Sompo Japan Nipponkoa Insurance Inc.

Laws and Insurance in our coming Automated-Driving society : How insurance can contribute to enhancing social receptivity

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July 2018

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1. Automated driving levels －A big hurdle between Level 2 and Level 3

By Seiichi Nishioka, July 2, 2018

Recently we have been frequently asked questions about automated driving such as:

"If automated driving becomes popularized and can reduce automobile accidents, automobile insurance and insurance companies would be unneeded, wouldn't it?"

"Instead of automobile insurance, product-liability insurance (PL insurance) become a main business of line, wouldn't it?", and

"What should insurance companies do for the future, while they have ever concentrated on automobile insurance?"

Nowadays in our country more than 90 percent of automobile accidents are said to have arisen from drivers' carelessness. It is certainly natural for people to raise those questions, considering the possibility that accidents caused by automated-driving systems (not by drivers) will relatively increase in the coming automated-driving society. In this series of articles, we would like to respond to those questions by introducing current societal situation in our country and our company's initiatives related to automated driving.

When talking about automated driving, the definition of automated-driving level should be noted. Conditions and functions of automated driving significantly differ according to its levels.

At present "SAE Level (0- 5)" is common to describe them, and the Cabinet Secretariat IT Strategic Headquarters also adopts it.

Vehicles up to Level 2 are currently on the market in Japan. These vehicles are installed with driving-supporting technologies, which are represented by Autonomous-Emergency Braking, and the driver is still the main party who conducts steering.

Overview of automated driving levels* *based on the SAE definitions

Level	Overview
0 No automation	The driver performs the entire driving tasks.
1 Driver assistance	The system performs subtasks of the dynamic driving task (DDT) relating to either longitudinal or lateral vehicle control.
2 Partial automation	The system performs subtasks of the dynamic driving task relating to both longitudinal and lateral vehicle control.
3 Conditional automation	The system performs the entire dynamic driving task (within operational design domains) The DDT fallback-ready driver is expected to respond appropriately to a request to intervene by the system.
4 High automation	The system performs the entire dynamic driving task (within operational design domains) The DDT fallback-ready driver is not expected to respond to it.
5 Full automation	The system performs the entire dynamic driving task (not within operational design domains).

In the United States, the Tesla car occurred accident in Autopilot mode, however, it is fair to say that this accident was Level 2's case, where the driver is the main party.

A big hurdle is there between Level 2 and Level 3 in terms of both technology and laws, because over Level 3 automated-driving, the main party who conducts steering shifts to the system from the driver. While Level 3 cars have been announced in Germany, it is not allowed to drive such cars in the country as laws and regulations have not yet been placed. In March, an Uber car caused a fatal accident during a field testing under Level 3 mode, by hitting a pedestrian in Arizona in the United States, and even in this case the driver's intervention would have been required.

As for Level 4, the Public-Private ITS Initiative/Roadmaps 2018, which was compiled by the IT Strategic Headquarters, indicates expected timeframes for marketing in Japan:

"Unmanned autonomous driving transport services in limited areas: by 2020",

"Fully automated driving of private vehicles on expressways: by 2025", and

"Fully automated driving trucks on expressways: from 2025 onwards".

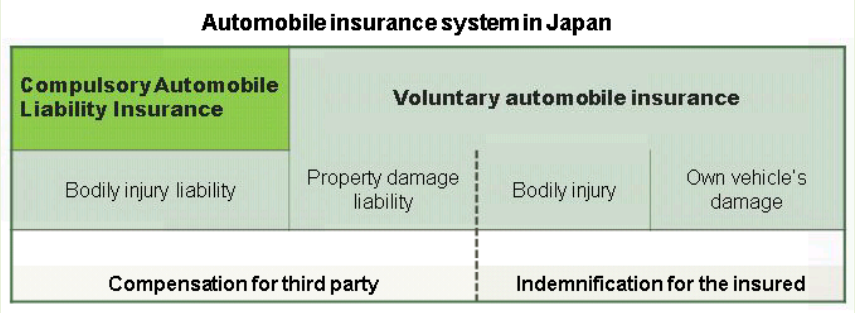
Aiming for these timeframes, various industries as well as auto manufacturers are moving forward with examinations towards commercialization related to automated driving.

2. Japanese legal and insurance systems related to automobile liability - Unique "two-layers" structure

By Seiichi Nishioka, July 3, 2018

I introduce Japanese current legal and insurance systems related to automobile liability, which are essential to understand how risks associated with automated driving should be dealt with. Notably, in our country, the current insurance system is two-layered structure: Compulsory Automobile Liability Insurance (CALI) and voluntary automobile insurance. This system is operated as a whole by combining two types of insurance, which makes it unique in the world. In ordinary accident cases, insurance companies (which underwrite voluntary automobile insurance) conduct claim handling of both CALI and voluntary automobile insurance.

In addition, automobile insurance's coverage is classified into "the third party liability" and "the first party indemnification (the insured's own bodily and property damages)". This system includes both types of coverage, by combination of CALI and voluntary automobile insurance.



When discussing about impacts of automated driving on legal and insurance systems, the main point is liability for accidents. Compensation for the third party could be highlighted then, while it is expected that the first party indemnification (the insured's own bodily and property damages) does not significantly change.

Subject matter of liability insurance is classified into bodily injury and property damage. At present, bodily injury up to a certain amount of damages (JPY 30,000,000 for death, JPY 1,200,000 for injury) is compensated in CALI, and the portion exceeding that amount is compensated in voluntary insurance. Property damage is only covered in voluntary automobile insurance.

Legal basis for property damage compensation (which triggers voluntary insurance payment) is tort liability based on the Civil Code. It adopts the principle of liability for negligence, i.e., the liability will not arise on the driver if there is no negligence by the driver's side. In addition, if there is negligence both on the driver's side and the victim's side, it will be subject to comparative negligence. The burden of proof for the driver's negligence lies on the victim's side.

On the other hand, however, CALI (its compensation for third party) adopts "liability of an Automobile Operator" under the Act on Securing Compensation for Automobile Accidents, a special law of the Civil Code. The Act places strict liability on the automobile owner or automotive transport business operator, and therefore the victims do not have to prove the perpetrator's negligence. If a perpetrator claims his/her innocence, he/she has to prove his/her exemption from liability by his/herself. If he/she fails it, then he/she is liable. This strict liability is also adopted in the case of accidents arising from defects in automotive structure or function.

This mechanism has ever achieved prompt and effective relief for victims and therefore contributed to stable automobile insurance systems in our country for sixty years, which would be proud achievement in the world.

3. Japanese legal system related to automated driving – The current liability will be maintained in the "transition period".

By Seiichi Nishioka, July 4, 2018

There is no unified system to deal with accidents' liability commonly in the world. In Japan, discussions on liability related to automated-driving accidents have been proceeding, while being attentive to international trends on this matter. Related issues have been examined on the basis of the Act on Securing Compensation for Automobile Accidents (the Automobile Compensation Act), at the Research Panel on Liability related to Automated Driving which was set up at the Ministry of Land, Infrastructure, Transport and Tourism (of which the secretariat was entrusted to our company's group since fiscal 2017) and they finalized a report in March 2018.

This report sorted out five issues in the transition period around 2020 to 2025, i.e., the period with mixed traffic of automated and non-automated vehicles. Therefore, Level 5 (full automation) is outside the scope of it.

Among those issues, the most essential one is related to the liability of the Automobile Operator, it makes automobile owners bear strict liability in effect.

Three proposals were presented by the Panel (see the chart below). Each of them has different approach in terms of how to deal with liability in accident cases caused by automated-driving systems. The report concluded that Proposal 1 is appropriate in light of achieving prompt and effective relief for victims, considering that automobile ownership and its using behavior would not change from their current status in the transition period.

Compulsory Automobile Liability Insurance:

Proposals on liability related to automated driving around the transition period (2020-2025)

	Overview
Proposal 1	While maintaining the existing liability of the Automobile Operator, it should be considered to develop a framework which secures insurance companies, etc. to effectively exercise the right to claim subrogation against automobile manufacturers etc.
Proposal 2	While maintaining the existing liability of the Automobile Operator, measures should be considered to newly place a certain amount of burden to automobile manufacturers, etc., in advance as premiums of compulsory automobile liability insurance.
Proposal 3	While maintaining the existing liability of the Automobile Operator, regarding accidents during the use of Automated Driving Systems, the option could be considered to impose the strict liability on automobile manufacturers, etc., under a concept of "System Providers' Liability" which could be newly established (on the condition that the Automobile Liability Security Act is applied to all levels of automated driving then).

The Panel's conclusion brings a great implication to industries, as it clarified that the existing liability relations in accidents are maintained. This encourages auto manufacturers, startups as well as insurers to surely push forward with business developments, while standing on the existing liability relations in the transition period.

On the other hand, however, as for accidents arising from automobile defects, insurance companies will claim ex-post subrogation against auto manufacturers under product liability. Therefore the report also refers that measures should be considered which ensure the effectiveness of insurer's subrogation claims exercised against automobile manufactures in Proposal 1. Concrete measures suggested in the report are: (i) event data recorders (EDRs) and other equipment that can contribute to an analysis of the causes of accidents, (ii) a cooperative relationship between insurance companies and auto manufactures, (iii) a system for investigating the causes of accidents in automated-driving mode, which contributes to improving the safety of automated driving vehicles, and (iv) utilizing related information including automotive recall.

It should be noted that the report only deals with liability within a framework of the Automobile Compensation Act and therefore some issues are beyond its scope. Another consideration should be given to address liability prescribed under the Civil Code and product liability, on which property damage

compensation is constructed in voluntary automobile insurance, as well as criminal liability.

The government has presented the direction for revising road traffic laws and regulations in the Charter for Development of Legal System and Environment for Automated Driving Systems which was compiled in April 2018, and it is expected to continue the examination at follow-up meetings.

4. Discussions on international treaties on road traffic - Revisions are needed.

By Arisa Takeuchi, July 5, 2018

In developing a legal system related to automated driving in each country, two international treaties on road traffic require revisions, because with the aim of standardization, they are superior to laws and regulations of signatory countries.

One is the Geneva Convention concluded in 1949. Japan ratified it in 1964 after developing domestic laws and regulations including Road Traffic Act in accordance with it. Nearly one hundred countries have ratified including the United States, the United Kingdom, and Southeast Asian and African countries. This treaty requires that a driver is always fully in control of a vehicle in traffic, and places an obligation on a driver to always conduct appropriate operation and pay attention to other road users' safety. However it does not assume the driving conducted by a system. Therefore, the treaty will need to be amended so that advanced automated-driving vehicles of Level 3 (conditional automation) or above are allowed legally.

Discussion on amending the treaty was taken place in the working party (WP1) of the United Nations Economic Commission for Europe, and a proposal for amendment was adopted in 2015. However, it has not yet taken into effect, and the reason is that countries' different attitudes toward automated driving make it difficult to achieve the two-thirds of signatory countries' agreements, which is the requirement for implementation of the amendment.

Another treaty is the Vienna Convention, which was concluded mainly by European countries in 1968. This treaty also has similar provisions requiring a driver to be always fully in control of a vehicle in traffic.

The Vienna Convention was amended in March 2016 after examinations in WP1. Provisions were added to the treaty so that highly-automated driving is allowed if the vehicle is equipped with functional structure which ensures driver's take-over action and stops automated driving mode if needed. All the countries in Europe has signed this treaty and the countries (except the United Kingdom and Spain) already ratified, however, Japan and the United States has not signed it. Accordingly, it brings the contrasting situation; ratified countries can proceed with facilitating domestic laws in order to allow commercialization of automated driving vehicles, but non-ratified countries can't.

On the other hand, requirements for public-road testing of automated driving vehicles were further relaxed than the treaties, after related countries agreed on it. In April 2016, WP1 decided to allow field testing, on condition that a person can control the vehicle either from inside or outside the vehicle. This decision enabled remote-monitoring (unmanned automated driving vehicles') field testing as well as the testing where a driver is riding on the vehicle in each country. As a result, field testing of automated-driving are becoming popular among advanced countries.

5. German legal system – The first country to have completed revision.

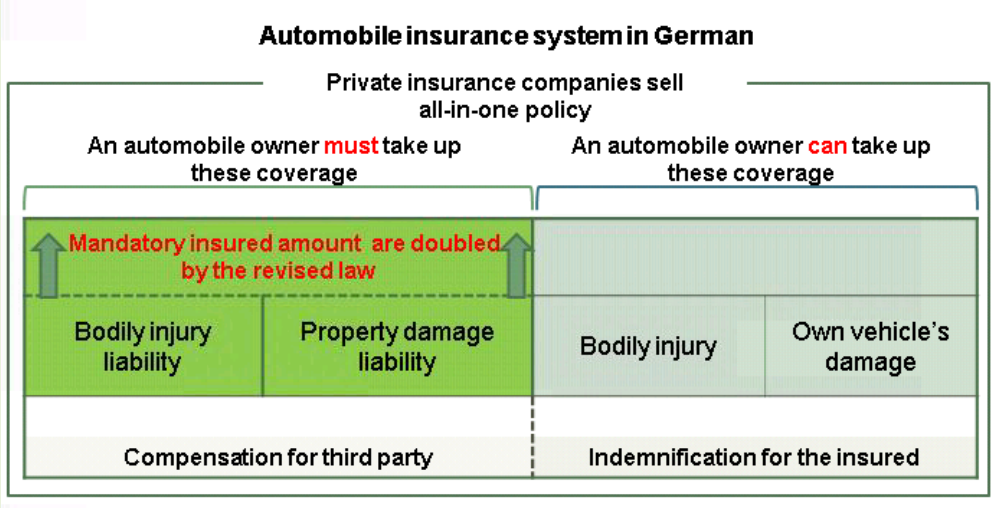
By Arisa Takeuchi, July 6, 2018

Law developments are decisive to secure the public's acceptance of automated driving, as laws clarify what party among related parties bears liability for damage compensation in accident cases, how compensation is processed in accordance with sharing of liability. Insurance framework is build upon these definitions. For that reason, issues on legal system suited for automated driving have been actively discussed in Europe and the United States.

Now I will introduce the example of Germany, it has revised a road traffic law and allowed use of automated-driving vehicles earlier than any other countries.

The revised road traffic law was put into effect in June 2017. Automated driving is assumed to be equivalent to Level 3 (conditional automation) under that law. During automated driving, the driver is obliged to maintain his/her attention in order to take over driving at any time in response to a requirement from the system. While telephone calls are permitted under certain conditions during automated driving (i.e., second activities), however, some activities including sleeping are still not allowed.

Notably, as for resolution of automated driving vehicles' accidents, the current framework will be maintained, and by that framework victims' relief is addressed by way of the civil liability and compulsory insurance. German insurance system is different from Japanese: their compulsory liability insurance is not a government-operated system like Japanese Compulsory Automobile Liability Insurance, and compulsory insurance in Germany obliges an automobile owner to take up coverage of both bodily injury and property damage from private insurance companies, attached with the statutory insured amount.



The owner, a person who uses the vehicle for his/her benefit and has the authority to do so, bears strict liability in effect. Whether the vehicle in question is automated or non-automated driving has nothing to do with this liability.

This approach could realize prompt relief of victims as automobile insurance payment is triggered also in disputable cases where auto manufacturer's product liability is likely to be claimed. The statutory insured amounts for automated driving vehicles were raised up to double of the amounts for traditional vehicles (i.e., 10,000,000 euros for bodily injury and 2,000,000 euros for property damage). By providing almost unlimited-coverage, it aims to mitigate the public's anxiety against the coming new technology.

Another notable point is that the revised law covers utilization of data generated by automated-driving vehicles. New obligations are established in it, obligation of data-recording and saving for a certain period including time and locations information, concerning when and where sifting driving operation occurred between a person and system, or when the system got in trouble. Such data is collected by satellite positioning, navigation and timing system. This makes it possible to objectively analyze whether a person or a system was steering the wheel at the moment of an accident. Further discussions are awaited on details such as concrete standards for data-recording media and requirements to grant the parties to access records.

The revised law is a temporary legislation until 2019 and reexamination is expected from 2020 onward, with taking account of technological development then.

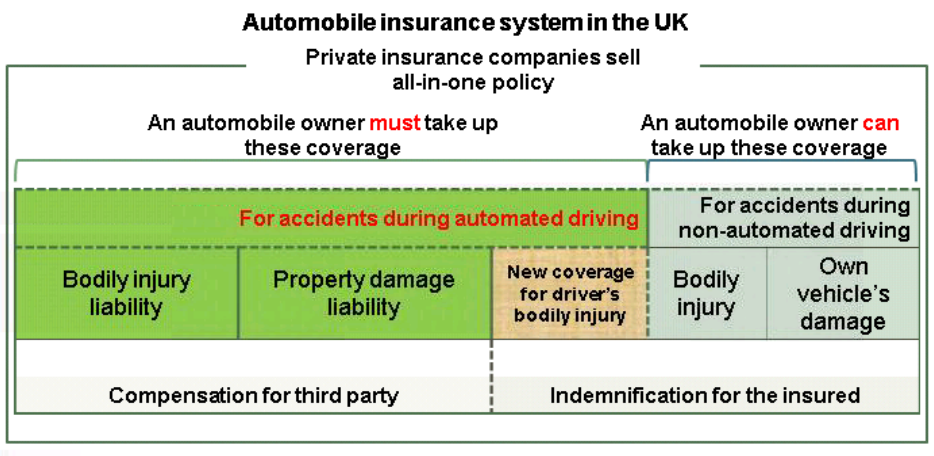
6. The UK's legal system – New legislation is coming soon.

By Arisa Takeuchi, July 10, 2018

(Note: The Automated and Electric Vehicles Act was passed on July 19, 2018.)

In the United Kingdom new legislation is proceeding under the national strategy aimed to full-fledged introduction of automated driving vehicles by 2021. Parliament has reached the final stage of the deliberation on the bill on automated and electric vehicles. The bill includes development of both automated and electric vehicles. Here I will highlight the bill's part on automated driving vehicles.

Characteristically, the bill focuses on a compulsory insurance system. This reflects the environment in this country where the majority of owned vehicles were imported from foreign manufacturers and therefore automobile industry's voices are hardly heard. On the other hand, the UK is the birthplace of insurance business and the insurance industry has strong commitments. Accordingly, lobbying activities of the insurance industry, which were mainly led by the Association of British Insurers, greatly contributed to the bill.



The UK's compulsory insurance system obliges an automobile's owner to take up coverage attached with the statutory insured amount (for both bodily injury and property damage) from private insurance companies. It is the same as the way of Germany. As for statutory insured amounts, bodily injury is unlimited, and property damage is 1,000,000 pounds or more.

Both the UK and Germany have applied the principle of liability for negligence to tort actions and thus accidents' victims cannot be compensated unless he/she prove the perpetrator's negligence by him / or herself. However, there could be cases where the driver of automated driving has no negligence in its accident and instead the vehicle's malfunction or defects (in other words, product liability of auto manufacturers) is in question. In those cases it will take long time until the liability is settled, therefore prompt relief of victims is hardly possible if they have to wait the resolution before making compensation claim. Taking account of this disadvantage, the bill intends to revise the compulsory insurance system so that insurance companies can make insurance claim payments without waiting the proof of negligence conducted by victims in any bodily injury and/or property damage cases on automated driving accidents.

Specially noted is that damages of drivers themselves who were killed or injured during automated driving are additionally included into the scope of compensation by the bill. They are positioned as "victims of automated driving system".

The bill clearly grants insurance companies the right to make subrogation claims against the third party who is liable for compensation, as well as creating a framework for prompt relief of victims by means of compulsory insurance.

What kinds of vehicles are to be regarded as the automated driving vehicles, which are subject to the new compulsory insurance system? The bill stipulates that the Secretary of State for Transport designates (lists) them and only those vehicles fall into the scope. The UK's insurance industry insists that Level 4 (high automation) or higher vehicles should be listed in order to correspond to liability's shift from human to system. Concrete measures depend on future deliberations, and in reality they will be affected by the development trends in foreign automakers, which occupy a majority of the UK's car markets.

7. The United States' legal systems– Different among states

By Arisa Takeuchi, July 11, 2018

In the United States, public-road tests of automated driving vehicles are being actively conducted in states under laws set by state. Supervisory authority over traffic related matters is vested in states and it includes legislating and enforcing road traffic laws as well as vehicle inspection and registration systems.

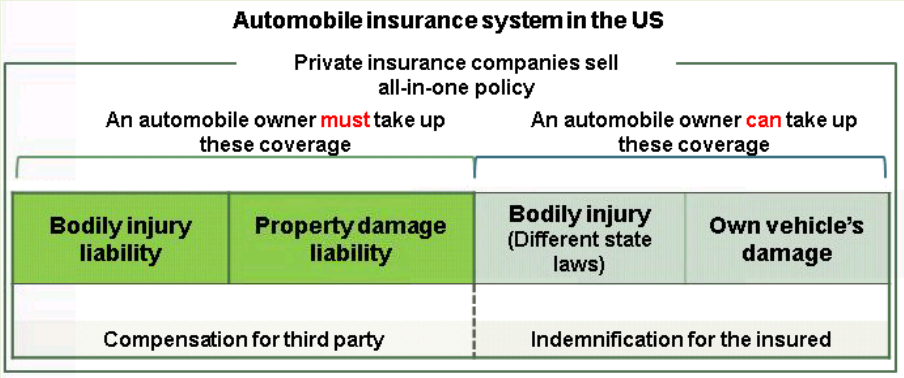
Recently, they recognized that federal laws are essential in order to address the problems arising from different safety requirements for testing vehicles among states. In the midst of this context, the House of Representatives passed the SELF DRIVE Act in September 2017, and the Senate has been deliberating the

AVSTART Act since October 2017.

These bills cover Level 3(conditional automation) to Level 5 (full automation) of automated driving vehicles, more broadly than any other major countries. They also intend a unified framework to secure the safety of automated driving vehicles across the country.

Concrete measures include new obligations of auto manufactures and system developers to submit safety-evaluation reports and to design cyber security plans. Revision of automobile safety standards is also stated in the bills.

Meanwhile, aiming for promoting development of automated driving vehicles, they propose relaxation of safety requirements to public-road testing vehicles while ceiling the number of vehicles to which such relaxation is applied. Initially the bills were to be passed by the Senate at the end of 2017. However, consumer groups and some members of Congress raised an objection against these relaxation provisions, saying that provisions will endanger citizens as guinea pigs. In March this year in the midst of arguments a fatal accident occurred, an Uber automated driving vehicle hit a pedestrian, and opposition against the proposed relaxation has escalated. Thus, future prospects towards legislation of federal law are unclear.



The bills also intend to clarify the demarcation of authority between the federal government and the states. Laws related to compensation and insurance will remain under the supervision of states. Generally, states' compulsory insurance obliges an automobile owner to take up bodily injury and property damage coverage to third party, attached with the statutory or higher insured amount, from private insurance companies (the same way as Germany and the UK). In some states an automobile owner also has to take up coverage for driver's bodily injury or protection against uninsured vehicles.

The National Highway Traffic Safety Administration (NHTSA) announced a guideline called "A Vision for Safety" in September 2017 and they encourages state governments to start considerations on sharing of liability among automobile owners, drivers, passengers, and manufacturers and those on the role of insurance. However, as of now full-scale discussions have not started yet and any movements have not been acknowledged towards revising the current states' system for automated driving vehicles.

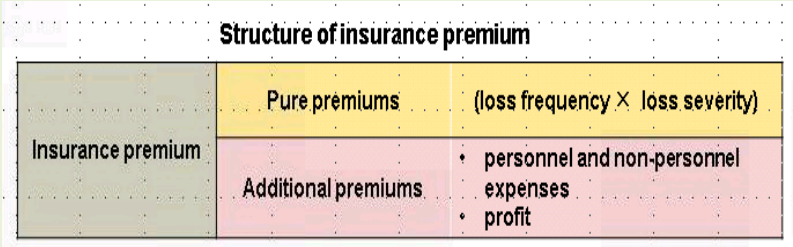
8. Impact on insurance companies – Traffic accidents reducing, what will happen with insurance?

By Nobuhisa Ishio, July 12, 2018

Along with popularization of automated driving vehicles, traffic accidents are expected to decrease. Insurance companies have to respond to that change in a flexible manner so that they continue to play an important role in society. How will such change affect insurance business?

Before going to the future prospect, it would be of use to refer what insurance premiums are comprised of. Automobile insurance (including compulsory liability automobile insurance) accounts for about 60% of net premiums income of general insurance companies.

As shown in the chart, insurance premiums are composed of pure premiums (the portion corresponding to estimated claim payments) and additional premiums (the portion corresponding to non-personnel/personnel expenses as well as profit).



US KPMG estimates that by 2040, number of traffic accidents would be reduced by approximately 80%. On the other hand, it also pointed out that vehicle's repair costs will increase as expensive parts such as sensors and cameras are equipped with automated driving vehicles, and that accidents will be intensified if automated-driving vehicles clash without slowing down travel speed. Whether or not a total amount of claim payments will definitely decrease is unclear: paid claims per accident will increase, while number of accidents will reduce in total. Considering the length of time until automated driving vehicles become fully popularized, its impact on insurance premiums does not seem to come out immediately. Close attention should be paid to technological development and its popularization speed.

On the other hand, it is clear that insurance companies have to enhance their claim handling capabilities. Insurance companies have conducted out-of-court settlement negotiations for a traffic accident on behalf of the insured and conducted negotiations on sharing of accident's liability (ratio of comparative negligence) between the parties through interviews to the parties and identifying accident situation.

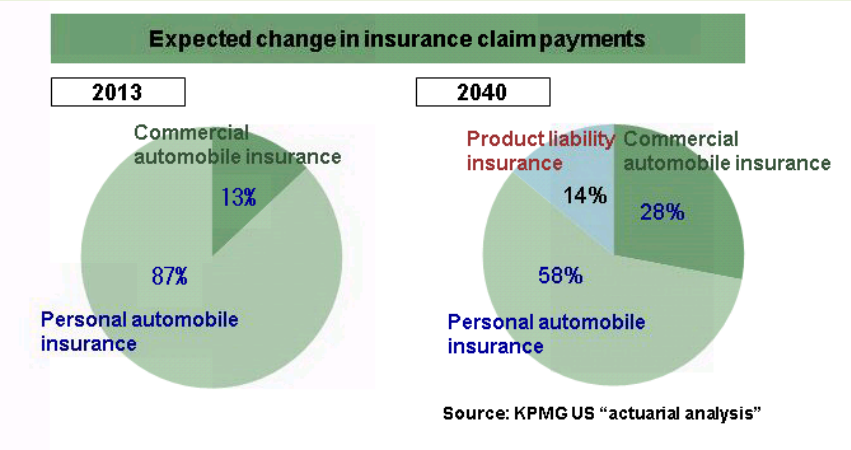
In April, the National Police Agency published the "Investigation and research for staged realization of automated driving in accordance with the direction of technology development". They state that in the future a driver's other activities such as using smartphone and reading could be allowed during automated driving of Level 3 (conditional automation) or higher. If it happens, there will be such accident cases where the driver doesn't see anything at the moment of his/her accident. Thus, accident analysis will become even more important by using in-vehicle datasets and dashboard camera. Further technical skills and expertise are required to continue out-of-court settlement negotiations, which insurance companies have ever handled, in the coming automated driving society.

9. Business opportunities for insurance companies – Expanding roles of insurance companies

By Nobuhisa Ishio, July 13 2018

Automated driving will also bring opportunities for expanding insurance companies' roles. It would make personal car-ownership less important. On-demand mobility service utilizing automated driving will become popular, and then people can call it anytime they need it via smartphone and automated driving vehicles take them to their destinations.

If such mobility-service business goes the mainstream, general insurance companies can find out a certain role by having contact with those business operators. In some cases, insurance companies can leverage their existing relations with transportation providers (such as taxi and bus services), who currently have insurance businesses with them.



In addition, while the number of accidents will decrease along with popularization of automated driving, accidents due to system's defects will relatively increase among them. If parties such as auto manufactures bear liability related to the accident, its compensation will be addressed in product liability (PL) insurance.

Automated driving vehicles are connected outside via internet, as well as internally controlled by high

performed computers. They face cyber risks such as hacking and infection of computer viruses. New types of trouble incidents are concerned that traditional automobiles have never had.

As for hacking cases, the study group established in the Ministry of Land, Infrastructure, Transport and Tourism's concluded that an automobile owner is thought to be liable as the Automobile Operator, if he/she have not taken any security countermeasures and therefore violation of an obligation for maintenance and inspection is recognized. General insurance companies are expected to find their roles related to cyber risks for automobile industry and transportation services industry, by providing "loss prevention" consulting and cyber insurance.

However, further discussions are awaited on to what extent owners' obligation will be required as for maintenance and inspection of automobiles and in what types of situations will parties such as auto manufactures bear liability for the accident.

Unmanned driving in fully automated driving vehicles; it brings issues on how passengers and victims should be assisted in the wake of the accident, or how passengers can address those situations without any vehicle operators being together with them. Opportunities are there for insurance companies to redefine insurance company's roles. Collaboration with towing services and/or security services companies could be crucial in developing insurance services, and those include dispatching a rescuer and providing alternative transportation for passengers, etc.

10. Product development in automobile insurance – Products have already been released.

By Nobuhisa Ishio, July 17, 2018

Although the advent of fully automated-driving era is still in the future, we can say that things are moving forward, like as advanced safety vehicles into the market and public road testing in certain areas across the country. Technology progress will change things rapidly and therefore insurance products cannot address it in their conventional way.

Insurance companies have already brought into the market their products and services responding to such changes. Here I would like to introduce our products. Hopefully, it would help foresee a future image of automobile insurance.

The first example is a special endorsement which covers accident victim's relief when the driver of automated vehicle (the insured of the endorsement) is not liable for the accident itself. We released it in July 2017. Existing automobile insurance indemnifies the driver's compensation to the third party, on condition that the driver's liability related to the accident is recognized due to his/her use of automobile. On the other hand, if the driver does not bear civil liability and the cause of accident belongs to other than the driver, this is out of indemnification under automobile insurance.

In automated driving, accidents could occur due to vehicle's system defects. Some cases would be challenging to judge whether a driver or an auto manufacturer is liable for the accident, and whether the accident is due to the former's operation mistake or vehicle's defects. Such cases are delivered into lawsuit and then prompt relief of victim would be difficult. Furthermore, is it acceptable in society that the victim cannot have any compensation as a result when lawsuit reached a conclusion that the driver has no liability?

This special endorsement addresses such problems. On condition that: (i) an accident clearly occurred due to malfunctions arising from vehicle's defects, and (ii)it is possible to judge that the driver has no liability for compensation, then, amount of expenses equivalent to damage compensation is paid to the victim. Thus, victims are compensated in both cases where the insured party is liable and not, by third party liability insurance or the special endorsement. It will achieve prompt victim's relief.

However, discussions remain on questions whether it is reasonable in light of social convention that a non-liable driver pays expenses to the victim by his/her insurance endorsement, even when automated driving has popularized, and whether it is possible for insurance companies to exercise subrogation claims against auto manufactures for the vehicle's defects. Product improvement is needed on an ongoing basis, in accordance with the way how automated-driving vehicles are accepted by consumers in society.

Another example of our products is insurance exclusively provided for field operational testing, which was

released in June 2016. Risks covered by this product are shown in the chart below. Field operational testing has been conducted under various conditions, such as a driver behind the wheel and/or remote-monitoring without it. Field operational testing will be further diversified and another indemnification of insurance can be needed.

Insurance coverage and services for field operational testing	
Vehicle's trouble	Expanding coverage for vehicle's trouble which traditional insurance excluded from its coverage
Liability	Expanding coverage for accidents arising from testing device's disorder as well as that of vehicle
Cyber	Coverage for personal data
Risk assessment	Identifying and evaluating all related risks in testing
Emergency readiness	Developing a emergency manual for testing

11. The public understanding on liability issues – still not enough

By Nobuhisa Ishio, July 18, 2018

Automated driving has various expectations including reduced traffic accidents and eased traffic congestion. When people deepen their understanding and have a preference for it, automated driving will dramatically spread in society. To what extent is the public currently ready to accept it in our country? I would like to introduce our awareness-surveys. We compared results in Japan and Germany (the former survey was conducted in 2017 and the latter in 2018, both targeted at ordinary people). Germany has some similarities as Japan; both have compulsory insurance system for victim's relief and major auto manufactures domiciled in the country. This is the reason why we compared survey results between them.

Firstly, a notable difference is acknowledged on the degree of understanding about the levels of automated driving technology. These concepts are adopted in related laws and regulation. Concerning the levels of SAE (the United States' Society of Automotive Engineers), which are divided into 0 through 5, only 30.5% respondents understand it in Japan, while in Germany the number reached nearly double at 57.0%. Many people answer that they like to drive in Germany, and this tendency seems to correlate with deeper understanding about automated driving.

Another difference between both countries is regarding the question of who should bear civil liability for accidents during fully automated driving. In Japan 55.6% of respondents said that the driver should do, while in Germany such answers represent 35.9%.

Do you think that a driver should be liable rather than other parties (auto manufacturer, system provider, etc.) for accidents during automated driving? (Japan)

Respondents who are positive to use a fully automated driving car	Respondents who doesn't have any ideas on what they want to do when they are riding on a fully automated driving car
- 61% 'No, other parties should be liable.' - 39% 'Yes, a driver should be liable rather than other parties'	- 34% 'No, other parties should be liable.' - 66% 'Yes, a driver should be liable rather than other parties.'

Source: "Awareness survey on automated driving car" by Sompo Japan Niopponkoa

On the other hand, a common finding in both countries is that more reliable they feel to automated system, their willingness for using automated driving vehicles is stronger. In addition, some people don't seem to find any benefits of automated driving in both countries: they answered that the driver is liable during fully automated driving and that they don't have any ideas on what they want to do during automated driving.

Thus, if the driver must bear liability even in accidents during automated driving, people might be hesitating to use automated-driving functions.

The research panel of the Ministry of Land Infrastructure, Transport and Tourism compiled a report related to

automobile liability insurance (compulsory automobile liability insurance) in March 2018. They concluded that existing strict liability of the automobile operator will be maintained in the transition period with the mixture of automated and non-automated driving vehicles. However, they stated that in the future time of full automation (Level 5), liability for accidents will be reconsidered.

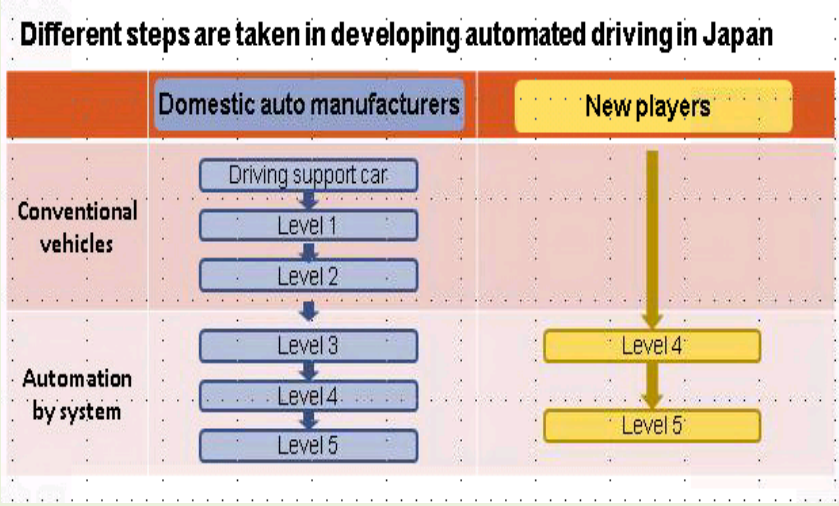
As seen from our survey results, people's attitudes are not uniform as for compensation liability for accidents during automated driving. It will be challenging to address liability issues at the stage of Level 5. However, prompt relief of victims is unchangingly crucial in the future. Reflecting it, they might end up the same conclusion in the case of Level 5, maintaining strict liability.

12. Different approaches of automated driving development – Different risk attitudes

By Masashi Shinkai, July 19, 2018

When we consider insurance products in the coming automated driving era, catching up with the technology advancements is essential. Particularly, attentions should be paid to companies' approaches and strategies which they adopt in developing automated driving.

Broadly speaking, there are two types of approaches. One is upgrading safety supporting functions and the other is going directly to full automation. The former approach is adopted by incumbent auto manufactures and the other is new business players'.



In Japan, advanced driver-assistance systems (ADAS) have been developed under the "zero fatal-traffic accidents" policy, and equipment of automatic emergency braking (AEB) into vehicles is currently proceeding. Level 2 (partial automation) vehicles also have been put on the market. Incumbent auto manufactures are advancing driving automation gradually by installing driver-assistance systems into vehicles and enhancing safety and automation through it, while assuming human's driving.

Another is open-type approach conducted by new business players such as tech-companies. They improve their product's performance through field testing on public roads. Tesla implemented automated-driving functions "Autopilot" (equivalent to Level2) by software-updates. This approach is similar to software development, by which tech companies improve their product while letting many people try it.

It can be said that risk attitudes are different between incumbent manufacturers and start-up companies, although both of them are engaged in vehicle development. Insurance industry has mainly looked at incumbent manufacturers in developing insurance products. What kinds of insurance and additional services will be suited for start-up's approach? Understanding such companies' risk attitudes will be crucial.

On the other hand, automated driving will change considerably vehicle's maintenance to secure safety. Automated driving vehicles are composed of computer instruments, and thus they require another type of maintenance such as online software updates, etc. Can personal owners handle it surely and in a timely manner? If people feel it troublesome to handle it by them, they might change their mind: shift from vehicle ownership to sharing. It will become necessary to design new insurance products responding to sharing, while traditionally automobile insurance has focused on vehicle ownership.

13. Joint research and alliances

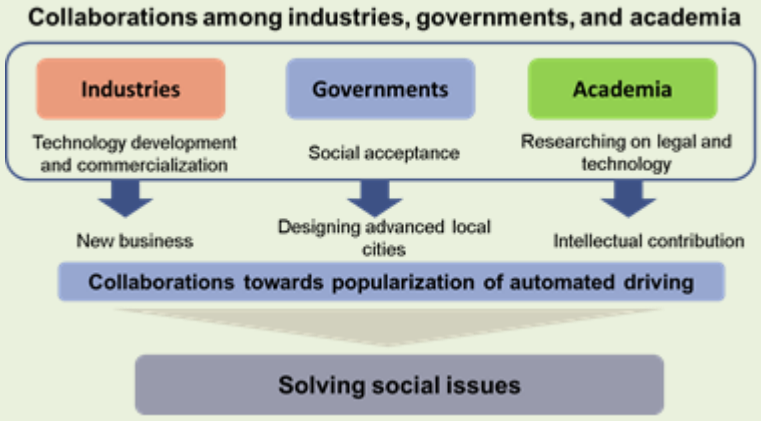
– Collaborations are spreading globally among industry, governments, and academia.

By Masashi Shinkai, July 20, 2018

Automobile industry is in the midst of major change such as only comes once in 100 years, and a race on development of automated driving technology has intensified. Consumer's behavior to use cars is also changing, which reflects their awareness. In order to respond to the coming new automobile society, researching new technology and business is important. Therefore, collaboration with other industries and research institutes are becoming active globally as well as in Japan.

One major example is the self-driving vehicle project that was launched by the World Economic Forum (WEF) in 2016. Various industries participated in the project: more than ten of the world's major motor companies (which include Toyota, Nissan, GM, Volkswagen (VW), BMW, Hyundai, and Volvo), tech companies, emerging mobility businesses, and insurance companies (including our company). It aims for creating a global system and standards for automated driving, and it conducted field operational testing on public roads in cooperation with the City of Boston.

Such kinds of projects also have been launched in Japan. One is the "Aichi Automated Driving Promotion Consortium", which mainly comprises of industries, universities, and municipalities operating in Aichi Prefecture. In this area, automobile industries are leading its local economic activities. While sharing updated information related to automated driving, this organization conducts matching activities between local municipalities and companies who are planning field operational testing. Insurance companies have also been engaged in it, too.



In addition, each insurance company is promoting its collaboration independently. I would like to introduce our company's case. In May 2017, with the aim of insurance products' development for automated driving, we set out joint research with Dr. Shinpei Kato, associate professor of the University of Tokyo. He is a founder of startups which develops automated driving systems, Tier IV, Inc. (based in the City of Nagoya). We are also cooperating with an oversea research institute, Center for Automotive Research at Stanford (CARS). Recently, we started collaboration with AISAN TECHNOLOGY, the company which produces high-accuracy three-dimensional maps that are essential for driving by automated driving vehicles.

What are insurance companies doing in joint research and field operational testing? In our company's case, employees go to every field operational testing and observe it from preparation to testing. Test vehicles are equipped with a set of highly accuracy devices including cameras and high-performance sensors, and they are connected with a complicated system. We collect various data originated from such system.

Automated driving era will arrive soon. Insurance companies around the world are cooperating with various industries and conducting investigations and researches through field operational testing of automated driving.

14. Insurer's purpose and roles in field operational testing

By Masashi Shinkai, July 23, 2018

Development, research, and driving tests for automated driving vehicles are proceeding in various locations throughout the world - Insurance companies are actively engaged in them, but what kinds of intentions do they have? I would like to explain it throughout our company's example.

Needless to say, catching up with updated technology trends is one of them. Continuous input is essential, considering uncertainty on what automated driving vehicles will be like in the final stage. Opportunities to touch with the most advanced technology are valuable for insurance companies, so that they can find out tips for the future insurance business from them.

If fully automated driving comes true completely, traffic accidents caused by systems will increase. Advanced knowledge related to information technology will be essential in investigating accident causes. How do they analyze information such as disorders and errors that occurred with automated driving systems? Thus, field operational testing provides the best opportunities to accumulate knowhow related to investigation of causes and designing insurance products. And, it's also suggestive in developing human resources in insurance companies. In this way, insurance companies have been involved at an earlier stage and do collect and analyze data.

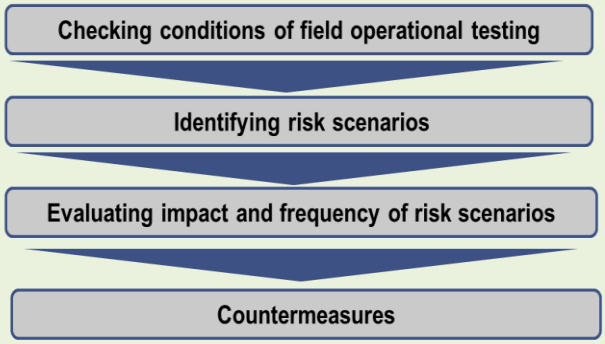
Another consideration is regarding B to B business. New types of transportation services are coming out one after another. By participating in their field operational testing, it will be possible to proceed with developing insurance products and services that respond to such service provider's needs.

In addition to such future-business considerations, insurance companies are also contributing to tests with their own experience and knowhow: insurance and safety measures (we say "risk assessment"). Risk assessment includes evaluation of dangers and taking countermeasures on scenarios-basis.

Many start-ups have entered into automated-driving development, and some of them are from other business sectors. Their safety-awareness varies by companies as they don't have rich experiences, while traditional companies such as auto manufactures, cultivated their experiences and knowledge over a long time period. Insurance companies contribute to enhancing such participants' safety awareness by participating the testing. We are promoting it by facilitating safety meetings with their managements and having daily exchanges between employees.

Insurance companies' assistance is increasingly needed for ensuring safety readiness in field operational testing. We continue to work together with them, seeking for the future automobile transportation.

Risk assessment process for field operational testing



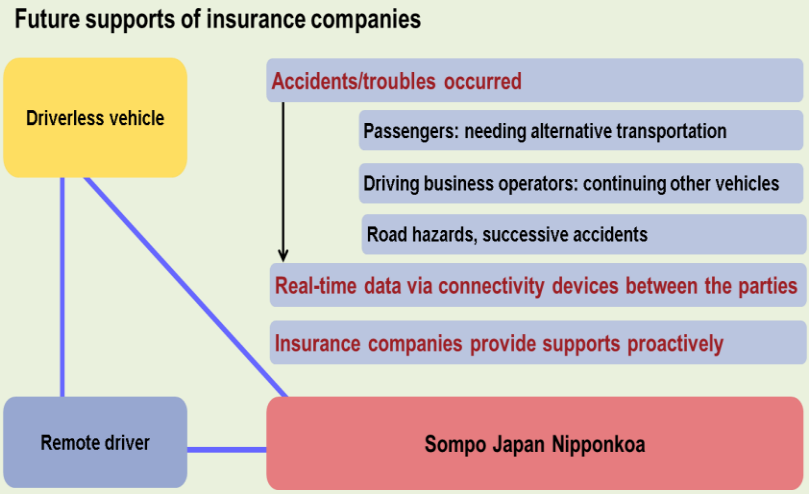
15. Insurer's field operational testing – accident handling will change significantly.

By Masashi Shinkai, July 24, 2018

We have already pointed out major impacts on insurance associated with popularization of automated driving, such as liability and insurance for damage compensation. Besides, handling in the wake of accidents will also be affected, especially taking account such cases where fully-automated driving doesn't need a driver behind the wheel.

Remote-type automated driving vehicles are likely to be realized in advance of fully automated driving by systems. The government has set a goal of starting transportation-service of unmanned cars on public roads by 2020. Then, the operation system is supposed to conduct "1-N" remote-monitoring against unmanned automated-driving vehicles and remote-steering intervention in dangerous situations. Here I would like to highlight some issues related to accidents/troubles in remote-controlled automated driving.

The first point is related to performance of the obligation under the Road Traffic Act. Article 72 provides some obligations to drivers: aiding injured persons, preventing road hazards and the spread of damage, and reporting to the police. In the case where no drivers are behind the wheel, who will bear these obligations that are currently imposed on the driver itself? These obligations should be reconstructed, taking account remote



operators who handle multiple vehicles, as well as in terms of victims' relief.

The second point is passenger's uneasiness at the time of an accident. It is important for related industries to enhance the public's understating on automated driving vehicles and provide correct knowledge related to accident handling, by disseminating information in an elaborated manner.

How should insurance companies contribute to it? One of our company's initiatives is evolving the accident services, which currently provide towing and dispatching a rescuer, in cooperation with a security service company. Further advanced initiative is the "Connected support center", which links automobiles with connectivity technology. By real-time monitoring, the center grasps accident and trouble conditions instantly, accurately, and in detail and it proactively provides assistances. Thus, towards the future mobility society which automated-driving brings, we are aiming to establish a new insurance service model by responding to uneasiness of people (vehicle passengers and operators, etc.,) against accidents.

We are planning to participate in driving tests of multiple remote-controlled automated driving vehicles. We will collect various data through these tests and utilize them to create more-valued services to accidents/troubles.

16. Future Japanese legal system – Paramount priority should be placed on victims' relief

By Seiichi Nishioka, July 25, 2018

How should civil liability be constructed when a traffic accident arose from an automated-driving vehicle? There are too complicated issues to jump into the conclusion, while various related parties have been discussing on this matter. I would like to summarize such issues related to laws and existing insurance system.

In addressing new technology that has never been before, the concept of legal system is largely depending on the public's consciousness and thoughts. In discussion at national level, they view victims' relief as the most important thing. I do agree with their standpoint, as victims' relief is the highest priority also in terms of securing stability of the legal system. If the legal system degraded it and thus provided only insufficient relieves to people, it results in a social movement to require a legal system that places higher priority on victims' relief. The conclusion that has been made by the research panel at the MLIT is in line with this thought, and they say that strict liability of automobile owners should be maintained under Compulsory Automobile Liability Insurance in the transition period before fully automated-driving coming out. It aims for prompt response to victims without waiting for investigation of accident causes to be completed.

Factors that should be taken in consideration of legal liability for automated driving

- ✓ Victims' relief
- ✓ Automobile users' and drivers' acceptability
- ✓ Auto manufactures' understanding
- ✓ Reduction rate of accidents (frequency of accidents by automated driving vehicles)
- ✓ Oversea trends related to law system
- ✓ Technology development's speed
- ✓ Changes in using-behavior (such as promotion of sharing)
- ✓ Other related-parties' response (insurance companies, attorneys, etc.)

The current system has rooted in society by concentrating liability on the party who provides vehicle operation and aiming to provide prompt and effective relief measures for victims. Thus, it is considered appropriate to maintain this point for the near future. It is also compatible with oversea trends such as in Germany and the UK. How should it be addressed when the transition period has ended up and fully automated-driving has been realized?

Further discussions are awaited, while various perspectives are suggested now.

In addition, another consideration should be taken as for the timing of transition to a new legal system, and whether such transition should be conducted gradually or at all once. According to survey results which our company conducted to ordinary people, a certain number of people think that it is unavoidable that drivers who use automated driving vehicles and are enjoying benefits from the driving will bear some kind of liability in accident. Thus, it may be appropriate to gradually develop environment throughout accumulating practices in insurance system, so that automobile users and drivers can accept sharing of liability with their satisfaction, rather than the way of shifting legal liability directly to auto manufactures.

To date, to what extent automated-driving vehicles can decrease accidents is unclear, while such effect is expected. Furthermore personal vehicle-ownership might be diminishing in line with the progress of automated-driving technology and thus people might hardly bear the liability for accidents.

Considerations will be proceeding, with bearing in mind these changing factors and sharing the assumptions among related parties. In addressing changes such as come only once in 100 years, halfway solution is never accepted. As one of parties in industries, we will make efforts to build the best system which many people welcome.

17. Future Japanese insurance system – Non layers or two layers?

By Seiichi Nishioka, July 26, 2018

How should victims be promptly relieved in the case of accidents during automated driving in the future? This question concerns insurance system's structure. In Japan, two-layer insurance system, which comprises Compulsory Automobile Liability Insurance and voluntary automobile insurance, has worked for victims' relief for about sixty years. Would this unique system be still applicable to automated driving, without making any changes?

In fact, we should note that legal basis of compensations are different among two types of insurance: the Act on Securing Compensation for Automobile Accidents and the Civil Code. The Act on Securing Compensation for Automobile Accidents (the Automobile Compensation Act), which is the basis for claim payments in Compulsory Automobile Liability Insurance, places strict liability on the automobile operator such as an automobile owner, by which he/she has to compensate to victims, irrespective of whether or not there is negligence with him/her. On the other hand, regarding liability related to tort action under the Civil Code, which is the basis for claim payments in voluntary automobile insurance, compensation does not arise unless there is negligence in the driver.

Compulsory Automobile Liability Insurance and voluntary automobile insurance

	Compulsory Automobile Liability Insurance	Voluntary automobile insurance* *coverage related to the third party liability
Laws (the basis of liability)	Automobile Liability Security Act	Civil Code
Liability	the liability of an Automobile Operator	tort action
Approach	strict liability	principle of negligence
Compensation	victim's bodily injury	victim's bodily injury and property damage compensation
Automobile Inspection system	linked	not-linked
Insurance premiums	unified	not-unified
Risk classification	less (vehicle type only)	many
Grade- rating system	-	adopted

Such difference will bring some problems in the future.

In automated-driving vehicle's accidents, judgments for claim payments may differ, between the third party compensation with strict liability (which does not require the party's negligence in practice) and property damage compensation with tort action (which requires the party's negligence). It might become more prominent for automated driving, although it sometimes occurs even in the

current situation. Then, victims will have difficulty in proving the driver's negligence when they claim property damage compensation, as these factors such as more complicated vehicle's system and the driver who is not engaged in steering by him/herself will be barriers.

One of possible solutions is to extend the liability of the automobile operator, which is an outstanding concept of the Automobile Compensation Act, into overall insurance system which now is layered into two. This solution leads to relaxing the victim's burden of proof in voluntary automobile insurance. As a result, the current two-layer insurance system would lose one of reasons for maintaining it, and discussion will arise towards integrated (non-layered) insurance system.

At present Compulsory Automobile Liability Insurance has also worked for preventing uninsured vehicles through the linkage between insurance's validation period and timing of automobile inspections. Such benefits should be maintained in a possible integrated insurance system. In Germany, the law stipulates an obligation to purchase coverage both for bodily injury liability and property damage liability, and private insurers provide them as all-in-one policy. From my personal point of view, such practice will be feasible in our country if we build a new checking system related to an obligation to purchase insurance. In terms of operation costs as well, an integrated system would be advantageous.

On the other hand, there are various issues to be addressed, including differences in roles and functions which compulsory automobile liability insurance and voluntary automobile insurance have preformed and the government's guarantee (a security system for cases such as hit-and-run accident, when victims can't receive claim payment from compulsory automobile liability insurance). It is also important to keep in mind the fact that Compulsory Automobile Liability Insurance has provided safety-net in society and therefore it has strong public nature.

These matters have not been deliberated ever. Discussions should be elaborated from consumers' perspectives in reconsidering the two-layer system, as well as in deciding whether the insurance system should be operated by both the government and private sector. Industries should be actively engaged in it beyond their own positions and interests, taking this opportunity of automobile industry's revolution.

18. Missions of insurance companies – Redefining them

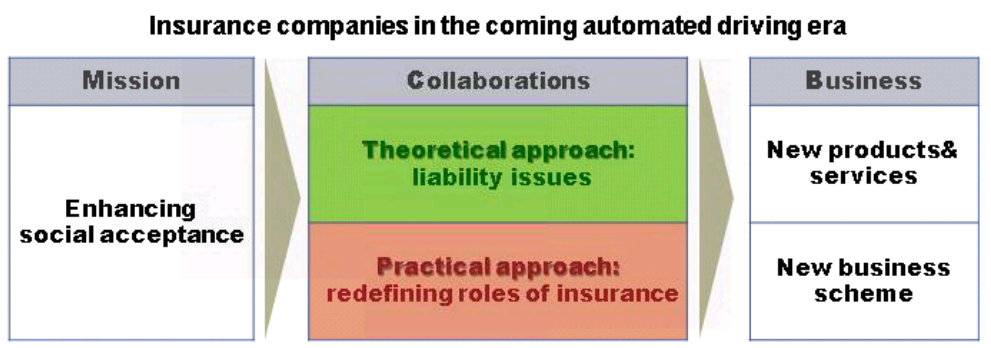
By Seiichi Nishioka, July 27, 2018

How should we respond to drastic changes in business environment? Knowing customers and reconsidering the company's mission is one approach. In concluding this series of articles, I would like to think about insurance companies' mission in the coming automated driving society. What will it be like in the future? It seems that insurance companies can uniquely contribute to those changes, not by directly promoting technology developments.

In the past, automobile insurance has taken root as a kind of social infrastructure, keeping pace with popularization of automobiles. Especially, out-of-court settlement negotiation, which is conducted by insurance companies on behalf of the insured, is one of good examples. It has been widely accepted by the public since this service was released after elaborated discussions with the Japan Federation of Bar Associations in the 1970s. It played a symbolic role of insurance to support worry-free riding, and thus contribute to enhancing public receptivity and popularization of automobiles.

This lesson is applicable to popularization of automated driving vehicles as well. Popularization of automated driving vehicles will probably be difficult without any supports for accidents/troubles. Accordingly, I think that insurance companies' paramount mission is to increase public receptivity of automated driving by providing their own knowledge and expertise.

In achieving "prompt and effective victims' relief" and providing "supports that matches with customers' needs", its approaches should be both theoretical (including studies on legal liability) and practical (including field operational testing).



It is pointed out that risks to be covered by automobile insurance might increase and intensify: cyber risks, new types of accidents with the mixture of automated and non-automated driving vehicles, and a rise in a unit payment per accident due to advanced vehicles' functions.

However, in the long term, the automobile insurance market will be unavoidably shrinking.

The most important is proactive actions by seizing signs of changes, and increasing the value of automobile insurance by cultivating new business amid intense competitive environment. These initiatives enhance the importance of insurance companies.

Now we are tackling those changes with a sense of crisis. Automated driving is rapidly developing. Once left behind it, it will be impossible to catch up again.

However, it's also a big chance towards automobile insurance's revolution. Deepening cooperation with related parties, we will continue to promote researches in cross-functional manner.

(end)

Photo by TierIV, AISAN TECHNOLOGY