

A background image showing light trails from a vehicle at night, with streaks of yellow, blue, and white light against a dark background.


TRB 98th Annual Meeting
International Programs on Road Vehicle Automation

SIP-adus Project

National R&D Initiative on Automated Driving in Japan: Outcomes and Next Actions

Yasuyuki KOGA
Cabinet Office, Government of Japan

14 January, 2019

A vertical banner on the left side of the slide features a background of colorful light trails in shades of yellow, blue, and purple, suggesting motion and technology. The text 'TRB 98th' is written in a large, white, sans-serif font, with a thin white horizontal line underneath it.

TRB 98th

INDEX

- 1. Society 5.0**
- 2. 1st phase of SIP-adus (2014-18)
(Automated Driving for Universal Services)**
- 3. 2nd phase of SIP-adus(2018-22)**
- 4. SIP-adus Workshop**

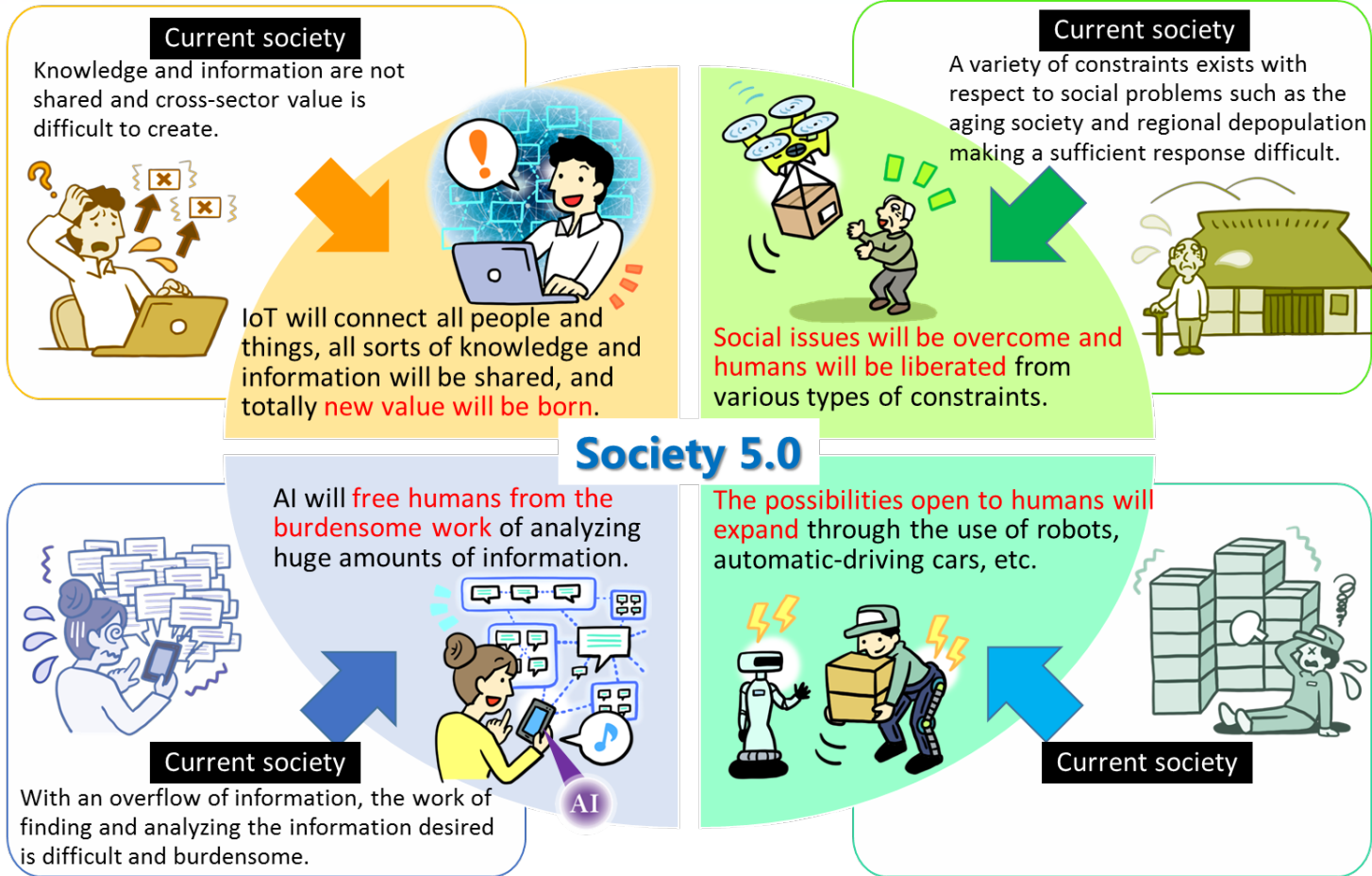
A vertical banner on the left side of the slide features a background of light trails from a road at night, with streaks of yellow, white, and blue light. The text 'TRB 98th' is written in white, bold, sans-serif font, underlined.

TRB 98th

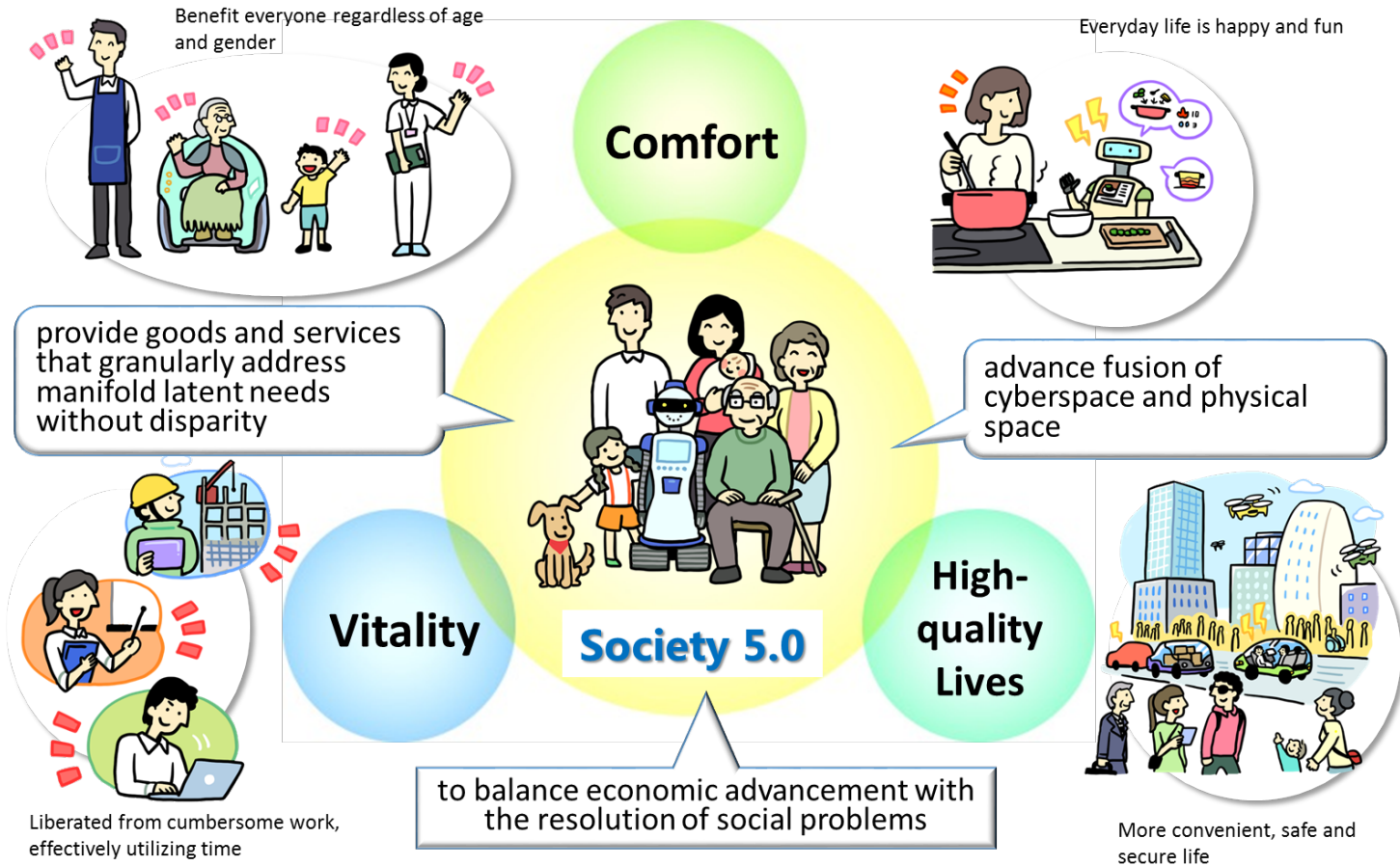
1

Society 5.0

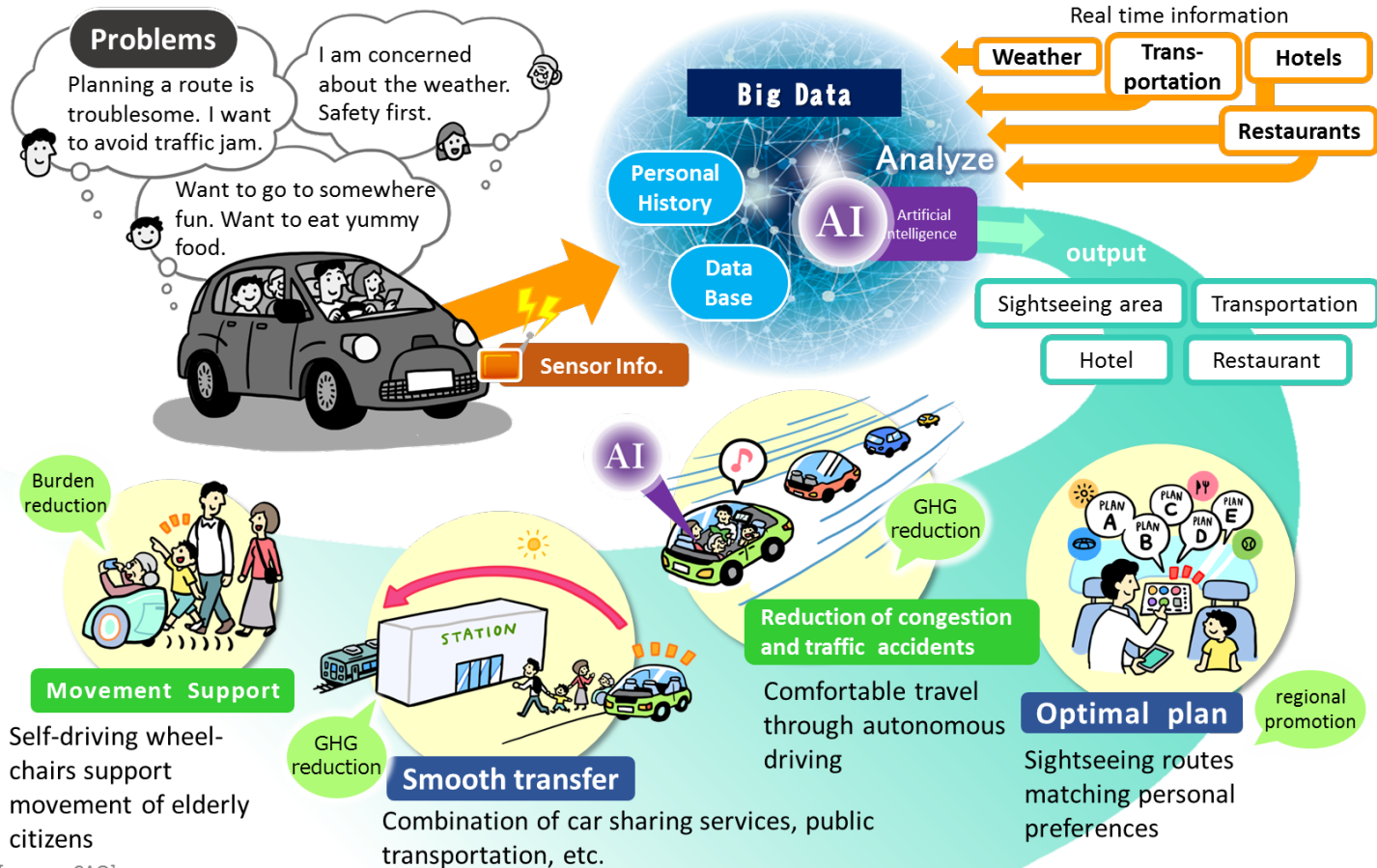
A society realized with “Society 5.0”



“Society 5.0” bring about a human-centered society



Example of creating new value (Mobility)



A vertical panel on the left side of the slide features a background of light trails from a road at night, with streaks of yellow, white, and blue light. The text 'TRB 98th' is written in white, bold, sans-serif font, underlined.

TRB 98th

2

**SIP-adus
(Automated Driving
for Universal Services)**

SIP (Cross-Ministerial Strategic Innovation Promotion Program)

➤ Intensive R&D program

- ✓ promote 5-years R&D (FY2014 - FY2018)
- ✓ 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)



Cross-Ministerial Strategic Innovation Promotion Program
Council for Science, Technology, and Innovation
(CSTI)

Governing board
(CSTI Executive Members)

← Outside experts

Executive Director of SIP (Assigned from 2018)

Program Director (PD)
(assigned to Cabinet Office for each policy issue)

Steering Committee
PD (Chairman), relevant ministries,
experts, corporations,
Cabinet Office (secretariat)

Relevant ministries and management
corporations and other researchers

Vision and Development Goals of automated driving

Vision for social aspects

Safer and more comfortable transport system

- Reduce traffic accidents
Target reduction in traffic fatalities
2017: 3,694 → 2,500 or less
- Reduce traffic congestion



For a society with a declining birth rate and aging population, and productivity revolution

- Ensure means of mobility in local areas
- Alleviate the shortage of human resources (drivers)

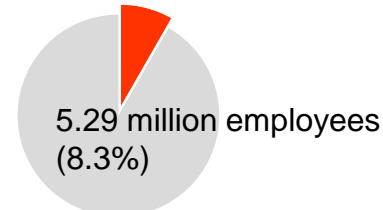


Vision for industrial aspects

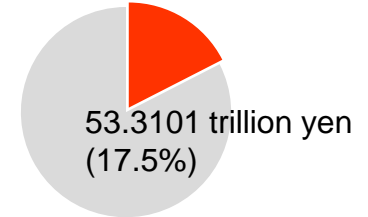
More competitive in auto industry

Shipment value of the auto manufacturing industry: accounts for 20% of major manufacturing industries

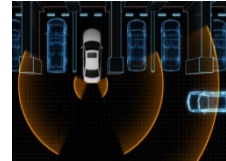
Persons employed



Value of manufactured goods shipped



Creation of new industries



Sensor-equipped vehicle
(e.g., cameras, radar sensors)

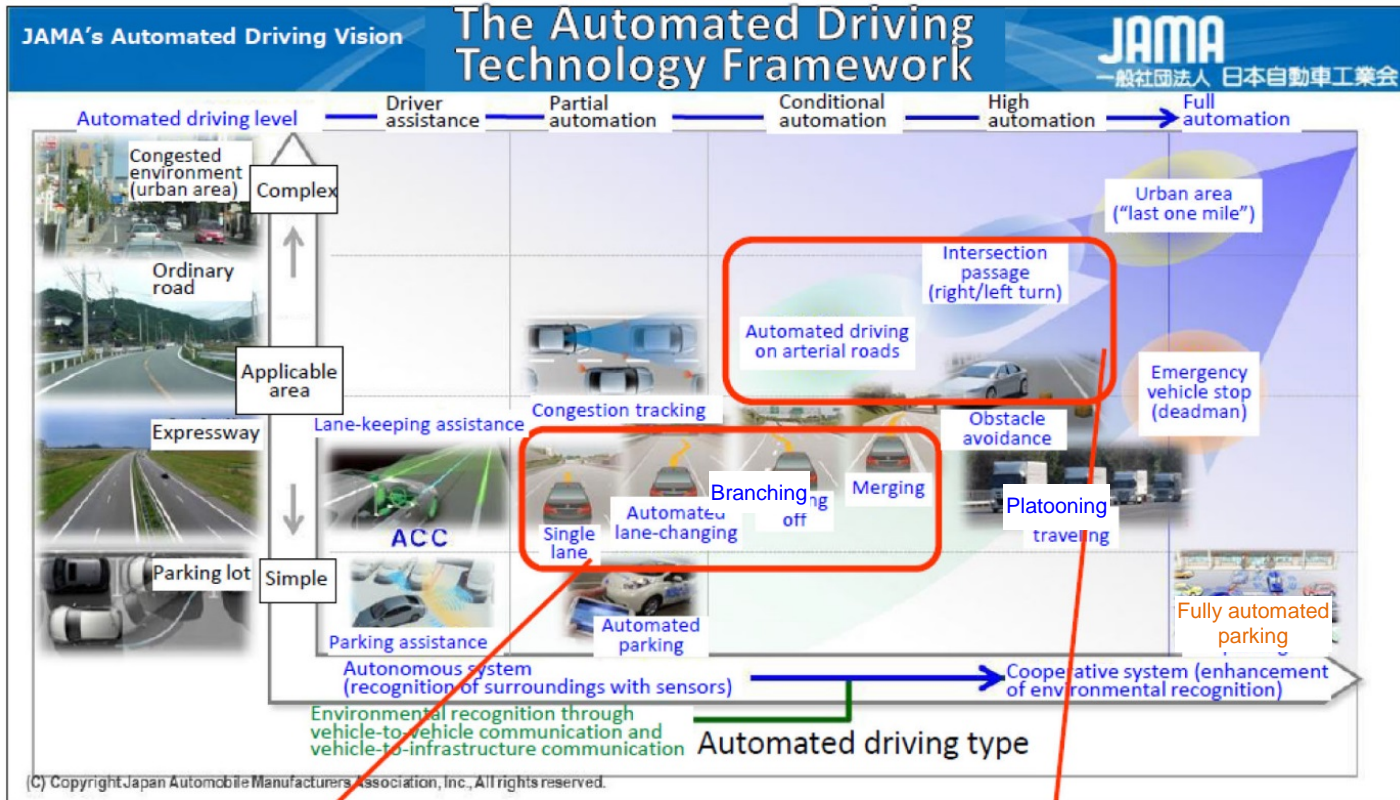


Communication device



Digital infrastructure

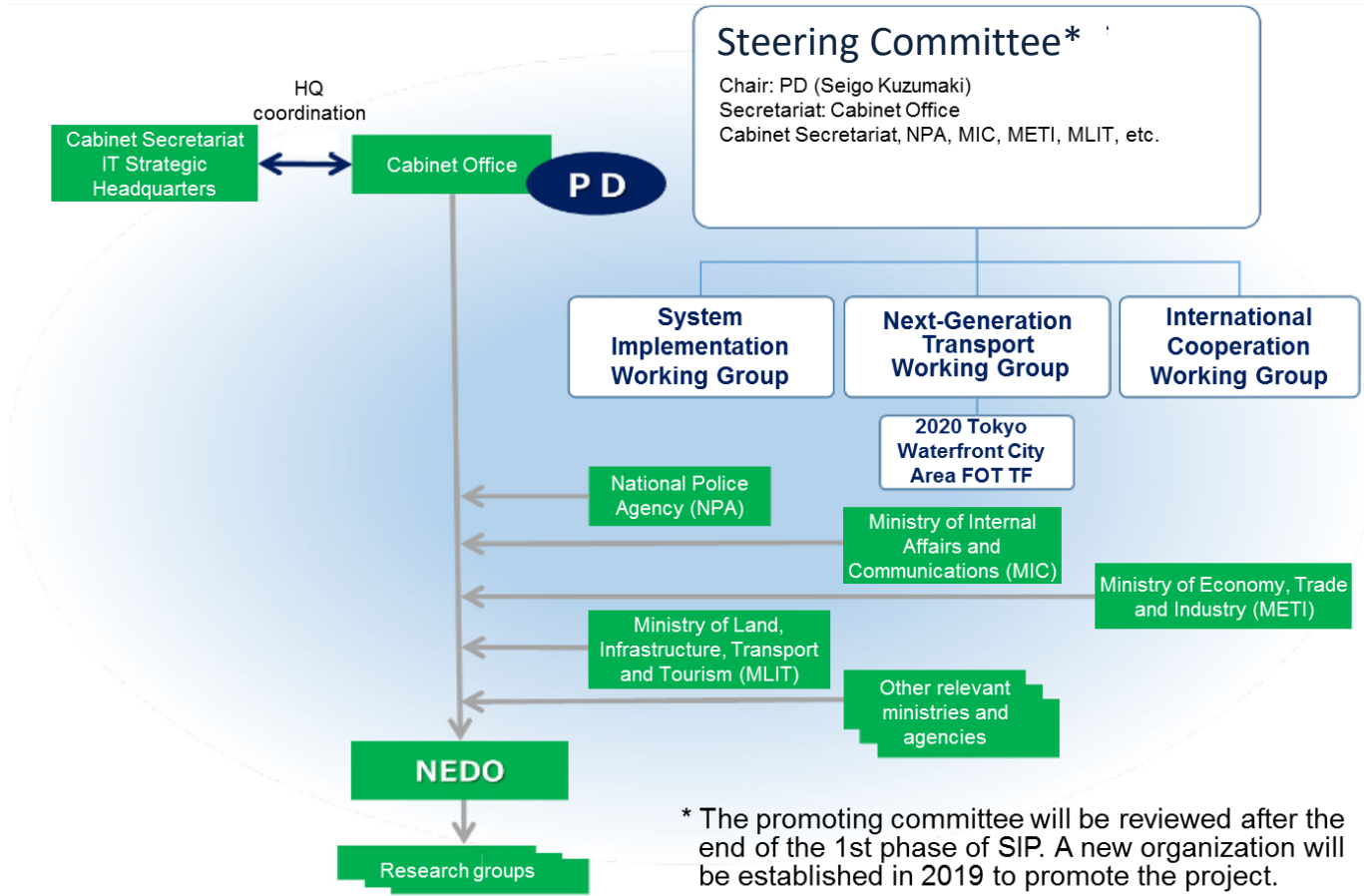
SIP-adus in Japan: Objectives



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

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

Implementation Organization



1st Phase of SIP-adus in Japan: Schedule

2014

2015

2016

2017

2018

- ◆ System development
- ◆ R&D on specific themes

Steering Committee

System Implementation Working Group

International Cooperation Working Group

Next Generation Transport Working Group

- ◆ Integration into 5 key issues

- ① Dynamic Map
- ② HMI (Human Machine Interface)
- ③ Cyber security
- ④ Pedestrian Traffic Accident Reduction
- ⑤ Next Generation Transport

- ◆ Large-scale field operational tests



- ◆ Field Operational Test of Automated Bus Driving in Okinawa

1st Phase of SIP-adus in Japan: Overview

Budget for FY 2018 2.8Bil. yen.

Vehicle



Recognition

Maps, ITS info, sensors



Judgment

Processing, artificial intelligence



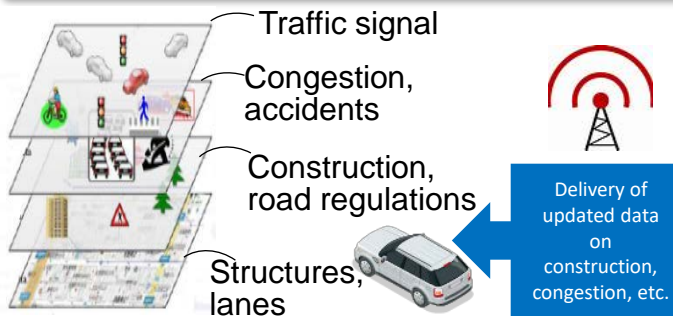
Operation

Hydraulics, electric motor

⇒ Development based on competition among manufacturers

Dynamic Map

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



Base technologies



Cyber Security, DB, simulator

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

HMI



Human Machine Interface



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



Pedestrian traffic accident reduction

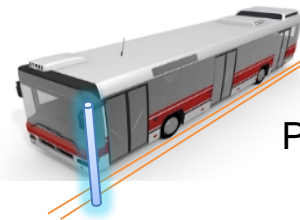


Pedestrian finding at intersection

V2X comm.

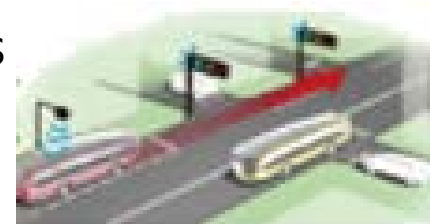
Next Generation Transport

Application of automated driving technologies to buses, etc.

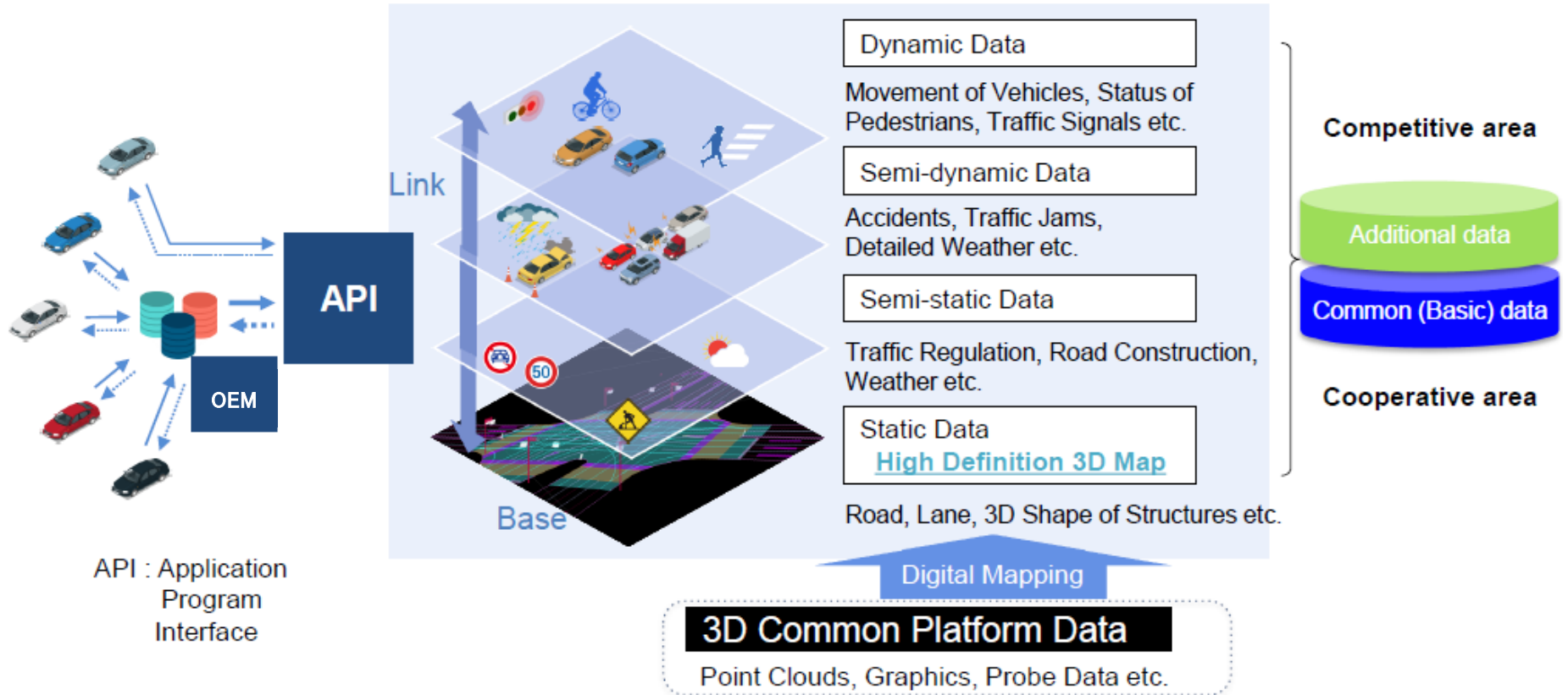


Precision docking

PTPS



Dynamic Map



API : Application Program Interface

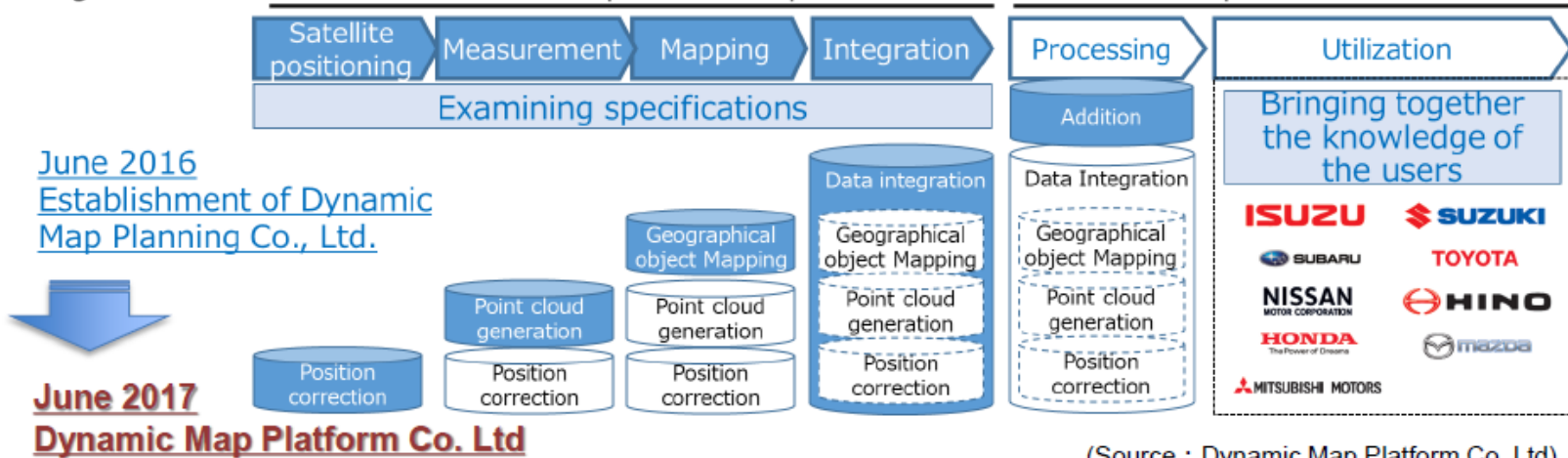
Dynamic Map Platform Co.Ltd

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



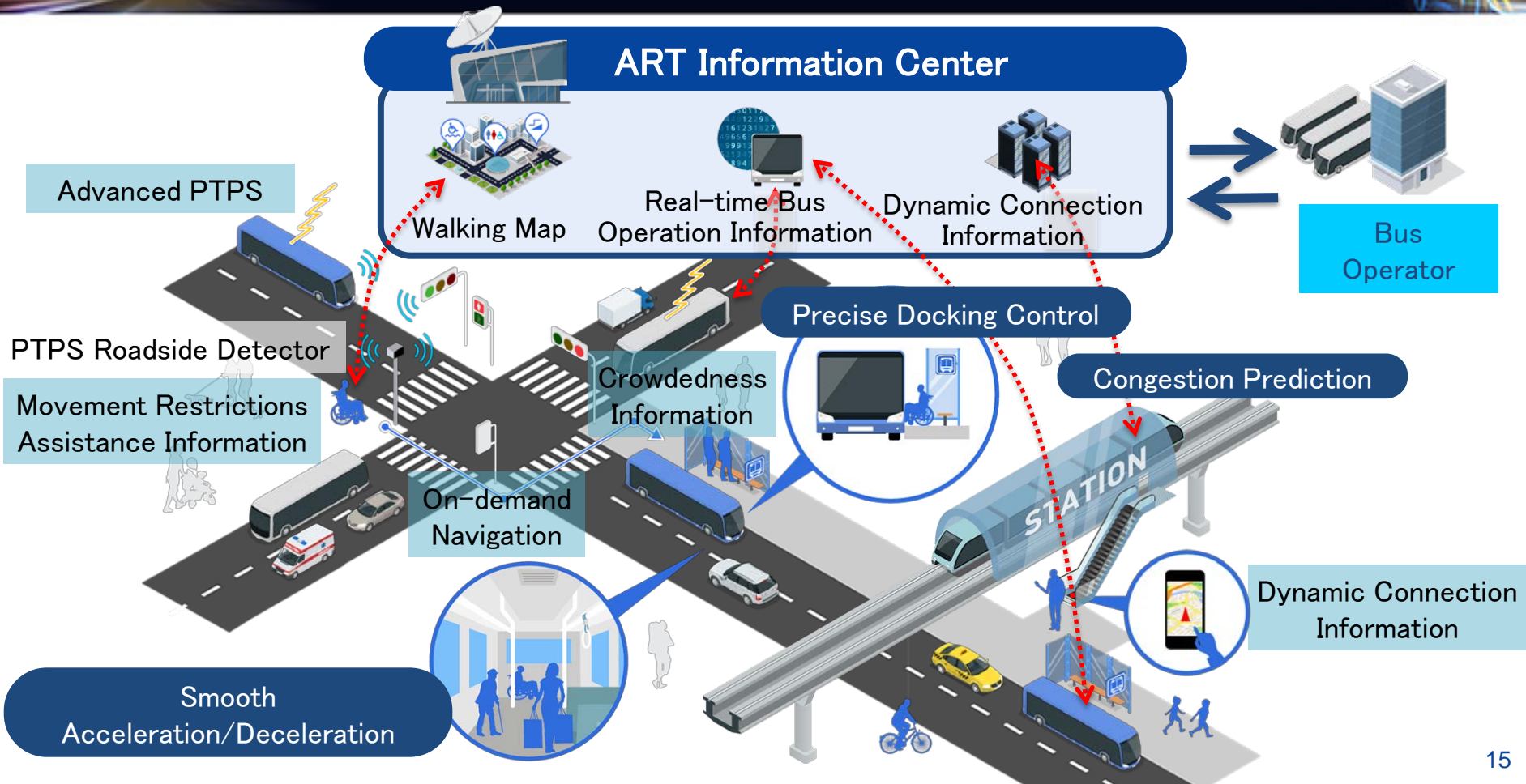
“High-Precision Three-Dimensional Map Data” Cooperation Areas

Competitive Areas



(Source : Dynamic Map Platform Co. Ltd)

Next Generation Transport



ART Information Center

Walking Map Real-time Bus Operation Information Dynamic Connection Information

Bus Operator

Precise Docking Control

Congestion Prediction

Dynamic Connection Information

Advanced PTPS

PTPS Roadside Detector
Movement Restrictions Assistance Information

On-demand Navigation

Crowdedness Information

Smooth Acceleration/Deceleration

A vertical panel on the left side of the slide features a background of colorful light trails in shades of yellow, blue, and purple, suggesting motion and energy. The text is overlaid on this panel.

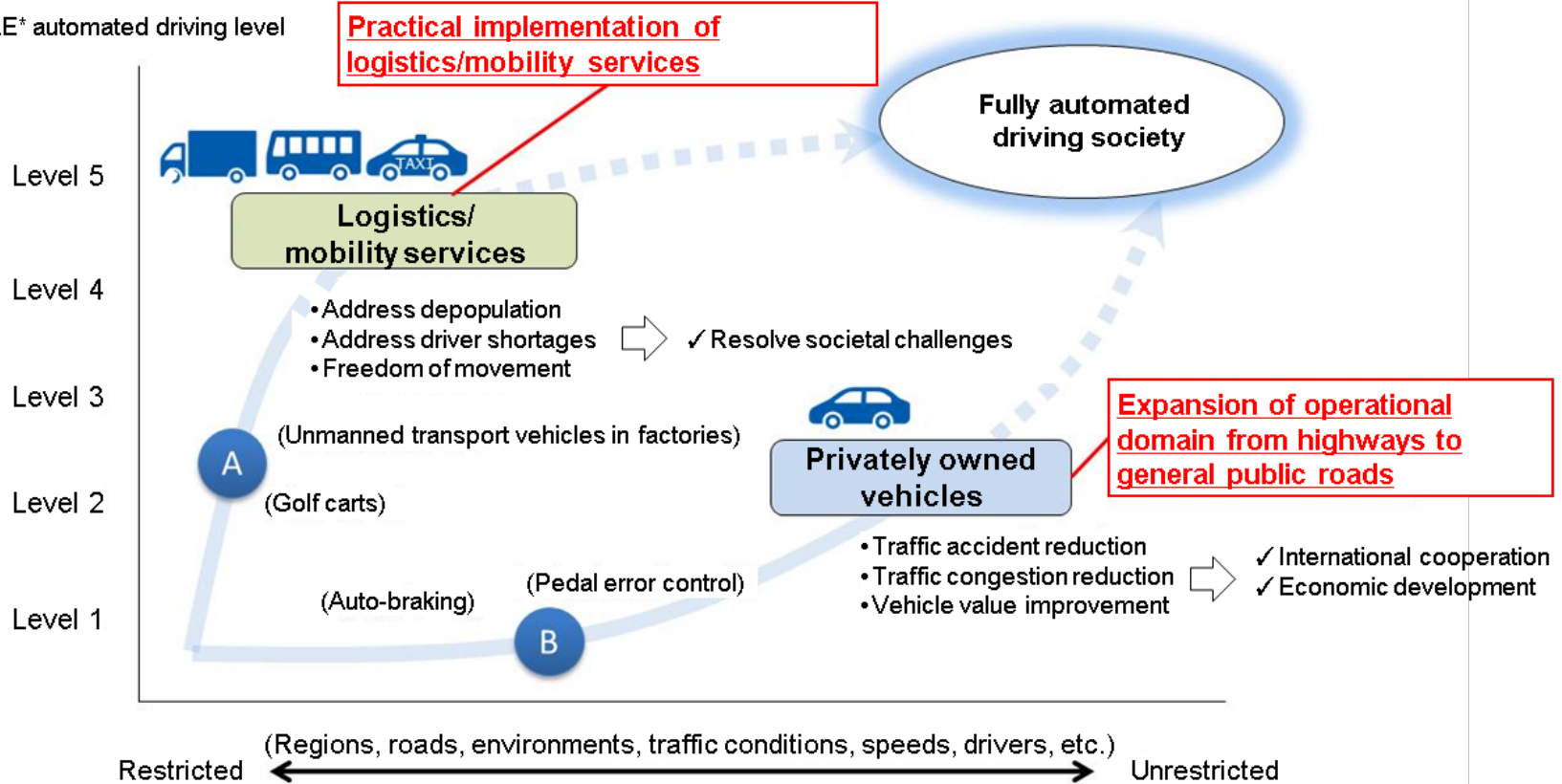
TRB 98th

3

**2nd phase of SIP-adus
(2018-2022)**

Overview of 2nd Phase of SIP-adus

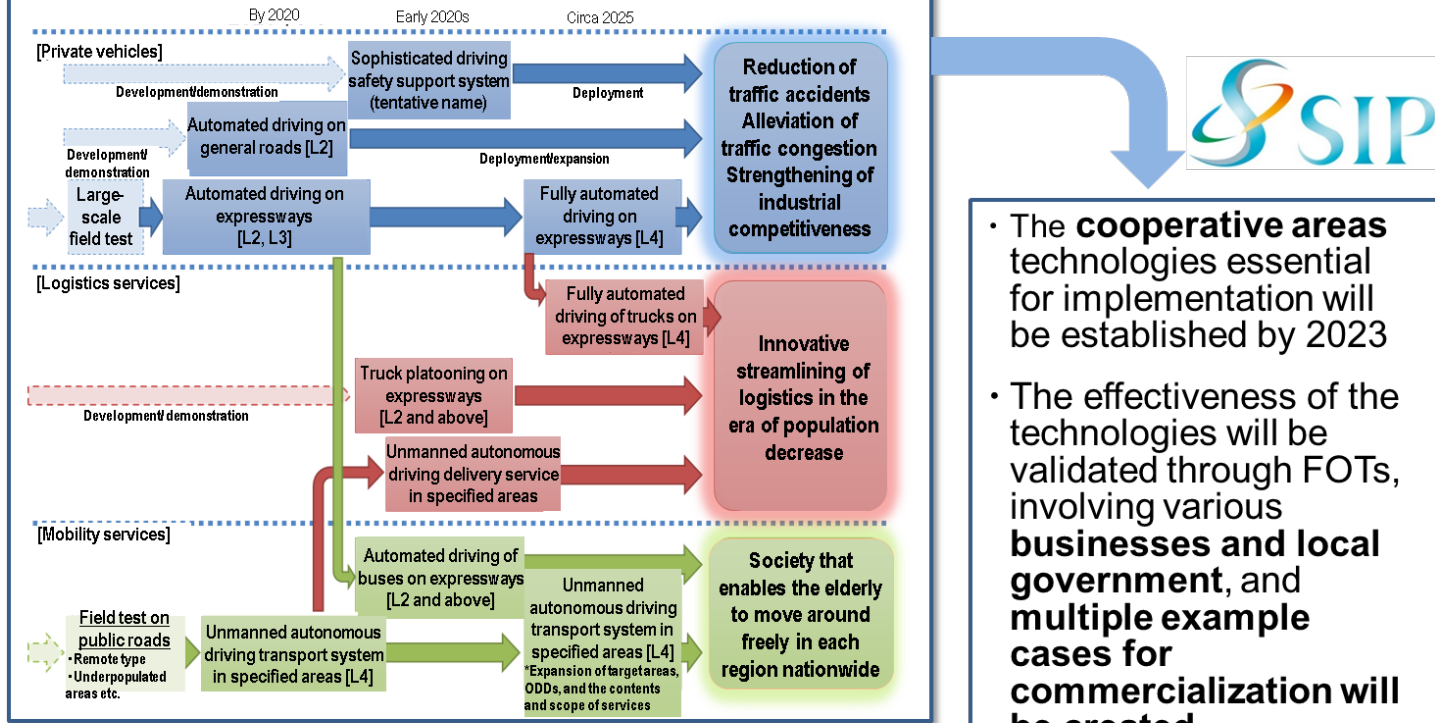
SAE* automated driving level



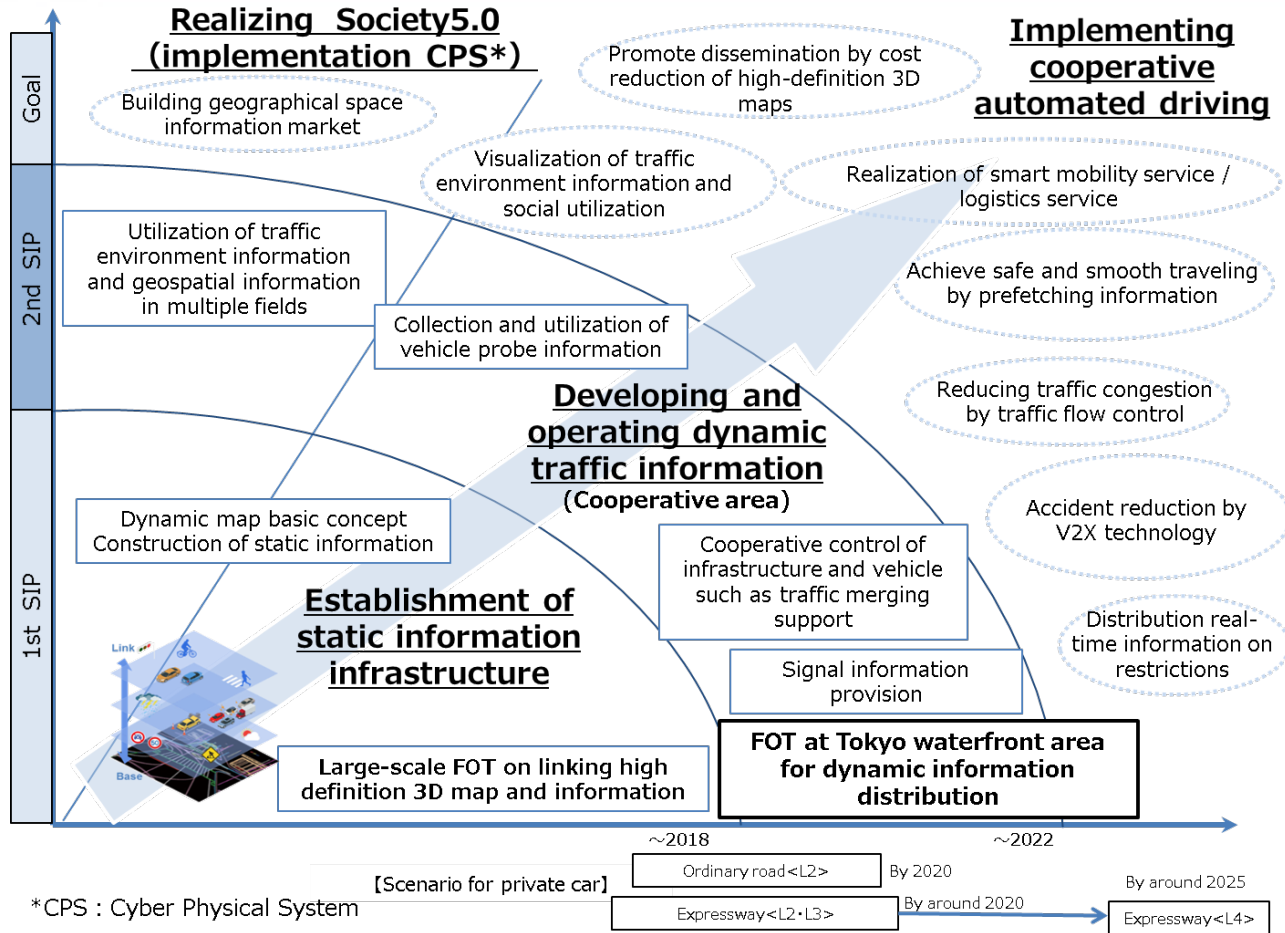
Objectives

Public-Private ITS Initiative/ Roadmaps 2018

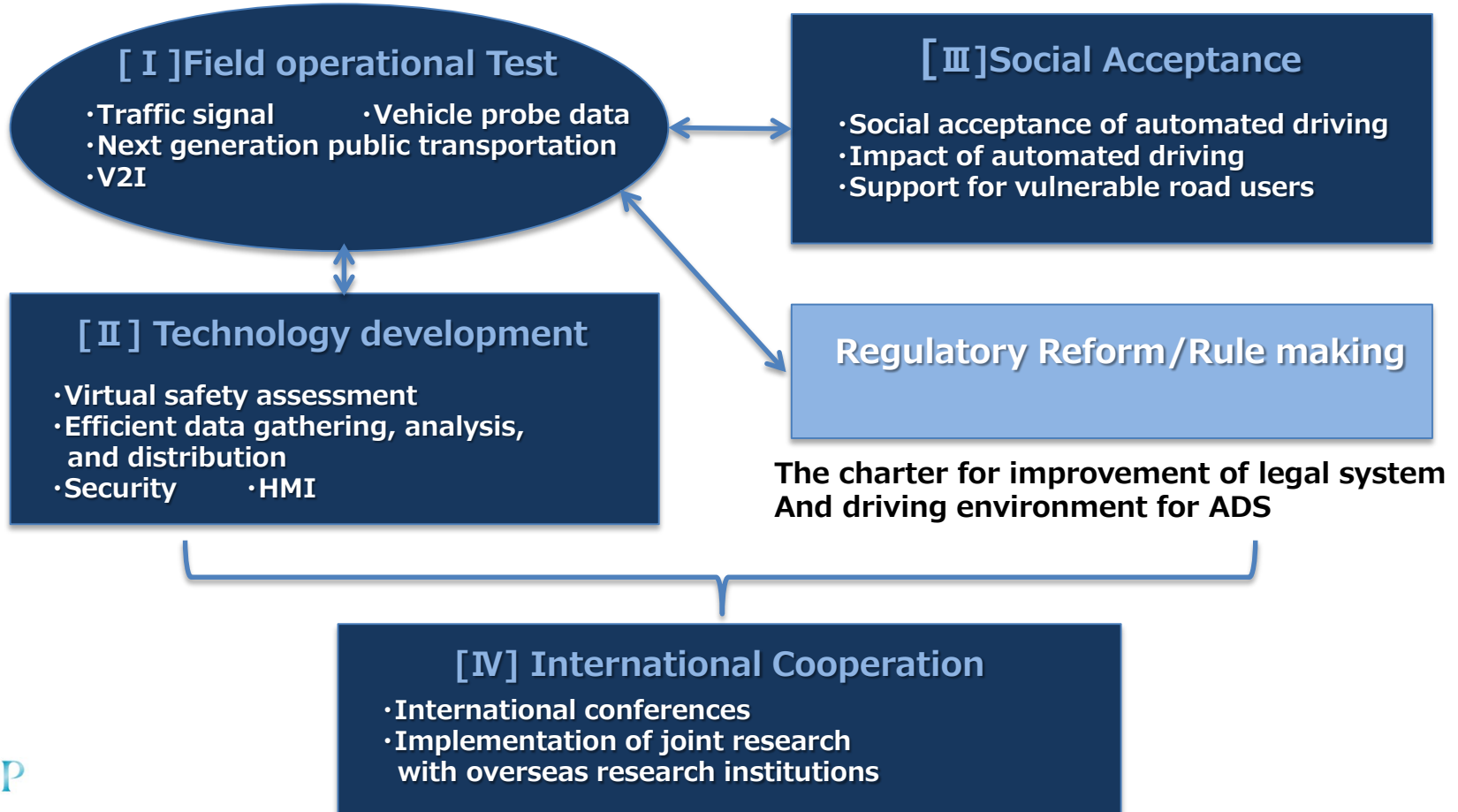
Scenario for the commercialization and service of fully automated driving by 2025



Building the Road Traffic Environmental Info. Framework



4 Pillars of 2nd SIP-adus



FOTs (Tokyo Waterfront City–Haneda Area)

1. Schedule

Coming soon (January 2019)

Participation will be solicited.

Around latter half of FY2019 to the end of FY2022:

FOTs will be conducted

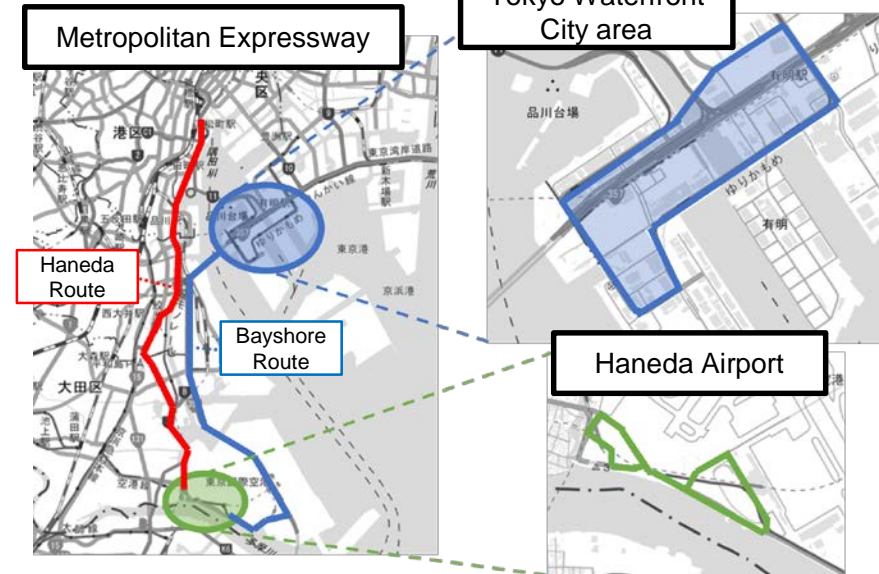
2. Participants (expected)

Automakers, components manufacturers, universities, research institutions, etc. **in and outside Japan**

3. Environments for the FOTs (planned)

- An environment to provide traffic signal information from traffic signals (roadside wireless communication equipment)
- High-definition 3D maps linked with traffic signal information
- An environment that provides merging support information
- An environment that provides traffic regulation information for each lane
- Onboard equipment (e.g., traffic signal information, merging support information) (only for applicants)

Planned areas



Source: maps of the Geospatial Information Authority of Japan

FOTs (Tokyo Waterfront City–Haneda Area)

Details of FOTs (draft)

Providing traffic signal information

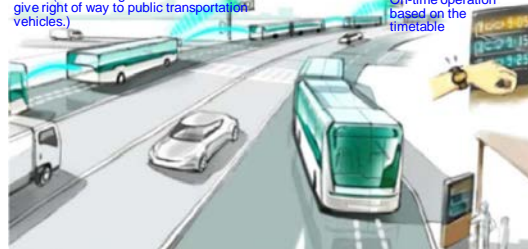
Vehicles are allowed to pass through intersections safely and smoothly based on **the signal display and change timing information** even in environments where recognition is difficult using in-vehicle cameras.



Public transport system (self-driving buses)

Vehicles are grouped into platoons by CACC to ensure smooth operation by FTPS (in which signals are controlled to give right of way to public transportation vehicles.)

On-time operation based on the timetable



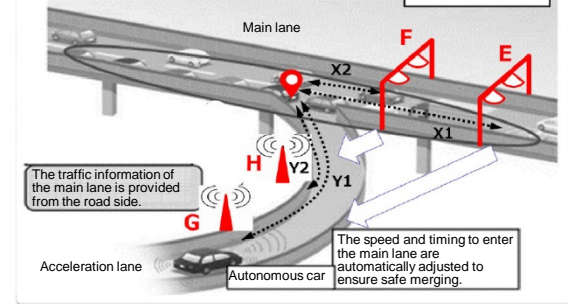
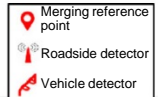
FOTs for the next-generation ART will be implemented on public roads by using automated driving technology in **mixed traffic flow**.

Merging assistance on the main lane of highways

Providing vehicle information on the main lane

A **vehicle detector** is installed at two locations before the merging reference point on the main lane (**E and F**).

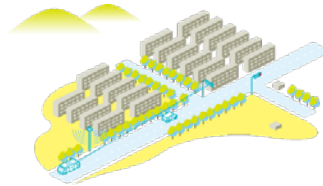
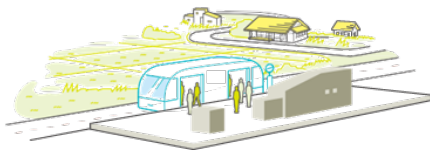
A **roadside detector** is installed at two locations before the merging reference point on the acceleration lane (**G and H**).



FOTs (Local Transportation)

Details of FOTs (draft)

Mobility/logistics services in underpopulated areas, etc.



FOTs for technologies



FOTs for implementation and commercialization

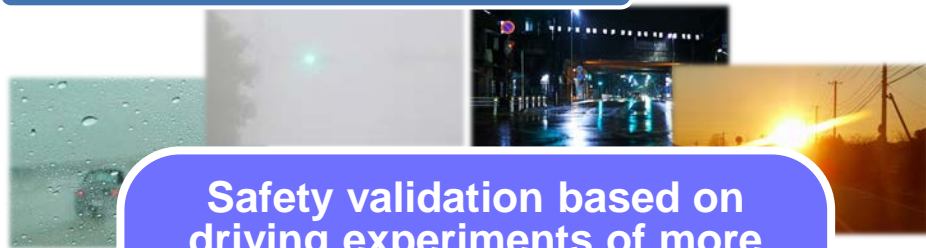
Long-term FOTs on public roads toward commercialization as means of local logistics and mobility services for citizens

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



Build a Virtual Environment for Safety Evaluation

Various weather conditions



Safety validation based on driving experiments of more than 10 billion km



Various traffic environments

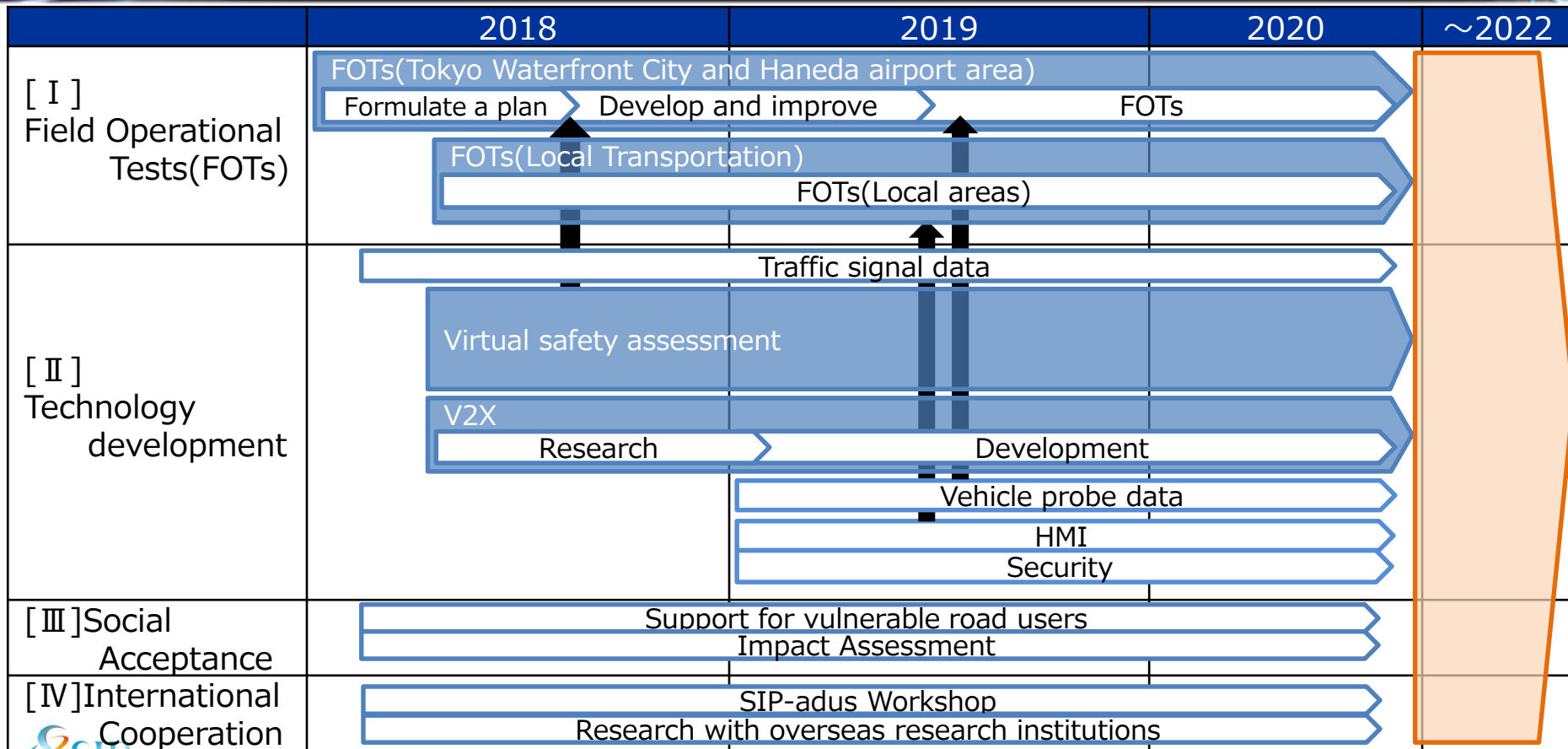


Virtual safety assessment



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

2nd Phase of SIP-adus in Japan: Schedule



A vertical panel on the left side of the slide features a background of colorful light trails from a long-exposure photograph of a road at night. The trails are in shades of yellow, white, blue, and purple, creating a sense of motion and depth. The top of the panel is dark blue, and the bottom is bright white.

TRB 98th

4

SIP-adus Workshop

Session (November 13-14)

- Sixty-four experts, including thirty-six experts from overseas, delivered presentations.
- Presentations were given on the following seven themes, and the status of SIP-adus development projects was reported.

Session themes:

1. Regional Activities and FOTs (Field Operational Tests)
2. Dynamic Map
3. Connected Vehicles
4. Cyber Security
5. Impact Assessment
6. Next Generation Transport
7. Human Factors



Vice-Minister for Policy Coordination Noriyuki Koda and speakers from outside Japan



Welcome Speech

Noriyuki Koda

Vice-Minister for Policy Coordination, Cabinet Office, Japan



Keynote Speaker

1 **Kenneth M. Leonard**: US Department of Transportation, USA

2 **Clara de la Torre**: European Commission, Belgium

3 **Seigo Kuzumaki**: SIP-adus Program Director, Japan



SIP-adus Exhibition (November 13-14)

Thirty posters from ministries and agencies working for SIP-adus development projects were exhibited at a hall adjacent to the conference hall.

Poster session



Breakout Workshop (November 15)

Overseas experts were invited to participate in discussions on seven session themes with SIP-adus members and other Japanese experts.



Breakout Workshop



Breakout Workshop Summary
Sharing the results on each theme

All the presentation materials and exhibited posters are available at:
<http://en.sip-adus.go.jp/evt/workshop2018/>

6th SIP-adus Workshop

Date: November 12-14, 2019

***Venue: Tokyo International Exchange Center,
JAPAN***

Please join us!!

SIP-adus (Workshop and other information):

<http://en.sip-adus.go.jp/>

*Summary Report and all presentations of the workshop
have been uploaded with permission from the speakers.*

Thank you for your kind attention!

SIP-adus (Automated Driving for Universal Services) National R&D Initiative on Automated Driving in Japan: Outcomes and Next Actions

Mobility bringing everyone a smile!



Yasuyuki KOGA

Cabinet Office, Government of Japan