SIP-adus
Automated driving system for universal service
Cross-ministerial Strategic Innovation promotion Program

Overview

- Promote cross-sector and **industry-academia-government collaboration**
- Intensive R&D program from **fundamental research to practical and commercialization**
- Promote Regulatory reform

SIP 2nd FY2018～FY2022

12 themes on going (SIP-adus is one of them)

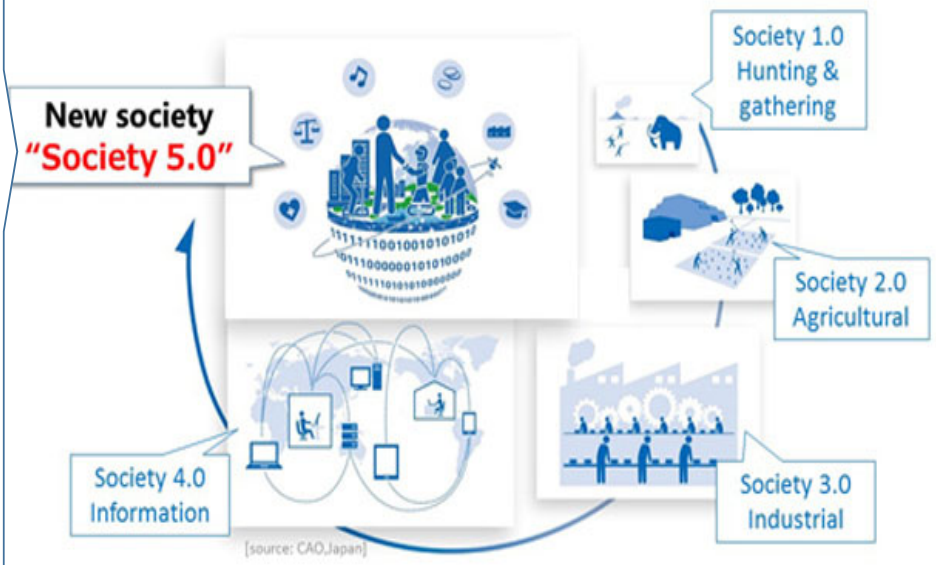
Data convergence

high degree of convergence between cyberspace (virtual space) and physical space (real space).

Economic advancement + **Solution of social problems**

provision of products and services that are needed to the people that need them at the time they are needed

human-centered society in which anyone can enjoy a high quality of life full of vigor

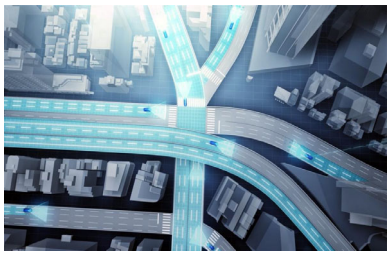


(Cabinet office HP)

ADS (Automated Driving Systems)

Safe and secure mobility for all

Competition



Cooperation

Realization of Society 5.0

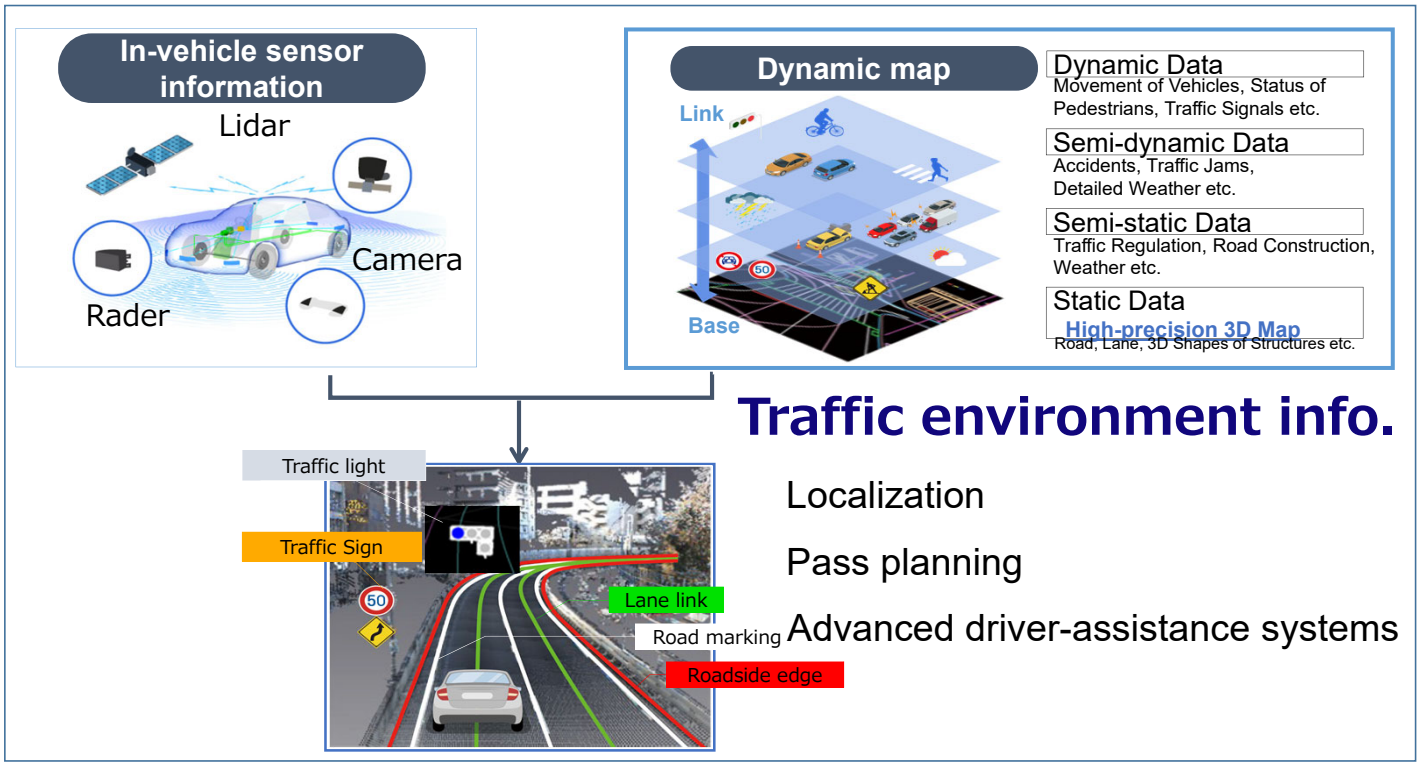
SIP

- **Technology**
  - **①Dynamic Map**
  - **②Safety Assurance**
  - **③Cybersecurity**
  - **④Geospatial dynamic data utilization**
  - etc.
- **Int. cooperation/Standardization**
- **Public acceptance**
- **Deregulation/Regulatory reform**

SIP Cabinet Office

① Dynamic map

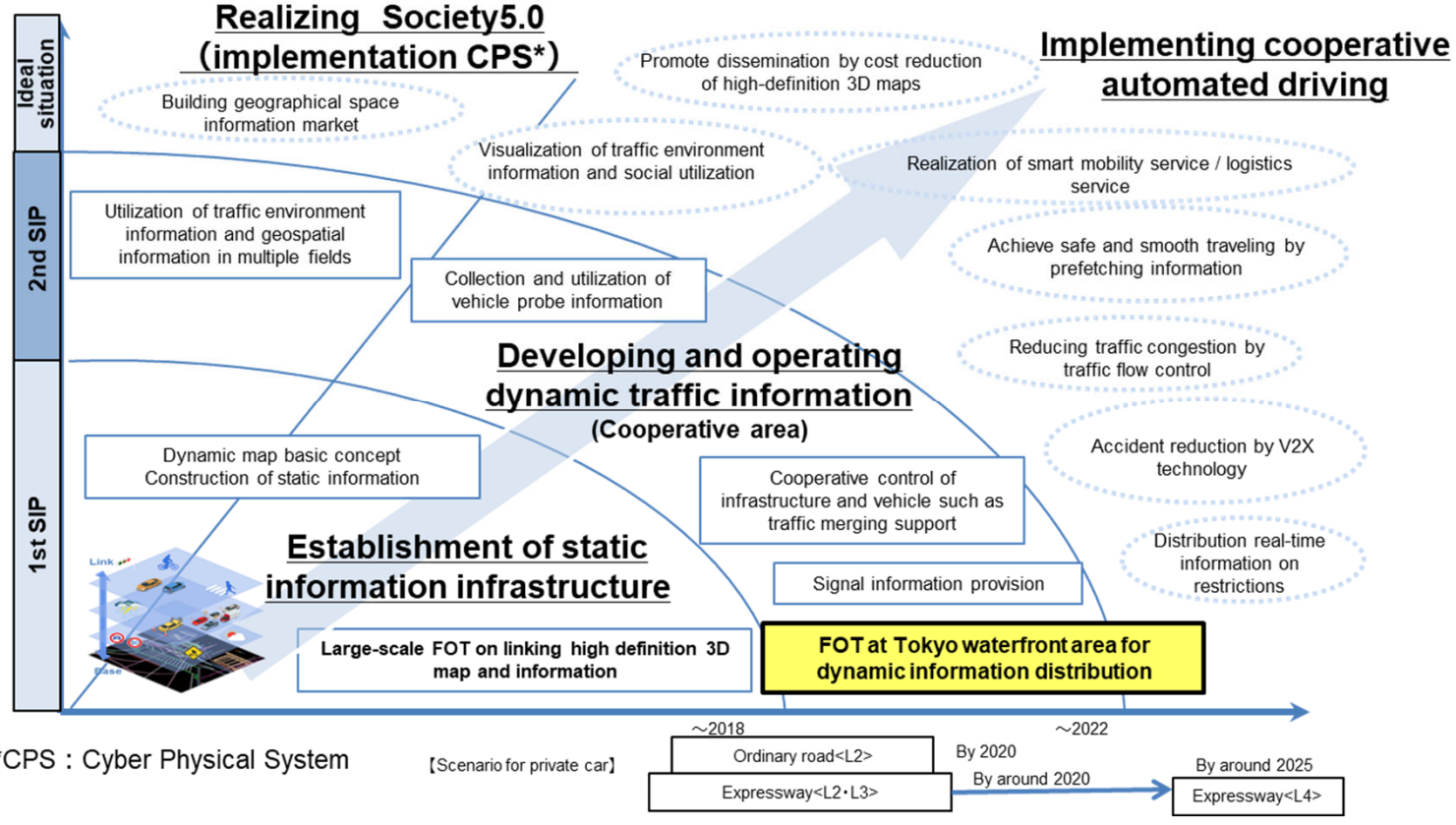
Structure of ADS



Technology development in cooperative areas

Realization of Society 5.0

Building the Traffic Environmental Info. Framework



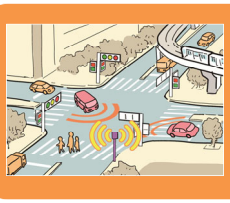
*CPS : Cyber Physical System

FOTs in Tokyo waterfront area

Focus

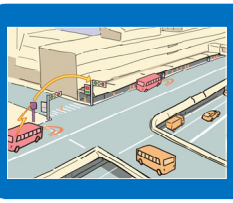
- Promoting standardization in an internationally open experimental environment under public roads and mixed traffic
- Promoting R&D by drawing out private investment through a matching fund format with industry-academia-government collaboration
- Improving measures to foster public acceptance with planning test drive events, etc. in connection with the Tokyo Olympics and Paralympics

Orange：Tokyo Waterfront City area
Blue：Haneda Airport area
Green：Metropolitan Expressway



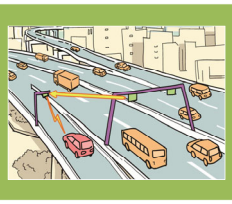
(a)Tokyo Waterfront City area

- Traffic signal information from ITS roadside unit.
- HD 3D map linked with signal info. etc



(b)Haneda Airport area

- Traffic signal information from ITS roadside unit.
- Magnetic marker
- Bus stop, designated lane for bus service



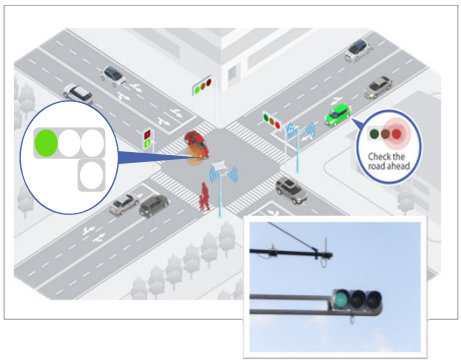
(c)Metropolitan Expressway

- Merging assistance at main lanes of expressway
- ETC gate open/close info.
- Lane level traffic flow regulation info. Etc.

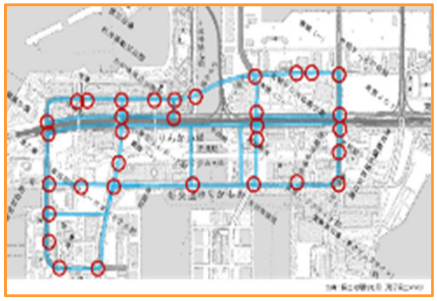
Participants from 29 institutions, including domestic and overseas automobile manufacturers, suppliers, universities, and other institutions.
※As of 2020

(a) Tokyo Waterfront City area

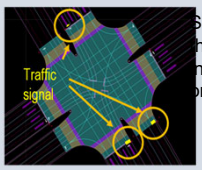
- Demonstrated the effectiveness of providing **signal information** via V2I



Installed V2I (760MHz) equipment at 33 intersections in Odaiba

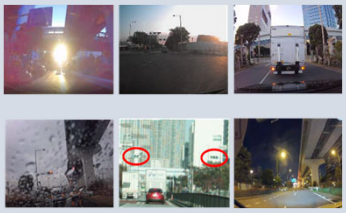


- Confirmed that **signal recognition** can be performed stably under various conditions based on **V2I information.**

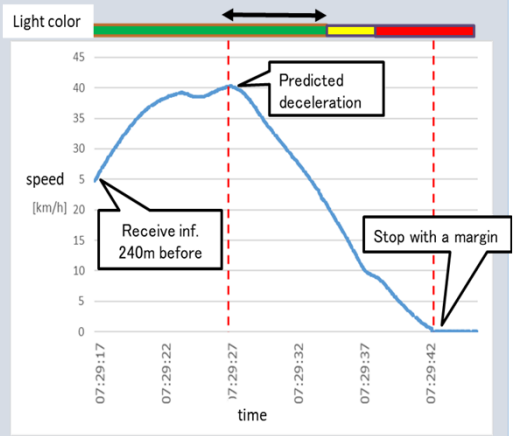


Superimpose display of the received V2I information on a high-precision 3D map

Ex.)Traffic signal color (green/yellow/red)



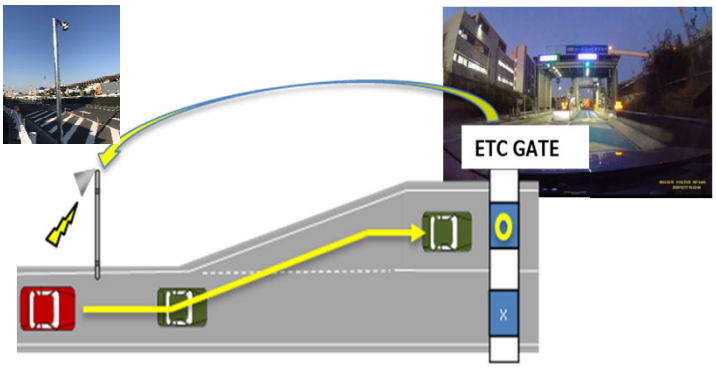
- Confirmed that **the dilemma zone* can be avoided** by V2I remaining seconds information



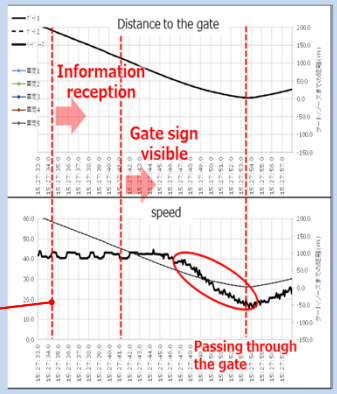
＊It is the timing which the vehicle cannot pass the stopping line , and stop without sudden braking in yellow light.

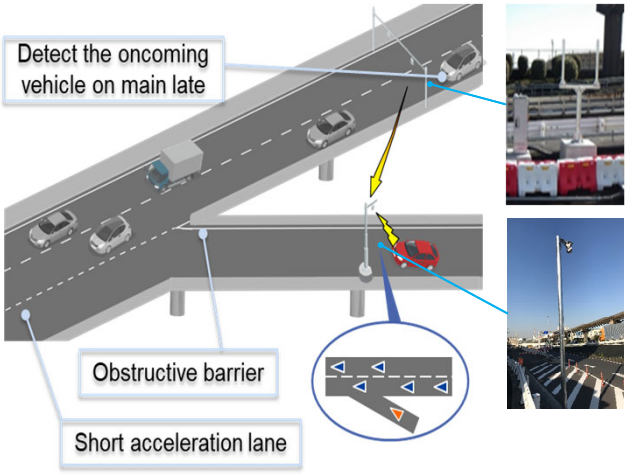
(b) Tokyo metropolitan expressway

➢ Demonstrated the effectiveness of **merging support information** via V2I

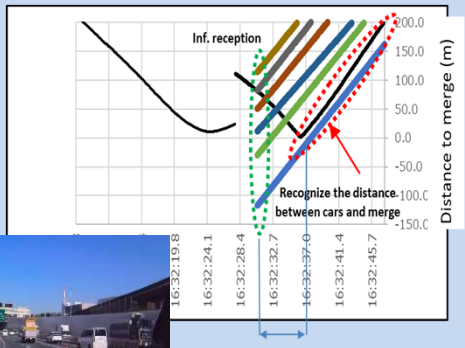


➢ **Smooth course change and gate passage** due to early recognition of operating gates.





➢ Confirmed the possibility of **merging judgment and speed control** aiming at the gap by automated driving control.

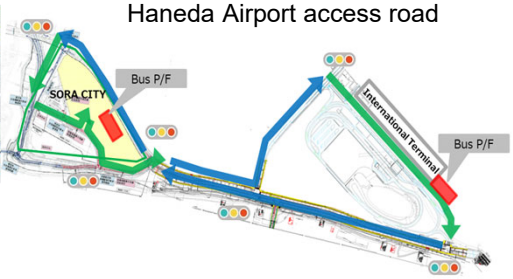


About 5 to 6 seconds from receiving information to merging

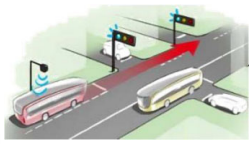
(c) Metropolitan Expressway

➢ Demonstrated the realization of **next-generation ART*** using AD technology under mixed traffic.

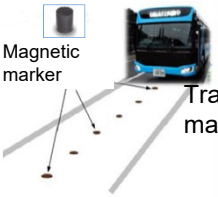
Haneda Airport access road



Road vehicle coordination equipment



PTPS** & Signal info. via V2I

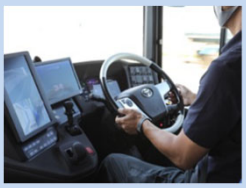


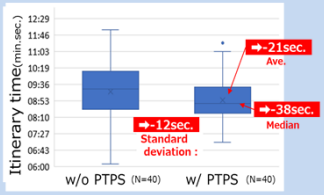
Track guidance magnetic marker

Dedicated bus lane

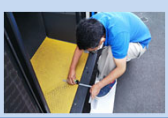
(**PTPS: Public Transport Priority system)

➢ Demonstrated **level 4 AD bus** that does not require driver intervention and **on-time express delivery** by road-vehicle cooperation.





➢ Demonstrated a bus that is friendly to all people by gentle acceleration / deceleration and **precise docking for accessibility** (45mm± 10 mm) by AD control.



Achieves reproducibility with standard deviation of less than 10 mm

② Safety Assurance

Focus

➢ Developing a simulation platform that replaces real vehicle evaluations with sensor modelling that is highly consistent with real phenomena, in order to perform reproducible safety evaluations of automated driving in various traffic environments.

Real experimental test

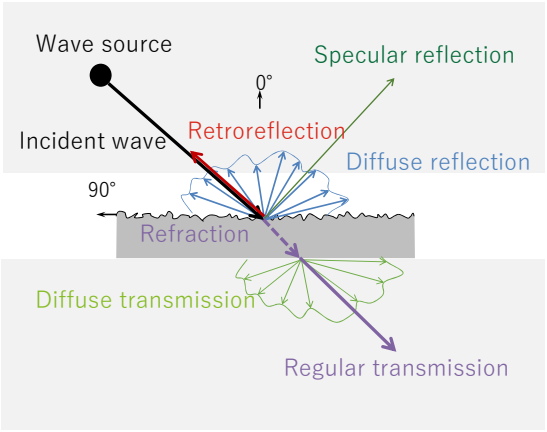
Virtual test

DIVP

Highly consistent sensor modeling

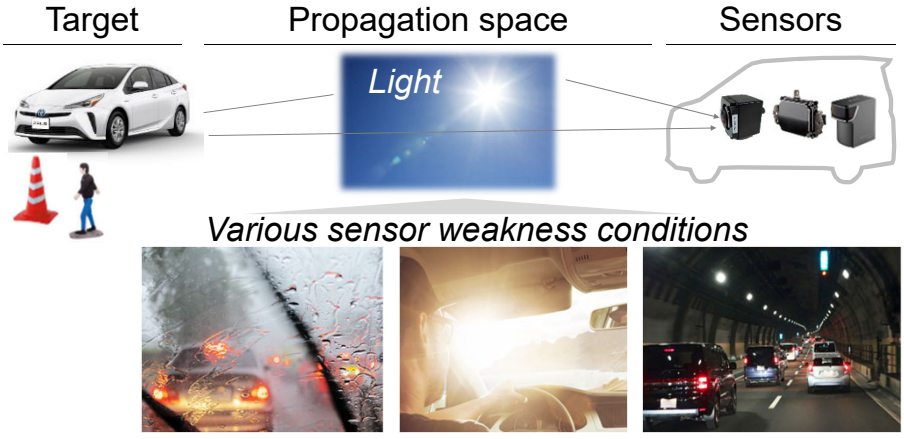
Measurement base modeling

■ 3-sensor electromagnetic wave characteristics measurement



Sensing physics base simulation modeling

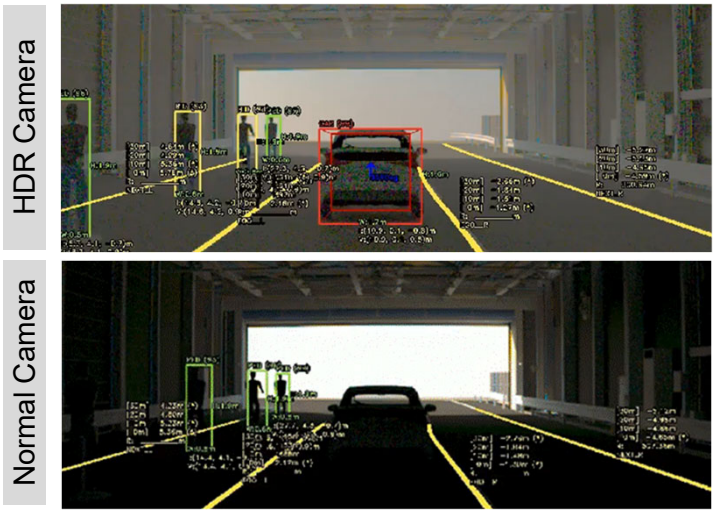
■ Sensing physics based detailed simulation modeling realize various sensor weakness conditions such as rain, backlit, multi-pass ,etc



Various sensor weakness conditions

Sensor validation

■ Precise environment & sensor pair modeling able to validate perception for safety assurance



German Japan international collaboration

■ DIVP and VIVALDI from Germany launched VIVID collaboration project for Safety assurance standardization

VIVALDI Partners for VIVID collaboration

TECHNISCHE UNIVERSITÄT ILMENAU · KIT Karlsruher Institut für Technologie · Hochschule Kempten University of Applied Sciences · TECHNISCHE UNIVERSITÄT DARMSTADT · Mercedes-Benz · Continental · AVL · IPG AUTOMOTIVE · Blickfeld LiDAR / scan your world · DLR

Objectives

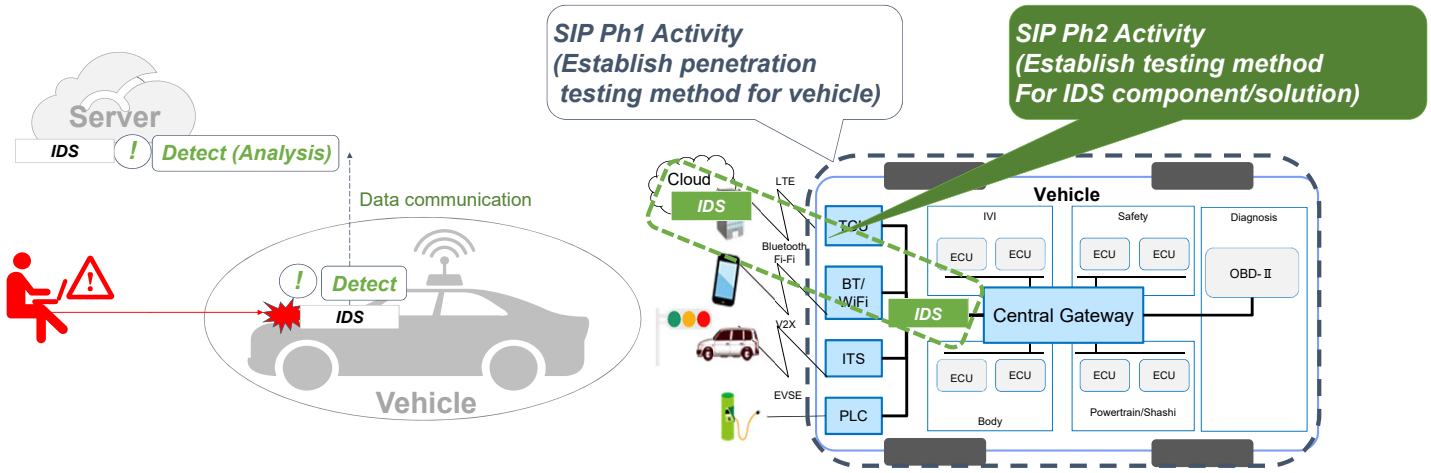
- ■ How safe is safe enough?
- ■ How realistic is realistic enough?

SIP · Cabinet Office

③ Cybersecurity

Objective

➢ To Establish **evaluation method for Intrusion Detection System(IDS) components/ solutions** provided by various security vendors from the view point of user(OEM).



1. Collection of new attack method or incident info. → 2. Analysis of new attack method → 3. Risk and Impact analysis for attack method → 4. IDS evaluation by using testbed → 5. To establish guideline for IDS evaluation

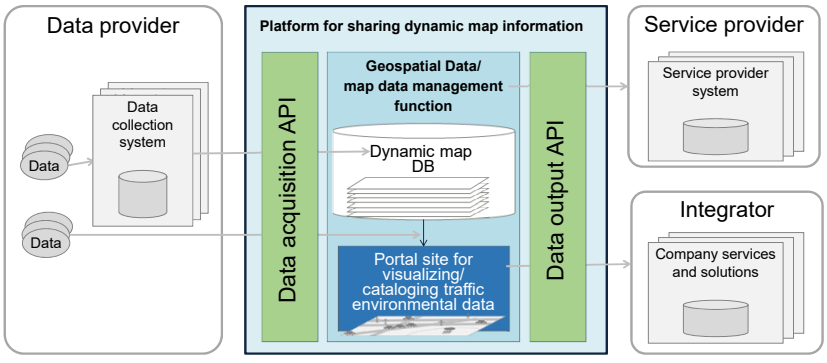
Efforts will be made to **establish guidelines** in cooperation with an industry organization (JASPAR).

JASPAR (Japan Automotive Software Platform and Architecture)

④ Geospatial dynamic data utilization

Objective

➢ **Enabling relation** and **sharing of data** by **compiling and structuring data** possessed by business operators in **various fields** to **solve social Issues and create new services**



➢ **A data service app competition was held to solve issues faced by Kyoto.**
⇒ The best awarded app is considered for actual implementation.

*Awards ceremony (on November 7, organized by the Cabinet Office and cooperated by Kyoto City)

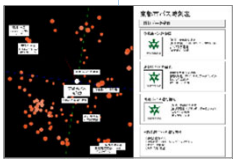
➢ **Data providers are matched with data users** on the portal site to **promote data sharing** by using an open API.

➢ **The portal site** has been **made accessible by limited users on a trial basis (first phase)** since the end of October 2020. It **will be made publicly available in spring 2021.**

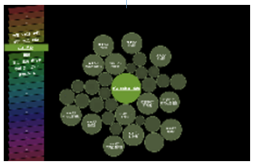
➢ Collaboration will be made to **increase the number of partners (supporters)** of data providers and data users, respectively.

Portal site

Matching of seeds with needs



Similarity search



Category search

Japan-Germany research cooperation

Start from September 2019

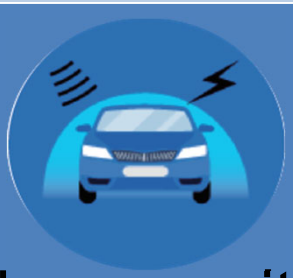
Human Factors

Impact Assessment

JPN-GER Cooperation

Safety Assurance

Start from October 2020



Cybersecurity

Start from November 2020

Objective

Human Factors

- Accelerate successful introduction of safe automated vehicle technology by this collaboration.
- Increase social acceptance of automated systems for broader international markets based on cross-cultural comparisons and considerations of obtained results.

Impact Assessment

- Expectation of the deployment of automated driving vehicles (ADs) to solve several social problems.
- ADs are necessary to be installed with equate consent by people and society.

Safety Assurance

- Define open standard Interfaces, to establish ‘reference platform’ with reasonable verification level, especially, for sensor modeling, and to establish the Environment & Sensor pair model-based approach for Validation & Verification reality.

Cybersecurity

- Establish evaluation method for Intrusion Detection System(IDS) components/ solutions provided by various security vendors from the view point of user(OEM).

SIP Cabinet Office

Event announcement : SIP-adus Workshop 2021

✓**Date : November 09-10, 2021**

✓**Format : Virtual conference**

✓ All sessions will be streamed live on line, additionally streamed in Central European Time and Eastern Standard Time(U.S.) for worldwide participants.

Objectives

To share the latest reports as below from global experts to find out our future views and seeds of further cooperation towards Society 5.0 with higher possibilities, by exchanging opinions through thematic sessions and workshops

- Reports by industry and academia research partners on the achievements of SIP-adus projects in Japan.
- Presentations by global experts on recent global progress and the status of R&D themes focusing on automated driving and connected vehicles.

Session Theme	
Regional Activities	Introduction of regional activities regarding automated driving
Service and Business Implementation / FOTs	Business model and planning scheme for accessible automated driving
Dynamic Map	Dynamic contents distribution/exchange with Dynamic Map and the updates
Connected Vehicles	Trends in Cooperative Driving Automation
Safety Assurance	Safety Assurance Virtual Testing Requirement and Validation
Cybersecurity	Utilization of IDS/IDPS* for the realization of cyber-safe automated driving
Human Factors	Human factors in automated mobility services
Impact Assessment	Social Impact of Automated Driving technologies

* IDS / IDPS : Intrusion Detection System / Intrusion Detection and Prevention System

As of September 6, 2021

Organizer

Cross-Ministerial Strategic Innovation Promotion Program, Council for Science, Technology and Innovation, Cabinet Office, Government of Japan

New Energy and Industrial Technology Development Organization (NEDO)

Supported by ITS Japan

For the latest information	https://en.sip-adus.go.jp/evt/workshop2021/

NEDO SIP Cabinet Office