Submitted by the expert from Japan

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Agenda item 5

Guideline regarding Safety Technology for Automated Vehicles in Japan [Outline]

September, 2018

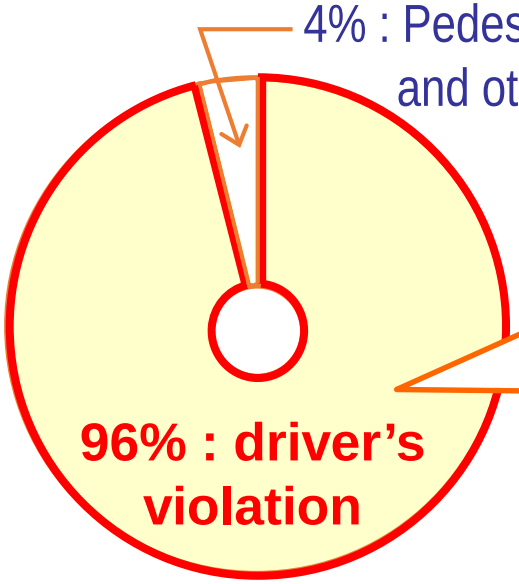
MLIT, Japan

Ministry of Land,
Infrastructure, Transport
and Tourism

Objectives of Automated Driving

○ The majority of fatality accidents are caused by a “law violation by the driver”
○ A significant decrease in traffic accidents caused by the driver is expected as a result of the realization of automated driving

Number of fatality accidents by law violation (2017)

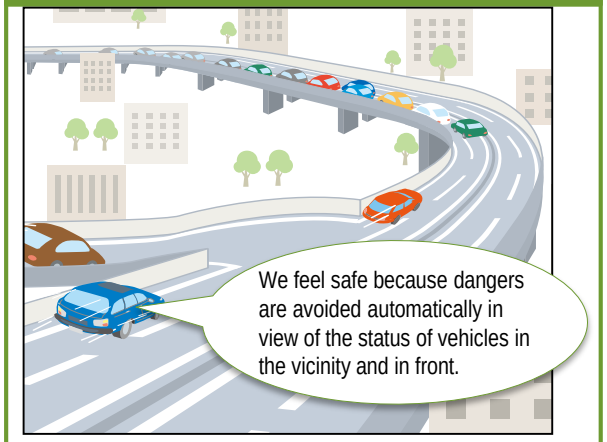


Number of traffic accident casualties in 2017
from White Paper on Traffic Safety in Japan 2018

Number of fatalities	3,694
Number of injuries	580,850

Examples of Effects due to Automated Driving

Reduction in traffic accidents

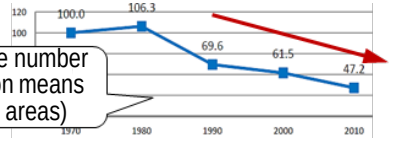


Response to decreasing birthrate and aging population, and improvement in productivity

About 40% of lorry drivers are 50 years old or older.

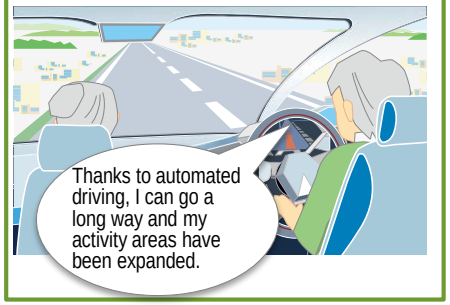
Source: Labor Force Survey (2015) of Ministry of Internal Affairs and Communications

Decrease in the number of transportation means (mainly in rural areas)

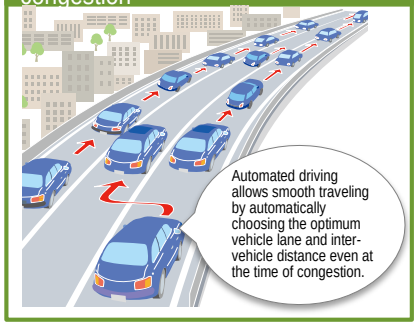


No. of daily operations by a bus on a regular route (number when it is 100 in 1970)

Transportation support for elderly people, etc.



Elimination and/or mitigation of traffic congestion



Guideline regarding Safety Technology for Automated Vehicles [Outline]

* The guideline aims to promote the development and commercialization of safe automated vehicles by prescribing safety requirements to be met by "conditional automated driving" or "conditional full automated driving" function as a guideline before the establishment of international regulations.
* The guideline sets the safety concept for automated driving for the first time in the world and clarifies the significance of the development and commercialization of such vehicles.

  Safety vision: *realize society where traffic accidents caused by automated driving systems resulting in injury or death become zero*

Safety concept for automated vehicles

- To realize society where traffic accidents caused by automated driving systems resulting in injury or death*1 become zero is set as a vision
- To ensure safety, vehicle safety to be met by automated vehicles is defined as "automated vehicles shall not cause any non-tolerable risk" *2, meaning that "automated vehicle systems, under their operational design domain (ODD), shall not cause any traffic accidents resulting in injury or death that are rationally foreseeable and preventable" and vehicle safety requirements are established

- (*1)"Traffic accidents caused by automated driving systems resulting in injury or death" in this Guideline mean accidents that automated driving systems are responsible for, and do not include any accidents attributable to victims such as their intentional rushing out to roads and those attributable to maintenance failure.
- (*2) "Safety aspects – Guidelines for their inclusion in standards" (ISO/IEC Guide 51:2014) defines safety as "freedom from risk which is not tolerable," and tolerable risk as "level of risk that is accepted in a given context based on the current values of society." Vehicle safety to be met by automated vehicles in this Guideline is defined according to these definitions under the international standard.

10 safety requirements for automated vehicles

Automated vehicles should meet the following safety requirements to ensure their safety

Vehicle safety item	Main requirements
(i) Setting of ODD	Set the operational design domain (specific design conditions related to the driving environment based on which an automated driving system operates properly: ODD) according to the performance of individual automated vehicles and use conditions to limit the driving environment and the way they are used
(ii) Safety of automated driving systems	- Ensure system safety by providing redundancy to control or sensor systems, etc. - Automatically stop a vehicle safely when it is difficult to continue automated driving, such as when the situation becomes outside of the set ODD, etc.
(iii) Compliance with Safety Regulations, etc.	- Comply with the existing Safety Regulations for Road Vehicles related to automated driving - Compliance with related international standards such as ISO is recommended.
(iv) Human machine interface (HMI)	Install HMI that has the following functions to notify the driver or passengers of the operation status of the automated driving system: - For conditional automated driving vehicles, to monitor to see if the driver is ready to take over driving from the system and issue an alarm as necessary (driver monitoring system, etc.) - For conditional full automated driving vehicles, to inform the driver or passengers (a person responsible for operation) in advance that the system has determined that it is difficult to continue automated driving and will stop the vehicle automatically
(v) Installation of data recording devices	Have a device that records the operational status of the automated driving system, the status of the driver, etc.
(vi) Cybersecurity	Design and develop vehicles that take account of cybersecurity such as measures against automated vehicle hacking, etc. based on the most recent requirements on cybersecurity by the UN (WP.29) or other organizations
(vii) Safety of vehicles used for unmanned driving services (additional requirement)	For automated vehicles used for unmanned driving services (conditional full automated driving), in addition to requirements (i) to (vi), have a camera that enables the operation control center to monitor the situation inside the vehicle, etc. and a function to automatically send a notification to the operation control center when the vehicle is stopped at emergency
(viii) Safety evaluation	Verify and confirm safety in advance by conducting simulations, and test track and road tests in adequate combination for rationally foreseeable hazardous events within the set ODD
(ix) Safety of in-use vehicles	Take measures such as maintenance (inspection) of automated vehicles and cybersecurity software update, etc. to ensure safety of in-use vehicles
(x) Information provision to automated vehicle users	Take measures to inform the users of automated vehicles how to use the system, scope of ODD, functional limitations, etc.