should have been able to and would have had to foresee this lack of security and safety. There is no valid exculpatory evidence at his side to assist him.

Where a successful hacker attack thus provides prima facie evidence for a defective product, this constitutes – at least if no reference is made to other possible reasons for the defect (Section 6 of the German Product Safety Act) [39] – a violation of Section 3 of the German Product Safety Act, the consequence thereof being that the competent market surveillance bodies have to interfere according to Section 26 of the German Product Safety Act. In individual cases, claims within the scope of Section 823 (2) BGB in conjunction with the German Product Safety Act as protective law are conceivable.

European law

The afore mentioned conditions possibly also constitute a violation of the type approval provisions laid down by the Framework Directive 2007/46/EC which also have protective effects to the benefit of third parties. According to Article 18 of the provision of the Directive, vehicle manufacturers shall deliver a certificate of conformity to accompany each vehicle. The certificate of conformity set out in Annex IX of Directive 2007/46/EC "is a statement delivered by the vehicle manufacturer to the buyer in order to assure him that the vehicle he has acquired complies with the legislation in force in the European Union at the time it was produced." The certificate of conformity is a statement of assurance made to an individual buyer which, in my opinion, constitutes the traits of a guarantee. For this reason, a direct contractual relationship between the vehicle

manufacturer and the consumer is conceivable in addition to the German delict law angle. To my knowledge, this assumption has so far not been rejected by relevant legal voices. As to my knowledge these arguments haven not been introduced in the numerous individual litigations against vehicle manufacturers.

Moreover, "the certificate of conformity also serves the purpose to enable the competent authorities of the Member States to register vehicles without having to require the applicant to supply additional technical documentation" [40] (Articles 7 ff. of Directive 2007/46/EC). Therefore, by addressing the competent approval authorities, the certificate also functions as a guarantee with legal relevance under public law. If the provisions set out in Articles 12 and 18 of Directive 2007/46/EC are violated, type-approval for the vehicle in question may not be granted. This conflict was already highlighted when the German Federal Motor Transport Authority (KBA) stated that it would not have granted type-approval to the Tesla car had it known that Tesla had only installed a beta version of the Autopilot. Tesla's vehicle was, however, granted type-approval in the Netherlands, the approval being effective in all European Member States. The KBA cannot take action against Tesla on its own. Pursuant to Directive 2007/46/EC, it has to inform the competent Dutch authorities.

In addition to the vehicle manufacturer's liability, the manufacturer and assistance system's supplier will be jointly liable (Section 5 of the German Product Liability Act) due to the latter's independent design activities which usually remain and should remain unknown to the former. The supplier cannot invoke the liability privilege that Section 1 (3) of the German Product Liability Act provides for component part producers because the vehicle manufacturer usually does not give the supplier instructions as to how he is supposed to produce the system (Section 1 (3) second alternative of the German Product Liability Act). There is no exculpatory evidence available for him, either.

Finally, the vehicle's buyer has the full spectrum of rights under German sales law pursuant to Section 437 BGB at his disposal, not only against the car dealer, but also the manufacturer, provided that the certificate of conformity according to Article 18 of Directive 2007/46/EC is considered as a contractual declaration directly addressed to the buyer.

Increased justification pressure

By illustrating this comprehensive range of liability mechanisms, I am not insinuating that vehicle manufacturers and their suppliers – especially driven by fierce competition – are consciously placing unsafe products on the market. That avoidable risks nonetheless are at times accepted can be assumed due to high recall rates. The complexity of technologies and the manufacturers' dependency on suppliers who have competing business interests undoubtedly pose heightened risks to controlling the entire bundle of technologies and their compatibilities in the vehicle. The way I see it, this increases the pressure for justifying the accuracy of the certificate of conformity according to Article 18 of the

type-approval Directive 2007/46/EC [41], which is directly addressed to the final buyer, or the specifications under German sales law according to Section 434 (1) BGB, which include the justified safety expectations for the purposes of Section 3 of the German Product Liability Act.

A model for the comprehensive documentation that vehicle manufacturers and their suppliers have to present in order to proof the reliability of their safety decisions is provided by the two “Orders” the American National Highway Traffic Safety Administration (NHTSA) issued to Takata and vehicle manufacturers affected by the recall due to faulty airbags on 18 November 2014. [42]

The questions posed to Takata in the “Special Order” read as follows:

REQUESTS

1. Explain the process by which Takata manufactures propellant for the Takata Inflators. Your response should include a summary of the step-by-step process from the time the chemical compounds are received at Takata's Moses Lake, Washington facility (or any other facility at which Takata receives chemical compounds) to the time the propellant wafers are shipped to the Takata Inflator manufacturing facilities.
2. Explain the chemical composition and manufacturing process for the propellant that is currently being used in the Takata Inflators.
3. Explain the chemical composition and manufacturing process for the propellant that was used in the Recalled Inflators.

4. Explain the chemical composition and manufacturing process for the propellant that is currently being used in the Replacement Inflators.
5. Produce a chronology identifying each point in time that Takata made a change to the chemical composition of the propellant used in the Takata Inflators from January 1, 2000 to the present. Your response shall include the precise date and time on which the change was made, the Takata Inflators affected by the change, the nature of the change made to the propellant formula, and the reason(s) for that change.
6. Produce the names, titles, and complete contact information for each and every Takata employee who recommended that a change to the propellant formula be made.

7. Produce the names, titles, and complete contact information for each and every Takata employee who was involved in the decision to change the propellant formula.
8. Produce the names, titles, and complete contact information for each and every Takata employee who developed the propellant formula used in the Recalled Inflators.
9. Produce the names, titles, and complete contact information for each and every Takata employee who developed the propellant formula used in the Replacement Inflators.
10. Produce the names, titles, and complete contact information for each and every Takata employee who formulated the propellant used in the Recalled Inflators.

11. Produce the names, titles, and complete contact information for each and every Takata employee who formulated the propellant used in the Replacement Inflators.
12. Produce the names, titles, and complete contact information for each and every Takata employee who tested the propellant used in the Recalled Inflators.
13. Produce the names, titles, and complete contact information for each and every Takata employee who tested the propellant used in the Replacement Inflators.

14. Produce all documents that refer to, relate to, discuss or concern the propellant used in the Takata Inflators; including, but not limited to, any studier or testing of the propellant formulas.
15. Produce all documents that refer or relate to concerns or allegations (regardless of whether or not such concerns or allegations were substantiated) by any Takata employee or contractor, or any motor vehicle manufacturer, that ammonium nitrate is too volatile or that there is otherwise a problem with using ammonium nitrate in the propellant for the Takata Inflators.

16. Produce all internal Takata documents referenced in the Reuters article entitled "Takata changes chemical compound involved in air bag recalls," a copy of which is attached hereto as Exhibit A.
17. Produce the Reuters analysis of internal Takata documents referenced in the Reuters article, attached as Exhibit A.
18. Produce all documents that refer to, relate to, discuss or concern the decision to change the propellant formula as reported in the Reuters article, attached as Exhibit A; including, but not limited to, emails, design specifications, and studies.

The questions posed to the vehicle manufacturers in the “General Order” were the following:

REQUEST

1. File a report that describes, in detail, all completed, ongoing or planned testing of Takata inflators outside of the HAH Region. At a minimum, your report must include, but should not be limited to, the following:

a. All documents regarding or relating to the testing contained in your report;
b. The location of the testing; the dates of the testing; whether the testing is completed, in progress, or planned; anticipated date of completion of testing; the nature and objective of the testing; and, testing protocols;
c. A roster of all vehicles where the inflator was tested which includes: the model; model year; vehicle build date; VIN; the vehicle's registration history, by location; inflator serial number; inflator type; dealership location with zip code where the inflator unit was returned; whether any deaths, injuries or claims are associated with the inflator in the vehicle; and, product specifications for the air bag and inflator modules in each vehicle.

d. If testing of inflators has been completed, describe in detail the results of the testing and the conclusions you have reached based upon the test results. If your conclusion is that a safety defect does not exist in inflators outside of the HAH Region, describe in detail the basis for that conclusion and when the decision was made and by whom. Provide a copy of all documents to or from any person(s) related to the conclusion that no safety defect exists in inflators outside of the HAH Region.

e. Sub-part (e) is directed to BMW, Chrysler, Ford, GM, Honda, Mazda, Mitsubishi, Nissan, Subaru and Toyota: State in your report whether or not Takata has performed testing of inflators used in your vehicles outside of the HAH Region. If so, describe in detail what Takata has communicated to you about the testing and/or test results. Produce all documents related to Takata's testing, test results and your communications, internal and external, related to the testing. State whether you have requested additional information from Takata concerning its testing of inflators outside of the HAH Region which you believe would assist in your determination of whether a defect exists. Identify and describe any information, documents or categories of information and documents that you reasonably believe that Takata has or reasonably should have concerning inflators or testing of inflators used in your vehicles that Takata has not provided you and which you believe would assist you in testing inflators to determine whether a safety defect exists in inflators outside of the HAH Region.

f. Provide the name, title and complete contact information for each and every manager or supervisor (at all levels of management or supervisory responsibility) involved in your investigation and decision-making process concerning rupturing air bag inflators manufactured, in whole or in part, by Takata.
g. Provide the name, title and complete contact information for each and every person who prepared and provided input and/or data included in the report contained in Request No. 1, including but not limited to inside or outside counsel, accountants, engineers, employees and other professional s."

Within the scope of our examination, two aspects in these lists of questions are essential with respect to the justification pressure that ultimately aims at establishing liability:

1. The NHTSA demands that the manufacturers and suppliers document that the assumption that they have made to meet the safety goals set prior to rolling out the vehicles as well as the conclusions' accuracy are reliable and duly documented.

2. The question of the personal responsibility that every single person involved in the production bears has to be asked throughout the entire hierarchy of the company. Having access to employees working at the lower hierarchy levels is an important tool in an effective investigation, especially since the NHTSA collects all the data so as to support private plaintiffs to enforce their claims in private litigation cases. There is no reason not to believe that this model will set a precedent for Germany and Europe.

The most recent indication for this trend are the legal proceedings against Volkswagen employee James Robert Liang who pleaded guilty in the wake of Volkswagen's emissions case. In his Plea Agreement, he not only agreed to cooperate fully with US law enforcement agencies in exchange for the prospect of a reduced sentence, but also to support the investigating Staatsanwaltschaft (state prosecutors office) Braunschweig in Germany, which the Staatsanwaltschaft has already gladly accepted. [43]

Supplier-manufacturer-relationship

The liability situation within the supply chain, which I can only address briefly, is no less multifaceted. What has been said so far with respect to consumer protection applies to the supply chain accordingly:

The vehicle manufacturers' dependency on their suppliers regarding basic as well as the special technologies for automated or autonomous driving has lead to an entirely new mode of collaboration within the entire supply chain which currently does not work in practice, at least not entirely smoothly. Any consultant in the sector will be able to share the experience that legal provisions or the customarily applicable, safety-oriented regulations in the sector, which aim at defect avoidance, are not always given number one priority.

Let me cite but one example from my experience: Chapter 8 of ISO 26262 Functional Safety, which usually forms a contractually agreed and thus integral part of the vehicle manufacturers' specifications, requires the conclusion of a trilateral "Development Interface Agreement" (DIA) supervised by the vehicle manufacturer in order to avoid the occurrence of risks at the interfaces between supplier system and vehicle level. This is done to ensure that the supplier system will be compatible with the entire onboard wiring system's electronics and electrics and that in turn the wiring system does not negatively influence the supplier systems. The standard itself and handling it are in my experience unchartered territory for many parties involved.

Practical experience has shown that these DIAs are rarely concluded; as a consequence, interfaces remain insufficiently defined and generate risk zones for later malfunctioning, the basis of which can by experience often be found in the vehicle manufacturers' specifications and testing requirements. Although a renowned German carmaker, for instance, has determined testing requirements, he has also included a passage into his agreement on how to handle warranty cases which states that the supplier's compliance with the testing requirements does not release him from his sole responsibility to ensure that the products are defect-free. However, the supplier often does not receive the information that would be necessary in order to make technological interface decisions at vehicle level so as to validate his systems.

Instead of improving cooperation in the interest of vehicle safety, experience has shown that more and more sophisticated recourse strategies in the event of field failures and recalls are dominating the relationship between manufacturers and suppliers. The car manufacturer – and big suppliers, as well – follow their recourse strategies in particular through so called "reference market procedures".

With this method, a projection of the supplier's liability share in the worldwide field failures is made using random samples from defined reference markets. Evidence of the respective product's individual defectiveness and the supplier's sole responsibility is not necessary. According to the automakers' contractual provisions, the "failure parts" are identified as such within the automaker's organization and thus trigger the recourse chain. Factors such as the vehicle's operating conditions, including, for instance, defects in the onboard wiring system, are hardly considered in the defect analysis which is usually limited to analyzing the supplier products.

This lack of cooperation between vehicle manufacturers and suppliers poses a considerable risk to safety. The legally required necessity of risk avoidance is explicitly contained in the revised version of ISO 9001:2015 ("Quality management systems – Requirements"). ISO 9001:2015 and ISO/TS 16949:2009 [44], the latter being the former's supplement to account for the specific needs of the automotive industry, are usually integral parts of contracts concluded within the entire global automobile industry. A violation of these standards constitutes a basis sui generis for legal claims and, apart from that, always gives rise to claims on grounds of breach of duty pursuant to Section 280 (1) BGB. Moreover, ISO 9001:2015 also explicitly establishes a safety-oriented connection to the final product and thus defines a statutory and contractual obligation to cooperate.

The standard directly impacts a vehicle's ability to be granted type-approval: According to the type-approval Directive 2007/46/EC and Regulation 371/2010 [45], the quality management system's effectiveness is a condition for a vehicle to be granted type-approval. This is something which is largely neglected in practice. Yet, it is very likely that the pressure will increase: The German Federal Court of Justice indicated in its reference for a preliminary ruling to the ECJ on 9 April 2015 [46] in the breast implant case that the mechanisms for the effectiveness of a quality management system may also have protective effects to the benefit of third parties.

Factoring in that the vehicle manufacturer's certificate of conformity according to articles 12 and 18 of Directive 2007/46/EC directly addresses the buyer of a vehicle, it would not be surprising if the ECJ were to confirm this notion. The Attorney General of the ECJ has in her statement of 15. September 2016 confirmed the basic liability of the certification bodies.

In my opinion, the standard incidentally shows a significant link to the requirements set by NHTSA regarding personal responsibility of individual persons. According to point 7.2 of ISO 9001:2015, an organization shall ensure and "determine the necessary competence of person(s)", "take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken." When "planning how to achieve its quality objectives", the organization shall also determine "who will be responsible". Consultants are more and more frequently asked about the question of personal responsibility. Numerous companies demand that their suppliers designate in writing a "product safety manager" with personal responsibility.

All things considered, a comprehensive liability system for all fields of automated and autonomous driving does exist due to statutory provisions and binding regulations. The new ISO 9001:2015 in connection with the new IAT 16949 provide significantly to strengthen the legal base for liabilities. It will be necessary, however, to enhance this liability system's efficiency in terms of visibility and application.

Driver's liability

Therefore, Hartmann accurately points out (page 119) that liability will shift to the disadvantage of vehicle manufacturers and suppliers. But for now, the driver will keep his hands on the wheel. As long as he decides to drive an incompletely automated or autonomous car, he will be the one liable for this decision. The conflict between the safety expectations raised by vehicle manufacturers and the driver's responsibility [47], a conflict that becomes increasingly complex, will primarily impact the burden of proof: The manufacturer has to bear the full burden of proofing that the vehicle was entirely safe and that the driver caused the damage with intent (including intoxication or the like). The driver's inability to handle or his mistakes in operating the vehicle, will in any case not be of any help to the manufacturer.

Conclusion

Advertisements touting automated or autonomous cars raise safety expectations that cannot be fully met at present. Social acceptance of risky products does not reduce the level of justified general safety expectations. Automated and autonomous vehicles are based on today's basic technology which, if seen in the light of increasing recall figures, do not provide an appropriate basis for justified safety expectations that will arise in the future. The compatibility of today's basic technology with future technologies of automated and autonomous cars has yet to be developed and is currently still at an experimental stage. Successful hacker attacks on vehicles provide prima facie evidence as to the products' insecurity.

Manufacturers and suppliers of automated and autonomous vehicles have to move within a complex, existing and working liability regime which exposes them to a continuously increasing pressure to justify their decisions. Within this context, personal liability consequences for decision makers become more significant. By being risk-oriented, the new version of ISO 9001:2015 increases the pressure on vehicle manufacturers and their suppliers to cooperate. The liability regime that is currently in place is sufficient to also control the risks posed by automated and autonomous driving.

References

1 http://www.welt.de/wirtschaft/article157906275/Wie-der-Apple-Effekt-die-Autoindustrie-veraendert.html, accessed 31 August 2016
2 Automotive News of 29 August 2016, page 24
3 Gwehenberger/Borrack „Einfluss von Fahrassistenzsystemen auf Versicherungsschäden" (in English, „Driver assistance systems' influence on insured loss"), Verkehrsunfall und Fahrzeugtechnik (in English, Traffic Accident and Vehicle Technology), October 2015
4 Automotive News of 29 August 2016, page 3
5 http://www.focus.de/auto/videos/johann-jungwirth-vw-digitalchef-erklaert-warum-der-fuehrerschein-schon-bald-ueberfluessig-wird_id_5874982.html (30 August 2016)
6 Automotive News of 1 August 2016, page 8
7 Automotive News of 8 August 2016, pages 3 and 37, „Big challenge for marketers: Pitching safety – safely"
8 http://www.heise.de/newsticker/meldung/Toedlicher-Unfall-mit-Teslas-Autopilot-3252120.html, accessed 30 August 2016
9 https://www.tesla.com/presskit/autopilot , accessed 30 August 2016
10 http://www.welt.de/wirtschaft/article157902290/Tesla-will-faulen-Nutzern-den-Autopiloten-abschalten.html, accessed 30 August 2016
11 http://www.pcwelt.de/news/Sicherheits-Luecke-Hacker-bremsen-Tesla-per-Fernzugriff-10044380.html
12 Automotive News of 8 August 2016, page 8
13 PHi 2016, pp. 114 ff
14 PHi 2016, pp. 150 ff
15 I am inclined to doubt that there is a general social acceptance of risks that are of ethical and legal relevance and result from new technologies. In my view, there is neither an inherent social acceptance of these risks nor a desire for them as Hartman seems to suggest. Rather, it is the offer of a given product that initially causes a general factual situation and thus risks to come into existence which, in turn, causes a social habituation effect. A perceptible habituation effect thus generated, however, cannot be used as a justification to reduce the level of general safety expectations according to Section 3 of the German Product Liability Act.
16 http://www.heise.de/newsticker/meldung/Dobrindt-Ethikkommission-fuer-autonomes-Fahren-nimmt-Arbeit-noch-diesen-Monat-auf-3318047.html, abgerufen 13.09.2016
17 Frankfurter Allgemeine Sonntagszeitung of 11 September 2016, page 21
18 http://www.welt.de/wirtschaft/article157890781/60-Millionen-Autos-muessen-in-die-Werkstatt-zurueck.html, accessed 29 August 2016
19 https://www.adac.de/infotestrat/reparatur-pflege-und-wartung/rueckrufe/default.aspx
20 http://www.nhtsa.gov/About+NHTSA/Press+Releases/nhtsa-expands-accelerates-takata-inflator-recall-05042016
21 http://www.spiegel.de/wirtschaft/unternehmen/daimler-will-wegen-takata-airbags-fahrzeuge-in-den-usa-zurueckrufen-a-1093190.html
22 http://www.krone.at/auto/daimler-und-vw-verteidigen-airbag-lieferant-takata-trotz-todesfaellen-story-429688
23 Helmig, „Rückrufdebakel in der Automobilindustrie und keine Ende", PHi, 2015, pp. 56 ff. For the English translation ("Recall debacle in the automotive industry: no end in sight") see http://www.ra-helmig.de/fileadmin/docs/publikationen/2015-04-25_Recall_Debacle.pdf
24 http://www.focus.de/auto/ratgeber/sicherheit/keyless-go-sicherheitsluecke-bei-audi-bmw-vw-wenn-ihr-auto-auf-dieser-liste-steht-knacken-diebe-es-auf-jedem-parkplatz-in-sekunden_id_5364995.html
25 http://www.spiegel.de/auto/aktuell/cyberattacken-auf-autos-der-feind-faehrt-mit-a-1084059.html
26 "IT security is the automakers' open flank. We are moving towards a time in which recalls will become cyber thrillers if we do not develop IT-specific recall systems" (freely translated into English); http://www.welt.de/wirtscahft/article157890781
27 http://www.n-tv.de/technik/Samsung-muss-1-Million-Note-7-ersetzen-article18656881.html, accessed 16 September 2016
28http://www.nhtsa.gov/About+NHTSA/Press+Releases/U.S.+Department+of+Transportation+Releases+Policy+on+Automated+Vehicle+Development (accessed 21 September 2016)
29 Der Spiegel No. 35/2016 (page 57, freely translated into English): "Most people associate Conti(nental) with tires, Bosch with spark plugs and ZF with transmission systems. Actually, these corporations develop essential technologies for the digitalization of driving and autonomous driving. They will become, in addition to Apple and Google, the traditional automakers' new competitors. Their business is thriving and often, their rates of return are already higher than those of traditional manufacturers. They will challenge the traditional carmakers' business in the future."
30 To name but one example: The supplier Delphi, who was split off from General Motors years ago, has forged an alliance with the company Mobileye that specializes in camera systems.: https://www.automobil-produktion.de/zulieferer/delphi-und-mobileye-entwickeln-selbstfahr-technologie-127.html, accessed 16 September 2016
31 Automobilwoche of 25 July 2016, pages 16 ff
32 Helmig: „ISO 26262 – Funktionale Sicherheit in Personenfahrzeugen – Zur Verantwortlichkeit der Funktionalen Sicherheitsmanager, InTeR 2013, 28; for the English translation ("ISO 26262 – Functional safety in personal vehicles: responsibilities and liabilities of functional safety") see http://www.ra-helmig.de/fileadmin/docs/publikationen/ISO_26262_Liability_Functional_Safety_Managers.pdf
33 ISO 26262-1, 1.103; in its "Asessment of Safety Standards for Automotive Electronic Control Systems" (page 14), the NHTSA explicitly mentions the risks resulting from subjectivity in data selection,https://www.bing.com/search?q=NHTSA+Assessment+of+Safety+Standards&pc=MOZI&form=MOZSBR

34 ISO 26262-1, 1.136
35 https://www.wired.com/2015/07/hackers-remotely-kill-jeep-highway/; http://www.focus.de/auto/ratgeber/sicherheit/autodiebstahl-2016-neue-tricks-und-mietwagen-im-visiier-autodiebstaaehle-nehmen-zu_id_5879702.html 31.08.2016; http://www.heise.de/security/meldung/ADAC-Viele-aktuelle-Pkw-Modelle-ueber-Funk-knackbar-3140796.html
36 Süddeutsche Zeitung Online of 25 February 2016
37 This is why Fiat Chrysler recalled about 1.4 million cars in July 2015: http://www-odi.nhtsa.dot.gov/acms/cs/jaxrs/download/doc/UCM493605/RCMN-15V799-6074.pdf;
38 ECJ Judgement of 5 March 2015 in the joined cases C-501/13 and C-504/13; for further detail see Helmig: „Herstellerverantwortlichkeit im Unionsrecht", PHi, 2015, 86 ff.; for the English translation ("Manufacturer responsibility under European Union law") see http://www.ra-helmig.de/fileadmin/docs/publikationen/2015-06-17_Manufacturer_responsibility_under_European_Law.pdf
39 According to the definition provided in ISO 26262-1; 1.97, „residual risk" means a „risk remaining after the deployment of safety measures"; according to ISO 26262-1; 1.965, a "residual fault" is a "portion of a fault that by itself leads to the violation of a safety goal, occurring in a hardware element, where that portion of the fault is not covered by safety mechanisms."
40 Official Journal of the European Union of 9 October 2007 L 263/1 in the consolidated version of 24 February 2011.
41 Official Journal of the European Union of 9 October 2007 L 263/1 in the consolidated version of 24 February 2011. http://eur-lex.europa.eu/legal-content/DE/TXT/PDF/?uri=CELEX:02007L0046-20160701&from=EN
42 http://www.nhtsa.gov/About+NHTSA/Press+Releases/2014/DOT-calls-for-national-recall-of-takata-driver-air-bags, accessed 17 September 2016
43 https://www.justice.gov/opa/pr/volkswagen-engineer-pleads-guilty-his-role-conspiracy-cheat-us-emissions-tests, accessed 12 September 2016
44 Effective from October 2016 the system has changed: ISO/TS 16949 is not longer a Technical Specification of ISO. It is now a global standard of the International Automotive Task Force (IAFT) who has published the standard as "IATF 16949". IATF 16949 is replenishing ISO 9001:2015 and ISO 9000:2015. These three documents must be read as a unit. The application is challenging in particular to two aspects: (1) The extended focus on risk management and on product safety laws and (2) the focus on individual responsibilities for each employee.
45 Official Journal of the European Union of 1 May 2015, L110/1.
46 VII ZR 36/14.
47 Matthias N. Schubert, „Autonomous cars – initial thoughts about reforming the liability regime", GenRE Insurance Issues, May 2015, page 3.