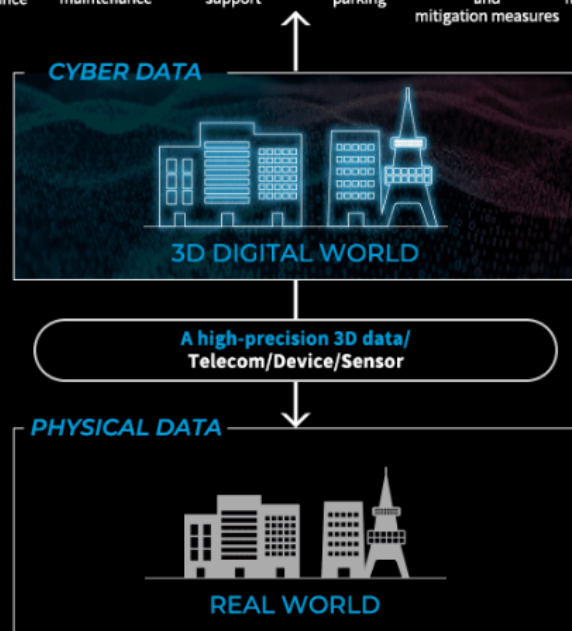


# Modeling The Earth

Our company supports innovation in a variety of industries by providing a high-precision 3D data platform that replicates the real world in digital space.

## 3D DIGITAL WORLD opens doors to a new world

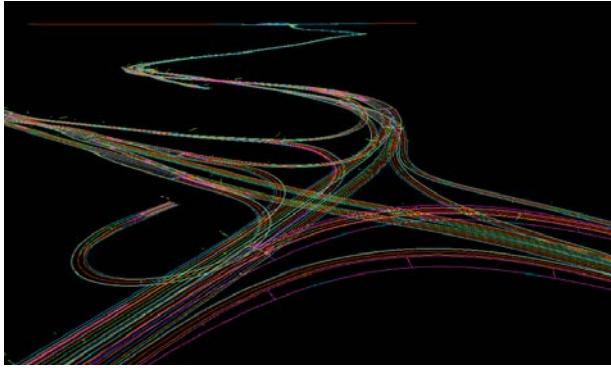
The 3D DIGITAL WORLD requires high precision and reality in order to serve as the foundation of the digital twin, which simulates the future by recreating the real world in digital space, and the metaverse, which is built based on the real world, as well as for advanced driving support systems and automated driving. The high-precision 3D data developed by Dynamic Map Platform will support a wide range of industrial fields by providing a highly accurate and realistic 3D DIGITAL WORLD in collaboration with other communication and device sensor technologies.



## Applications that utilize high-precision three-dimensional map data (HD maps)

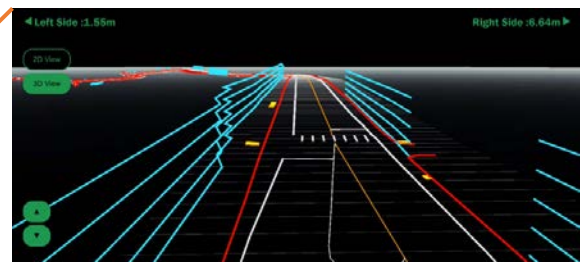
### Contributing to solving social issues in various industrial fields

*Contributing to advanced "self-location estimation" and "environmental awareness" of autonomous driving systems and ADAS*



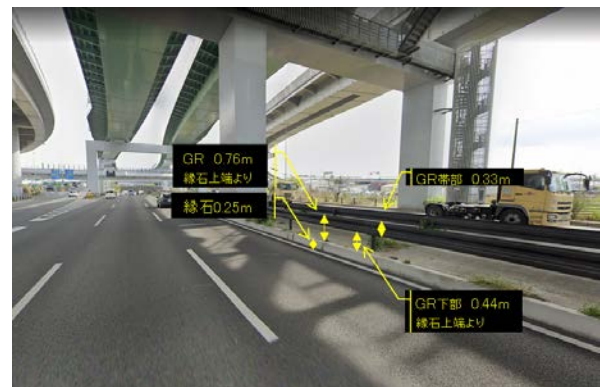
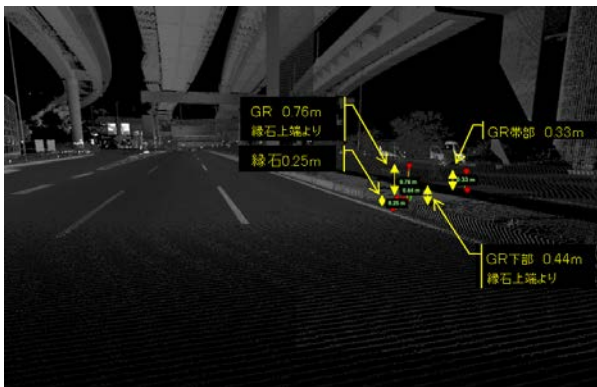
**Expansion of autonomous driving**

*Solving social issues such as the aging of snow removal workers through the development of a snow removal support system repurposed as an HD map*



**Skill transfer**

*Achieving DX of current investigation at traffic accident sites*



**Safety improvement and congestion reduction**



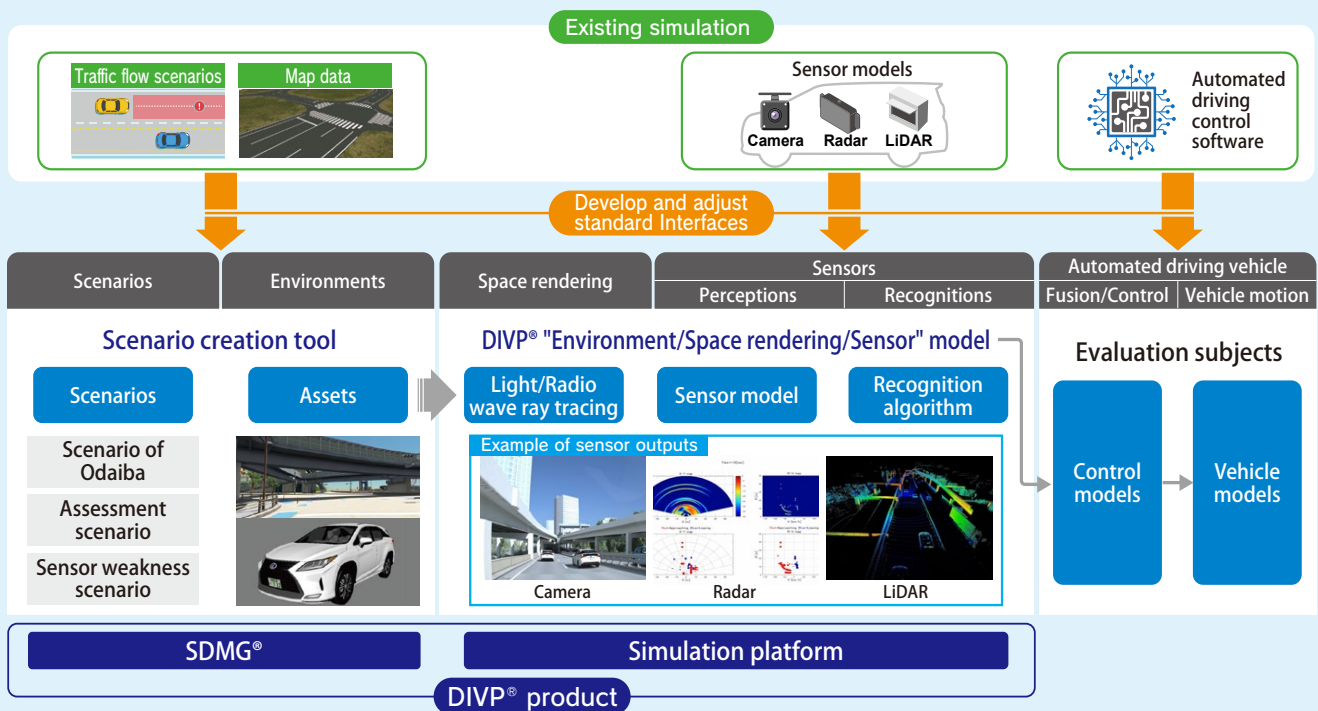
# Automated driving simulation platform

Virtual space simulator that accelerates safe and resilient automated driving society.

## Deliver the DIVP<sup>®</sup> products and services

### Our Product

Implementation of highly consistent simulation platform that enables comparable assessments to real vehicle tests under various traffic environments.



### Special Feature

#### Simulation models that highly consistent with physical phenomena.

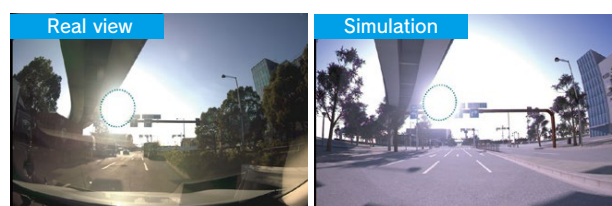
Our modeling for real-virtual consistent sensor outputs is the digital process of modeling physical phenomena in an electromagnetic spectrum, predicated upon the detection principle of sensors and verifying in comparison with real vehicle test results.

Simulation of proving ground



Sim Camera vs Real Life

Simulation of backlight scene



Source : Kanagawa Institute of Technology, AD-URBAN, SOKEN, Sony Semiconductor Solutions



<https://www.vdrive-tech.com/en/>

DIVP®

Driving Intelligence Validation Platform (DIVP®) project launched as research consortium with 10 partners (at present), industries and academia including sensor manufacturers and software companies as well as universities from 2018. We are dedicated to creating a safety validation simulation platform for automated driving in virtual space focusing on highly consistent sensor models.

# at one stop to meet customer's needs.

## Way to use

Support the throughout process of sensor units and automated driving systems, from planning and development to assessment and application.

Elaborate simulation of the real environment in virtual space.

Support the model based development of sensor units and/or automated driving system from early process like planning and development to validation and verification of systems equivalent to real vehicle test.

Planning

Development

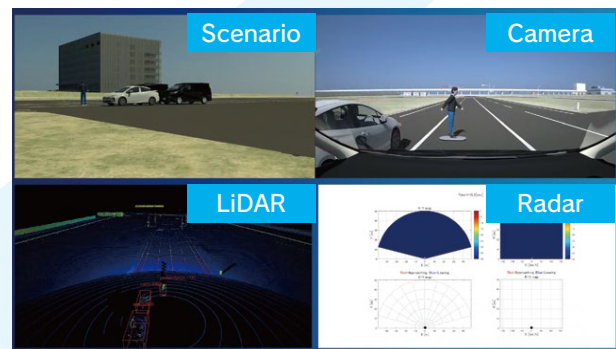
Assessment

Application

### Sensor weakness scene



### Examples of NCAP assessment



Examples of simulation application in each process.

## Structures

### Products (Cloud & On-premise)

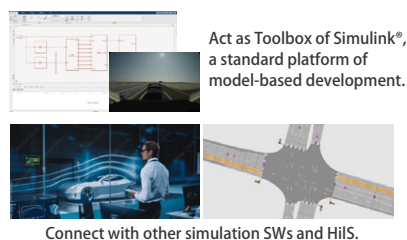
#### Cloud computing

Build necessary modules in the cloud and view simulation results



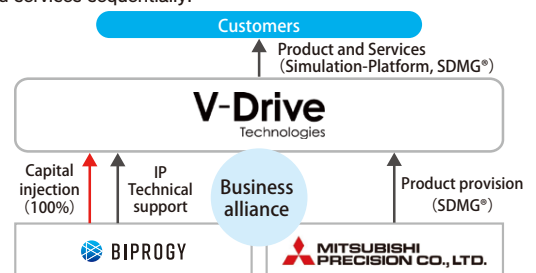
#### On-premise (module)

Purchase modules and install them to in-house facilities.



### Business formation / Product and services

BIPROGY has established V-Drive Technologies, and makes business alliance with MITSUBISHI PRECISION to deliver DIVP® products and services at one stop. V-Drive Technologies are going to add and enhance products and services sequentially.

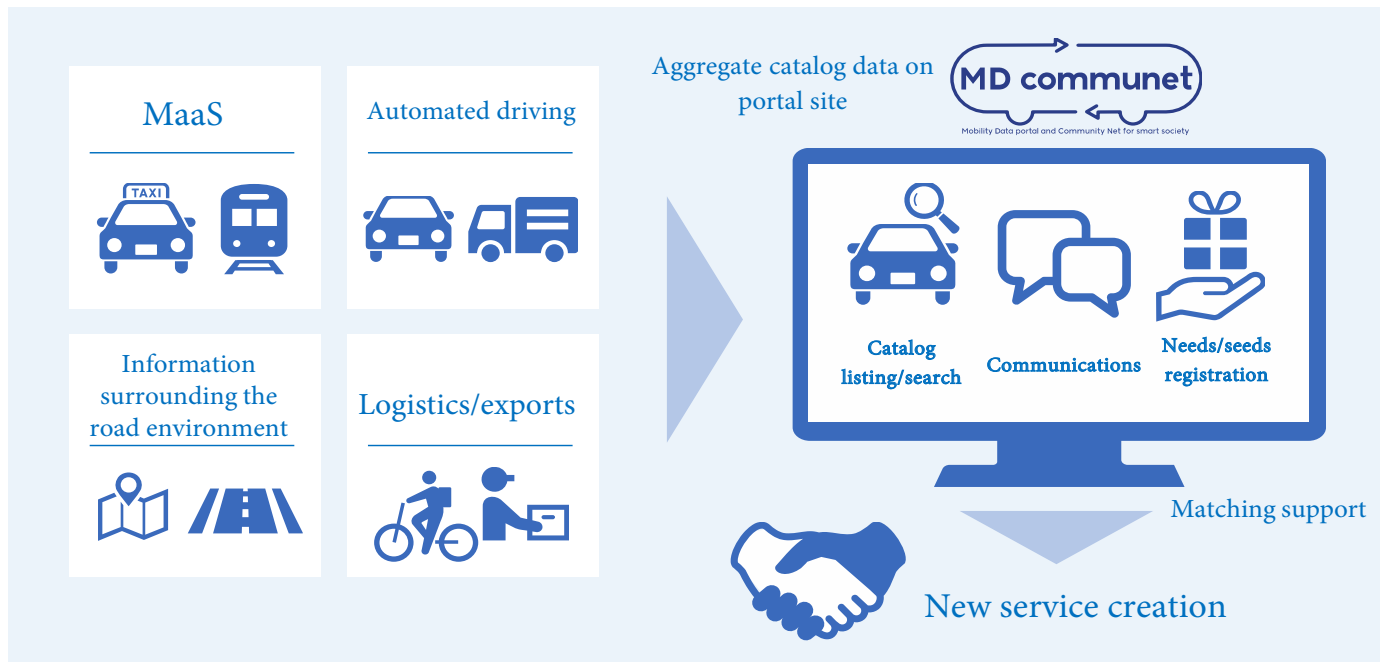




# What is MD communit® and its vision

## Matching site that aggregates data related to the mobility field centrally and generates services by public-private cooperation

MD communit® aggregates diverse road traffic environment data in the mobility field that is dispersed across the world in a central portal site as well as supports matching of private and public entities for creating new user services by establishing places of communication in various formats.



## Value proposition of MD communit

MD communit provides support to solve user issues by delivering data and creating services with the aim to generate new services and solve social issues by data utilization



### Extract and provide public-private road traffic environment data

Post over 7,000 pieces of road traffic environment data Presents users with data they did not realize by searches outside of keyword searches, such as providing similar data through machine learning and data recommendations for each user.



### Promote matching of providers and users and support service creation

Introduces companies and organizations that seem to fit the needs and seeds held by users. Supports the creation of services through connecting companies and organizations that didn't know or weren't connected to one another.

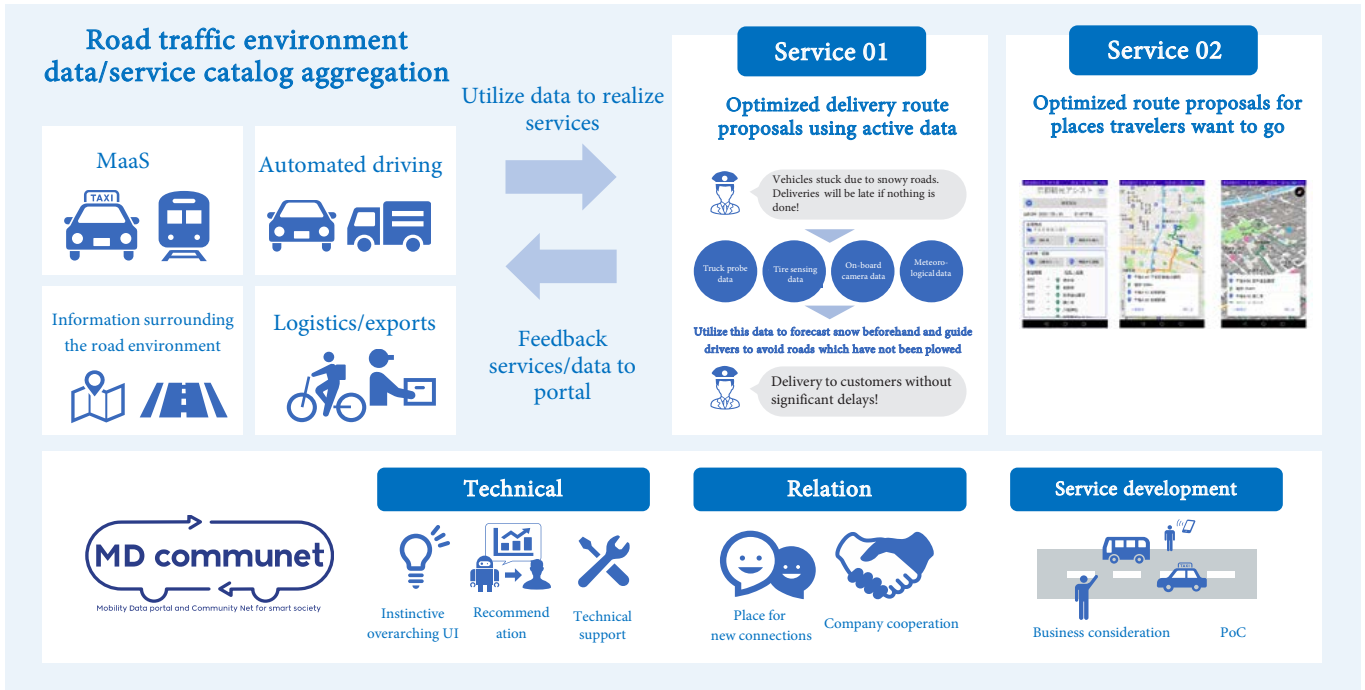


### Support service creation through technical support, such as data processing, etc.

User needs support for data in sales and service development, but doesn't know where to go. In this situation, MD communit provides support in service creation with technical support, including company referrals.

# Examples of utilizing MD communit

## What MD communit can realize



## MD communit members (not exhaustive)

Various companies and organizations have provided support and participate as MD communit members. We will conduct various promotions to expand the number of companies and organizations participating in this project in the future.



Contacts

<https://info.adus-arch.com>





# Mobility Innovation Alliance Japan

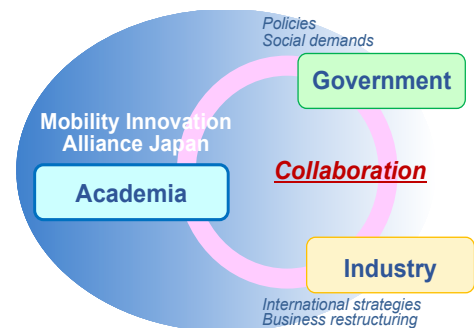
## Background

The new association, Mobility Innovation Alliance Japan was established in July 2022 led by academia researchers. There is a common understanding among relevant ministries, agencies and industry that the industry-academia-government collaboration on automated driving that was fostered during the 1st and 2nd phases of the SIP-adus needs to continue. The establishment of a contact organization in Japan for international collaboration and cooperation is also required.

## Mission

An academia platform to identify interdisciplinary research topics for mobility innovation and initiate activities for social implementation working with industries and government agencies;

- To fully utilize and benefit from innovative mobility services with shared data platforms.
- To increase productivity and strengthen competitive advantages of industries, create new businesses and opportunities, and enhance well-being of the people.
- To cope with social challenges such as declining population, demographic overconcentration, energy security, climate change and intensifying natural disasters.



## Activities



Formulate cross-sectoral academic activities

Taking over the activities of the "Alliance for Promoting Mobility Innovation" in SIP-adus



Discuss and advance proposals on cross-ministerial policies



Create collaborations over researchers, industries and public sectors



Promote international joint research through annual workshops in Japan



Launch activities to integrate technologies and societal changes



Hold competitions to foster young researchers and start ups



### Mobility Innovation Alliance Japan

**Date of establishment :** July 1st, 2022

**Address :** Cw501, IIS, The University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8505 Japan

**Representative Director :** Hajime Amano (Former ITS Japan President, former visiting professor of the University of Tokyo)

**Vice Representative Director :** Prof. Yoshihiro Suda (Director, The University of Tokyo (UTmobl))

<https://mobilityinnovationalliance.org/en>



# The Act for Partial Amendment of the Road Traffic Act

Hisaaki Ikeuchi (National Police Agency)

## 1 Permission Framework for Specified Automated Operation (SAO)

Through the 208th ordinary session of the Diet, the Act Partially Amending the Road Traffic Act (Act No. 32 of 2022) (hereinafter referred to as the "Amending Act") was enacted, which establishes provisions related to the permission framework for specified automated operation (SAO), and will take effect within one year from the date of promulgation (April 27, 2022). This paper will outline the regulations pertaining to the framework. (Fig.1)

### 1.1. Definition of SAO

SAO refers to an operating on a road a motor vehicle which is equipped with an automated operation device (AOD), which is equivalent to SAE Level 4 (excluding cases when a person drives), under its operating conditions.

When using an AOD equivalent to SAE Level 4 under its operating conditions, it is possible to operate the vehicle without violating the driver's obligations during the operation, and because the vehicle will immediately stop automatically in a safe manner when the use of that AOD has become unable to satisfy the operating conditions, it is possible for the vehicle to operate without a driver. Based on this, the Road Traffic Act (Law No. 105 of 1960) as amended by the Amending Act (hereinafter referred to as the "Revised Act") defines SAO as a concept that is different from "driving" that requires a driver. (Article 2 (1)(172) of the Revised Act)

### 1.2. Permission for SAO

Although it is possible for a vehicle to operate without a driver when using an AOD equivalent to SAE Level 4, if the vehicle has safely stopped due to the operating conditions not being satisfied, and measures are not taken to respond to instructions from police officers or approach of an emergency vehicle, or to report to the police in the event of a traffic accident, there is a risk of creating a hazard and obstruction to road traffic.

Therefore, under the Amending Act, it is stipulated that only those who have obtained a permission from the prefectural public safety commission can perform SAO. (Article 75-12 (1) of the Revised Act)

#### 1.2.1. Application for Permission of SAO

A person seeking to conduct a SAO must obtain permission by submitting a written application which includes a plan for SAO describing the implementation methods for fulfilling the obligations described below that apply to a SAO permission holder (hereinafter referred to as a "SAO implementer") to a prefectural public safety commission having jurisdiction over the place where the SAO is to be conducted. (Article 75-12 (2) of the Revised Act)

#### 1.2.2. Criteria for Permission of SAO

Because the permission framework for SAO is a framework to ensure that even when a vehicle is operated without a driver, the safety and smoothness of road traffic is ensured in the same manner as when a driver is present, the prefectural public safety commission will examine whether or not the plan for SAO conforms to the following criteria in order to determine whether or not the system and measures for fulfilling the obligations of the SAO implementer are in place. (Article 75-13 (1) of the Revised Act) (Fig.1)

- (1) The vehicle to be used for SAO in connection with the plan for SAO (hereinafter referred to as "vehicle for SAO") shall be capable of conducting a SAO. (Item (1))
- (2) The SAO conducted according to the plan for SAO satisfies the operating conditions in connection with the AOD of that vehicle for SAO. (Item (2))
- (3) Smooth and reliable implementation of the measures that must be taken by the SAO implementer and the persons who are employed for the SAO (hereinafter referred to as the "SAO staff") in accordance with the provisions of the Act, etc. is expected. (Item (3))
- (4) The SAO conducted according to the plan for SAO is not likely to significantly interfere with other traffic. (Item (4))
- (5) The SAO conducted according to the plan for SAO is for the



purpose of transporting persons or objects, which also contributes to the improvement of the convenience or welfare for local residents. (Item (5))

The prefectural public safety commission shall examine whether or not the submitted plan for SAO complies with the above criteria, and shall grant the permission of SAO after hearing the opinion of the Minister of Land, Infrastructure, Transport and Tourism and the heads of the municipalities (including special wards) (Article 75-13 (2) of the Revised Act).

### 1.3. Obligations of SAO Implementers

The following obligations are imposed on SAO implementers.

- (1) SAOs must comply with the plan for SAO and the conditions attached to the SAO permission. (Article 75-18 (1) of the Revised Act)
- (2) The SAO implementer must provide education to the SAO staff. (Article 75-19 (1) of the Revised Act)
- (3) The SAO implementer must designate a supervisor of SAO and persons responsible for on-site measures. (Article 75-19 (2) and (3) of the Revised Act)
- (4) The SAO implementer must take one of the following measures: (Article 75-20 (1) of the Revised Act)
  - (a) measures to equip a place with equipment capable of confirming the road and traffic conditions around that vehicle for SAO and the conditions of that vehicle by images and sounds and to place a supervisor of SAO at that place (Item (1))

(b) measures to place a supervisor of SAO in that vehicle for SAO (Item (2))

- (5) When conducting a SAO, the SAO implementer must indicate on an easily visible place of that vehicle for SAO that the SAO is running. (Article 75-20 (2) of the Revised Act)

### 1.4. Responsibilities of a Supervisor of SAO

Regarding the driver's obligations related to driving operation that require specific response on site, it is assumed that even an AOD with functions and capability equivalent to SAE Level 4 cannot respond to them. Besides, the obligations other than those for a driver related to driving operation, for example, responding to a traffic accident, is not presumed to be handled by the AOD.

Therefore, the Amending Act separately stipulates the following obligations when conducting SAO, which are equivalent to the obligations that an AOD is assumed not capable of responding to, and imposes them upon the supervisor of SAO (or the persons responsible for on-site measures (7)).

- (1) A supervisor of SAO must monitor the state of the operation of equipment, while that vehicle for SAO is conducting the SAO. In such a case, that supervisor of SAO must, when finding that that equipment is not operating in a normal manner, take measures to halt that SAO immediately. (Article 75-21 (1) of the Revised Act)
- (2) A supervisor of SAO must, when a SAO is halted on a road, immediately check whether or not to take the measures

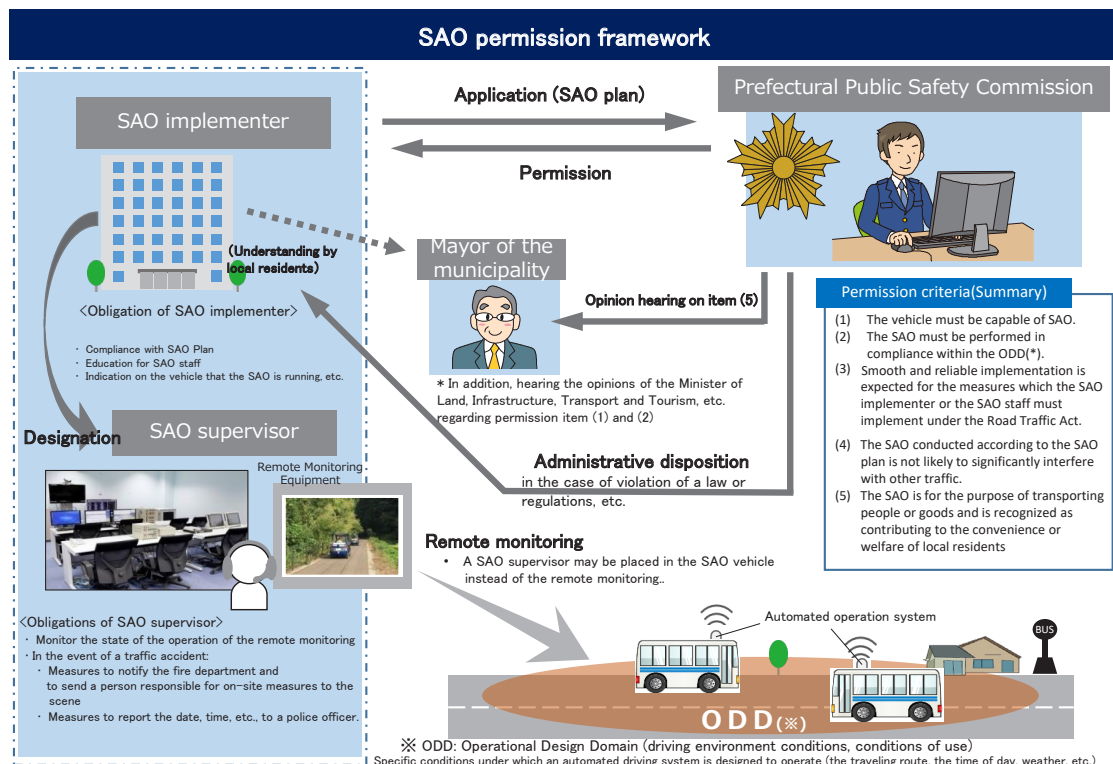


Fig.1: Image of the Permission Framework for SAO

which a supervisor of SAO must implement. (Article 75-21 (2) of the Revised Act)

- (3) In a case where a SAO is halted, the supervisor of SAO must, when any measure or order is taken or issued to that vehicle for SAO or to that supervisor of SAO (e.g., in a case that a police officer is controlling the traffic with hand signals), immediately take necessary measures to have that vehicle for SAO run according to those measures or orders. (Article 75-22 (1) of the Revised Act)
- (4) In a case where a SAO is halted, the supervisor of SAO must, when emergency motor vehicles are approaching to that vehicle for SAO or there are emergency motor vehicles in the vicinity of it, immediately take the necessary measures so that that vehicle for SAO does not prevent the passage of those emergency motor vehicles. (Article 75-22 (2) of the Revised Act)
- (5) In a case where a SAO is halted, the supervisor of SAO must, when that vehicle for SAO is found to have been parked illegally, immediately take necessary measures to change how that vehicle for SAO is parked or move that vehicle from that place. (Article 75-22 (3) of the Revised Act)
- (6) In the event of a traffic accident in connection with a vehicle for SAO (excluding when the supervisor of SAO is placed in that vehicle), the supervisor of SAO must immediately take measures to notify a fire department nearest to the scene of that traffic accident and must send a person responsible for on-site measures to the scene of that traffic accident. In such a case, the supervisor of SAO of that vehicle for SAO must immediately report the date, time, etc., where the traffic accident occurred to a police officer of the nearest police station. (Article 75-23 (1) of the Revised Act)
- (7) In the case of (6), a person responsible for on-site measures who arrives at the scene of the traffic accident must take necessary measures to prevent road hazards at the scene of the traffic accident. (Article 75-23 (2) of the Revised Act)

### 1.5. Administrative Disposition

Because there is a risk that a SAO may cause road hazards or obstruct traffic if it is not performed in accordance with the approved plan for SAO, provisions have been put in place so that a prefectural public safety commission may conduct the following administrative disposition against a SAO implementer if the SAO implementer or SAO staff violates the Revised Act.

- (1) Instruction to the SAO implementer to take necessary measures for the SAO by the prefectural public safety commission (including not conducting a SAO until measures are taken) (Article 75-26 of the Revised Act)
- (2) Revocation of permission or suspension of its validity by the prefectural public safety commission (Article 75-27 of the Revised Act)

- (3) Provisional suspension of permission by the chief of a police station (Article 75-28 of the Revised Act)

### 1.6. Towards Enforcement of the Amending Act

As mentioned at the beginning of this paper, the Amending Act is to take effect within one year from the date of promulgation.

Regarding the provisions related to the permission framework for SAO, matters such as the contents of education for those involved in SAO, the aptitude required for those who perform remote monitoring, and the requirements for remote monitoring equipment are left to subordinate orders and regulations; considering the need for business operators to prepare for applications of permission, it is necessary to complete the formulation of the subordinate orders and regulations as early as possible and within one year.

[Contacts].....

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# The Act for Partial Amendment of the Road Act

Road Bureau, Ministry of Land, Infrastructure, Transport and Tourism

## 1 Introduction

The Road Act (Act No. 180 of 1952) was enacted and enforced in 1952 as a basic law to provide for the designation and approval of road routes, management, structure, maintenance, cost sharing, and other matters concerning roads in order to improve the road network.

In recent years, in order to meet the needs of increasingly diverse and sophisticated road use, the following main revisions were passed in May 20, 2020 in the "Act for Partial Revision of the Road Act, etc." and thus promulgated in May 27, 2020 (Act No. 31 of 2020):

- Acting as an agent for direct control of disaster restoration, etc., of locally managed roads
- Establishment of dedicated stopping facilities for business vehicles
- Construction of pedestrian-centered road areas
- Development of facilities to assist in automated driving
- Creation of a new traffic system for special vehicles

This section introduces the revisions related to automated driving.

## 2 Overview of revisions

The practical application of automated driving will contribute to solving various issues related to road transportation, such as reducing traffic accidents involving the elderly, easing traffic congestion, securing means of transportation in rural areas, and eliminating driver shortages in logistics services, etc. Therefore, the "Outline on improvement of legal system and environment for automated driving system" (April 30, 2008; IT Comprehensive Strategy Office) was decided as a government policy.

For the time being, however, it is expected that the devices that will be put to practical use in vehicles that

perform automated driving will not be those that can operate safely at any time and place (Level 5), but rather those that can operate safely only when used under specific driving environment conditions (Level 3 or 4).

In addition, the driving environment conditions include the maintenance and use of "infrastructure such as equipment and communications installed on the road," in addition to keeping the speed below a predetermined level, limiting the driving range to only a predetermined route, limiting the weather and time of day, and establishing the necessary communication conditions.

The outline also recommends that "the necessary items for infrastructure such as equipment and communications (including infrastructure-to-vehicle cooperative technologies) to be installed on roads to complement the safety of automated driving should be considered based on the driving mode, technological progress, results of FOTs (Field Operational Tests), and opinions of users and operators." In order to put automated driving into practical use, these infrastructures need to be developed. (Fig.1)

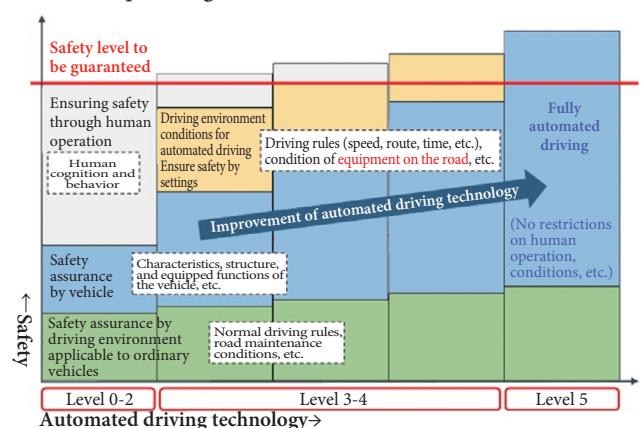


Fig.1: Image of the step-by-step approach to the practical application of automated driving (Partially edited from the "Outline on improvement of legal system and environment for automated driving system")

The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has conducted FOTs of automated driving services based at "Michi-no-Eki" and other locations in 18 locations across Japan since 2009. In these FOTs, it became clear

that stable driving is difficult to achieve with vehicle technology alone due to weather conditions such as snowfall and terrain such as mountainous areas. It was also confirmed that assistance from facilities installed on the infrastructure side, such as magnetic markers, is effective in ensuring stable driving.

Based on the above, in order to respond to the practical application of automated driving, the Road Act defines facilities to assist the driving of automated vehicles as "supporting infrastructure for automated driving."

-Supporting infrastructure for automated driving installed by the road administrator are added as attachments to the road.

-Relaxing the strict requirements by adding supporting infrastructure for automated driving to the occupied property, assuming that they are installed by someone other than the road administrator.

Based on the above, promote public-private efforts toward the practical application of automated driving.

In addition, automated driving technology is in the process of rapid progress, and Japan aims to steadily reflect the technology related to infrastructure for automatic driving in international standards. Therefore, it is necessary to develop supporting infrastructure for automated driving installed in an internationally coordinated and unified manner throughout Japan. The act includes the following provisions regarding supporting infrastructure for automated driving installed by road administrators:

-Infrastructure meets the performance standards specified by the Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism

-After installation, report to the Minister of Land, Infrastructure, Transport and Tourism (in the case of a municipality, report to the prefecture, which in turn reports to the Minister of Land, Infrastructure, Transport and Tourism).

#### <Reference texts>

○Regulations for Enforcement of the Road Act (Ministry of Construction Ordinance No. 25 of 1952) (Extract)

(Criteria for the performance of supporting infrastructure for automated driving, etc.)

1 Article 4-8-2 The performance standards for supporting infrastructure for automated driving that are attached to roads specified by an Ordinance of the Ministry of Land, Infrastructure, Transport and Tourism under Article 45-2 paragraph (1) of the Act shall be that the supporting infrastructure for automated driving apply to any of the following items.

(i) Items such as magnets or objects that emit waves to be detected by sensors to detect the status of automated vehicle driving shall conform to the standards specified by the Minister of Land, Infrastructure, Transport and Tourism. The purpose of such items is to correct the position of an automated vehicle or motor vehicle that operates by technology related to automated driving (hereinafter "Automated Vehicle")

equipped with automated driving systems (meaning automated driving systems prescribed in item (xx) of paragraph (1) of Article 41 of the Road Transport Vehicle Act (Act No. 185 of 1951)) that travel on roads on which supporting infrastructure for automated driving are installed.

(ii) Items that emits or displays data that shows the position of supporting infrastructure for automated driving in order to be detected by sensors that detect the status of driving of Automated Vehicles shall conform to the standards specified by the Minister of Land, Infrastructure, Transport and Tourism.

The purpose of such items is to correct the position of Automated Vehicles that drive on roads where supporting infrastructure for automated driving was installed, roads that intersect with such roads, and roads that connect with such roads.

(iii) Items that emit or display data related to the road structure, other vehicles, status of pedestrians, presence of obstacles, and other data related to the road to be detected by sensors that complement sensors that detect the status of the Automated Vehicle scope shall conform to the standards specified by the Minister of Land, Infrastructure, Transport and Tourism. The purpose of these items is to ensure the safe passage of Automated Vehicles on roads where supporting infrastructure for automated driving was installed, roads that intersect with such roads, and roads that connect with such roads.

2 Supporting infrastructure for automated driving shall be such that they do not interfere with the roadway structure or traffic.

## 3 Conclusion

We hope that the establishment of infrastructure to support automated driving will promote the realization of automated driving and contribute to safer and smoother traffic and greater convenience on roads, and we ask for the continued understanding and cooperation of those involved in road management and the public in promoting road policies.

#### [Contacts]

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# The Act for Partial Amendment of the Road Transport Vehicle Act

Yoshitaka Tada (Road Transport Bureau, Ministry of Land, Infrastructure, Transport and Tourism)

At the Ministry of Land, Infrastructure, Transport and Tourism, and based on the Road Transport Vehicle Act, safety is ensured in an integrated manner from the design and manufacturing stages of vehicles through to the stage of use on public roads. Specifically, we are involved with measures such as formulating safety standards, type certification, servicing & maintenance, inspections, and recalls.

On the other hand, this specific law was created in 1951, and at that time it was not considered that some non-human system would also operate vehicles. For this reason, the law was revised in May 2019 to accommodate automated vehicles (Level 3 and Level 4).

## 1 Addition of automated driving systems to the equipment subject to safety standards

"Automated driving systems" were added to the list of devices subject to the safety standards, as devices necessary for automatically operating a vehicle by means of a program. (Fig.1) In addition, the Minister of Land, Infrastructure, Transport and Tourism shall attach conditions under which the automated driving system are to be used (the driving environment conditions) to each such system.

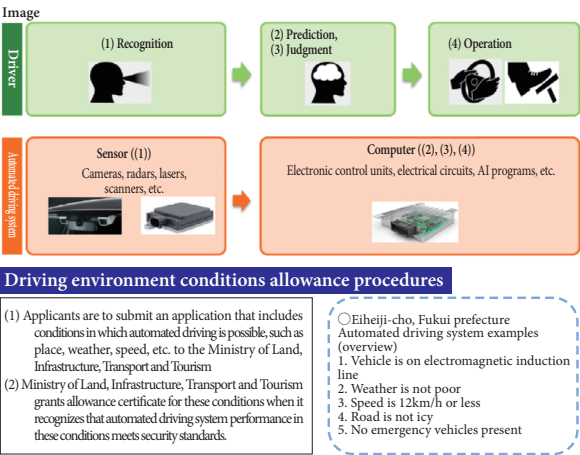


Fig.1: Definition of an automated driving system

### ○ Road Transport Vehicle Act (Act No. 185 of 1951) (Extract)

#### Article 41

A motor vehicle shall not be provided for use in operation unless it conforms to the technical standards for safety, pollution prevention and other environmental preservation specified by Ministry of Land, Infrastructure, Transport and Tourism ordinances with regard to the following devices.

#### 20 Automated driving system

2 "Automated driving system" in item (xx) of the preceding paragraph refers to a device in which the main components are sensors that detect the conditions of the vehicle and the surrounding conditions during operation, and the computer and program (commands to a computer (including an input or output device; the same shall apply hereinafter except for this paragraph and Article 99-3(1) (i) which are combined to obtain a single result;

the same shall apply hereinafter) for processing the information sent by the sensors which are necessary for the automated operation of the vehicle by the program, and has functions that replace all of the abilities related to prediction, judgment, and operation related to operation by a person who operates a vehicle when used under the conditions imposed by the Minister of Land, Infrastructure, Transport and Tourism for each device, and is equipped with a device to record the information necessary to confirm the operating state of the relevant functions.

### ○ Road Transport Vehicle Safety Standards (Ministry of Transport Ordinance No. 67 of 1951) (Extract)

#### Article 48

A motor vehicle (excluding motorcycles, motorcycles with a sidecar, three-wheeled motorcycles, light vehicles with caterpillars or sleds, large-sized special motor vehicles, small-sized special motor vehicles, and towed motor vehicles) may be equipped with an automated driving system.

2 A motor vehicle equipped with an automated driving system shall conform to the standards specified in public notifications regarding function, performance, etc., as a vehicle capable of ensuring the safety of automated operation of the vehicle via a program.

3 An automated driving system whose type is designated pursuant to the provisions of Article 75-3 (1) of the Act shall make a vehicle equipped with said system conform to the standards set forth in the preceding paragraph.

## 2 Summary of the Public Notification Concerning Automated Driving Systems

The following is a summary of the standards set forth in the Public Notification Concerning Automated Driving Systems.

- (1) There is no risk of interfering with the safety of passengers and other traffic under the driving environment conditions
- (2) It does not operate outside of the driving environment conditions
- (3) An alarm for taking over the driving operation is issued before the driving environment conditions are left, safe operation is continued until the driver takes over, and if the driver does not take over, the vehicle is safely stopped
- (4) Driver monitoring is installed to monitor the driver's condition
- (5) Measures are taken to ensure cybersecurity to prevent unauthorized access, etc.

## 3 Establishment of a permit system related to modifications involving alterations to the programs incorporated in an automated driving system, etc.

With the advancement of vehicle technology, it has become possible for vehicle manufacturers, etc. to alter the programs incorporated in the electronic control devices of vehicles and change their performance and add (modify) functions easily and on a large scale while the vehicle is being used by utilizing communications.

For this reason, a person who intends to make a modification by altering a program incorporated in an automated driving system, etc. through the use of telecommunication lines, etc., which may cause the vehicle to fail to conform to safety standards (a Specified Modification Etc.) (Fig.2) must obtain permission from the Minister of Land, Infrastructure, Transport and Tourism in advance.

Since the Road Transport Vehicle Act until now did not envision the large-scale electronic modification of vehicles using communications, conformance to the standards specified in the public notification regarding functionality and performance,

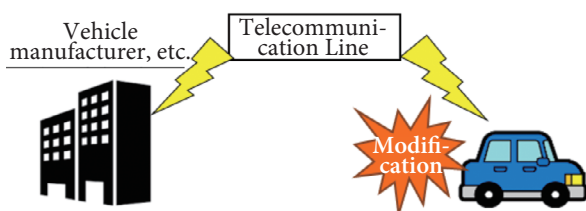


Fig.2: Image of a Specified Modification Etc.

including ensuring cybersecurity, is required. (Fig.3)

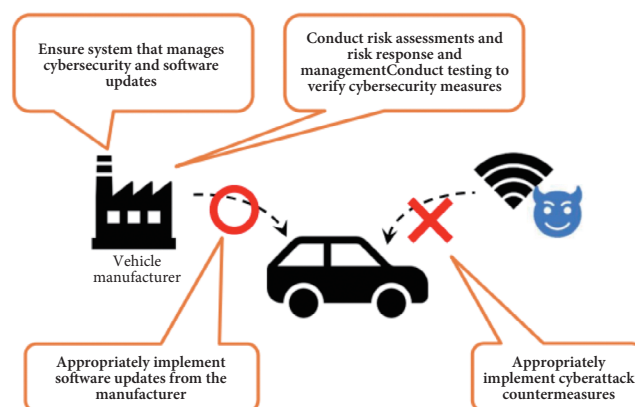


Fig.3: Overview of Cyber security

## 4 Expansion of the Scope of Disassembly and Maintenance

It was necessary to expand the scope of "disassembly and maintenance" because it did not include maintenance and modifications related to advanced technologies, which meant there was a risk that safety may not be ensured.

The definition of "disassembly and maintenance" that requires certification was expanded by adding "automated driving systems" and also maintenance and modifications that may affect the operation of such systems, and the name was changed to "specified maintenance". (Fig.4) In addition, there is an obligation for vehicle manufacturers, etc. to provide the model-specific technical information necessary for inspections and maintenance to the service providers who perform specified maintenance.

Equipment	Maintenance and modifications that involve removal	Maintenance and modifications which affect operation but do not involve removal	
Motor	Conventional "disassembly and maintenance"	Expansion of definition (e.g.) Adjustment of cameras or radar	Certification by the Director of the District Transport Bureau, etc. is required
Power			
Running gear	Term changed to "Specified maintenance"	Expansion	Expansion
Control unit			
Braking device	Expansion	Addition of covered equipment	Expansion
Shock absorber			
Coupling device	Not subject to "disassembly and maintenance"	Not subject to "disassembly and maintenance"	Expansion
Automated driving system			
Lighting devices, etc.	The vehicle manufacturer, etc. is obligated to provide certified maintenance service providers, etc. with technical information necessary for inspection and maintenance of advanced technologies.		Expansion

Fig.4: Image of specified maintenance

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## Projects List and Publication Status of the Second Phase of SIP Automated Driving for Universal Services

The following is a list of all Second Phase of SIP Automated Driving R&D projects. This also shows whether projects have been published in previous reports (Mid-term results report<sup>1</sup>) and final reports (Final results report<sup>2</sup>), and page numbers of each. " ○ " indicates that the project is included in the results report, " — " indicates that the project is not included in the results report, and " \* " indicates the project of producing and publishing the results report.

For more detailed information on each project, please refer to the "Report of Results for Each project" described in Section 7 of this report.

Project No.	Project title	Project period (As of December 1st, 2022)	Availability and page numbers	
			Mid-term results reports	Final results reports
[I]	Development and validation (FOTs) of automated driving systems			
F001	Research on effectiveness and impact on traffic flow for field operational tests in Tokyo waterfront area in 2020	2018.07.19 ~ 2019.03.20	○ Pages 53 - 78 [Section 3(1)]	○ Pages 41 - 46 [Section 2 (1) 1)]
F003	Review and evaluation of planning regarding 2020 the field operational tests in Tokyo waterfront area in 2020	2018.11.01 ~ 2019.06.28		
F005	Infrastructure preparation, preliminary research, and maintenance and management for FOTs	2019.03.08 ~ 2022.05.31		
F006	Implementation of FOTs in the Tokyo waterfront area	2019.04.12 ~ 2023.02.28		
F009	Constructing the field operational tests environment to provide signal information via the public network	2021.08.05 ~ 2023.02.28	○ Pages 111 - 116 [Section 4 (1)]	○ Pages 154 - 161 [Section 4 (1) 1)]
F002	Field operational tests for automated driving services in rural areas aiming for the improvement of the social environment	2018.10.12 ~ 2019.08.30		
F007	Improvement of the social environment for practical implementation and horizontal deployment of automated driving services	2019.09.09 ~ 2020.12.28		
F008	Research on the social implementation and permanent adoption of automated driving transport service in rural areas	2020.10.22 ~ 2023.02.28		
F004	Research on environmental improvement for practical use of transport services by automated driving in the new town area	2018.12.14 ~ 2019.04.30	—	○ Pages 260 - 263 [Section 7]
[II]	Development of core technologies for the practical implementation of automated driving			
R001	Study of utilization of new communication technologies including V2X technology to automated driving system	2018.09.13 ~ 2019.02.28	○ Pages 38 - 41 Pages 192 - 194 [Section 2 (2)] [Section 7]	○ Pages 85 - 93 [Section 2 (2) 1)]
R016	Study of communication technologies for use by automated driving systems	2019.09.20 ~ 2020.03.19		
R027	Study on V2X communication for achieving use cases of cooperative driving automation	2020.11.25 ~ 2022.02.28		
R028	Study on V2X communication for achieving use cases of cooperative driving automation: evaluation of 700 MHz band ITS	2021.04.27 ~ 2022.02.28		
R033	Study on V2X communication protocol in 5.9 GHz band to realize the cooperative driving automation use cases	2022.04.07 ~ 2023.02.28	—	○ Pages 94 - 98 [Section 2 (2) 2)]
R017	Research and development on the collection, integration, and delivery of short-range and medium-range information	2019.08.19 ~ 2021.05.31	○ Pages 42 - 48 [Section 2(2)]	○ Pages 99 - 103 [Section 2 (2) 3)]
R002	Research on the enhancement of technologies to provide traffic signal information toward the realization of automated driving	2018.09.20 ~ 2019.03.20	○ Pages 15 - 22 [Section 2 (1)]	—
R009	Research on the enhancement of technologies to provide traffic light information toward the realization of automated vehicles	2019.05.28 ~ 2020.10.30		
R003	Research on the provision of traffic signal information through means other than vehicle-to-infrastructure communication via ITS roadside radio units and others	2018.09.20 ~ 2019.03.20	○ Pages 15 - 22 [Section 2 (1)]	○ Pages 47 - 53 [Section 2 (1) 2)]
R010	Research and development on the provision of SPaT information through methods other than vehicle-to-infrastructure communication via ITS roadside radio units and others	2019.05.22 ~ 2020.02.28		
R021	Research and development on the provision of signal phase and timing (SPaT) information using cloud and other technologies	2020.06.22 ~ 2021.02.26		
R029	Research and development on the provision of signal phase and timing (SPaT) information using cloud and other technologies toward social implementation	2021.07.07 ~ 2022.03.31		
R004	Research on measures for the utilization of V2X information for ensuring traffic safety under mixed traffic conditions	2018.09.13 ~ 2019.03.20	—	○ Pages 260 - 263 [Section 7]
R012	Research on utilization method of V2X information for ensuring traffic safety under coexisting traffic -simulation of evaluation of impact of automated vehicles on traffic Flow-	2019.05.28 ~ 2020.02.28		
R023	Research and development on traffic signal control using GNSS (location information) and other technologies	2020.07.02 ~ 2022.02.28	—	○ Pages 73 - 79 [Section 2 (1) 6)]
R025	Improvement of data accuracy of traffic regulation information	2020.09.16 ~ 2021.03.12	—	○ Pages 67 - 72 [Section 2 (1) 5)]
R030	Research on model system for improvement of data accuracy of traffic regulation information	2021.07.06 ~ 2023.02.28		
R005	Approach development for improving an automated driving validation environment in virtual space	2018.12.14 ~ 2023.03.31	○ Pages 89 - 94 [Section 3 (2)]	○ Pages 108 - 120 [Section 3 1)]
R006	Research on the recognition technology required for automated driving technology (levels 3 and 4)	2018.12.06 ~ 2023.02.28	○ Pages 79 - 85 [Section 3(1)]	○ Pages 121 - 129 [Section 3 2)]
R008	Update of high-precision three-dimensional map with vehicle probe data	2019.02.15 ~ 2021.02.26	○ Pages 30 - 37 [Section 2 (1)]	—
R013	Operations of planning and deliberation council for the creation of systems for generating and providing Lane-level road traffic information using probe information	2019.04.22 ~ 2023.02.28	○ Pages 23 - 29 [Section 2 (1)]	○ Pages 54 - 60 [Section 2 (1) 3)]
R020	Technical study and evaluation of automated driving control using lane-level probes or the like	2020.01.16 ~ 2023.02.28		
			—	○ Pages 218 - 221 [Section 5 4)]

1 SIP 2nd Phase: Automated Driving for Universal Services—Mid-Term Results Report (2018–2020) (ISBN: 9784904056899) [https://en.sip-adus.go.jp/rd/rd\\_page03.php](https://en.sip-adus.go.jp/rd/rd_page03.php)  
2 SIP 2nd phase: Automated Driving for Universal Services—Final Results Report (2018–2022) (ISBN: 9784904056936) [https://en.sip-adus.go.jp/rd/rd\\_page04.php](https://en.sip-adus.go.jp/rd/rd_page04.php)



Project No.	Project title	Project period (As of December 1st, 2022)	Availability and page numbers	
			Mid-term results reports	Final results reports
[II] Development of core technologies for the practical implementation of automated driving (continued from previous page)				
R011	Research on application and construction of a transport environment information platform for tourist attractive city	2019.04.25 ~ 2019.08.30	○ Pages 156 - 158 [Section 5 (1)]	○ Pages 207 - 210 [Section 5 2)]
R018-a	Research for design and development of automated driving and drive assistance architectures - to build a geographic data communication portal site and geographic data for FOTs in the Tokyo waterfront area and urban areas for cooperative mobility and logistics services	2019.08.30 ~ 2023.03.31		
R018-b	Research for design and development of automated driving and drive assistance architectures - to clarify requirements to construc an operation system for local automated driving service	2019.08.30 ~ 2021.05.31	○ Pages 117 - 121 [Section4 (1)]	○ Pages 154 - 161 [Section 4 (1) 1)]
R026	Establishing an environment that promotes the utilization of mobility-related data	2020.09.30 ~ 2021.03.12	○ Pages 159 - 161 [Section 5 (1)]	—
R014	Research on new types of cyber-attacks and countermeasures against them	2019.07.16 ~ 2020.03.19	○ Pages 95 - 98 [Section 3 (2)]	○ Pages 130 - 134 [Section 3 3)]
R024	Research and study on new types of cyber-attacks and countermeasures against them	2020.08.07 ~ 2023.02.28		
R015	Research and study on HMI and safety education methods for advanced automated driving	2019.08.19 ~ 2022.08.31	○ Pages 99 - 106 [Section 3 (2)]	○ Pages 135 - 149 [Section 3 4) - 6)]
R019	Research and study of common reference point (CRP) in high definition map	2019.08.19 ~ 2021.02.28	○ Pages 192 - 194 [Section 7]	—
R022	Study and field operational tests for improving logistics efficiency based on architecture utilizing vehicle information such as probes	2020.07.02 ~ 2021.04.30	—	○ Pages 211 - 217 [Section 5 3)]
R032	Field operational tests and evaluation for improving logistics efficiency based on architecture utilizing vehicle information such as probes	2021.12.03 ~ 2022.12.31		
R031	Simulation analysis of verification of merging assistance system	2021.09.15 ~ 2023.02.28	—	○ Pages 61 - 66 [Section 2 (1) 4)]
[III] Fostering of public acceptance of automated driving				
P001	Study on advanced driver assistance system for drivers with visual field defects	2018.12.25 ~ 2021.02.28	○ Pages 130 - 135 [Section 4 (2)]	—
P002	Study of socioeconomic impacts of automated driving including traffic accident reduction	2018.12.28 ~ 2021.05.31	○ Pages 136 - 141 [Section 4 (2)]	○ Pages 173 - 179 [Section 4 (2) 2)]
P010	Research on assessment of the impact of automated driving on society and the economy and on measures to promote deployment	2021.07.02 ~ 2023.02.28		
P003	Survey to foster public acceptance of automated driving technology	2019.04.04 ~ 2020.03.19	○ Pages 192 - 194 [Section 7]	○ Pages 180 - 188 [Section 4 (2) 3)]
P004-a	Strategic planning for fostering social acceptance and survey regarding its evaluation - to create overall strategies and to plan and operate information dissemination through web-based media	2019.09.13 ~ 2023.03.31		
P009	Research to measure effect of efforts for fostering social acceptance through events	2020.09.09 ~ 2023.03.31		
P004-b	Strategic planning for fostering social acceptance and survey regarding its evaluation - evaluation of efforts to foster social acceptance	2019.09.13 ~ 2023.02.28	○ Pages 124 - 129 [Section 4 (2)]	○ Pages 166 - 172 [Section 4 (2) 1)]
P005	Visualize the effects of reducing traffic accidents through automated driving and driving assistance	2019.10.08 ~ 2021.03.01	○ Pages 142 - 147 [Section 4 (2)]	—
P006	Research for introducing precise docking technology by automatic driving to BRT (bus rapid transit)	2020.02.28 ~ 2021.12.28	—	○ Pages 260 - 263 [Section 7]
P008	Fundamental research for automated buses friendly to mobility-constrained people	2020.06.02 ~ 2021.09.30	○ Pages 192 - 194 [Section 7]	○ Pages 189 - 194 [Section 4 (2) 4)]
[IV] Enhancement of international cooperation				
G001	Study on the strengthening of information dissemination capabilities in preparation for the realization of automated driving systems	2018.07.20 ~ 2019.03.20	○ Pages 165 - 167 [Section 6 (1)]	○ Pages 227 - 229 [Section 6 1)]
G003	Research on the strengthening of information dissemination capabilities in preparation for the realization of automated driving systems	2019.04.05 ~ 2021.05.31		
G007	Research of trend in order to strengthen information dissemination capabilities in preparation for the realization of automated driving systems	2021.05.24 ~ 2023.03.31		
G002	Basic study in promotion of joint research on automated driving with overseas research institutions	2018.08.24 ~ 2019.02.28	○ Pages 168 - 170 [Section 6 (1)]	○ Pages 230 - 233 [Section 6 2)]
G004	Construction of collaboration structure in promotion of joint research on automated driving with overseas research institutions	2019.05.27 ~ 2023.02.28		
G005	Study of overseas trends, etc., in preparation for international collaboration regarding traffic environment information	2019.07.04 ~ 2023.02.28	—	○ Pages 260 - 263 [Section 7]
G006	Study on intellectual property management strategy	2020.05.28 ~ 2021.03.12	○ Pages 192 - 194 [Section 7]	—
G008	Review and publication of mid-term results report to effectively promote R&D results	2021.04.19 ~ 2022.02.28	* Mid-term results reports preparation services	—
G009	Effective compilation and dissemination of R&D results	2022.05.11 ~ 2023.03.31	—	* Final results reports preparation services

# Correspondence Chart for the Titles Listed in This Report and Each Project (Reverse Lookup of the List of Projects)

The correspondence between the contents of this report and the related R&D project numbers is shown below. For the project title corresponding to the project number, please refer to the second phase of SIP-adus project list and report publication status in this report.

SIP final result report chapter title	Corresponding project number
Section 1: The Second Phase of SIP-Automated Driving for Universal Services	
Section 2: Establishment and Utilization of Traffic Environment Data	
(1) Technological Development Concerning the Generation of Traffic Environment Data	
1) The Tokyo Waterfront City Area Field Operational Tests	F001, F003, F005, F006, F009
2) Technological Development to Provide Traffic Signal Information to Automated Vehicles Connected to Infrastructures (V2N)	R003, R010, R021, R029
3) Technological Development for Lane-specific Road Traffic Information Using Vehicle Probes	R013, R020
4) Technological Development and Establishment of Simulation Environment for Lane Merging Support	R031
5) Improvement of Data Accuracy of Traffic Regulation Information	R025, R030
6) Technological Development for Traffic Signs Control and Emergency Vehicles Information Using GNSS (Location Information) and Other Technologies	R023
(2) Technological Development Concerning the Transmission of Traffic Environment Data	
1) Research on Communication Methods to Realize Cooperative Automated Driving Use Cases	R001, R016, R027, R028
2) Development of New Technologies, V2X and Others, for Communication	R033
3) Research and Development Concerning the Collection and Transmission of Medium Range Information	R017
Section 3: Ensuring the Safety of Automated Driving	
1) Development of Driving Intelligence Validation Platform (DIVP*) for Automated Driving Safety Assurance	R005
2) Research on the Recognition Technology Required for Automated Driving Technology (Levels 3 and 4)	R006
3) Research of New Cyberattack Techniques and Countermeasure Technologies	R014, R024
4) Research of Education Methods for Advanced Automated Driving Systems	R015
5) Research on Communication between Low-Speed Automated Transportation and Logistics Services Vehicles and Surrounding Traffic Participants	R015
6) Research of HMI for Advanced Automated Driving Systems	R015
Section 4: A Society with Automated Driving	
(1) Automated Driving Mobility Services in Regional Communities	
1) Establishing the Environment for the Deployment of Transportation Services Relying on Automated Driving	F002, F007, F008, R018-b
(2) Public Acceptance of Automated Driving	
1) Research and Evaluations for Fostering Public Acceptance	P004-b
2) Development of Assessment Methodology for Socioeconomic Impacts of Automated Driving Including Traffic Accident Reduction	P002, P010
3) Projects to Foster Public Acceptance	P003, P004-a, P009
4) Research for Automated Driving Bus Friendly to Persons with Disabilities or Reduced Mobility and Orientation	P008
Section 5: Data Connection and Use to Achieve Society 5.0	
1) Design of Geographical Data Architecture — Building and Promoting a Traffic Environment Data Portal Site	R018-a
2) Resolving Social Issues in Cities Popular with Tourists	R011, R018-a
3) Research to Realize More Effective Logistics System with Probe Vehicle Data	R022, R032
4) Utilization and Application of Probe Data to Road Maintenance and Management	R020
Section 6: Promoting International Cooperation	
1) SIP-adus Workshop	G001, G003, G007
2) Japanese-German and Japanese-European Cooperation	G002, G004
3) Dynamic Maps	
4) Human Factors	
5) Safety Assurance	
6) Connected Vehicles	
7) Cybersecurity	
8) Socioeconomic Impacts	
9) Service and Business Implementation	
Section 7: Other Achievements and Activities	F004, R004, R012, P006, G005
Section 8: Conclusion and Outcomes through SIP-adus to be Inherited	



## **SIP 2nd Phase: Automated Driving for Universal Services - Final Results Report (2018-2022)**

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