

Japan's SIP-adus Program on Road Vehicle Automation

January 9, 2018

Hajime Amano

Chair, International Cooperation WG
SIP-adus

- **Intensive R&D program**
promote 5-year R&D (FY2014 - FY2018)
enhancing cross-ministerial cooperation
- **11 research themes**
From societal issues such as Energy,
Next-Generation Infrastructures and
Local Resources, including R&D for AD
- **Leadership and total Budget**
CSTI appointed Program Directors
and allocates the budget for each
research theme. *
* ¥50 billion in total per year
65% for SIP 11 themes, 35% for medical R&D

adus : Automated driving systems for universal service



Cross-Ministerial Strategic Innovation Promotion Program

Council for Science, Technology, and Innovation

Governing board
(CSTI Executive Members)

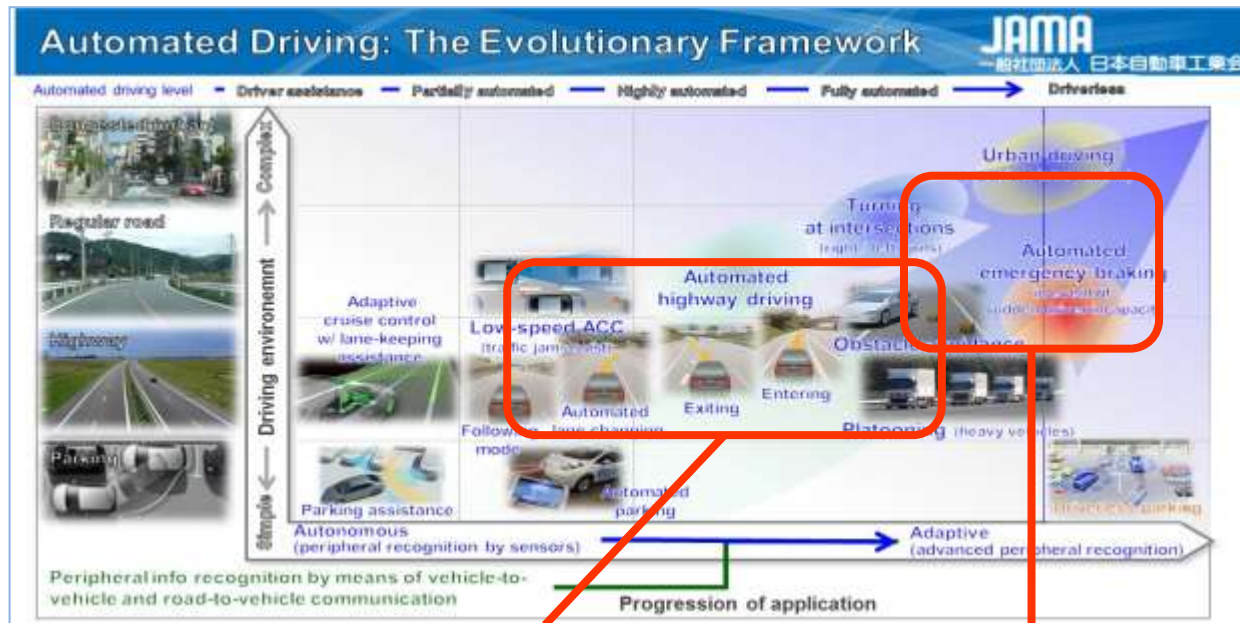
Independent
experts

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

Steering Committee
PD (Chairman),
relevant ministries, academia,
and industries,
Cabinet Office (secretariat)

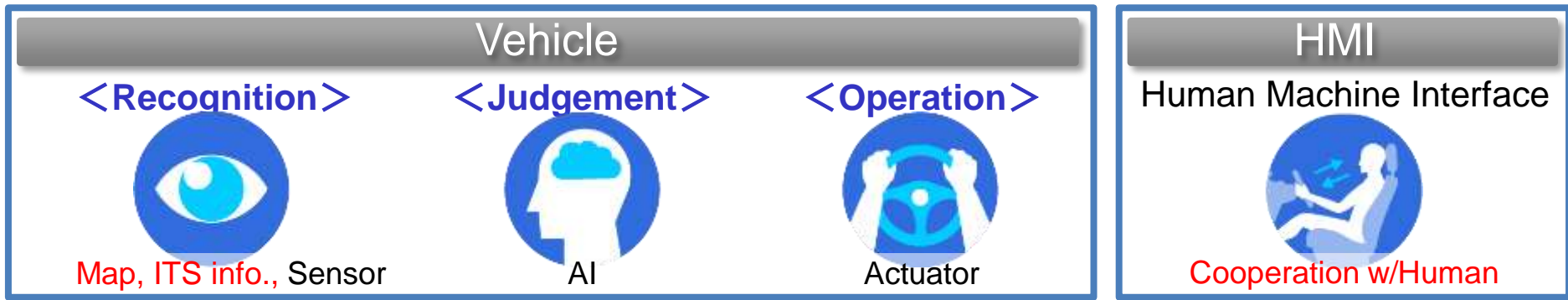
Relevant ministries and management
corporations and other researchers

- Ensuring safety and traffic jam reduction on the road
- Realization and spread 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 the next step Level 2 on regular road

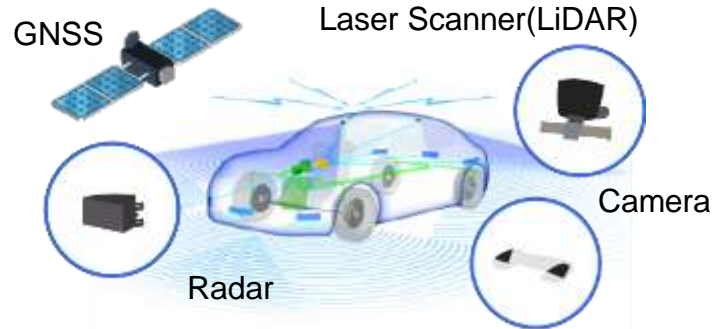
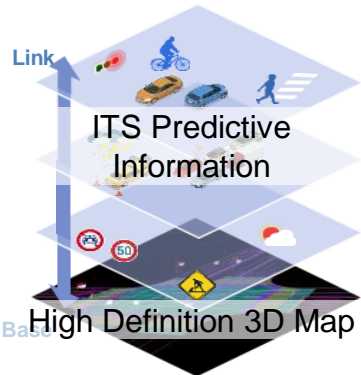


Dynamic Map

Onboard Sensors

Key Technologies

- Localization
- Environmental recognition



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



Structure construction Independent R&D

- Steering committee
 - System implementation Working Group
 - International cooperation Working Group
 - Next Generation Transport Working Group

Integrated into 5 main themes

- 1. Dynamic map**
- 2. Human Machine Interface (HMI)**
- 3. Cyber security**
- 4. Pedestrian traffic accident reduction**
- 5. Next Generation Transport**

Field Operational Test

- Acceleration of R&D activities for deployment
- Extraction of challenges in real traffic environment
- Validation of technology elements for practical use
- International cooperation and harmonization
- Building social acceptance

Implementation

< Purposes >

1. To accelerate R&D for deployment
2. To extract challenges in real traffic environment
3. To validate technology elements
4. To enhance international cooperation and harmonization
5. To build social acceptance

< Period >

Autumn 2017 to Spring 2019

Call for participation

1st call mid-2017, 2nd call early 2018

< Themes >



< Test Participants >



BOSCH
Invented for life



HONDA
The Power of Dreams



NISSAN
MOTOR CORPORATION



TOYOTA



Alphabetical order

< Test site >

Expressway

300 km stretch in Tokyo Area

- Joban expressway
- Tokyo Metropolitan expressway
- Tomei expressway
- Shin-Tomei expressway

Test facility

Japan Automobile
Research Institute

Arterial roads

Tokyo waterfront city area





GNSS



Laser Scanner(LiDAR)



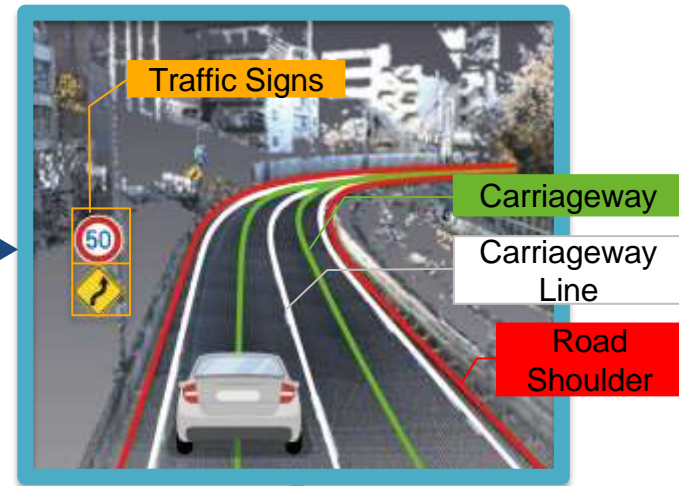
Radar

Camera

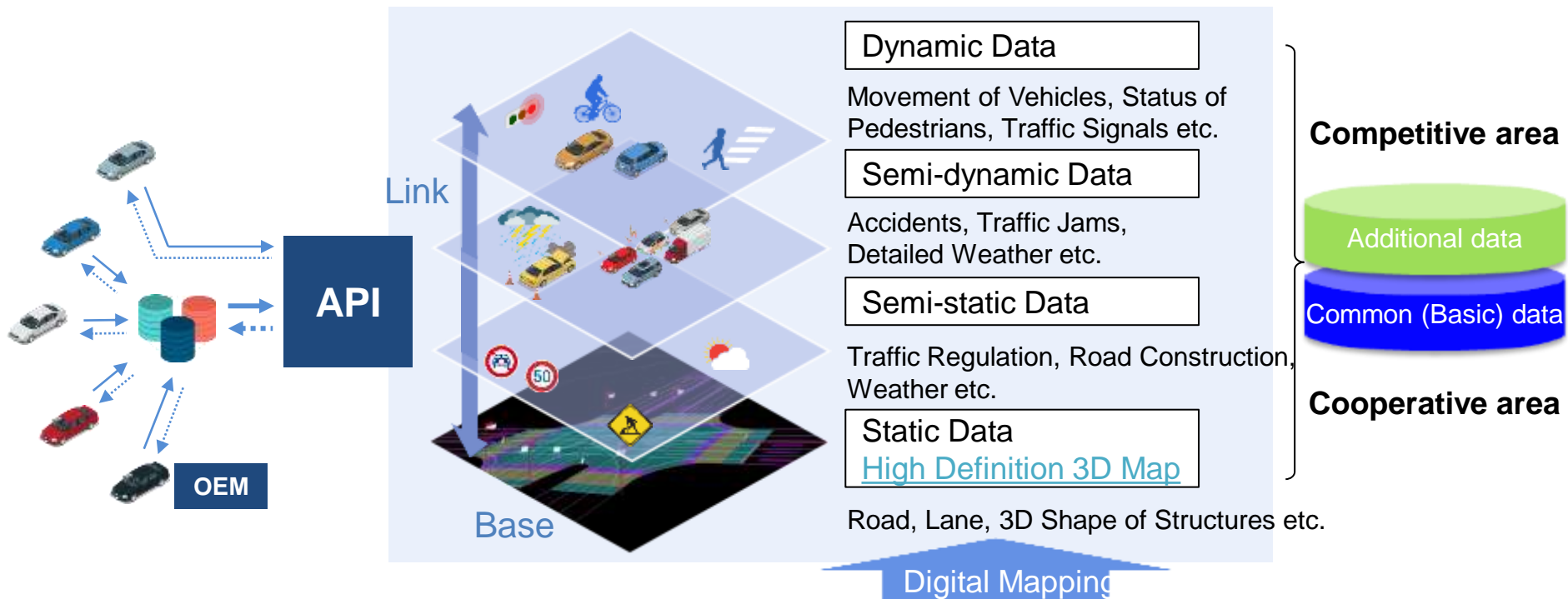
Sensed Data

Compare to estimate the position

High Definition 3D Map



Estimate the position of the vehicle



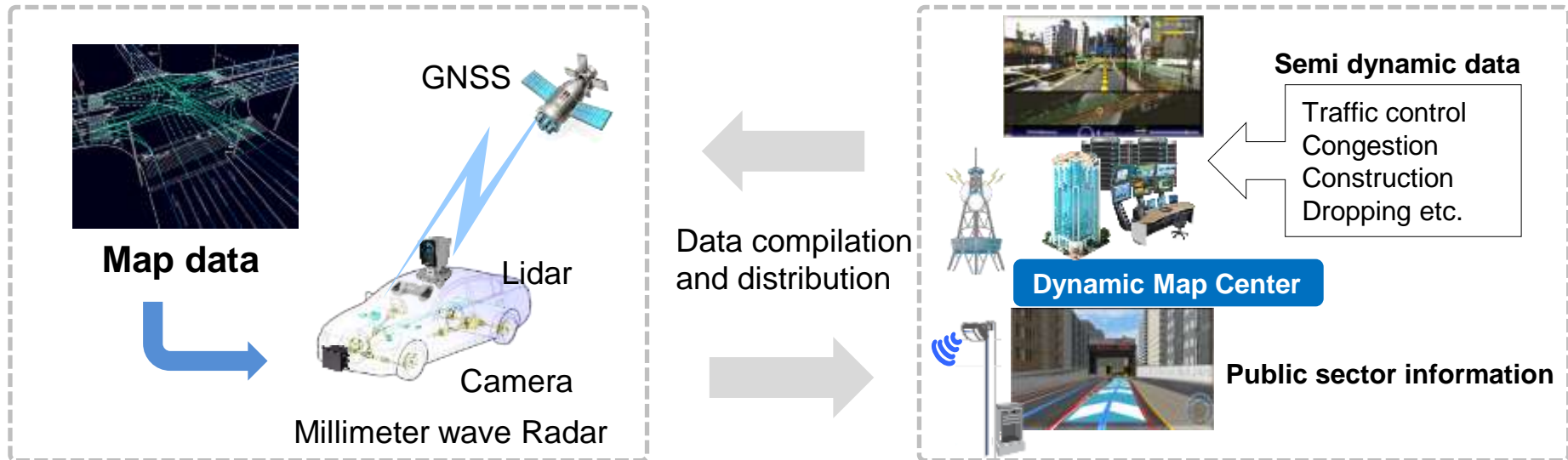
API : Application Program Interface

3D Common Platform Data
Point Clouds, Graphics, Probe Data etc.

< Goal > To establish and commercialize a dynamic center function, and standardization

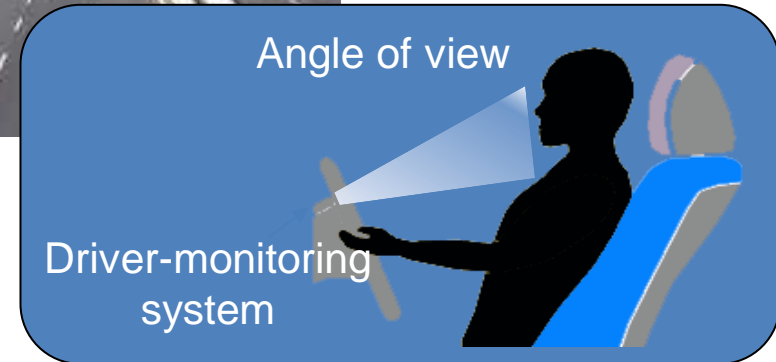
- To validate 3D high-resolution digital map data
- To validate data collection and distribution method
- To verify the utility of semi dynamic information

The map data are provided by SIP-adus.



Human Machine Interface

- ✓ Collection and analysis of the driver state data
- ✓ Definition of driving readiness status of the driver
- ✓ Verification of methods and devices for human machine interface



Society

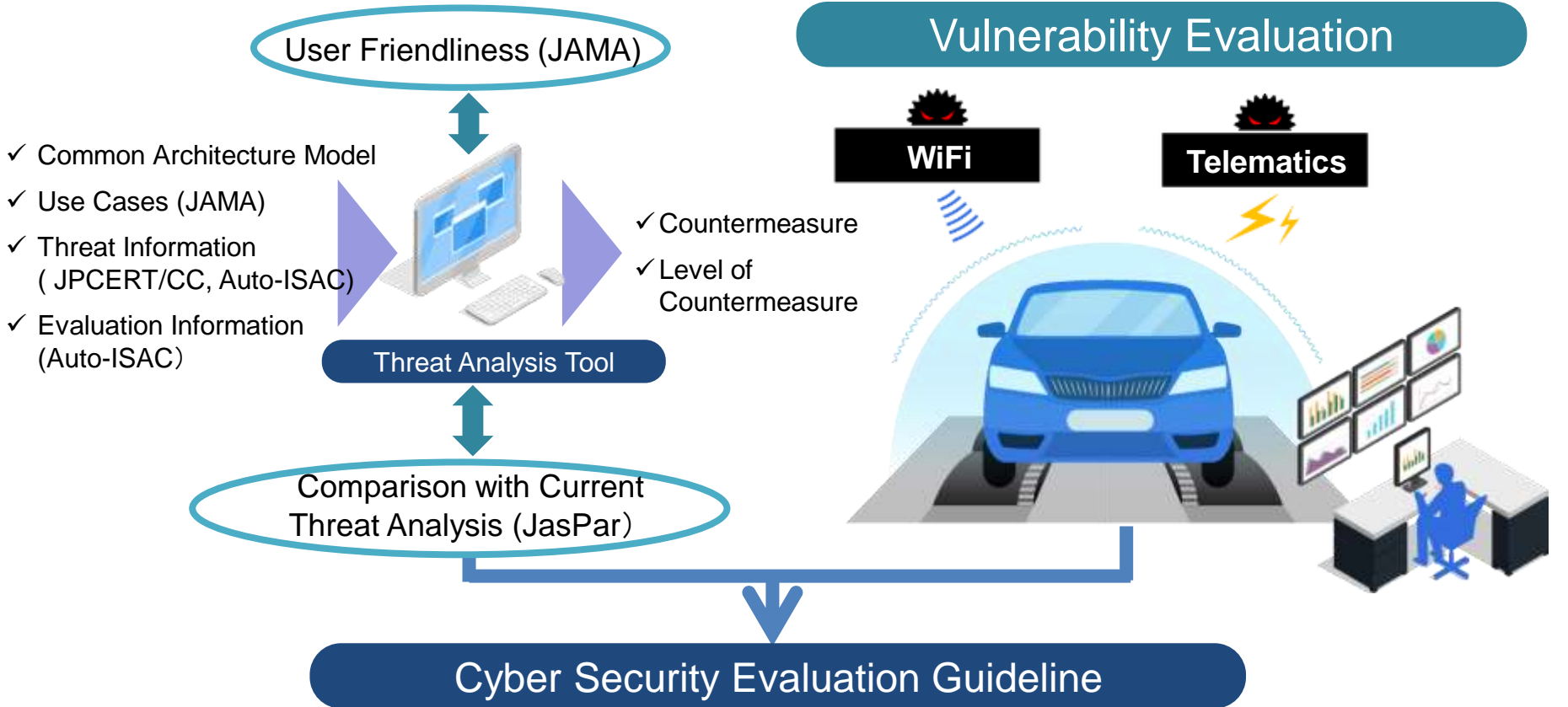


Interaction

Automated Vehicle / System

Levels 2,3,4 and 5

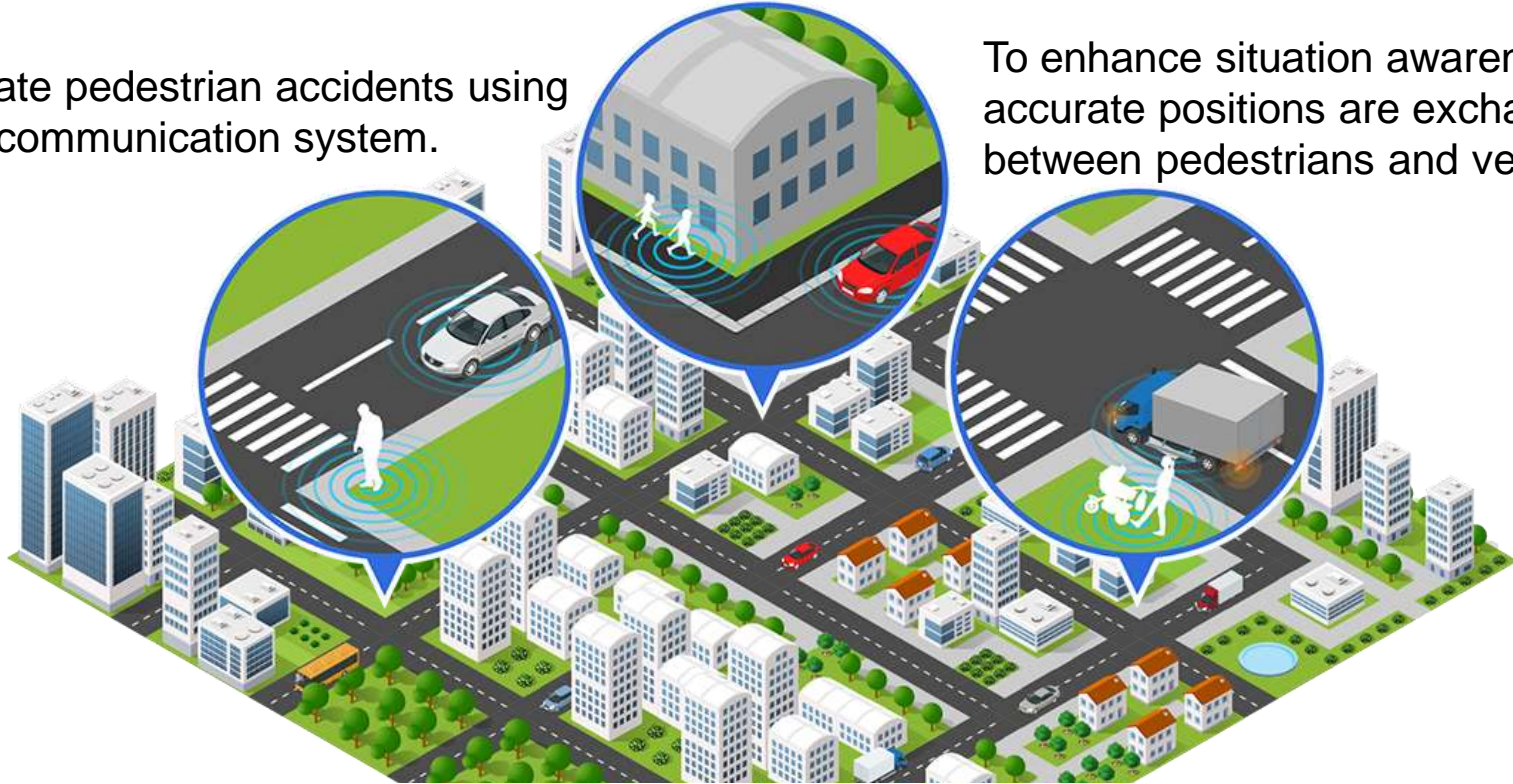
< Goal > To establish HMI guideline for level 3 and standardization



< Goal > To establish evaluation method at vehicle and component level and standardize

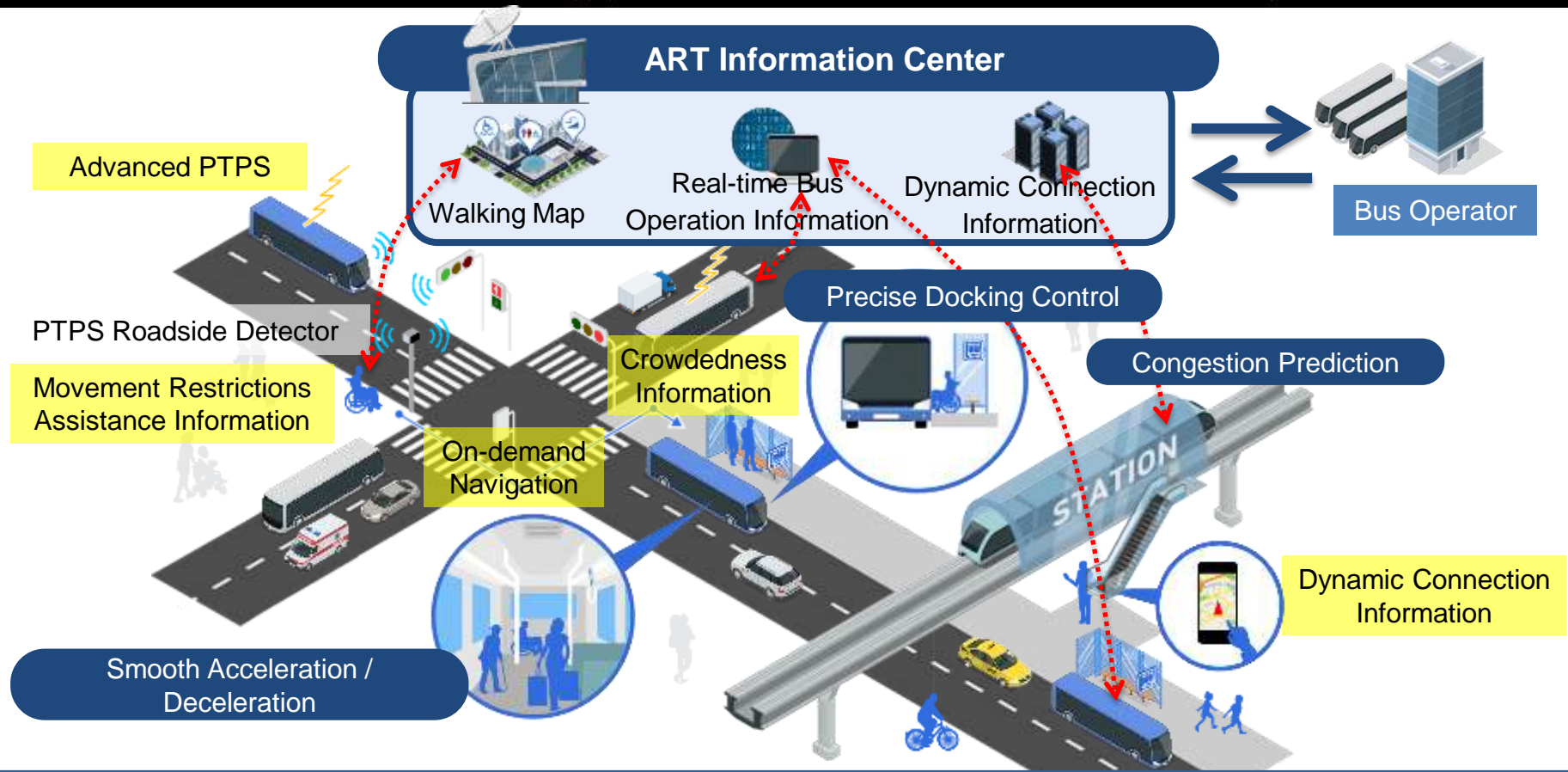
Mitigate pedestrian accidents using V2P communication system.

To enhance situation awareness, highly accurate positions are exchanged between pedestrians and vehicles.



Evaluate system performance and effectiveness under real traffic world

< Goal > To develop technology and personal handy phones for pedestrian localization



< Goal > To develop the Advanced Rapid Transit system and demonstrate its operation

■ Experts are assigned in Focused areas

1. Dynamic Map
2. Connected Vehicle
3. Human Factors
4. Impact Assessment
5. Next Generation Transport
6. Cyber Security



SIP-adus Workshop

A banner for the SIP-adus Workshop 2017. The background features a silhouette of a city skyline at dusk, with a suspension bridge on the left and the Tokyo Tower in the center. Overlaid on the right side is a large, stylized globe composed of blue and purple curved lines. The text 'SIP-adus Workshop' is in white, '2017' is in white on a red rectangular background, and 'on Connected and Automated Driving Systems' is in smaller white text below.

SIP-adus Workshop 2017

on Connected and Automated Driving Systems

4th SIP-adus Workshop 2017 Snap Shots

Plenary Sessions

Seven full-day Breakout Workshops

**FOTs and
Regional
Activities**

**Dynamic
Map**



**Connected
Vehicles**



**Cyber
Security**



**Impact
Assessment**



**Next
Generation
Transport**



**Human
Factors**



Breakout Workshop Summary Session



Participants

International	75
Domestic	402
Total	477

Speakers / Moderators

International	35
Domestic	24
Total	59

Breakout Workshop

International	43
Domestic	105
Total	148



Opening

Ryo Kuroda SIP-adus / Cabinet Office, Japan

Kenneth M. Leonard U.S. Department of Transportation, USA

Ludger Rogge European Commission, Belgium

Seigo Kuzumaki SIP-adus Program Director, Japan



FOTs and Regional Activities

Hajime Amano ITS Japan, Japan

Masato Minakata TOYOTA Motor Corporation, Japan

Jan Hellaker DRIVE SWEDEN, Sweden

Helge Neuner Volkswagen Group Research, Germany

Christian Rousseau RENAULT GROUP, France

Reija Viininen Finnish Transport Agency, Finland

Paul Retter National Transport Commission, Australia

Tom Alkim Ministry of Infrastructure and the Environment, The Netherlands

Takashi Oguchi The University of Tokyo, Japan



Dynamic Mac

Satoru Nakajo The University of Tokyo, Japan

Yoshiaki Tsuda Mitsubishi Electric Corporation, Japan

Tsutomu Nakajima Dynamic Map Platform Co.,Ltd. , Japan

Volker Sasse NavInfo / NDS / OADF, Germany

Jean-Charles Pandazis ERTICO – ITS Europe, Belgium



Connected Vehicles

Vincent Blervaque BLERVAQUE Sprl, France

Kevin Doport U.S. Department of Transportation, USA

Maxime Flament ERTICO – ITS Europe, Belgium

Frank Foersterling Continental, Germany

John Kenney Toyota InfoTechnology Center USA, USA

Norifumi Ogawa Mazda Motor Corporation, Japan

Cyber Security

Satoru Taniguchi Toyota InfoTechnology Center Co., Ltd. , Japan

Annie Bracquemond VEDECOM, France

Shigeru Uehara TOYOTA Motor Corporation, Japan

Dan Klinedinst Carnegie Mellon University, USA

Ingo Dassow Deloitte Gmbh, Germany

Rob Shein PwC, USA

Jonathan Petit OnBoard Security, USA

Tsutomu Matsumoto Yokohama National University, Japan

Impact Assessment

Koichi Sakai The University of Tokyo, Japan

Steven E. Shladover University of California, Berkeley, USA

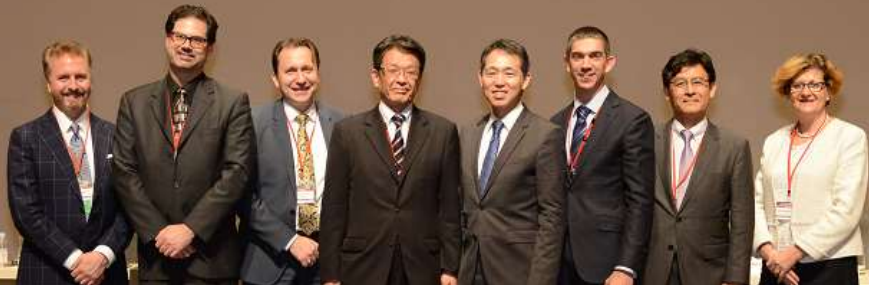
Felix Fahrenkrog BMW Group, Germany

Adrian Zlocki fka, Germany

Satu Innamaa VTT Technical Research Centre, Finland

Nobuyuki Uchida Japan Automobile Research Institute, Japan

Hiroaki Miyoshi Doshisha University, Japan





Next Generation Transport

Jane Lappin Toyota Research Institute, USA

Nadege Faul VEDECOM, France

Habib Shamskhov GoMentum Station Inc. , USA

Elizabeth Machek U.S. Department of Transportation, USA

Naohisa Hashimoto National Institute of Advanced Industrial Science and Technology, Japan

Yoshihiro Suda The University of Tokyo, Japan

Kazuki Takahashi YAMAHA Motor Co.,Ltd. , Japan

Alain Paul Dunoyer SBD, UK



Human Factors

Satoshi Kitazaki National Institute of Advanced Industrial Science and Technology, Japan

Daniel V. McGehee University of Iowa, USA

Brian H. Philips U.S. Department of Transportation, USA

C. Y. David Yang AAA Foundation, USA

Peter Burns Transport Canada, Canada

Panos Konstantopoulos SBD, UK

Natasha Merat University of Leeds, UK

Makoto Itoh University of Tsukuba, Japan

Toshihisa Sato National Institute of Advanced Industrial Science and Technology, Japan

Tatsuru Daimon Keio University, Japan



FOTs and Regional Activities



Dynamic Map



Connected Vehicles



Cyber Security



Impact Assessment



Next Generation Transport



Human Factors



Summary Session

Presentation materials are available at <http://en.SIP-adus.jp>

Automated Vehicle test rides were held provided by OEMs participating in the SIP-adus FOT



5th SIP-adus Workshop

Date: **November 13 – 15, 2018**

Venue: **Tokyo International Exchange Center**

