Automated Vehicles Symposium 2019

SIP Automated Driving System

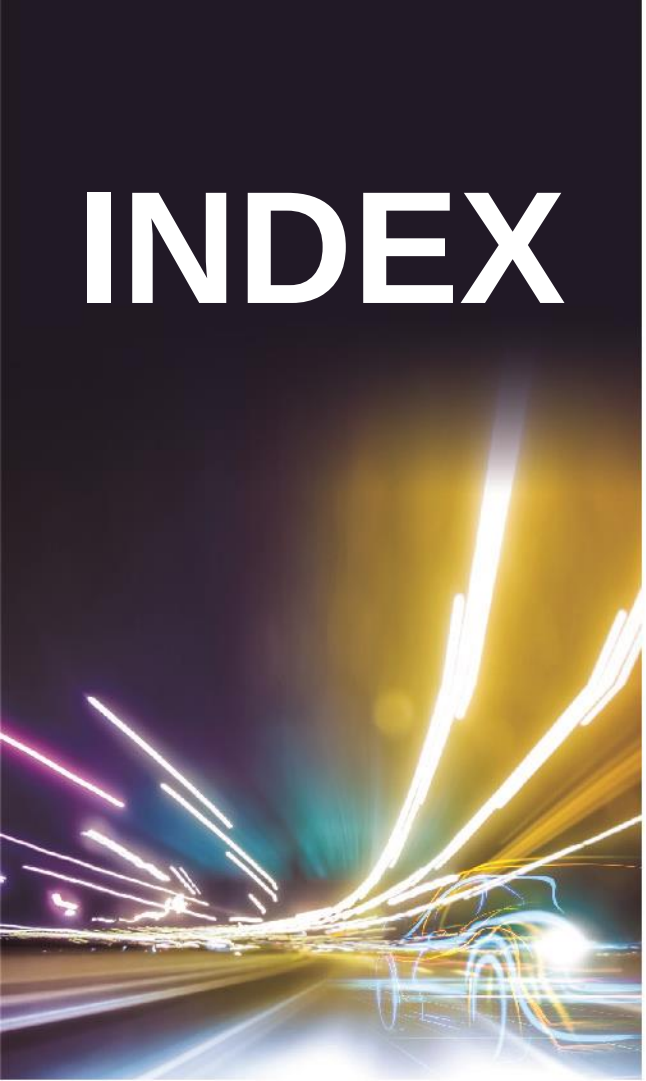
SIP-adus ; Automated Driving System for universal service

Ryota SHIRATO
Sub Program Director of SIP-adus

18 July. 2019

SIP

Cabinet Office



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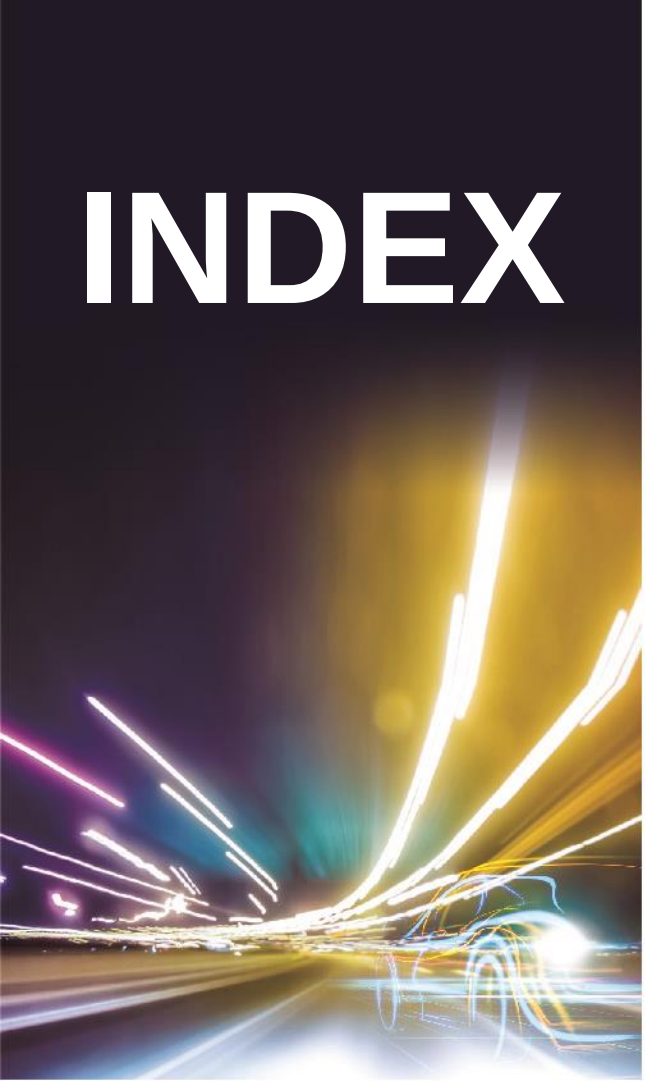

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Society 5.0

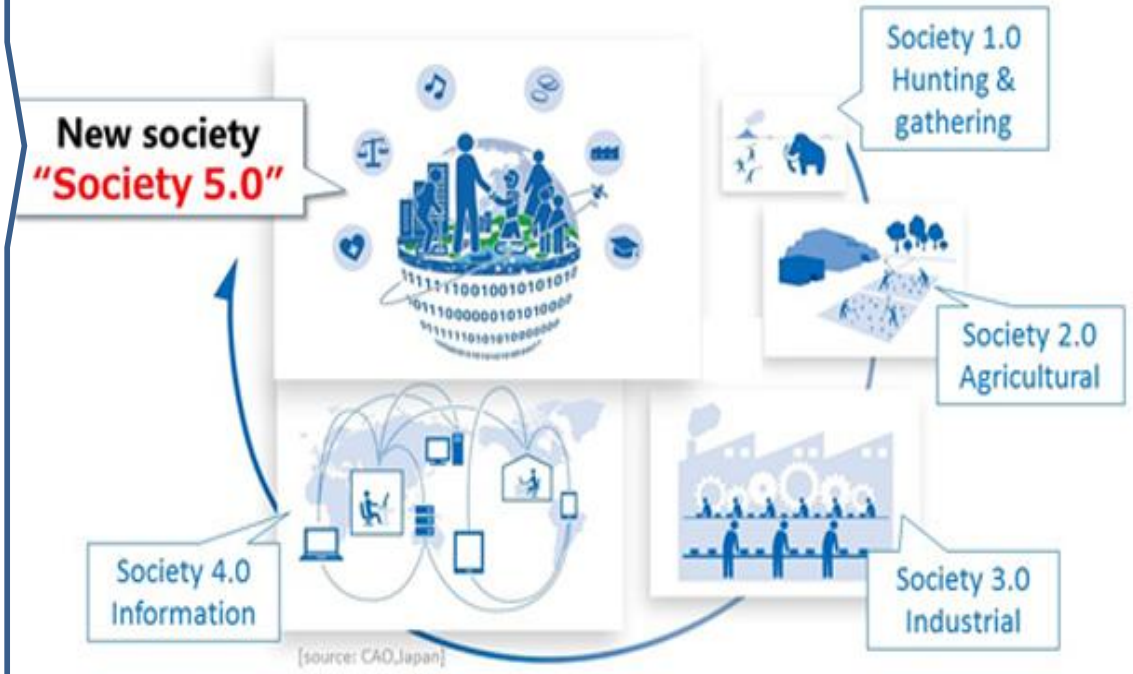
Data convergence

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

Economic advancement + **Solution of social problems**

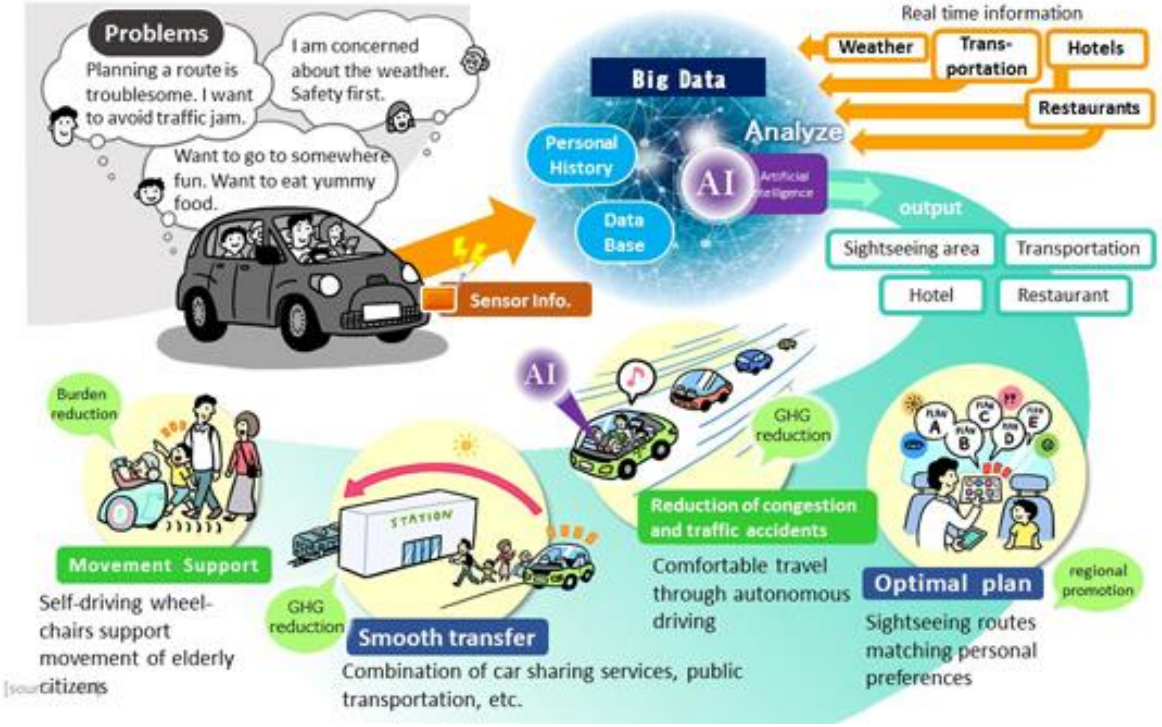
provision of products and services that are needed to the people that need them at the time they are needed

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



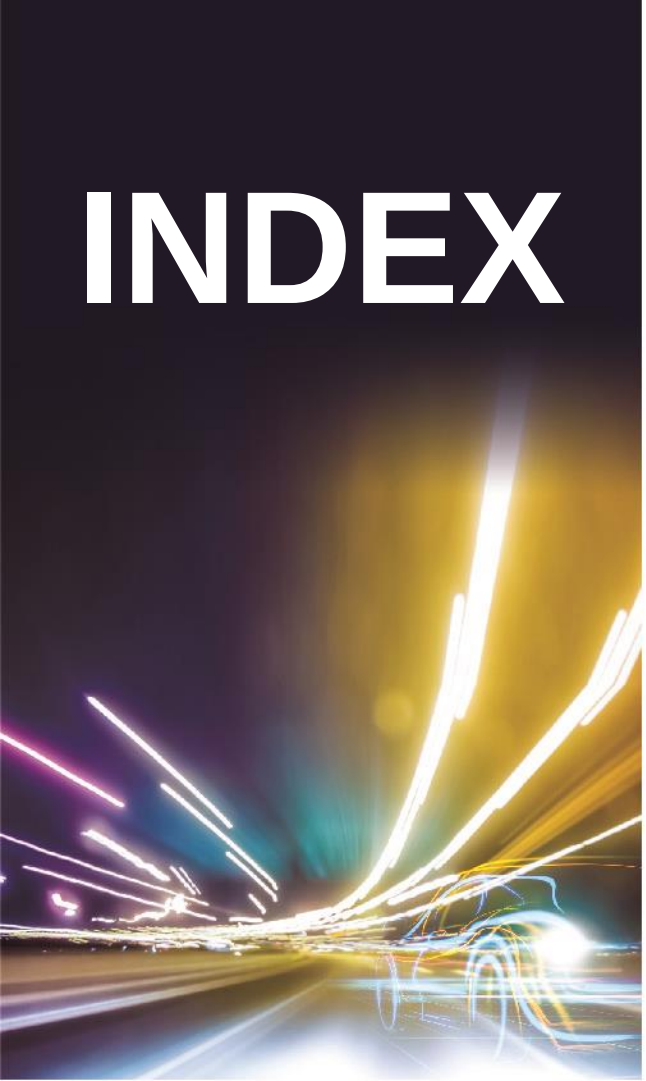
(Cabinet office HP)

New value in the field of mobility



- Optimal plan
- Reduction of congestion and traffic accident
- Smooth transfer
- Movement support

(Cabinet office HP)



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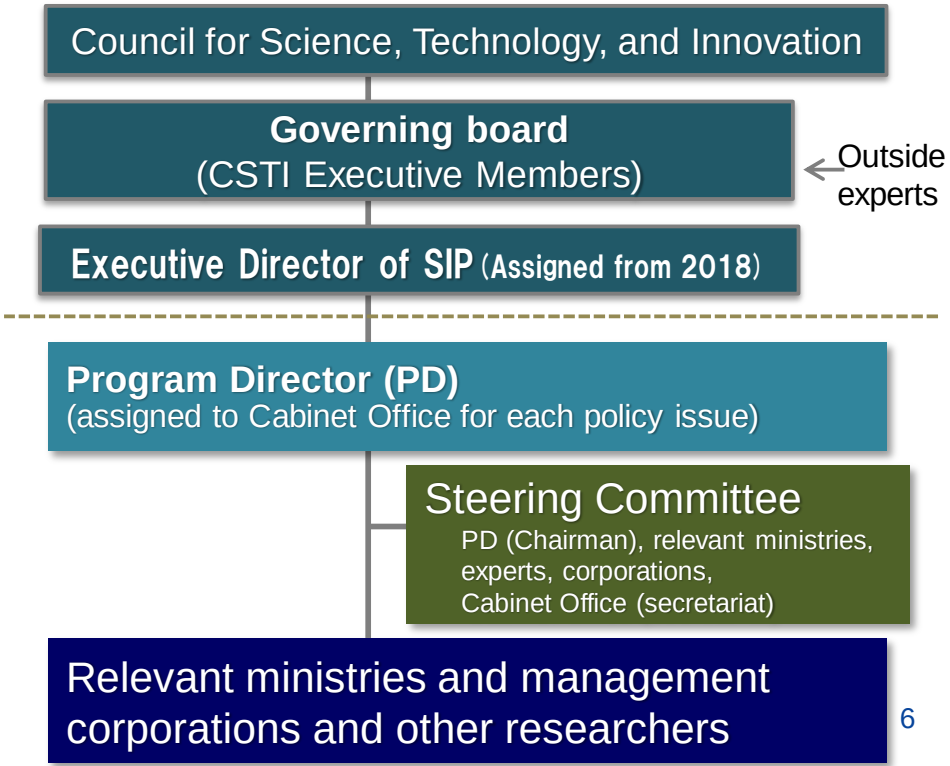
Outline of SIP

- **Intensive R&D program**
  - ✓ promote 5-years R&D
    - 1st phase : FY2014 - FY2018
    - 2nd phase : FY2018 - FY2022
  - ✓ from fundamental research to practical and commercialization
- **Promote cross-sector collaboration**
  - ✓ enhancing cross-ministerial cooperation
  - ✓ promote industry-academia-government collaboration
- **Leadership and total Budget**
  - ✓ CSTI appointed Program Directors and allocates the budget for each research theme.*

* \50bil in total per year
(65% for SIP 11 themes, 35% for medical R&D)

SIP

Cross-Ministerial Strategic Innovation Promotion Program

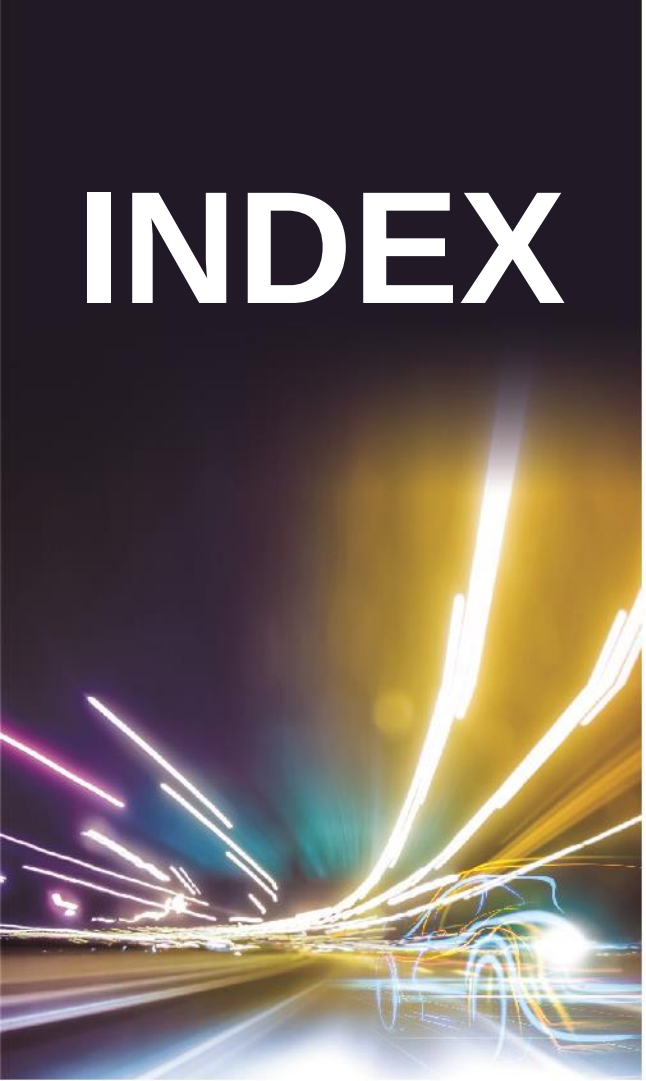


11 Themes of SIP (FY2014)

Priority policy issues	Themes	Objective
Energy	Innovative Combustion Technology	Improving fuel efficiency of automobile engines
	Next-Generation Power Electronics	Integrating new semiconductor materials into highly efficient power electronics system
	Structural Materials for Innovation (SM⁴I)	Developing both ultra-strong and -light heat-resistant materials for airplane such as CFRP, alloys, intermetallic, and ceramic-coatings and Materials integration system to predict performance of materials.
	Energy Carriers	Promoting R&D to contribute to the efficient and cost-effective technologies for utilizing hydrogen
	Next-Generation Technology for Ocean Resources Exploration	Establishing technologies for efficiently exploring submarine hydrothermal polymetallic ore
Next-generation infrastructures	Automated Driving System	Developing new transportation system including technologies for avoidance accidents and alleviating congestion
	Infrastructure Maintenance, Renovation and Management	Developing low-cost operation & maintenance system and long life materials for infrastructures
	Enhancement of Societal Resiliency against Natural Disasters	Developing technologies for observation, forecast and prediction of natural disasters
	Cyber-Security for Critical Infrastructures	Development of technologies that monitor, analyze, and defend control and communication system as well as confirm integrity and authenticity of system components to protect critical infrastructures against cyber threats.
Local resources	Technologies for Creating Next-Generation Agriculture, Forestry and Fisheries	Realizing evolutionary high-yield and high-profit models by utilization of advanced IT etc
	Innovative Design/Manufacturing Technologies	Establishing new styles of innovations arising from regions using new technologies such as Additive Manufacturing

SIP-adus

SIP



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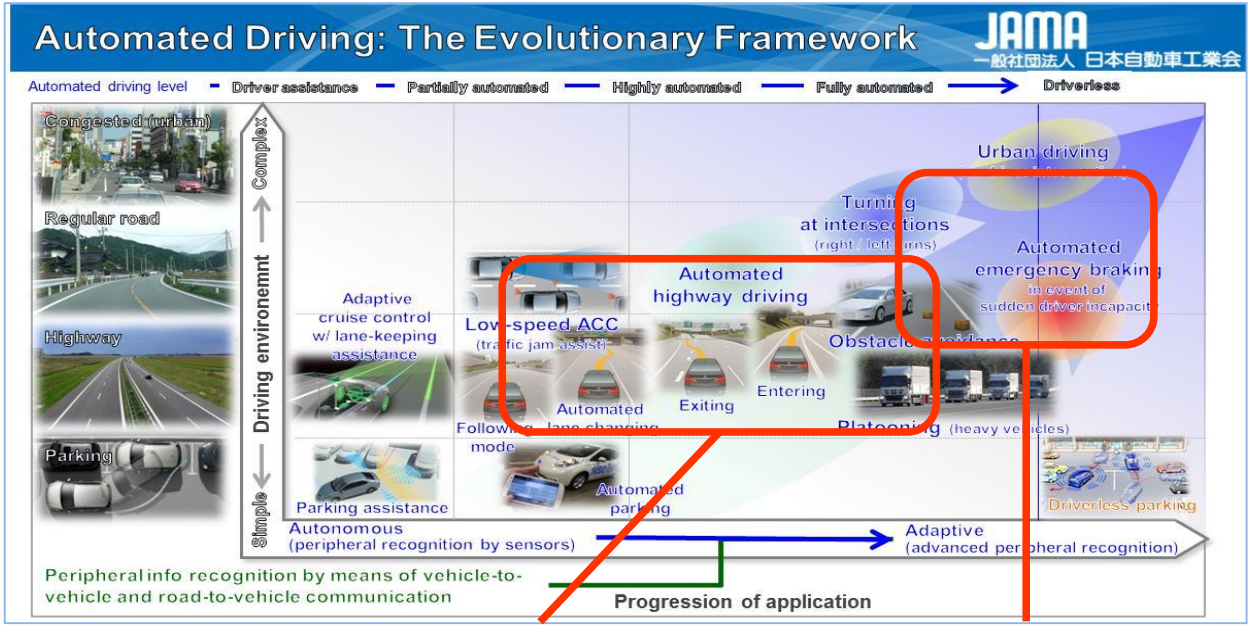
Goal & Deployment milestone

- Ensuring safety and traffic jam reduction on the road
- Realization and deployment of Automated Driving System
- Realization of advanced next generation public bus service for vulnerable people.



Realization of Level 2 on highway by 2020

Prioritization for next step Level 2 on regular road

Main technology domain

Vehicle

＜Recognition＞

Map, ITS info., Sensor

＜Judgement＞

AI

＜Operation＞

Actuator

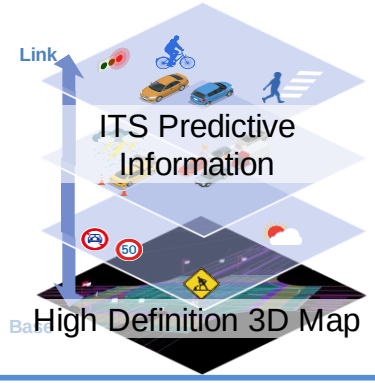
HMI

Human Machine Interface

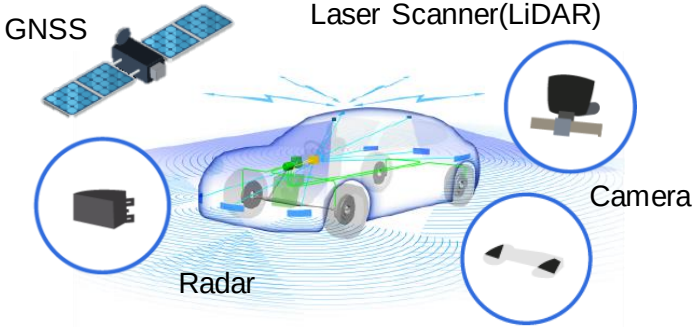
Cooperation w/Human

Key Technologies
- Localization
- Environmental recognition

Dynamic Map



Onboard Sensors



Basic Tech. | Cyber Security, Simulation, Database, etc.

In red : Area of Cooperation ⇒ Main Area of SIP-adus

SIP-adus focus on R&D in Cooperative area with Industry, Academia and Government

Output of 1st phase of SIP-adus

OUTPUT

“Collaboration”

Cross-ministerial cooperation

FOT

DYNAMIC MAP PLATFORM

DMP

Network of Academia

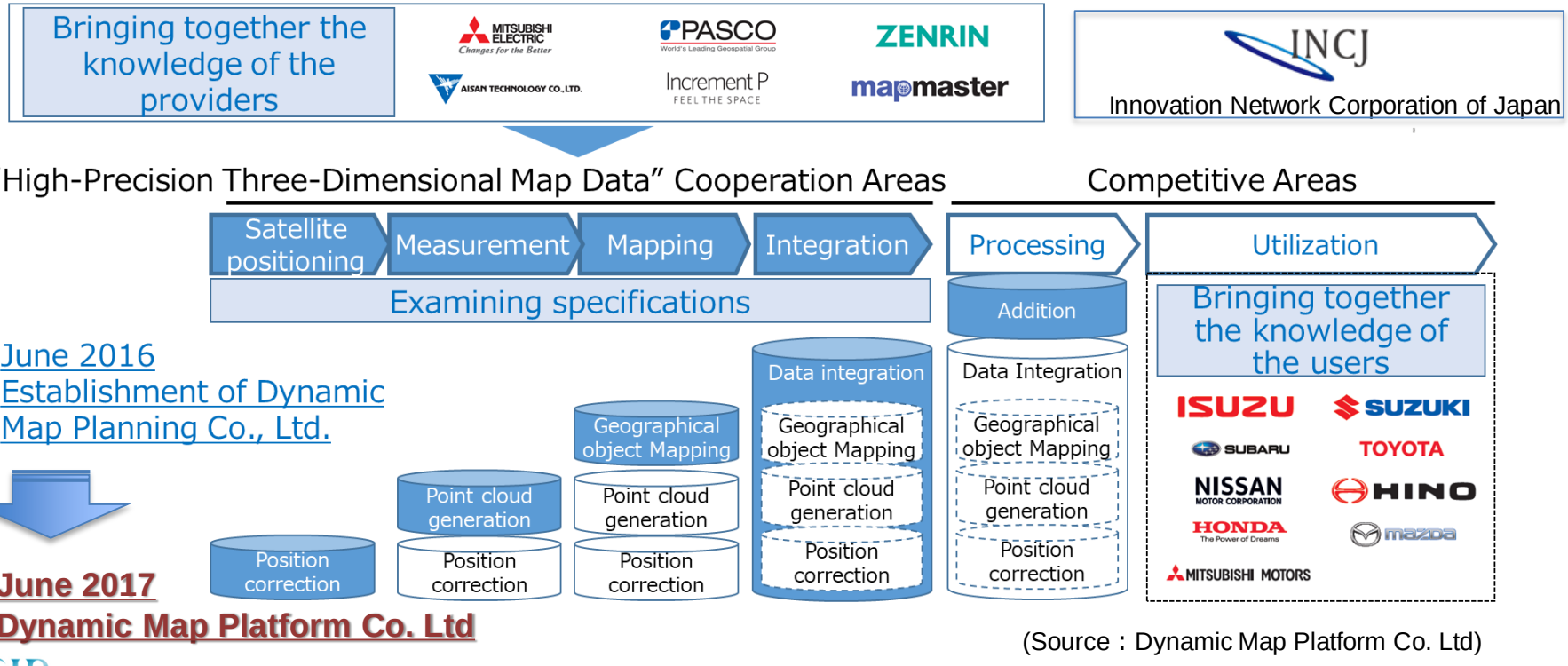
Standardization & Harmonization

International cooperation

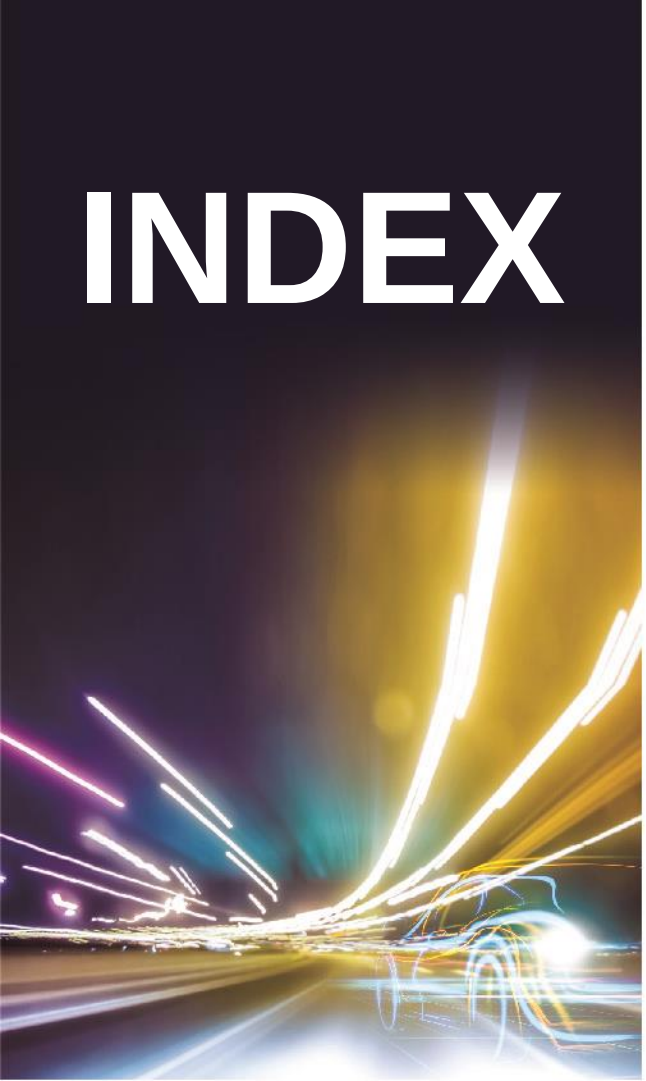
SIP

Dynamic Map Platform Co. Ltd

- The knowledge of the companies were brought together for the practical application of three-dimensional high-precision maps



(Source：Dynamic Map Platform Co. Ltd)



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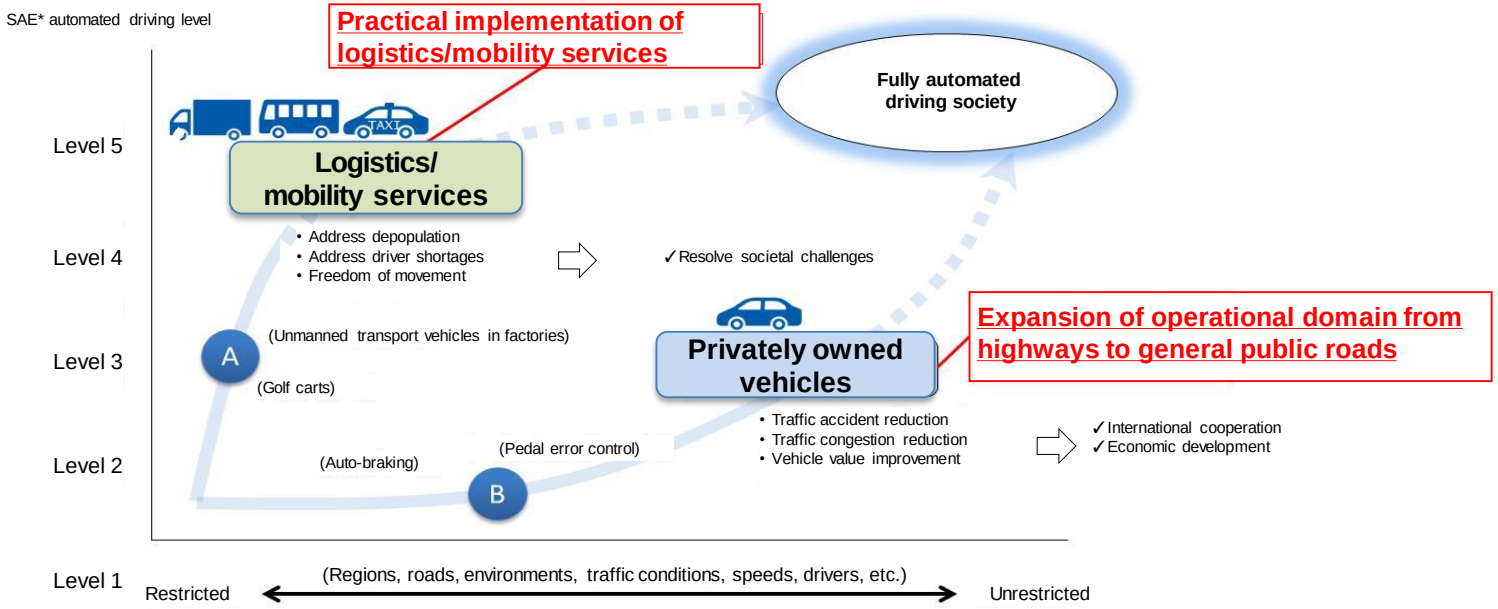
Overview of 2nd Phase of SIP-adus

The operational domain of automated driving will be **extended from highways to arterial and general public roads**, and automated driving systems will be **implemented in mobility services including public transport and logistic operations.**
⇒ Safe and comfortable mobility for everyone in society.

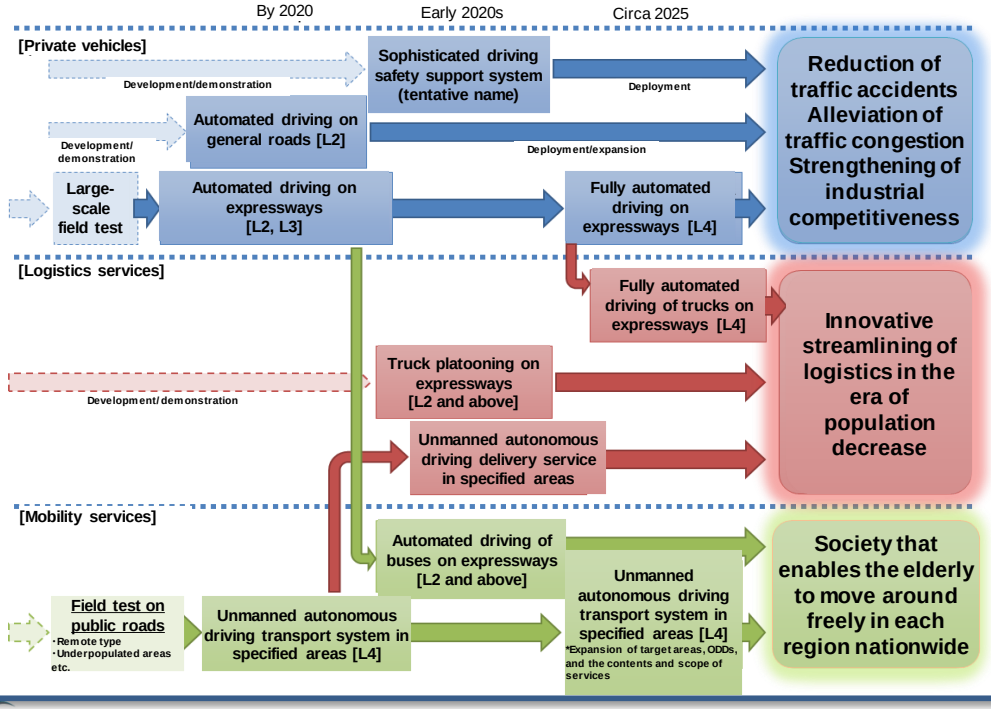


*SAE (Society of Automotive Engineers): Standardization body in the U.S.

Objectives

Public-Private ITS Initiative/Roadmaps 2018

Scenario for the commercialization and service of fully automated driving by 2025



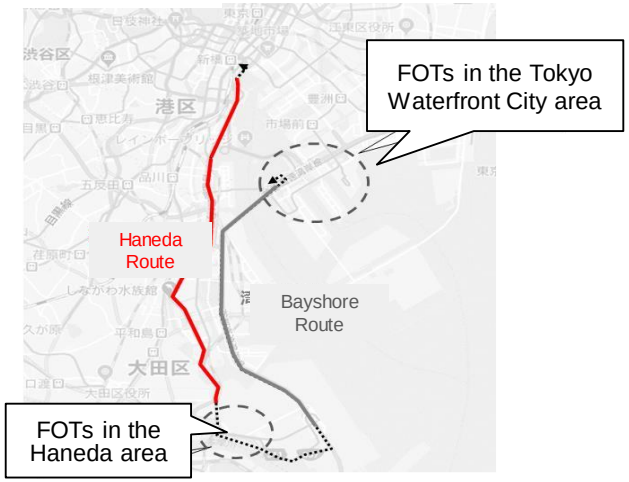
- The **cooperative areas** technologies essential for implementation will be established by 2023
- The effectiveness of the technologies will be validated through FOTs, involving various **businesses and local government**, and **multiple example cases for commercialization will be created.**

Deployment Milestones

Investment and business planning by private operators will be promoted by:

1) **taking full advantage of the Olympic and Paralympic Games Tokyo 2020**
2) **conducting FOTs based on the plans of businesses and local government**

■Course

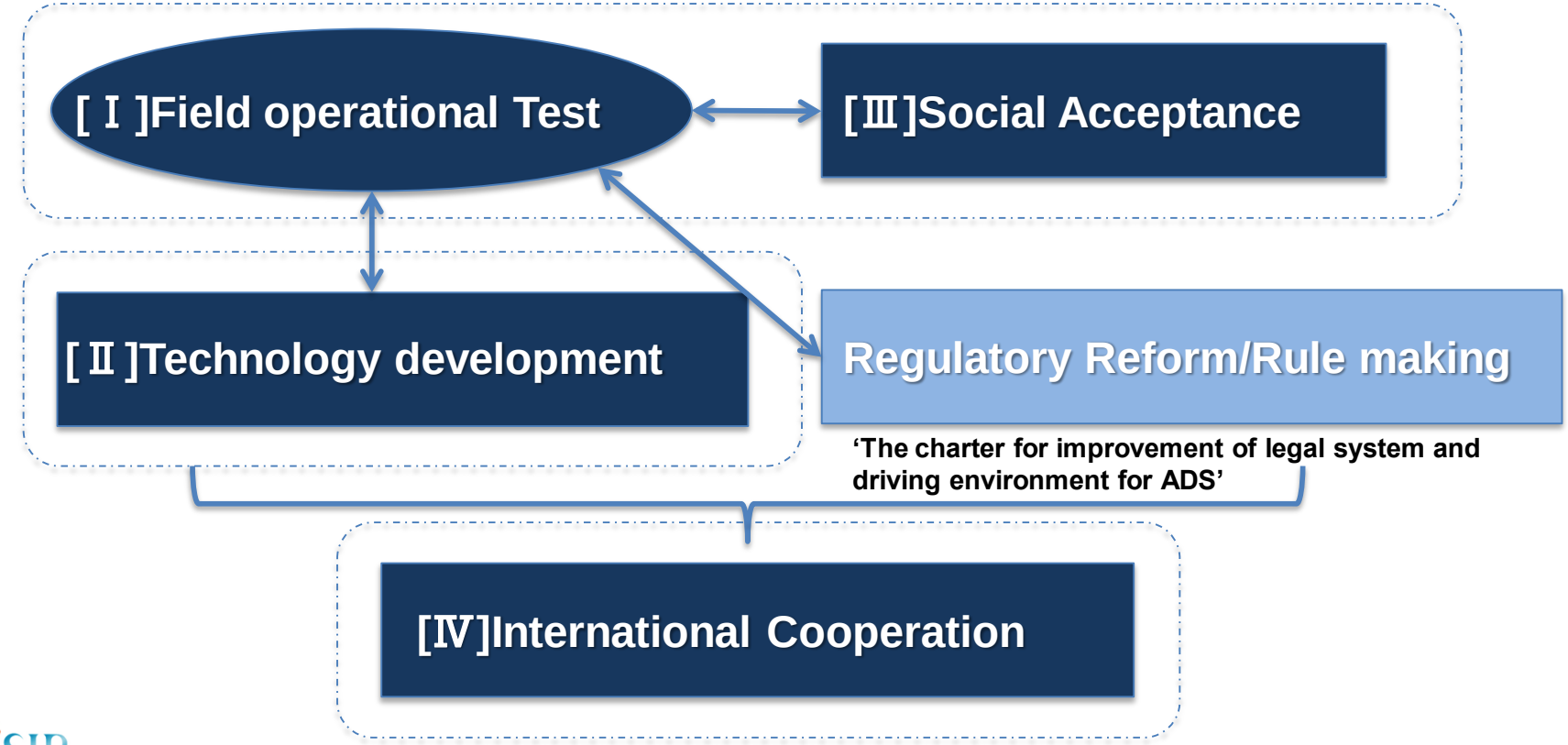


Open discussion for promoting international standardization and R&D

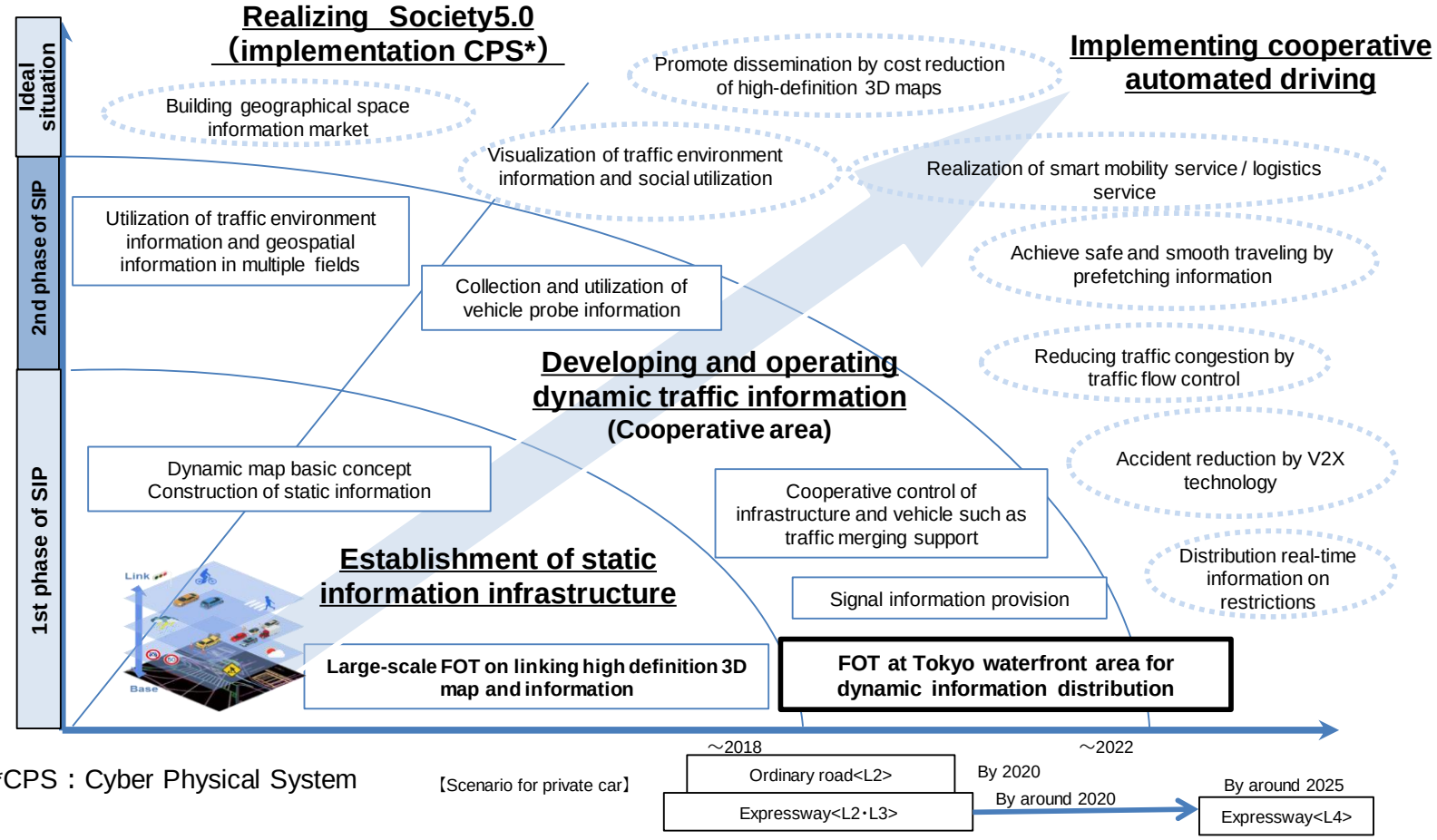
FOTs with **matching fund**

Local FOTs involve **businesses and local government**.

4 Pillars of 2nd SIP-adus



Building the Traffic Environmental Info. Framework



*CPS : Cyber Physical System

【Scenario for private car】

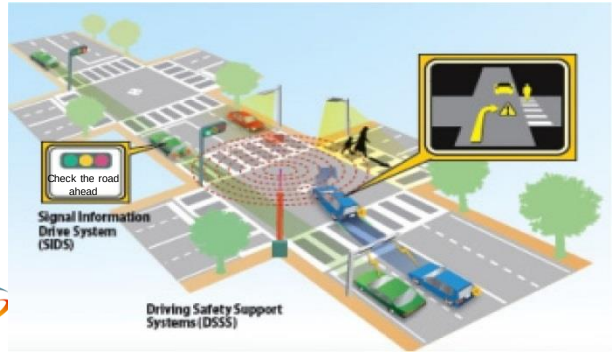
FOTs (Tokyo Waterfront City–Haneda Area)

■ **FOTs will start in autumn 2019 in the Tokyo waterfront city area** (general roads and Metropolitan Expressway in the Tokyo Waterfront City area/Haneda area) in cooperation with Japan Automobile Manufacturers Association.

We are planning to recruit participants widely in order to promote international harmonization and early implementation of automated driving.

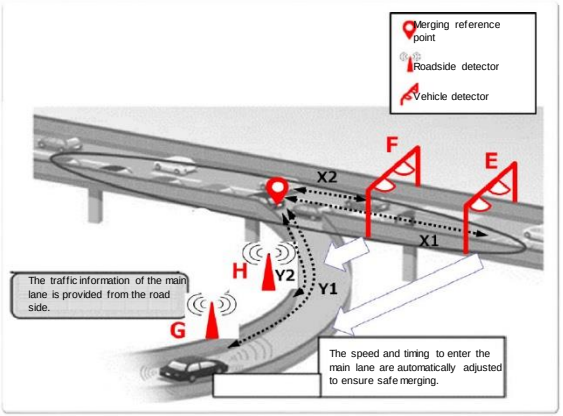
Providing traffic signal information

Vehicles are allowed to pass through intersections safely and smoothly based on **the signal display and change timing information** even **in environments where recognition is difficult using in-vehicle cameras.**



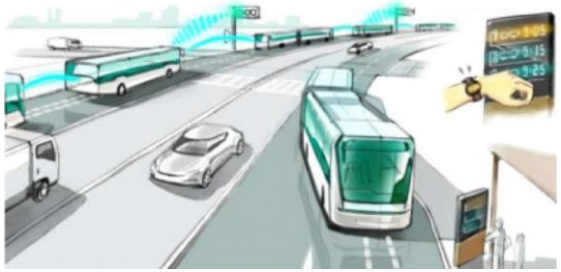
Merging assistance on the main lane of highways

Providing vehicle information on the main lane



Public transport system (self-driving buses)

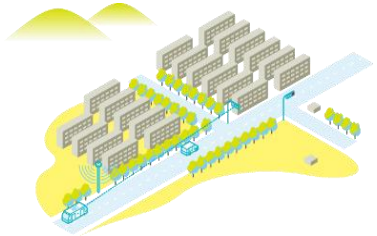
FOTs for the next-generation ART will be implemented on public roads by using automated driving technology in mixed traffic flow.



FOTs (Local Transportation)

■ **Long-term FOTs** will be implemented in underpopulated areas, local communities, etc. through **collaboration with businesses and local government** to validate the effectiveness and business feasibility of automated driving in terms of **logistics and mobility services.**

Mobility/logistics services in underpopulated areas, etc.



FOTs for technologies

FOTs for implementation and commercialization

Long-term FOTs on public roads toward commercialization as means of local logistics and mobility services for citizens

Ensuring means of mobility in areas where many elderly persons live or that are not easily accessible

Virtual Environment for Safety Evaluation

■ **Simulation tools for assessing the safety of automated driving in various traffic environments** — Joint research will be conducted by experts in industry and academia.

Virtual safety assessment

Simulation tools that can reproduce and combine various environments will be developed for performing safety assessments based on automatic assessment by repeating critical situations.

Network of Academia

- Establish academia network to promote collaboration and information sharing
- UTMobI facilitate SIP-adus' collaborative research with overseas entities

"Mobility Innovation Promoting Council"

UTMobI (Mobility Innovation Collaborative Research Organization, The University of Tokyo)

金沢大学 KANAZAWA UNIVERSITY
Kyutech Kyushu Institute of Technology
国立大学法人群馬大学 NATIONAL UNIVERSITY CORPORATION GUNMA UNIVERSITY
慶應義塾 Keio University
筑波大学 University of Tsukuba
東京大学 THE UNIVERSITY OF TOKYO
国立大学法人 東京農工大学 TAT Tokyo University of Agriculture and Technology
同志社大学 Doshisha University
東北大学 TOHOKU UNIVERSITY
名古屋大学 NAGOYA UNIVERSITY
自主創造 日本大学 NIHON UNIVERSITY
明治大学 MEIJI UNIVERSITY
AIST NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)
JARI
NTSEL 交通安全環境研究所 National Traffic Safety and Environment Laboratory

+ Individual researchers from:

大阪大学 OSAKA UNIVERSITY
法政大学 HOSEI University
立命館大学
横浜市立大学 YOKOHAMA CITY UNIVERSITY
WASEDA University 早稲田大学

SIP

SIP-adus Workshop 2019

Outline

SIP-adus Workshop is a global cooperative activity to resolve the challenges to implement Automated Driving Systems, through debate among international experts. The event will consist of focused sessions open to the public and breakout workshops for experts.

Date

November 12 - 14, 2019

Venue

Tokyo International Exchange Center

Tokyo Academic Park, 2-2-1 Aomi, Koto-ku, Tokyo 135-8630 Japan

3 minutes from "Tokyo International Cruise Terminal" station on New Transit "Yurikamome" line (Shimbashi Station <-> Toyosu Station)

15 minutes from "Tokyo Teleport" station on "Rinkai" line (Shinkiba station <-> Osaki station)

SIP-adus Workshop 2019

Program (tentative)	Tuesday, November 12	Wednesday, November 13	Thursday, November 14
AM	Opening Session	Cybersecurity	Breakout Workshop
	Regional Activities	Safety Assurance	
	Poster Session		
PM	FOTs and Next Generation Transport	Dynamic Map	Breakout Workshop Summary
	Human Factors	Connected Vehicle	Closing Session

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

Supported by ITS Japan

For the latest information http://www.sip-adus.go.jp/evt/workshop2019/


Thank you