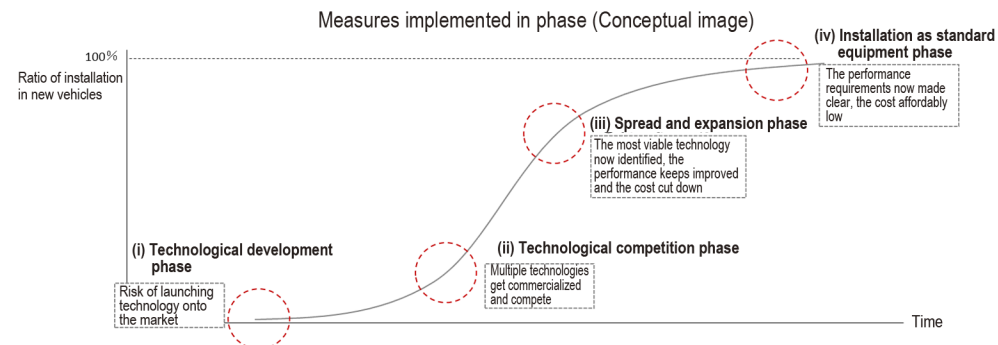
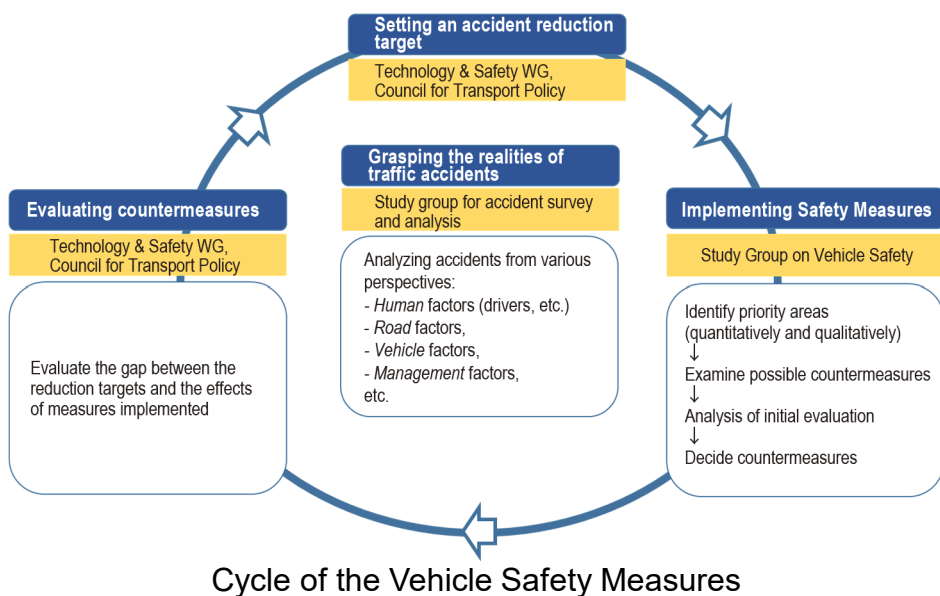


The Future of Vehicle Safety for a Traffic Accident-Free Society

Engineering and Environmental Policy
Division, Road Transport Bureau, MLIT

- Every 5-year, the Japanese government has studied necessary measures from the perspective of the three factors (*people, roads, and vehicles*), as well as emergency and lifesaving activities to mitigate the damage after accidents, established goals and measures in the form of “the Road Safety Master Plan”, which the entire government has promoted.
- To take measures from the perspective of *vehicles*, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has set up a Technology and Safety Working Group under the Automobile Traffic Subcommittee, Land Transport Subcommittee, Council for Transport Policy and discussed the issues.
- Vehicle safety measures in Japan have been implemented through the PDCA cycle, which, based on the analysis of actual accidents, sets targets for traffic accident reduction, implements measures, and evaluates the effects.
- Vehicle safety measures are required to be encouraged for the diffusion of such technologies across the market through appropriate implementation of policies in each stage (phase), from the birth of new technologies to their adoption as standard equipment.

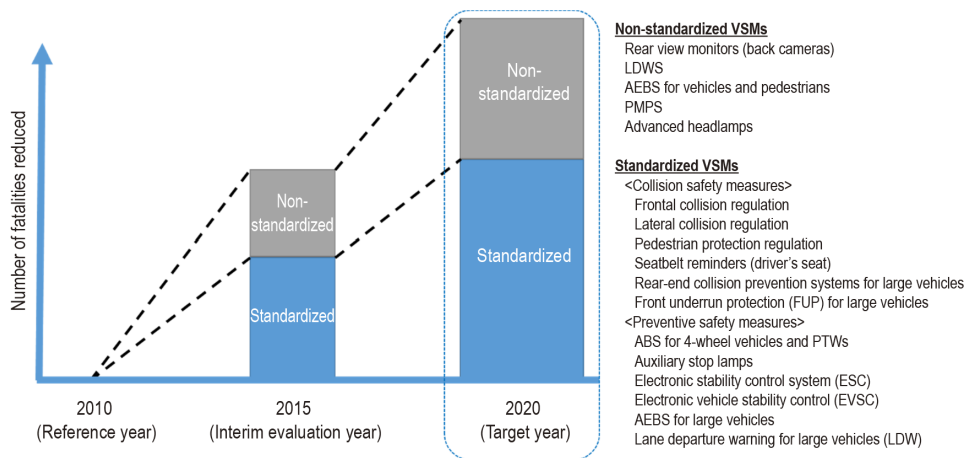


Phase	Purpose of the measures	Measures
(i) Technological development	Develop an environment favorable for the introduction of new technologies	ASV Promotion Plan, establishment of technological guidelines
(ii) Technological competition	Promote technological competition on the market	NCAP (Compare performance among models and publish the results)
(iii) Spread and expansion	Give incentives to spread installation	Subsidies for SuppoCars, subsidies for ASVs, tax credits for ASV, etc.
	The government stamps new technologies with approval	System that certifies performance
(iv) Installation as standard equipment	Installed on all vehicles, the minimum performance ensured.	Development of safety regulations

Phased implementation of the Vehicle Safety Measures

Reduction Targets So Far Achieved Through VSMS

- The 2011 report set a target of “reducing the number of annual traffic accident fatalities within 30 days by 1,000 by 2020 (compared to 2010) through VSMS.”
- By calculating the effect of each VSM on reducing the number of fatalities and by fine-tuning the primary areas in which these effects overlap, WG evaluated that **VSMS reduced the number of traffic accident fatalities within 30 days per year by 1,332 (compared to 2010).**



Approach to the evaluation of the effects of VSMS on the achievement of reduction targets

		Conducted in 2020	Subject accident types (Summary, conducted in 2020)	Subject vehicle types (Summary, conducted in 2020)	
Measures against frontal collisions	Frontal collision	438	Between vehicles, single vehicle	Cars (including K cars), trucks (including K trucks)	
	AEBS		Between vehicles, single vehicle	Cars (including K cars), trucks (including K trucks)	
Measures against rear-end collisions by large vehicles	AEBS for large vehicles	33	Between vehicles, single vehicle	Cars (10 or more occupants), trucks	
	Front underrun protection for large vehicles (FUP)		Between vehicles (rear-end collision)	Trucks	
Measures for pedestrians	Pedestrian protection	503	Pedestrian vs vehicle	Cars (including K cars), trucks (including K trucks)	
	AEBS		Pedestrian vs vehicle	Cars (including K cars), trucks (including K trucks)	
	Advanced headlamps		Pedestrian vs vehicle	Cars (including K cars), trucks (including K trucks)	
Other safety measures	Lateral collision	100	Between vehicles, single vehicle	Cars (including K cars), trucks (including K trucks)	
	Rear-end underrun protection for large vehicles (RUP)	10	Between vehicles	Trucks	
	FUP	71	Between vehicles (head-on collision)	Trucks	
	Seatbelt reminders	9	Between vehicles, single vehicle	Cars (including K cars), trucks (including K trucks)	
	Auxiliary brake lamps	15	Between vehicles	Cars (including K cars), trucks (including K trucks)	
	Anti-lock brakes (ABS)	4	Between vehicles, single vehicle, pedestrian vs vehicle	Cars (10 or more occupants), trucks (including K trucks), PTWs	
	Electronic static control (ESC)	65	Between vehicles, single vehicle, pedestrian vs vehicle	Cars (including K cars)	
	Electronic vehicle stability control (EVSC)	16	Between vehicles, single vehicle, pedestrian vs vehicle	Cars (10 or more occupants), trucks (including K trucks)	
	Lane departure warning (LDW) for large vehicles	3	Between vehicles, single vehicle, pedestrian vs vehicle	Cars (10 or more occupants), trucks	
	Rear view monitors (back cameras)	5	Pedestrian vs vehicle	Cars (including K cars), trucks (including K trucks)	
	Lane departure warning /Lane departure prevention/Lane keeping assist (LDW/LDP/LKA)	60	Between vehicles, single vehicle, pedestrian vs vehicle	Cars (including K cars), trucks (including K trucks)	
	Pedal misapplication prevention systems (PMPS)	0*	Between vehicles, single vehicle	Cars (including K cars), trucks (including K trucks)	
	Total fatalities		1,332 people	*The PMPS subject to the regulation are systems that prevent unintended sudden starting or acceleration after the acceleration pedal has been strongly misapplied. Their effect on the reduction of fatalities has so far been zero, but they are expected to reduce accidents by about 30%.	

Ex-post evaluation of the effect of VSMS on the reduction of the number of fatalities (after fine-tuning calculation)

Social changes:

○ Accelerating aging society with declining birthrate

- With the decline of population underway in earnest, the percentage of people aged 65 and over is expected to rise to 30% by 2030.

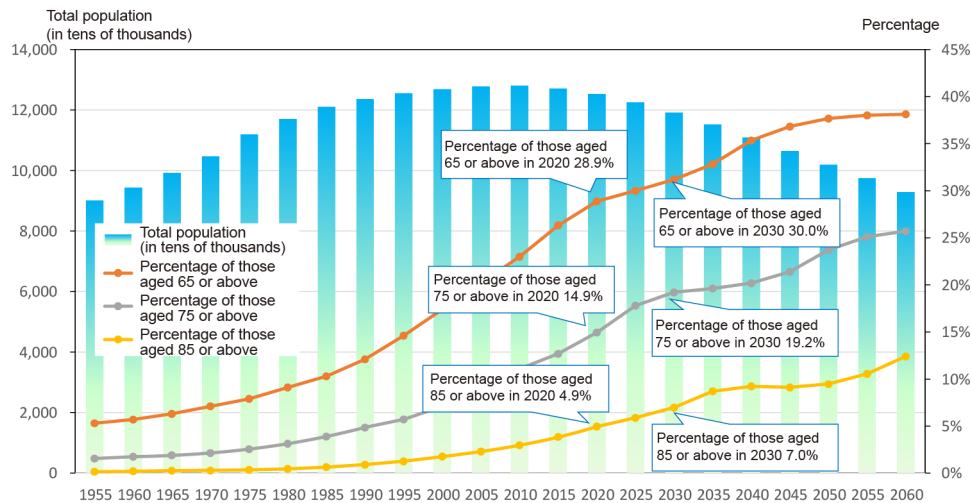
○ Changes in public transport and mobility services

- With maintaining and securing public transport getting more and more difficult, especially in rural areas, it is important to secure alternative means of mobility.

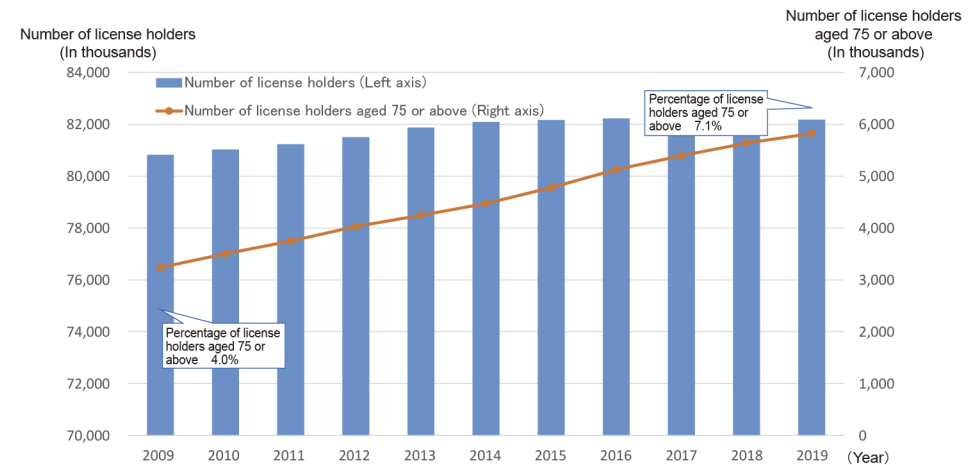
○ Changes in vehicle ownership and mobility needs

- The Covid-19 crisis is changing mobility needs and replacing some with Safety Support Cars*.

*Vehicles so nicknamed with safety functions such as AEBS and pedal misapplication prevention devices.



Declining birthrate, aging population and future projections

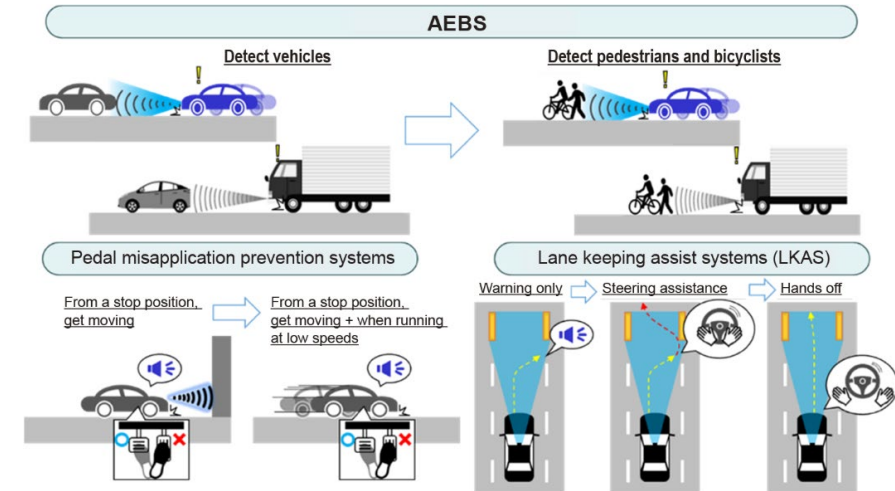
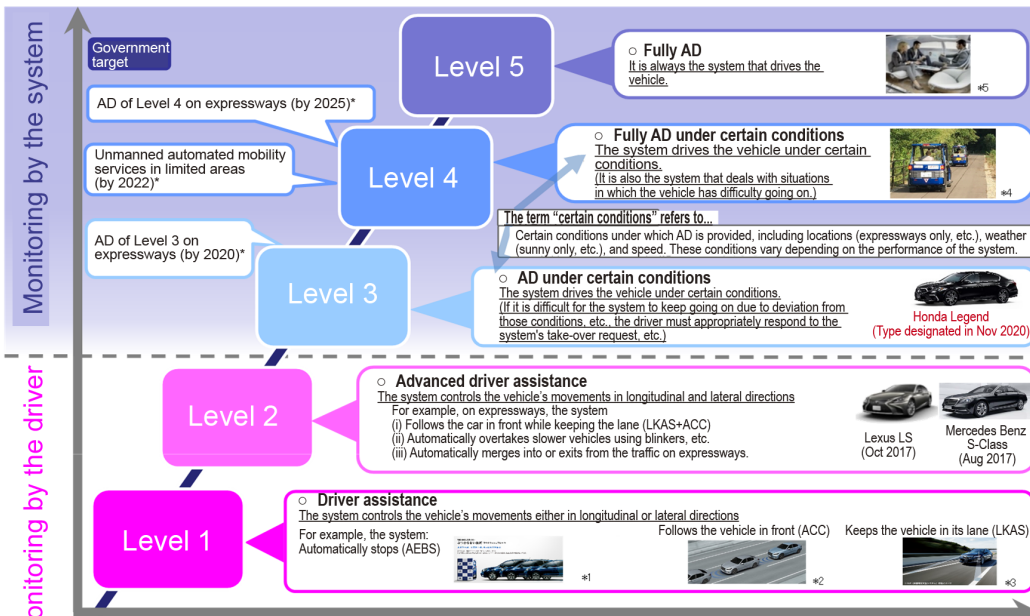


Changes in the number of driver's license holders

Situation Surrounding VSMs

Development and evolution of technology:

- **Development and evolution of technologies for automated driving**
 - Advancement of detection and processing technologies has led to the widespread use of devices that are highly effective in reducing accidents, such as advanced emergency braking systems (AEBS).
 - The world's first passenger car has been type-designated that is equipped with automatic driving technology (Level 3) on expressways.
- **Acceleration of electrification**
 - Improvements in battery technology will lead to the widespread use of electric vehicles, including HVs.
- **Advancement of other vehicle safety technologies, etc.**
 - Development of collision safety technology and automatic accident reporting systems.
 - Further promotion of activities for the harmonization of international regulations.



Examples of evolution and sophistication of Advanced Driver Assistance Systems (ADAS)

*As stated in the Public-Private ITS Initiatives/Roadmaps 2020 (adopted by the IT Strategic Headquarters (headed by the Prime Minister) in July 2020). #1 Subaru Corporation website #2 Nissan Motor Co. website #3 Honda Motor Co. website #4 Demonstration experiments in Eihei, Fukui #5 CNET JAPAN website

ACC: Adaptive Cruise Control, LKAS: Lane Keep Assist System

Situation Surrounding VSMs

Status of Traffic Accidents:

○ Overview

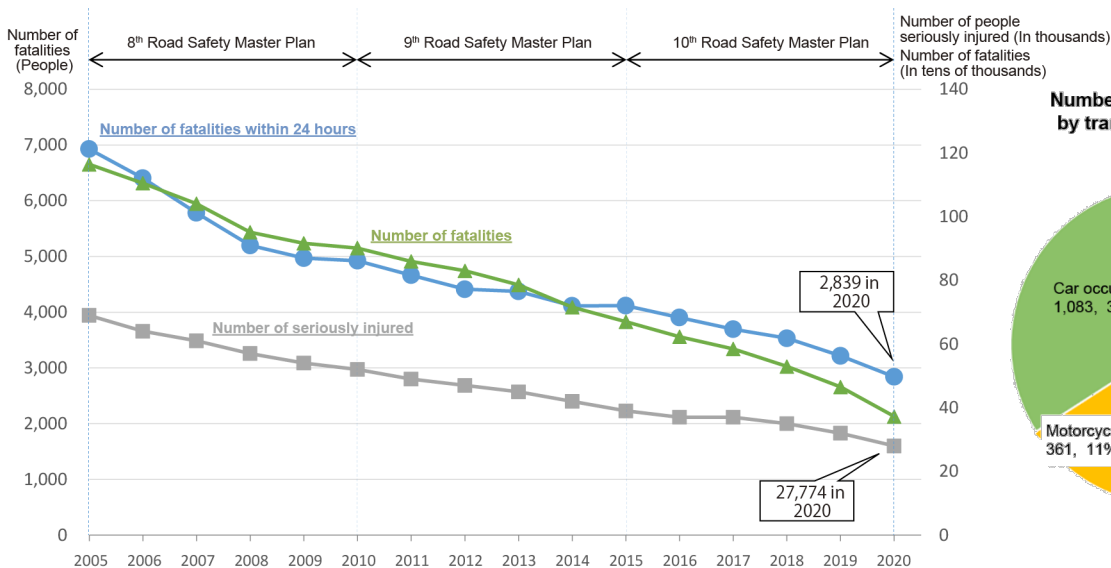
- The number of traffic fatalities in 2020 was 2,839, the lowest since the end of World War II, but the target for the Tenth Road Safety Master Plan (2,500 or less in 2020) has not yet been achieved.

○ Characteristics of traffic accidents

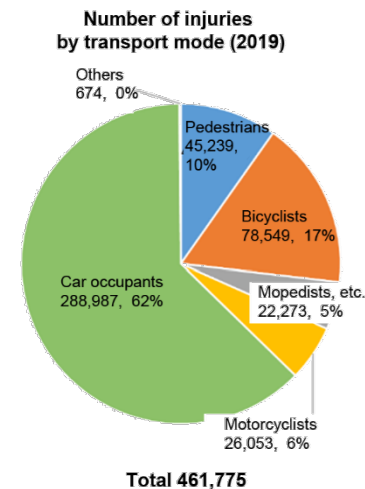
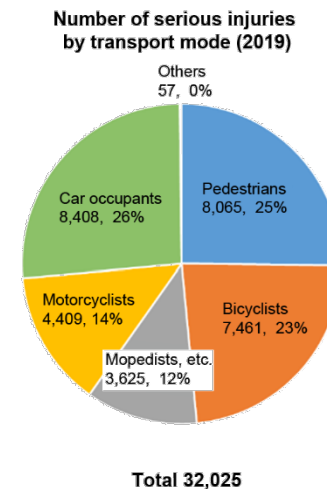
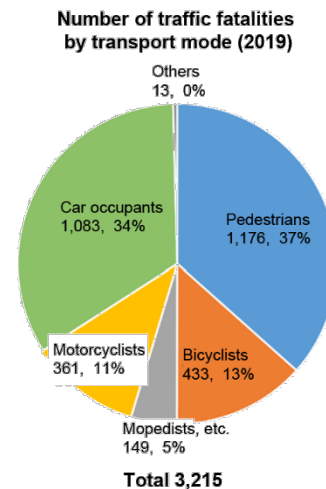
- Half of the fatalities are pedestrians or cyclists and approximately 60% of all fatalities are of people aged 65 and over, which makes the protection of vulnerable road users an urgent need.

- Approximately 60% of all road traffic injuries are to vehicle occupants, so further occupant protection, including head and chest protection, is essential.

- The number of accidents caused by non-compliance with laws and regulations, including driver errors, remains high. It is essential that measures are taken to prevent accidents in which people become the parties at fault.



Changes in traffic accidents
(Number of fatalities, serious injured, and casualties)



Percentage of traffic fatalities, serious injuries, and injuries by transport mode (2019)

Directions of vehicle safety measures in the Future

○ Short to medium-term perspective*:

- Accelerate the development, commercialization, spread and appropriate use of more advanced driver assistance technologies for situations involving a high risk of death or serious injuries.

○ Long-term perspective:

- By around 2035, aim to reduce to zero the number of fatal accidents caused by newly introduced vehicles on the market, where vehicle technologies are capable of addressing these issues.

*For the next three to five years



Priority Measures

(1) Ensuring the safety of pedestrians, cyclists, etc.

- Mitigation and reduction of damage to vulnerable road users

(2) Ensuring the safety of vehicle occupants

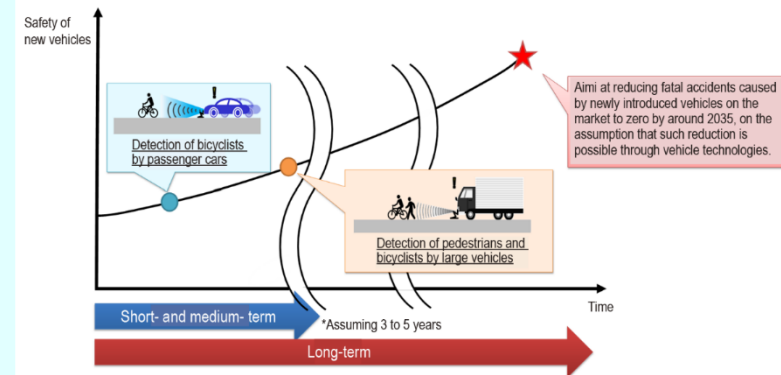
- Mitigation and reduction of damage to vehicle occupants including children

(3) Preventing certain types of serious accidents in light of social background

- Mitigation and reduction of damage to the victims of certain types of accidents to which a quick response is necessary from the social context

(4) Promotion of the effective and appropriate use of automated driving-related technologies

- Effectively using and promoting advanced technologies necessary to achieve the measures (1) to (3)



Conceptual image of vehicle safety in the future

Ensuring the safety of pedestrians, cyclists etc.

○ Ensuring the safety of pedestrians

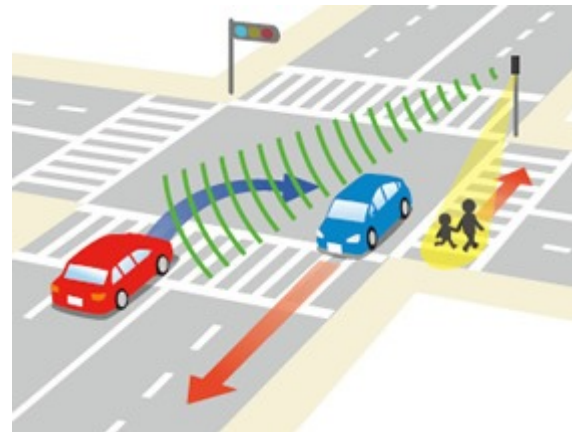
- Enhancement of safety regulations for AEBS for nighttime use etc.
- Improvement of technology for detecting pedestrians when turning right at intersections etc.
- Enhancement of measures for pedestrian head and leg protection
- Enhancement of safety regulations on close-proximity vision, etc.

○ Ensuring the safety of cyclists, etc.

- Addition of assessment testing of AEBS for cyclists and enhancement of related safety regulations
- Improvement of detection and communication technologies, etc. to prevent road users from bumping into each other as they enter an intersection, etc.
- Enhancement of safety measures for various types of mobility and so on



Assessment test of AEBS for nighttime use



Technology image of detecting pedestrians with coordination between vehicle and infrastructure*

* Toyota website



Assessment test image of AEBS for cyclists

Ensuring the safety of vehicle occupants

○ Ensuring the safety of children

- Promotion of products with high safety and usability on the market
- Improvement of understanding of child restraint systems, etc. and their proper use
- Enhancement of the dissemination of information meeting the needs of automobilists

○ Ensuring the safety of the elderly, etc.

- Improvement of occupant protection performance for the elderly, etc.

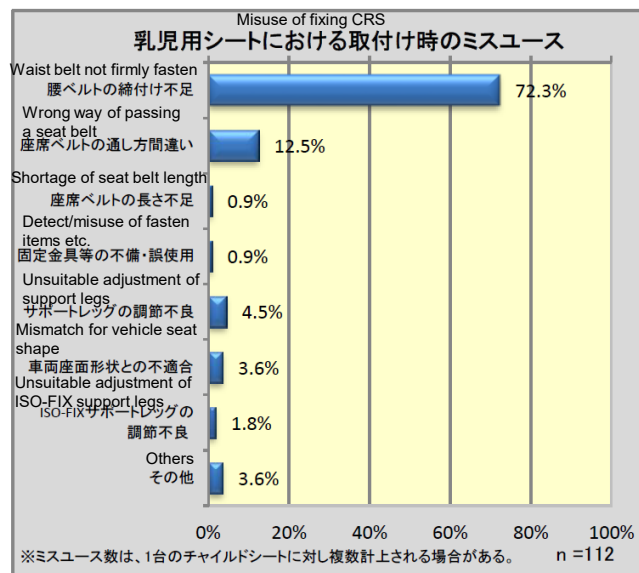
○ Sophisticating occupant protection measures

- Addition of assessment tests that take into account cases where the driver becomes party at fault in the event of a collision
- Promote research for occupant protection based on realities of accidents
- Promote research for occupant protection for automated vehicles and so on



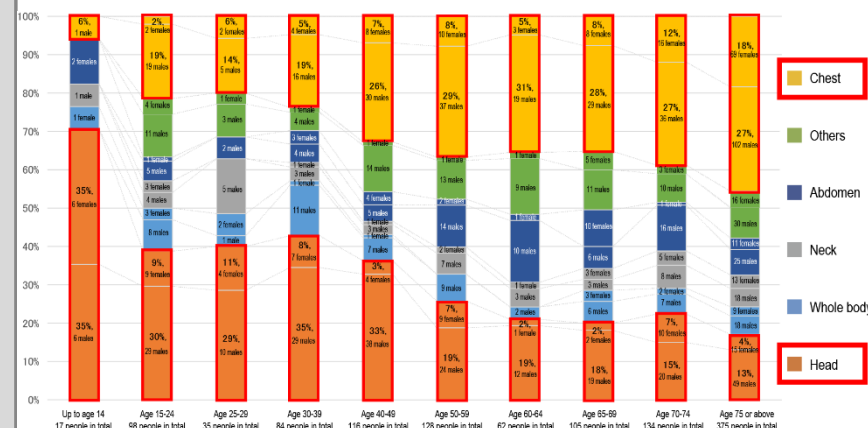
ISO-FIX compatible child restraint system*

* COMBI website



Survey of wrong cases of fixing CRS*

* Survey of usage of child restraint systems 2019 by National Police Agency and JAF



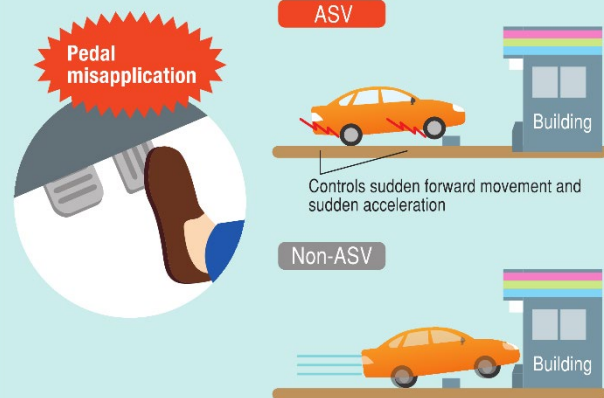
Ratio of the primary sites of damage in fatal accidents involving vehicle occupants (by age group and gender) (2018)

Preventing certain types of serious accidents in light of social background

- Preventing accidents caused by drivers, in particular by elderly ones in error or incapacity
 - Study of safety regulations for unintended acceleration prevention systems
 - Acceleration of installation of driver incapacity response systems and study relevant safety regulations
 - Promotion of the preventive use of drive recorders, etc. for monitoring elderly drivers, etc.
 - Preventing dangerous driving
 - Promotion of the use of information devices for road signs
 - Promotion of the commercialization of automatic speed control devices
 - Preventing accidents involving large vehicles
 - Enhancement of safety regulations for AEBS
 - Ensuring the safety of bus passengers and prevent onboard accidents
 - Promotion of the replacement of obsolete models with those with advanced safety technology
- and so on

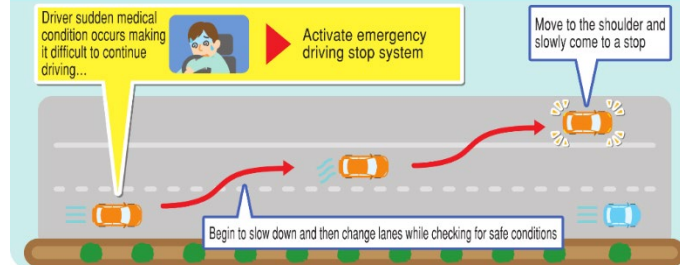
Pedal Misapplication Prevention Device

When starting or proceeding slowly, if there is a danger of colliding with something (obstacle, etc.) due to a shift-lever or accelerator-pedal error, the device limits sudden forward movement or sudden acceleration.



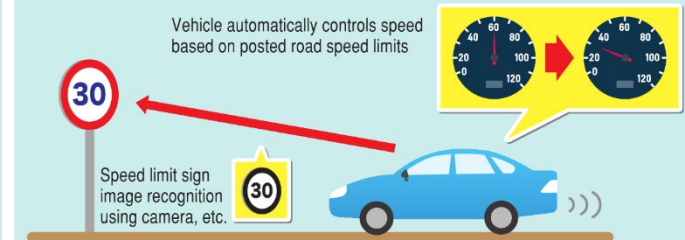
Unintended acceleration prevention system

Technical requirements of evolving emergency driving stop system for taking refuge on shoulder, etc.



Emergency driving stop system for taking refuge on shoulder

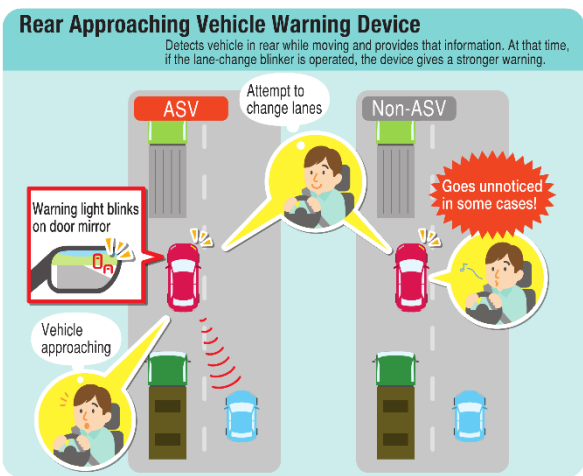
Technical requirements and issues for ISA (Intelligent Speed Adaptation) devices



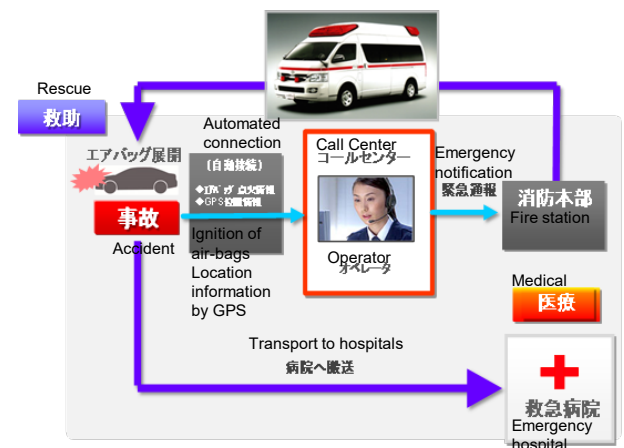
Intelligent Speed Adaptation devices

Promotion of the effective and appropriate use of automated driving-related technologies

- **Acceleration of the installation and improve the performance of advanced driver assistance systems, etc.**
 - Spread of the use of lane keeping and lane changing functions, etc.
 - Utilizing advanced image recognition and augmented reality (AR) technologies
 - Spread of the use of automatic accident reporting systems and study issues involved
- **Promotion of the development of automated vehicles and ensure their safety**
 - Establishment of safety regulations for advanced automated driving functions
 - Improvement of technology to cope with bad weather and other incidents
 - Enhancement of safety regulations for data recording in automated vehicles
- **Improvement of the social acceptability of automated driving-related technologies, etc.**
 - Promotion of measures to prevent overconfidence and misunderstanding and promote appropriate use
 - Study of how to harmonize automated vehicles with existing traffic
 - Enhancement of the dissemination of information on how automated vehicles help reduce accidents and so on



Rear approaching vehicle warning device

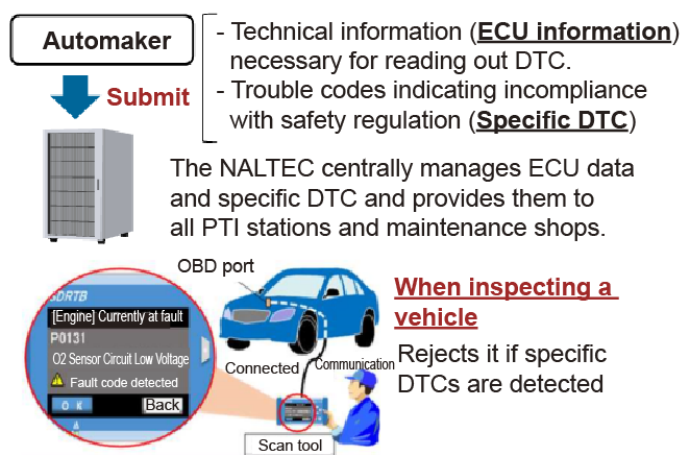


Automatic collision notification system

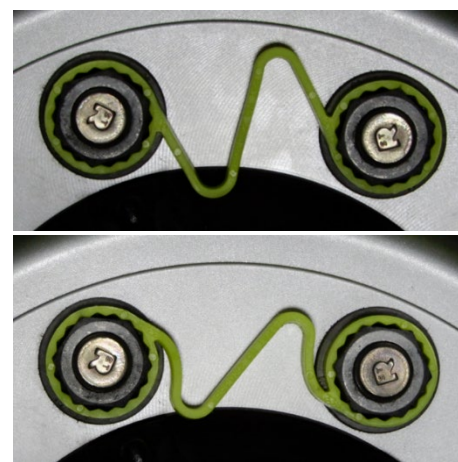


Truck platooning traveling based on automated driving technologies

- **Vehicle safety measures other than the priority items**
 - Promotion of onboard diagnosis (OBD) inspection
 - Promotion of proper use of tires
 - Enhancement of safety measures for electric vehicles
- **Coordination with other road safety measures**
 - Reduction of the risk of death or serious injuries by using automatic accident reporting systems
 - Promotion of safety measures by using vehicle-to-everything (V2X) communication technology and data and so on



Vehicle inspection using an OBD



Wheel nut marker
(Above: normal, below: nut loosened)

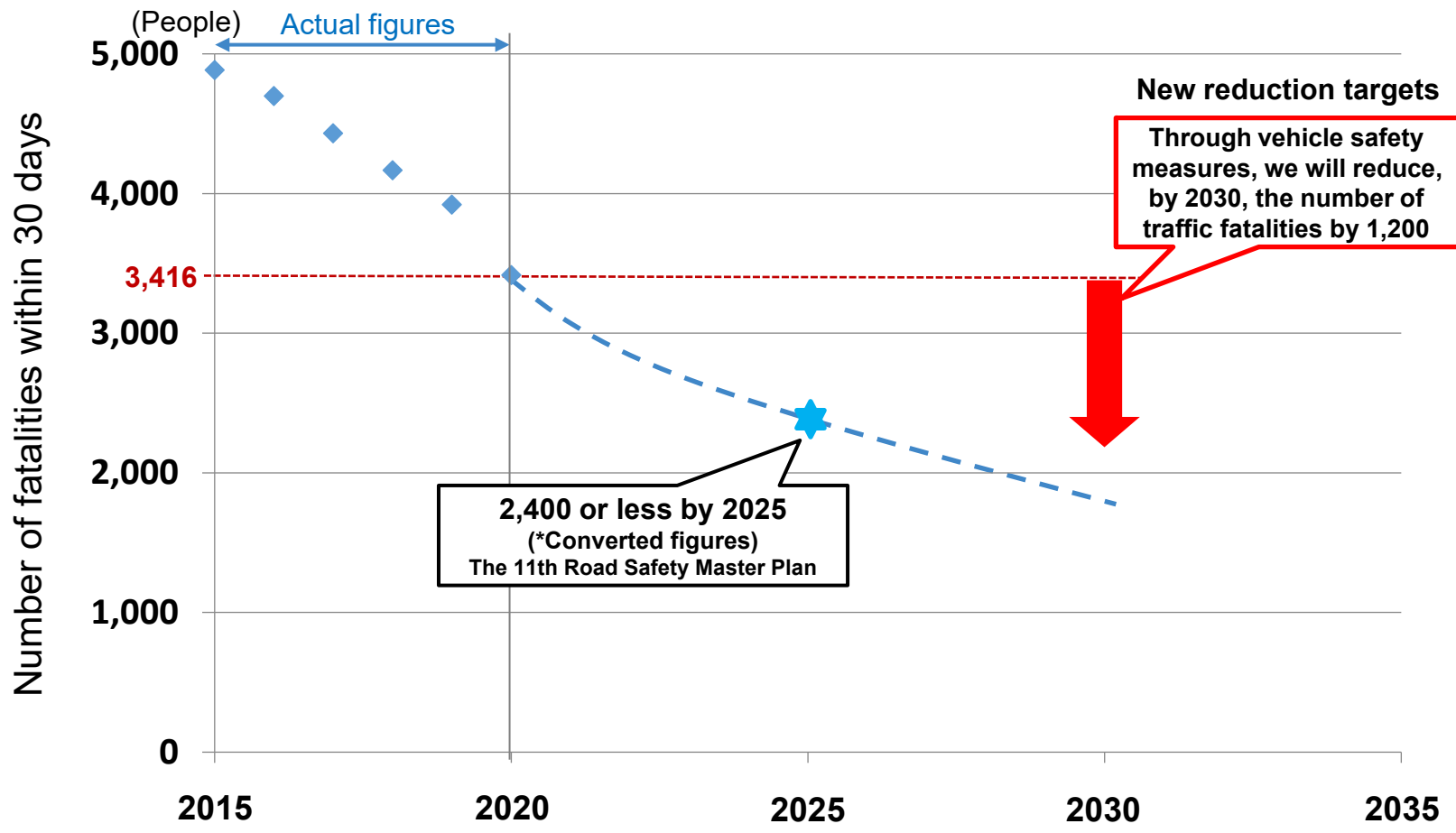


Vehicle fire caused by heat chain of a battery

Next reduction target

Through vehicle safety measures, we will reduce, by 2030, the number of traffic fatalities within 30 days by 1,200 and the number of serious injuries by 11,000 compared to 2020.

Schematic figure of our new reduction targets for vehicle safety (traffic fatalities within 30 days)



Reference

- Priority VSMS (detailed)
- Other VSMS (detailed)
- Relationship with the 11th Road Safety Master Plan
- Summary of the Future of Vehicle Safety for a Traffic Accident-Free Society

Priority measure 1: Ensuring the safety of pedestrians, cyclists, etc.

1. Ensure the safety of pedestrians

Current situation and issues:

- Approximately 37% of all road traffic fatalities are pedestrians. Many of them are killed at night, while crossing the road, or while the vehicle is traveling straight ahead.
- Ensure safety of pedestrians, the most vulnerable road users, is crucial to achieving a safe and secure road transport environment.
- The key to reducing pedestrian fatalities and the severity of injury is to prevent accidents from occurring themselves and, even when they happen, to reduce the speed at which the vehicle collides.

Examples of future measures:

- **Sophisticate and spread AEBS for pedestrians on passenger cars, etc.**
 - Develop and enhance relevant safety regulations for AEBS that are also effective at night.
 - Improve technologies capable of detecting also pre-school children, wheelchair users, etc.
- **Enhance the performance and spread the use of AEBS for pedestrians on heavy vehicles**
 - Develop and enhance safety regulations for AEBS for pedestrians.
- **Improve technologies to detect, alert, and brake when approaching pedestrians at intersections and other high-risk situations**
 - Improve technologies for vehicles to detect pedestrians while turning right at intersections, where the risk of accidents is particularly high.
 - In the longer term: Consider countermeasures that work in coordination with infrastructure using technologies such as pedestrian-vehicle communications.
- **Spread and promote the use of advanced lights to improve the visibility of pedestrians at night**
 - Spread the installation of advanced lights (automatic high beams (AHB) and adaptive driving beams (ADB)).
 - Enhance safety regulations for auto-levelling devices.
 - Promote research on the effects of glare on elderly people.
- **Enhance head and leg protection upon collision with a pedestrian**
 - Develop and enhance safety regulations to extend the pedestrian head protection area.
 - Improve pedestrian leg protection technology.
- **Enhance safety regulations to effectively ensure visibility and prevent accidents involving pedestrians, etc. in close proximity**
 - Develop and enhance safety regulations on devices to ensure visibility and detection of pedestrians around and behind vehicles.

2. Ensure the safety of cyclists, etc.

Current situation and issues:

- Approximately 13% of all traffic fatalities are cyclists (29% including motorcyclists).
- In accidents involving cyclists and motor vehicles, the most lethal accidents are rear-end collisions and the most frequent accidents are two parties bumping into each other as they enter an intersection.
- The progress of technologies and other factors is enabling various mobility devices, such as electric kickboards, enter the market.

Examples of future measures:

- **Sophisticate and spread AEBS for cyclists on passenger cars, etc.**
 - Introduce new car assessment program (NCAP) tests for AEBS for cyclists and develop and enhance relevant safety regulations.
 - Improve technologies to detect the occupants of various mobility devices, including electric kickboards.
- **Enhance the performance and spread the use of AEBS for cyclists on heavy duty vehicles.**
 - Develop and enhance safety regulations for AEBS for cyclists.
- **Improve technologies to detect, alert, and brake when approaching cyclists, etc. in situations with a high risk of accidents**
 - In the long term: Consider countermeasures in coordination that work with infrastructure using technologies such as cyclist-vehicle communication.
 - Improve technology to detect motorcycles at intersections prone to crashes between straight-going motorcycles and right-turning vehicles.
- **Promote vehicle safety measures to ensure the safety of the occupants of various mobility devices**
 - Study how to ensure the visibility of various mobility devices and what kind of safety devices are necessary.

Priority measure 2: Ensure the safety of vehicle occupants

1. Ensure the safety of children

Current situation and issues:

- Children are the future of our society and their lives should be fully protected from traffic accidents. Ensure the safety of children is a top priority.
- The majority of fatal accidents involving pre-school children occur when they are in a car, so it is essential to take children into account when developing occupant protection measures.
- The misuse of child restraint systems (CRS) and the non-use of booster seats are still common. It is hence important to ensure that they comply with appropriate specifications and to raise awareness among automobilists of how they are important.

Examples of future measures:

- **Develop and promote CRS of high safety performance and usability**
 - Develop and spread products that can cope with side collisions (UNR129-compliant).
 - Promote the spread of ISO-FIX compatible products to prevent misuse, including booster seats.
 - Promote further improvement of safety performance and usability through NCAP and elimination of non-compliant products.
- **Promote the proper use of CRS, etc.**
 - Raise awareness of road safety and how to use CRS correctly among the public nationwide through NCAP, etc.
- **Enhance the spread of information that meets the needs of automobilists**
 - Consider how we could disseminate information on the proper use of CRS and booster seats with high safety performance and usability.

2. Ensure the safety of the elderly, etc.

Current situation and issues:

- Approximately 60% of all road traffic fatalities are people aged 65 and over. It is hence essential that measures are taken to protect vehicle occupants, particularly taking into account the characteristics of this age group, such as the decline of physical strength (the chest often being the main area of damage).

Examples of future measures:

- **Improve occupant protection performance focused on the elderly, etc.**
 - Enhance occupant protection performance by applying international standards for occupants at high risk of injury in a collision, such as the elderly.

3. Sophisticate occupant protection measures

Current situation and issues:

- Actual crashes occur under a variety of conditions. The pursuit of ideal crash tests is essential.
- The introduction of automated vehicles is expected to lead to more diverse seating arrangements and orientations. It is hence necessary to study how we could adapt our occupant protection to those changes.

Examples of future measures:

- **Improve occupant protection performance in the event of a collision through NCAP and the enhancement of safety regulations**
 - Raise and spread the awareness of occupant protection performance through collision safety performance tests in NCAP using MPDB*, which takes into account the risk of the driver becoming the party at fault in the event of a collision.
*Mobile Progressive Deformable Barrier
 - Enhance safety regulations on headrests to reduce the risk of serious injury.
- **In the long term: Promote research on occupant protection measures based on the realities of crash accidents**
 - Research on occupant protection based on actual collisions between vehicles, one party traveling straight and the other turning right at intersections.
- **Promote research on occupant injury mechanisms through collaboration between medicine and industry**
 - Verify the effectiveness of automatic accident reporting systems in reducing accidents through the collection and use of traffic accident data.
- **In the long term: Promote research on occupant protection measures for automated vehicles**
 - Research on how to protect occupants from accidents while in reclined seats or riding in rear-facing seats.
 - Study appropriate methods of raising awareness among the public of occupant protection.

Priority measure 3. Prevent certain types of serious accidents in light of social background

1. Prevent accidents caused by drivers, in particular by elderly ones in error or incapacity

Current situation and issues:

- A relatively large number of fatal accidents caused by elderly drivers are attributable to driver error.
- Given the even further aging of the population, it is essential to take further action to prevent accidents involving health factors.
- Taking preemptive measures is also necessary to encourage elderly drivers to change their behavior.

Examples of future measures:

- **Improve technologies that help prevent accidents due to driver error and spread such devices**
 - Promote the spread of pedal misapplication prevention devices and develop and enhance relevant safety regulations.
- **Promote and spread driver incapacity response systems**
 - Improve technologies for automatic detection of driver incapacity, spread such systems (especially for buses and taxis), and develop and enhance relevant safety regulations.
- **Help drivers change their behavior with video drive recorders, etc.**
 - Promote preemptive measures that help drivers develop safe driving characteristics through the analysis of daily driving patterns of their own.
- **Promote research on the driving patterns of elderly drivers, etc.**
 - Promote research on the driving patterns of elderly drivers, etc. through collaboration between medicine and industry.

2. Prevent dangerous driving

Current situation and issues:

- Technological progress has made it possible for vehicles to detect everything from information on surrounding traffic to how the driver behaves while driving, which enables them to encourage the drivers to drive safely.
- The use of onboard recording devices is preferable that help prevent abnormal driving characteristics such as tailgating and accidents resulting from such behaviors.

Examples of future measures:

- **Promote the use of information provision devices on maximum speeds and other road signs**
 - Promote the spread of devices that provide drivers with information on road signs such as maximum speeds, temporary stops, etc.
- **Promote the commercialization of intelligent speed adaptation (ISA)**
 - Commercialize early ISAs by improving their social acceptability, etc.
- **Promote analysis and preemptive measures through the use of onboard devices**
 - Promote preventive measures such as monitoring services with data recorded by onboard devices.
- **Promote the spread and proper use of video drive recorders as a solution to prevent tailgating**
 - Promote proper use and spread of video drive recorders.

3. Prevent accidents involving large vehicles

Current situation and issues:

- Large vehicles, which play an important role in transport infrastructure, have a high fatality rate in the event of an accident, and their impact on society is significant.
- The transportation industry suffers serious problem such as driver shortage and aging workforce. It is essential to take measures to prevent accidents caused by the driver's fatigue and health problems.
- The main users of large vehicles in the transport industry are mostly small and medium-sized companies. If vehicle prices rise as a result of enhanced safety equipment, the owners' hurdles to replacing them with new vehicles will become greater.

Examples of future measures:

- **Enhance the performance of AEBS for pedestrians, etc. on large vehicles and spread them**
 - Develop and enhance the safety regulations on AEBS for pedestrians and cyclists (Reminder).
- **Accelerate the installation of detection and warning systems for pedestrians and vehicles in blind spots in situations with a high risk of accidents**
 - Accelerate the installation of systems that detect pedestrians, cyclists, etc. while turning right at intersections, where the risk of accidents is particularly high, as well as vehicles behind when changing lanes and alert the driver to the danger.
- **Enhance safety regulations to ensure the visibility for the driver of pedestrians, etc. in close proximity in order to effectively prevent accidents involving those road users**
 - Develop and enhance safety regulations that ensure the visibility and detection of other road users around and behind the vehicle and prescribe devices for such purposes (Reminder).
 - Develop and enhance safety regulations on reverse warning sounds.
- **Ensure the safety and security of bus passengers and crew**
 - Promote the protection of passengers and crew on large buses: Extend the use of seat belt reminders for passenger seats.
 - Ensure the safety and security of passengers on route buses: Promote the prevention of on-board accidents by the use of on-board safety confirmation devices, etc.
- **Promote the replacement of obsolete vehicles with vehicles with advanced safety technology**
 - Maintain measures to promote the replacement of obsolete vehicles with new vehicles with advanced safety technologies.

Priority measure 4. Promote the effective and appropriate use of automated driving-related technologies

1. Accelerate the installation and improve the performance of advanced driver assistance systems, etc.

Current situation and issues:

- Since it will take a certain number of years for automated vehicles to spread widely, it is essential for the time being to promote the development, commercialization, diffusion and appropriate use of more advanced driver assistance systems that operate under the driver's responsibility.
- It is necessary to pay attention to the cost burden of advanced driver assistance systems, their acceptability to drivers, etc., and their effectiveness in reducing accidents.
- In order to further reduce the damage caused by accidents, it is important not only to prevent accidents from occurring, but also to take post-accident measures in cooperation with lifesaving and emergency services.

Examples of future measures:

- **Sophisticate and spread AEBS for detection of pedestrians and cyclists at night** [Reminder]
- **Improve the performance and expand the range of models with lane-keeping and lane-change assistance systems**
 - Expand the use of lane departure warning systems (LDWS) and lane keeping assist systems (LKAS)
 - Expand the number of models with lane change assist systems and promote their spread
- **Develop and implement a variety of advanced technologies**
 - Consider developing and implementing a variety of advanced technologies, such as image recognition technology (technology to recognize road signs, traffic signals, images reflected in road reflectors, etc.) and augmented reality (AR).
- **Spread the use and improve the performance of automatic accident reporting systems**
 - Expand the use of automatic accident reporting systems through cooperation between relevant ministries and agencies and resolve issues such as the development of systems on the reception side.
 - In the long term: Research to pave the way to expand the scope of the automatic accident reporting system (e.g. accidents involving pedestrians)

2. Promote the development of automated vehicles and ensure their safety

Current situation and issues:

- For the first time in the world, Japan has type-designated and launched onto the market a passenger car equipped with automatic driving technology (Level 3) that operates under certain conditions.
- In the future, it will be necessary to consider how to ensure safety in response to the expansion of driving environment conditions (ODD) and the implementation of unmanned mobility service vehicles.
- For Japan to achieve Level 4 by 2025, it is essential to consider safety measures, including an examination system for vehicles that do not assume the presence of a driver.

Examples of future measures:

- **Establish safety regulations for highly automated driving functions**
 - Establish safety regulations for more advanced automated driving functions for high-speed ranges, etc.
- **Consider certification and screening methods for automated vehicles**
 - Study methods for verifying vehicle safety using simulations, etc.
- **Improve the detection technology of automated vehicles**
 - In the long term: Improve their technologies so they can deal with bad weather, sudden incidents (such as people lying on the road, falling objects), etc.
- **Promote safety measures by collecting and analyzing data for automated vehicles**
 - Consider the expansion of safety regulations on event data recorders (EDRs), data storage system for automated driving (DSSADs), etc.
- **Implement socially unmanned automated mobility services**
 - Consider demonstration tests and development of technical requirements, etc., toward the realization and nationwide deployment of automated mobility service of Level 4.

3. Improve the social acceptability of automated driving-related technologies, etc.

Current situation and issues:

- In order to prevent accidents implicating automated driving-related technologies, it is essential that the driver understand the technologies correctly and use them properly.
- In order to promote automated vehicles in the years to come, it is necessary to consider issues from the perspective not only of ensuring the safety and cybersecurity of automated vehicles *per se* but of improving social acceptability as well.

Examples of future measures:

- **Promote measures to prevent overconfidence in and misunderstanding of automated driving-related technologies and to ensure their proper use**
 - Raise awareness through the provision of easy-to-understand information tailored for the interests of automobilists, using videos, illustrations, etc.
- **Consider measures to improve the social acceptability of automated vehicles**
 - Consider safety requirements for automated vehicles, such as HMI for interacting with other road users
 - In the long term: Study ways to harmonize automated vehicles with existing traffic through research on traffic accident precedents, control take-over, etc.
- **Ensure cybersecurity for automated vehicles, etc.**
 - Promote the establishment of a system that ensures that the cybersecurity of automated vehicles etc. is always up-to-date.
- **Disseminate information on the effects of advanced driver assistance systems on accident reduction**
 - Promote consumers' understanding and behavioral change through enhanced information dissemination on the effects of various devices on accident reduction

Other vehicle safety measures, etc.

1. The system to promote vehicle safety measures

Current situation and issues:

- In order to implement effective and strategic vehicle safety measures, it is essential to enhance the coordination of various measures.
- It is also important to make use of the knowledge gained from the many experiments on automated driving being conducted across the country.
- Further, to clarify the driving characteristics of elderly drivers, it is necessary to study how we can collect and use vehicle-related data, which is getting more and more accessible as technology advances.

Examples of future direction:

- **Enhance measures for vehicle safety**
 - Enhance the linkage between the main measures, i.e., "Expansion and enhancement of safety regulations", "ASV promotion plan" and "NCAP".
 - Expand NCAP: Introduce pedestrian leg protection test using aPLI*, MPDB* test, AEBS test for cyclists, etc.
 - Accelerate the ASV promotion plan: Study the scope of responsibility to be assumed by vehicles for the advancement of automated driving, etc.
- **Enhance the system to implement automated driving demonstration on public roads, etc.**
 - Publish best practices that ensure the safe and smooth conduct of demonstration tests.
 - Study safety regulations based on the findings and data from demonstration tests.
- **Understand the driving characteristics of elderly drivers and promote the use of onboard recording devices**
 - Promote an interdisciplinary research on the driving characteristics of elderly drivers.
 - Promote the use of vehicle data from EDRs and drive recorders in accident analysis, etc.
 - Promote the use of data from drive recorders, etc. in driver management, driving education, etc.

* aPLI: advanced Pedestrian Legform Impactor
MPDB: Mobile Progressive Deformable Barrier

2. Other vehicle safety measures

Current situation and issues:

- In order to truly reduce the number of traffic accidents, it is important to take measures not only for new vehicles, but also for the maintenance and management of advanced driver assistance functions and devices on in-service vehicles.
- It is also essential to examine safety measures for electric vehicles and fuel cell vehicles, which are expected to increase in the future.

Examples of future measures:

- **Promote the maintenance of the functions of advanced driver assistance systems (OBD inspection) on in-service vehicles**
 - Steadily pave the way to the implementation of OBD inspections from October 2024.
 - Develop safety regulations for OBD and expand the scope of OBD inspections of ADAS, etc. under international coordination.
- **Enhance measures for the proper use of automotive tires**
 - Raise awareness of automobilists as to the service life of tires, proper way to fasten bolts when changing tires, and proper ways to use winter tires in snowy conditions, etc.
 - Expand the use of tire pressure monitoring systems (TPMS)
- **Enhance safety measures for electric vehicles**
 - Consider developing and enhancing safety regulations for thermal chain test methods for onboard batteries, etc. under international coordination.
 - Promote research on the impact of battery degradation on the safety of in-service vehicles.
- **Promote vehicle safety measures for in-service vehicles**
 - Promote the use of retrofit devices that are highly effective in preventing accidents, such as pedal misapplication preventing device.

3. Measures taken in coordination with other road safety fields

Current situation and issues:

- In order to further reduce the number of accidents, it is necessary for the relevant ministries and agencies in charge of each field to cooperate and implement cross-the-board measures according to their objectives.

Examples of future measures:

- **Reduce the risk of death or serious injury by using automatic accident reporting systems**
 - Expand the use of automatic accident reporting systems through cooperation between relevant ministries and agencies and resolve issues such as the development of systems on the reception side. [Reminder]
- **Promote safety measures using communication technology and data**
 - In the long term: Promotion of safety measures through the use of communication technologies (such as V2X and ITS) and probe data.

	The 11th Road Safety Master Plan (Related to road safety)	Report of the Automobile Traffic Subcommittee, Land Transport Subcommittee, Council for Transport Policy
Positioning	Decision of the Central Road Safety Measure Conference (March 29, 2021)	Report of the Automobile Traffic Subcommittee, Land Transport Subcommittee, Council for Transport Policy (June 2021)
Subject of deliberation	The government's road safety measures in general (focused on the three elements, i.e., <i>people, roads</i> and <i>vehicles</i>)	Among the road safety measures, <i>safety measures for vehicles</i> .
Plan year	FY2021 to 2025	FY2021 to 2030 (An interim review in 2025)
Numerical targets	By 2025: ○ Number of fatalities within 24 hours: 2,000 or less (Number of fatalities within 30 days: 2,400 or less) *Reduction of 839 or more compared to 2020 ○ Number of seriously injured: 22,000 or less *Reduction of 5,774 or more compared to 2020	Through vehicle safety measures, reduce the number of fatalities within 30 days by 1,200 by 2030 (compared to 2020) ○ Reduce the number of seriously injured by 11,000 (compared to 2020)
Direction of the measures	Perspective (i) Ensure the safety of the elderly and children (ii) Ensure the safety of pedestrians and cyclists and raise their sense of compliance (iii) Ensure safety on roads for daily life (iv) Promote the use of advanced technology (v) Promote detailed measures based on the actual situation of road traffic (vi) Promote road safety measures for the whole community Principal measures (i) Improve the road traffic environment (ii) Promote awareness of road safety (iii) Ensure safe driving (iv) Ensure vehicle safety (v) Maintain road traffic in order (vi) Enhance rescue and first aid services (vii) Enhance and support victim assistance (viii) Promote R&D and survey research	Perspectives ○ Short to medium term perspective For situations where the risk of death or serious injury is high, accelerate the development, commercialization, dissemination and proper use of more advanced driver assistance technologies, etc. ○ Long-term perspective By around 2035, we aim to reduce to zero the number of fatal accidents caused by newly launched vehicles, to the extent that countermeasures are feasible through automotive technology. Principal measures (i) Ensure the safety of pedestrians, cyclists, etc. (ii) Ensure the safety of vehicle occupants (iii) Prevent certain types of serious accidents in light of social background (iv) Promote the spread and proper use of automated driving-related technologies

Situation surrounding vehicle safety measures

Social changes:

- **Accelerating aging society with declining birthrate**
 - With the decline of population underway in earnest, the percentage of people aged 65 and over is expected to rise to 30% by 2030.
 - **Changes in public transport and mobility services**
 - With maintaining and securing public transport getting more and more difficult, especially in rural areas, it is important to secure alternative means of mobility.
 - **Changes in vehicle ownership and mobility needs**
 - The Covid-19 crisis is changing mobility needs and replacing some with SuppoCars*.
- *Vehicles so nicknamed with safety functions such as AEBS and pedal misapplication prevention devices.

Development and evolution of technology:

- **Development and evolution of technologies for automated driving**
 - Advancement of detection and processing technologies has led to the widespread use of devices that are highly effective in reducing accidents, such as advanced emergency braking systems (AEBS).
 - The world's first passenger car has been type-designated that is equipped with automatic driving technology (Level 3) on expressways.
- **Acceleration of electrification**
 - Improvements in battery technology will lead to the widespread use of electric vehicles, including HVs.
- **Advancement of other vehicle safety technologies, etc.**
 - Development of collision safety technology and automatic accident reporting systems.
 - Further promotion of activities for the harmonization of international regulations.

Status of Traffic Accidents:

- **Overview**
 - The number of traffic fatalities in 2020 was 2,839, the lowest since the end of World War II, but the target for the Tenth Road Safety Master Plan (2,500 or less) has not yet been achieved.
- **Characteristics of traffic accidents**
 - Half of the fatalities are pedestrians or cyclists and approximately 60% of all fatalities are of people aged 65 and over, which makes the protection of vulnerable road users an urgent need.
 - Approximately 60% of all road traffic injuries are to vehicle occupants, so further occupant protection, including head and chest protection, is essential.
 - The number of accidents caused by non-compliance with laws and regulations, including driver errors, remains high. It is essential that measures are taken to prevent accidents in which people become the parties at fault.

Directions of vehicle safety measures in the future

*For the next three to five years

- **Short to medium-term perspective***: Accelerate the development, commercialization, spread and appropriate use of more advanced driver assistance technologies for situations involving a high risk of death or serious injuries.
- **Long-term perspective** : By around 2035, aim to reduce to zero the number of fatal accidents caused by newly introduced vehicles on the market, where vehicle technologies are capable of addressing these issues.

Priority Measures

Ensuring the safety of pedestrians, cyclists, etc.:

- **Ensuring the safety of pedestrians**
 - Enhance safety regulations for AEBS for nighttime use etc.
 - Improve technology for detecting pedestrians when turning right at intersections etc.
 - Enhance measures for pedestrian head and leg protection.
 - Enhance of safety regulations on close-proximity vision, etc.
- **Ensure the safety of cyclists, etc.**
 - Add assessment testing of AEBS for cyclists and enhancement of related safety regulations.
 - Improve detection and communication technologies, etc. to prevent road users from bumping into each other as they enter an intersection, etc.
 - Enhance safety measures for various types of mobility. and so on.

Ensure the safety of vehicle occupants:

- **Ensure the safety of children**
 - Promote products with high safety and usability on the market.
 - Improve understanding of child restraint systems, etc. and their proper use.
 - Enhance the dissemination of information meeting the needs of automobilists.
- **Ensure the safety of the elderly, etc.**
 - Improve occupant protection performance for the elderly, etc.
- **Sophisticate occupant protection measures**
 - Add assessment tests that take into account cases where the driver becomes party at fault in the event of a collision.
 - Promote research for occupant protection based on realities of accidents.
 - Promote research for occupant protection for automated vehicles. and so on

Prevent certain types of serious accidents in light of social background:

- **Prevent accidents caused by drivers, in particular by elderly ones in error or incapacity**
 - Study safety regulations for unintended acceleration prevention systems.
 - Accelerate installation of driver incapacity response systems and study relevant safety regulations.
 - Promote the preventive use of drive recorders, etc. for monitoring elderly drivers, etc.
- **Prevent dangerous driving**
 - Promote the use of information devices for road signs.
 - Promote the commercialization of automatic speed control devices.
- **Prevent accidents involving large vehicles**
 - Enhance safety regulations for AEBS.
 - Ensure the safety of bus passengers and prevent onboard accidents.
 - Promote the replacement of obsolete models with those with advanced safety technology. and so on

Promote the effective and appropriate use of automated driving-related technologies:

- **Accelerate the installation and improve the performance of advanced driver assistance systems, etc.**
 - Spread the use of lane keeping and lane changing functions, etc.
 - Utilize advanced image recognition and augmented reality (AR) technologies.
 - Spread the use of automatic accident reporting systems and study issues involved.
- **Promote the development of automated vehicles and ensure their safety**
 - Establish safety regulations for advanced automated driving functions.
 - Improve technology to cope with bad weather and other incidents.
 - Enhance safety regulations for data recording in automated vehicles.
- **Improve the social acceptability of automated driving-related technologies, etc.**
 - Promote measures to prevent overconfidence and misunderstanding and promote appropriate use.
 - Study how to harmonize automated vehicles with existing traffic.
 - Enhance the dissemination of information on how automated vehicles help reduce accidents. and so on

Other measures

- Vehicle safety measures other than the priority items: promotion of onboard diagnosis (OBD) inspection, promotion of proper use of tires, enhancement of safety measures for electric vehicles, etc.
- Coordinate with other road safety measures : reducing the risk of death or serious injuries by using automatic accident reporting systems, promoting safety measures by using vehicle-to-everything (V2X) communication technology and data. and so on

Set new reduction targets

- **Target year** : 2030
- **Target figures** : Through vehicle safety measures, compared to 2020, reduce (i) the number of deaths in traffic accidents within 30 days by 1,200 or more and (ii) the number of serious injuries by 11,000 or more per year, respectively.