SIP-adus Overall Progress Report

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<Translated Version>

SIP
Cabinet Office

SIP : Cross-ministerial Strategic Innovation Promotion Program

Characteristics of SIP (Cross-ministerial Strategic Innovation promotion Program)

- SIP is a national project for science, technology and innovation that was established to realize science, technology, and innovation through management that goes beyond the framework of government ministries and traditional disciplines. It is spearheaded and led by the Council for Science, Technology and Innovation.
- Targeting social challenges that have true importance for Japan's citizens and world-leading challenges that can contribute to Japan's economic revival, it seeks to build industry-academia-government collaboration and promote focused R&D covering everything from basic research to deployment and commercialization.
- "Science, technology and innovation promotion expenditures" have been included in the Cabinet Office's budget since FY2014.
- The Council for Science, Technology and Innovation makes independent budgetary allocations that go beyond the framework of government ministries and traditional disciplines.
- SIP will promote S&T innovation, which drive our nation's economic growth and vitality and which will dramatically change society.

The SIP Framework

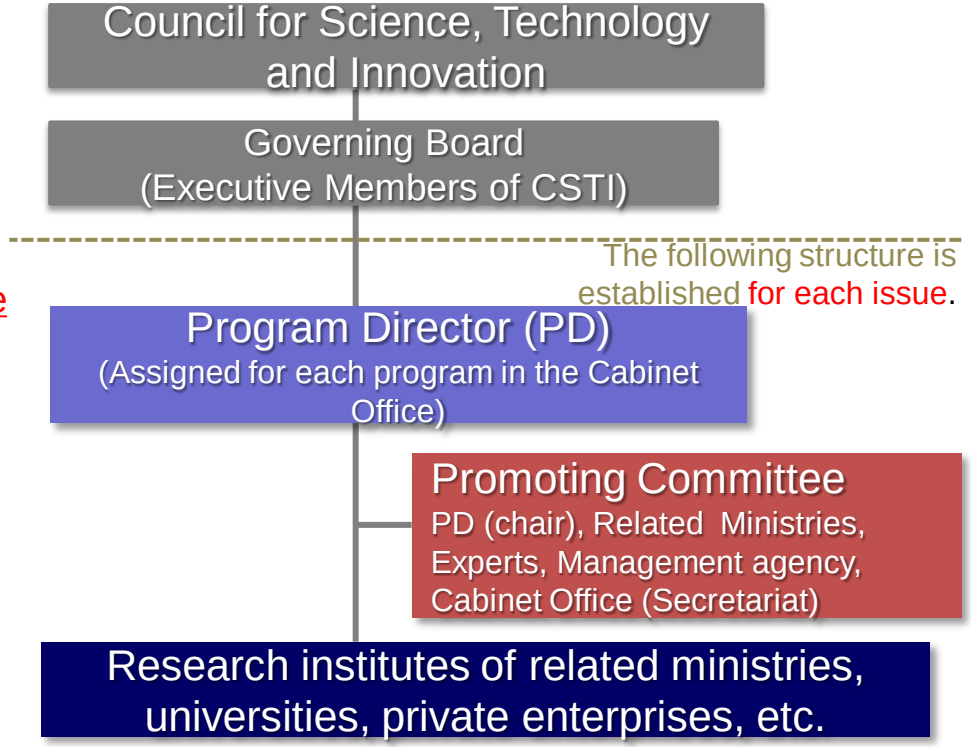
Implementation structure

SIP 戦略的イノベーション創造プログラム
Cross-ministerial Strategic Innovation Promotion Program

○ Program Directors (PD) are selected for each program (appointed by the Prime Minister following approval by CSTI.)

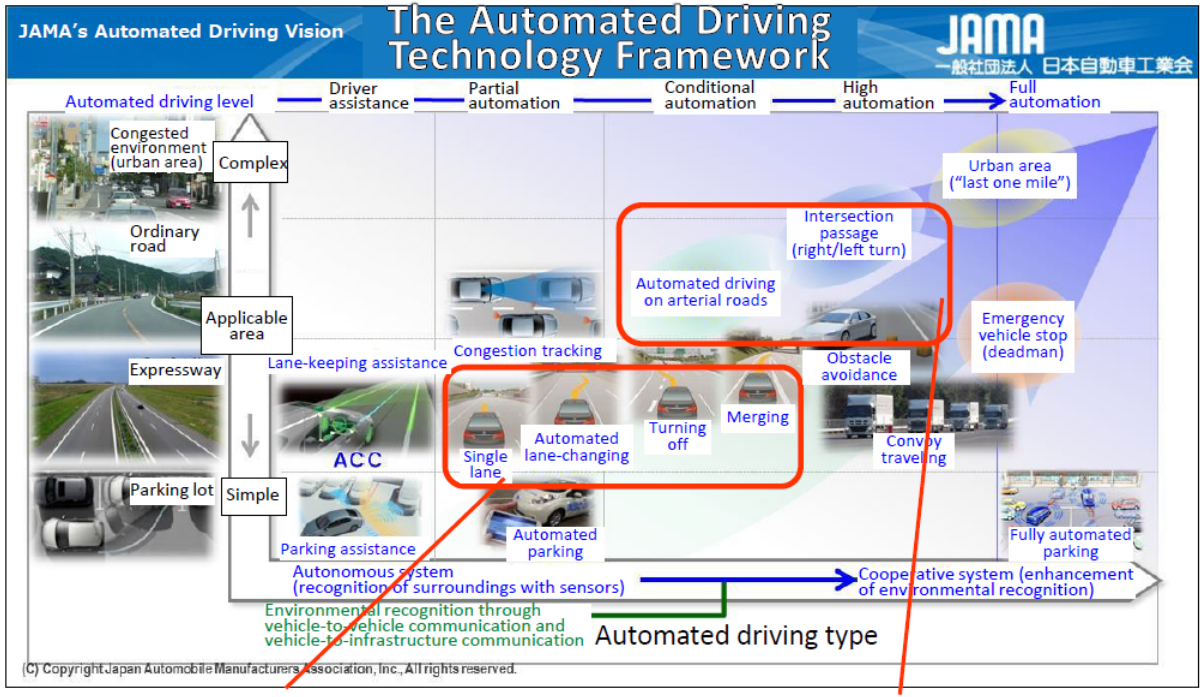
○ The PDs promote programs from a cross-ministerial standpoint aimed at breaking down the vertical barriers that exist among concerned government bodies. For this reason, the PDs serve as chairpersons of Steering Committees that are attended by related ministries.

○ A Governing Board (members: Executive members of CSTI) meets as required and evaluates and provides advice for all program.



The SIP Automated Driving System: Objectives

1) Reduction of accidents and congestion in road traffic
2) Early realization and deployment of automated driving systems
3) Realization of an advanced public bus system that is easy to use by elderly and disabled people



(1) Practical application of a high-end semi-automated driving system (Level 2) by 2020

(2) Clarification of functional expandability requirements and priority for next step and scheduling of its deployment

Areas Targeted by the SIP Automated Driving System

Promoting R&D focused on topics for technical fields (cooperative fields) that require a joint industry-academia-government collaboration at SIP.

Elements constituting the "automated driving system"

Vehicle

Recognition — Maps, ITS info, sensors

Judgment — Control, artificial intelligence

Operation — Hydraulics, electric motor

⇒ Development based on competition among manufacturers

⇒ Dynamic Map (high-precision 3D map + changes over time)

Congestion, accidents

Construction, road regulations

Structures, lanes

Delivery of updated data on construction, congestion, etc.

Tying together information that changes with time (e.g., construction, congestion, etc.) on a highly-precise 3D map for car localization

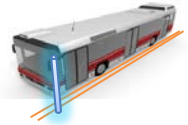
Base technologies

Cyber Security

Guidelines for protection against cyber attacks on vehicles, etc.

Next Generation Transport

Application of automated driving technologies to buses, etc.



Precise stopping at bus stops with almost no space between the bus and the curb to make getting on/off easier for wheelchair users and elderly passengers

Improved express performance and on-time operation through enhancement of Public Transportation Priority Systems (PTPS) Etc.

HMI

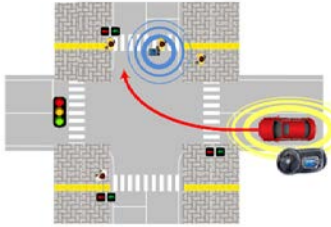
Human Machine Interface

The transition time required, depending on driver's readiness, to safely switch from automated driving to manual driving

Interfaces with other traffic participants

Instruction method concerning the operating condition of the automated driving system, etc.

Pedestrian traffic accident reduction



Verification of the accident-reduction effects of wireless communication between cars and pedestrians' devices and use of radar, etc.

Red lettering: "Cooperative area" in which SIP is involved

Promotion Structure

Promoting Committee for SIP Automated Driving Research Project

PD: Seigo Kuzumaki, Executive General Manager, Toyota Motor Corporation
Sub-PD: Tateo Arimoto, Professor, National Graduate Institute for Policy Studies
Masao Fukushima, ITS Technical Consultant, Nissan Motor Company
Yoichi Sugimoto, Senior Chief Engineer, Honda R&D Co., Ltd.
Members: Cabinet Office, National Police Agency, MIC, METI, MLIT
Industry, Experts

- System Implementation Working Group
  Chair: Toshiyuki Inagaki, Vice President, University of Tsukuba
- Map Structuring Task Force
  Chair: Hiroaki Takada, Professor, Nagoya University
- International Cooperation Working Group
  Chair: Hajime Amano, President and CEO, ITS Japan
- Large-Scale Field Operational Tests Task Force
- Next Generation Transport Working Group
  Chair: Takeshi Oguchi, Professor, University of Tokyo

Govt.

R&D is outsourced to research institutions by the management agency, related ministries, and the Cabinet Office.

Management agency: NEDO

Integrated promotion of the large-scale field operational tests

Cabinet Office ⇔ "headquarters function" partnership ⇔ Cabinet Secretariat (IT)

National Policy Agency | MIC | METI | MLIT (Road Bureau, Road Transport Bureau)

Unified promotion with ministerial measures using the organization/knowledge each ministry

Industry

ITS Japan
Japan Automobile Manufacturers Association, Inc.
Society of Automotive Engineers of Japan, Inc.
Japan Automobile Research Institute
Japan Auto Parts Industries Association
Car manufacturers
Related device manufacturers

Academia

Japan Electronics and Information Technology Industries Association
Association of Radio Industries and Businesses
Advanced Mobility Research Center, Institute of Industrial Science, University of Tokyo
Institutes of Innovation for Future Society, Nagoya University
and others

Schedule

2014	2015	2016	2017	2018
2.535 billion yen	2.358 billion yen	2.713 billion yen	3.365 billion yen	

- Team Building
- R&D on specific themes

Steering Committee

- System Implementation Working Group
- International Cooperation Working Group
- Next Generation Transport Working Group

- Integration into 5 key fields

① Dynamic Map

② Information security

③ HMI (Human Machine Interface)

④ Pedestrian Traffic Accident Reduction

⑤ Next Generation Transport

- Large-scale field operational tests

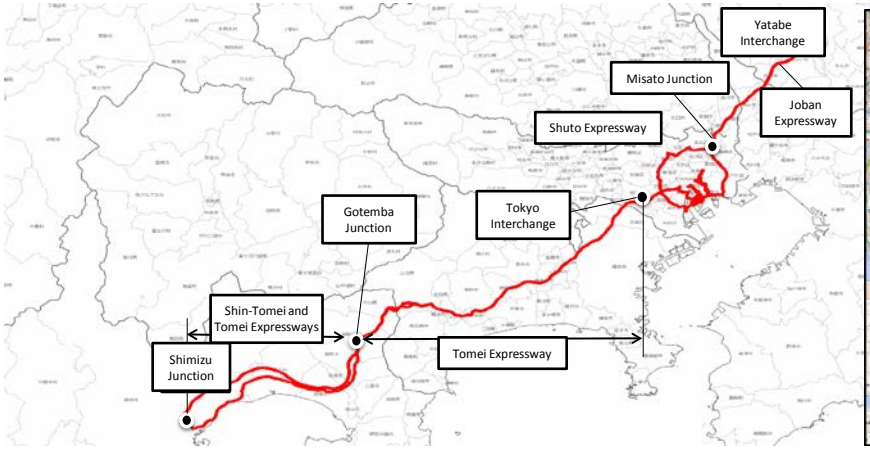
- Field Operational Test of Automated Bus Driving in Okinawa

Large-Scale Field Operational Test of the "Automated Driving System"

○ With the participation of many car manufacturers, technical verification tests are being conducted by many people and in actual traffic environments on public roads in order to test the outcomes of R&D (Dynamic Map, etc.) promoted by the SIP Automated Driving System since 2014.

Test period: 18 months, from October 2017 to March 2019 *To be implemented sequentially during the test period

Test area: Approx. 300 km on expressways (portions of the Tomei, Shin-Tomei, Shuto, and Joban Expressways), surface streets of the Tokyo waterfront area, etc.



Participating organizations: Total of 21 organizations, including domestic and overseas car manufacturers, car parts manufacturers, and universities

car manufacturers in Japan	Overseas car manufacturers	Car equipment manufacturers	Others
・Toyota ・Nissan ・Honda ・Mazda ・Subaru ・Daihatsu ・Suzuki	・BMW ・Volkswagen ・Mercedes-Benz ・Bosch (parts manufacturer) ・Continental (parts manufacturer)	・Calsonic Kansai ・Pioneer ・Alpine ・Mitsubishi Electric ・Omron	・Meiji Logitech (logistics company) ・ZMP (automated vehicle venture) ・Saitama Institute of Technology ・Nagoya University

Field Operational Test of Automated Bus Driving in Okinawa

Time	March 2017	June and July 2017	November and December 2017
Place, etc.	Area of “Azama Sun Beach,” Nanjo City, Okinawa ○ Public road (low traffic volume) ○ Driving route of approx. 2 km round trip	Ferry Terminal ⇔ New Ishigaki Airport, Ishigaki City, Okinawa ○ Public road (traffic volume of approx.. 10,000 cars/day) ○ Driving route of approx. 32 km round trip ○ Regular operation on an actual local bus route	Aeon Mall Okinawa Rycom ⇔ Ginowan Marina, Ginowan City and Kitanakagusuku Village, Okinawa ○ Urban arterial road with heavy traffic volume (approx.. 58,000 cars/day) ○ Driving route of approx. 20 km round trip
Purpose	Technical test Automated driving performance evaluation, system behavior verification, etc.	Social test The first trial operation of its kind in Japan, conducted with the participation of ordinary passenger monitors (total of 368, including residents and tourists [200 signed up in advance, 168 joined on the day of the test])	Technical test (Step II) Verification of possibilities for automated bus driving and technical challenges in an actual traffic environment with relatively heavy traffic volume in an urban part of Okinawa’s main island

Dynamic Map Initiatives

Dynamic Data

Traffic Signals, etc.

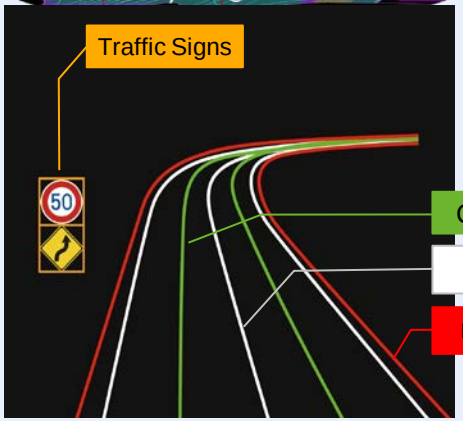
Semi-dynamic Data

Traffic Jams, Accidents, etc.

Semi-static Data

Construction, Road Regulations

Static Data
=**High Definition 3D map**



Lane, Elevated Structures, etc.

Base

Digital Mapping

Platform

3D Common Platform Data

Point Clouds, Graphics, etc.

Dynamic Map Platform Co., Ltd. was established as a business company in June 2017 based on the results of SIP-adus.

○ Joint contributions by Innovation Network Corporation of Japan; 6 electrics, map, and survey companies; and 10 car manufacturers

○ Preparation of high-precision 3D map data for all expressway routes in Japan (total of approx. 30,000 km for inbound/outbound routes) scheduled during FY2018

○ Linkage of various forms of cross-field data and verification of service platforms that create new value based on the Dynamic Map.

○ Study of possibilities for application in development and upgrade of road inventories, support of snow-removal work, maintenance of power poles, etc.

The Fourth SIP-adus Workshop 2017

- An international workshop attended by experts to share issues and discuss solutions toward the realization of advanced automated driving systems

Dates: Tuesday, November 14, to Thursday, November 16, 2017

Venue: Tokyo International Exchange Center (Aomi, Koto-ku, Tokyo)

Participants: 477 (including 75 from outside Japan)

	Tuesday, November 14	Wednesday, November 15	Thursday, November 16
AM	Opening Session	SIP-adus Report Sessions	Breakout Workshop-1 (Technical discussions by small groups with experts from Europe and the US) Note: Invited persons only
	Regional Activities and FOTs (Latest trends in initiatives and field operational tests for automated driving in each country)	Impact Assessment (Social effects of automated driving)	
PM	Dynamic Map (Development of a Dynamic Map for use in automated driving)	Next Generation Transport (Application of automated driving in next generation transport)	Breakout Workshop-2 (Technical discussions by small groups with experts from Europe and the US) Note: Invited persons only
	Connected Vehicles (Application of communication technologies concerning automated driving)	Human Factors (Relationship between automated vehicles and people, road users, and society)	Breakout Workshop (Overall discussion of content addressed in the technical discussions)
	Cyber Security (Cyber security for automated vehicles)		Closing Session

Social Acceptance (Civic Dialogue)

Activities to develop a future vision of automated driving systems and identify future needs through dialogue with ordinary citizens.

- New realizations and visions from not only experts but also ordinary citizens
- Conversation with ordinary citizens to gain social acceptance in parallel with R&D

Date	Theme	Main participants
Nov. 1, 2016	Social change with the advent of automated driving	Young people in their early 20s who are expected to form society's central generation when automated vehicles become fully deployed
Jan. 17, 2017	Linking automated driving and society	Ordinary citizens, including vehicle-related businesses, professional drivers, and university students who will lead the next generation
Feb. 21, 2017	Drivers' rights and responsibilities	Attorneys, students attending law school and law faculties who will lead the next generation, vehicle-related businesses, and professional drivers
Nov. 3, 2017	Mobility and urban design	Citizens from various backgrounds—including urban transport employees, developers, designers, AI researchers, and students—who are concerned with mobility and urban planning (more than 300 people attended or posted online opinions with cooperation of the Tokyo Motor Show)
Feb. 5, 2018	Future society and MaaS	Working people and students having backgrounds in agriculture, engineering, urban design, vehicle-related business, transportation, etc.

Study of the Social Effects of Automated Driving

• Clarification of impacts—not only in terms of technical aspects but also proposals for the future and social and industrial aspects—with an eye to the deployment of automated driving systems

○ Study of social and industrial impacts

- Study by university researchers from diverse fields, including engineering, law, urban planning, and business management

○ Estimation of effects in reducing traffic accidents

- Study of methods for estimating and analyzing traffic fatality reduction effect
- Development and testing of simulation technologies

○ Development and testing of technologies for visualizing local traffic CO_2 emissions


Thank you