



Connected and Automated Driving Project in Japan “SIP-adus”

Takahiko Uchimura

SIP-adus International Cooperation Working Group

November 9, 2017



Contents

- ◆ SIP, SIP-adus
- ◆ Development Structure
- ◆ Government Structure
- ◆ Technologies for Automated Driving
- ◆ Development Focus Areas
- ◆ FOT from FY2017
- ◆ International Cooperation
- ◆ SIP-adus Workshop

◆ SIP

- Cross-Ministerial **S**trategic **I**nnovation Promotion **P**rogram

“SIP- adus”

- Mobility Bringing Everyone a Smile -

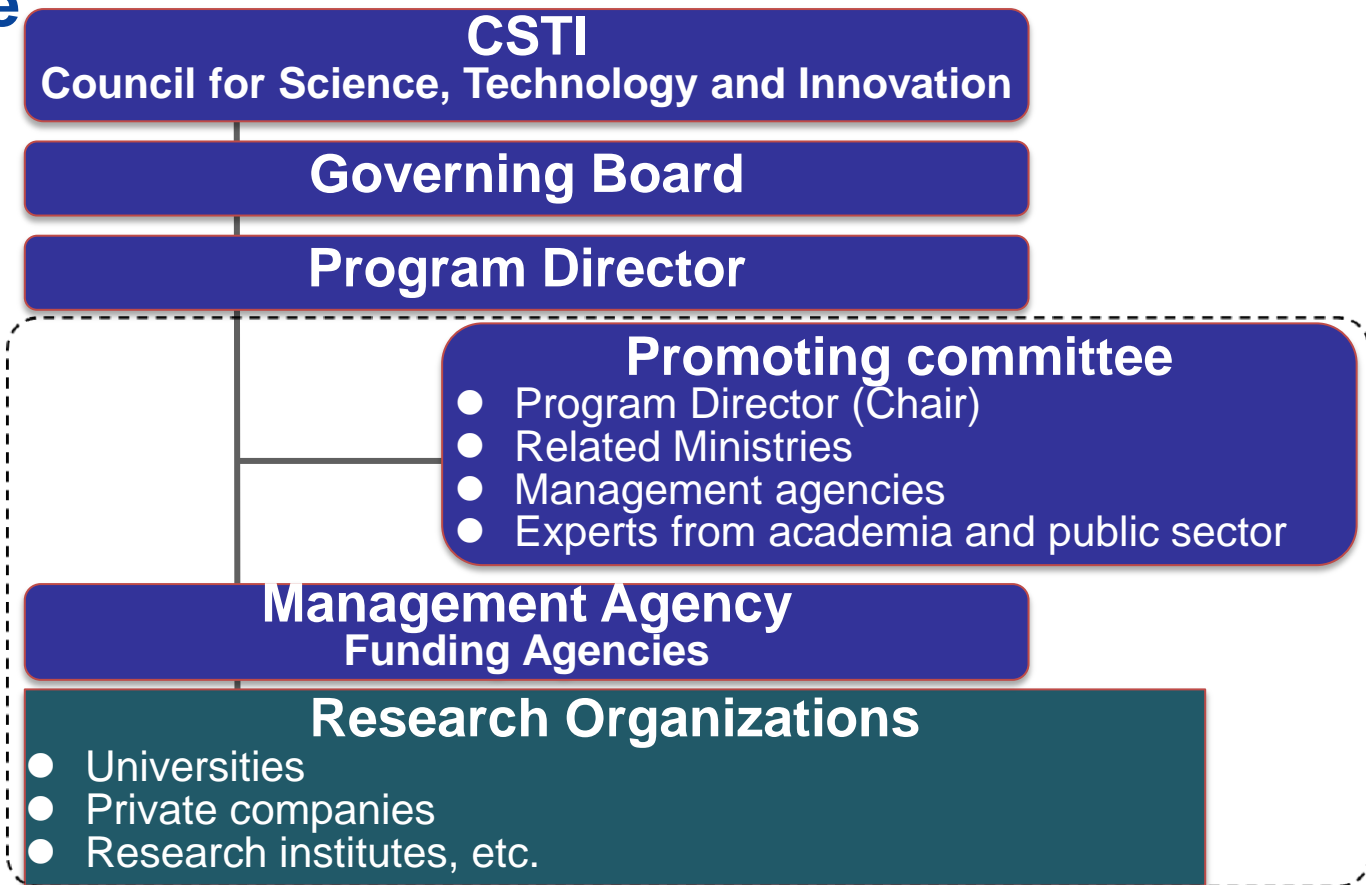
- Innovation of **A**utomated **D**riving for **U**niversal **S**ervices



SIP-adus

Innovation of Automated Driving for Universal Services

◆ SIP Structure



Cross-ministerial Strategic Innovation Promotion Program

11 Programs

◆ Three WGs under SIP-adus

Promoting Committee

Large Scale
FOT TF

System Implementation WG

- ◆ Technology development

Next Generation Urban Transportation WG

- ◆ Development and Deployment
of NGUT

International Cooperation WG

- ◆ Communication and Cooperation
- ◆ Social acceptance

Dynamic Map
Structuring TF

HMI TF

◆ Governments under SIP-adus Project

Cabinet Secretariat
IT Strategic Headquarters

Cabinet Office
Council for Science,
Technology and Innovation

**National Police
Agency
(NPA)**

Road Traffic Safety

**Ministry of Internal
Affairs and
Communications
(MIC)**

**Communication
Technology**

**Ministry of
Economy, Trade
and Industry
(METI)**

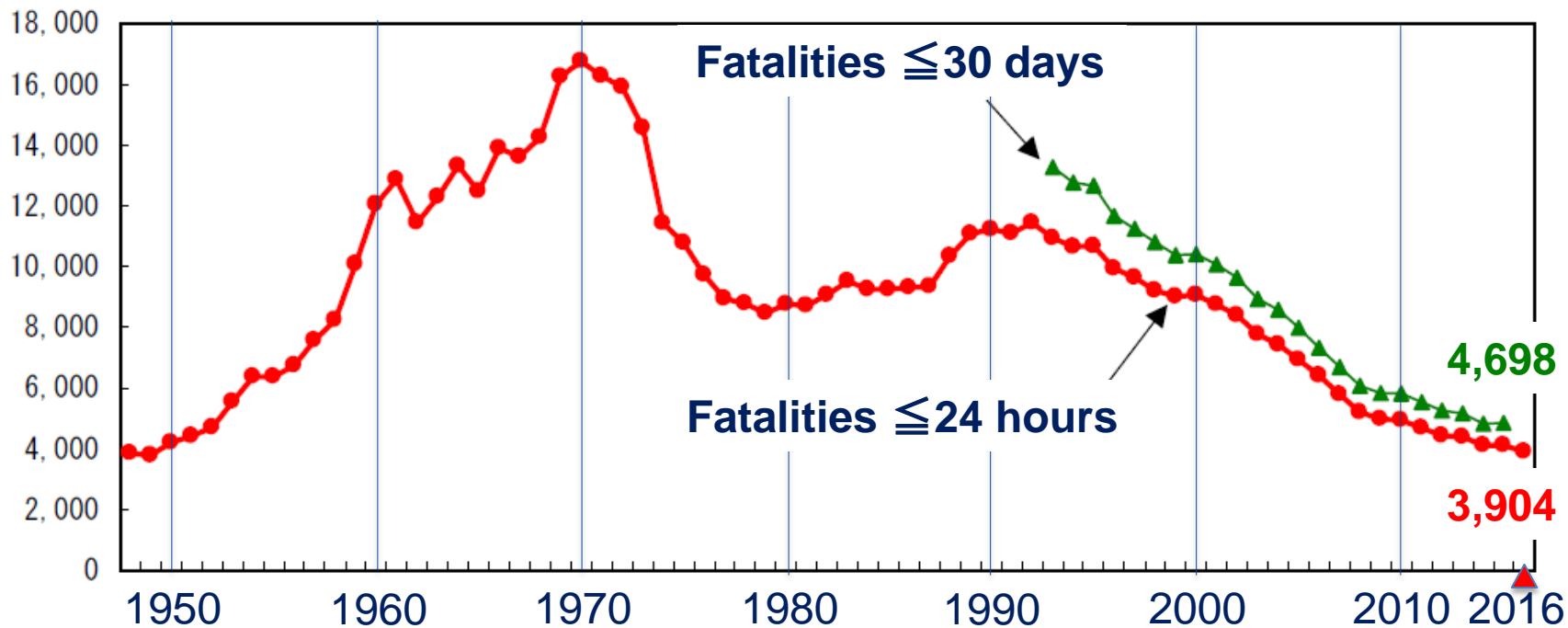
**Economy and
Industry**

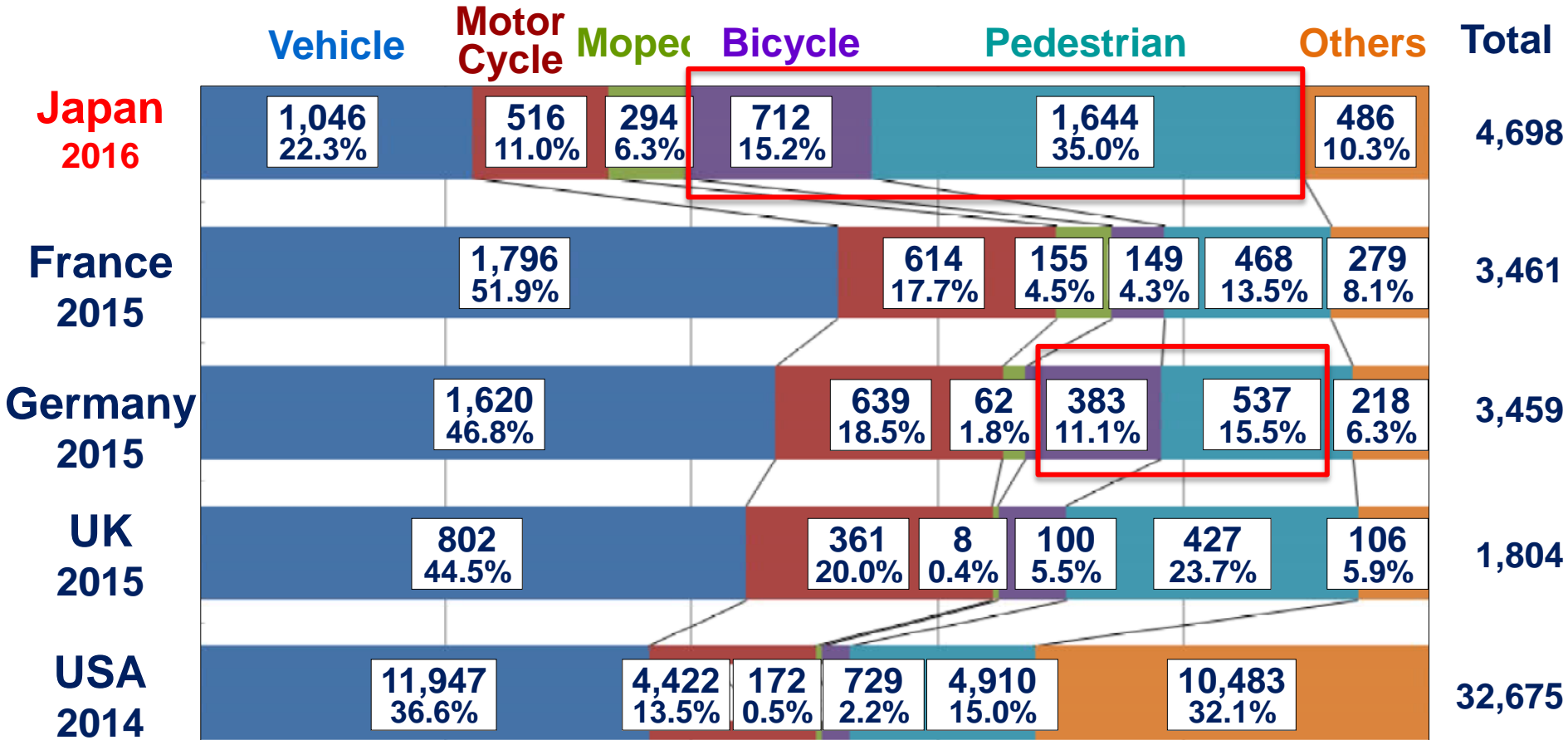
**Ministry of Land,
Infrastructure,
Transportation and
Tourism
(MLIT)**

**Road Bureau
Road and
Infrastructure**

**Road
Transport Bureau
Standards**

◆ Trends in Japan





1. Achieve National Objectives

- Traffic fatalities reduction

Traffic Fatalities in 2016: **3,904** (≤ 24 hours, **4,698** ≤ 30 days)

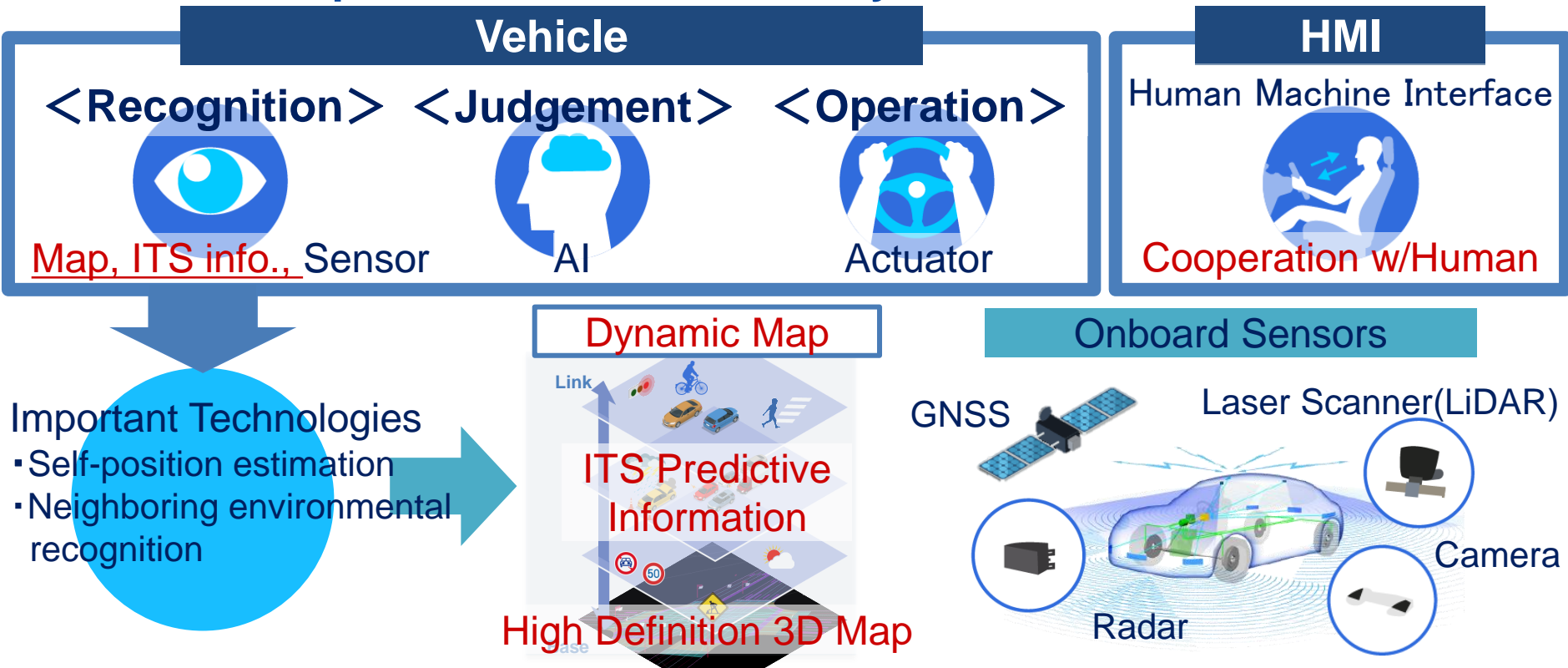
2. Implement and popularize Automated Driving Systems

- Technology development for Cooperative and Fundamental areas

3. Implement Next Generation Transport System

- Milestone at Tokyo Olympic and Paralympic Games

◆ R&D in Cooperative area with Industry, Academia and Government



Basic Tech. Security, Simulation, Database, etc.

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

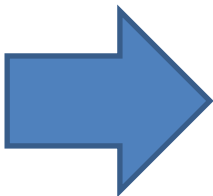
◆ 20 to 30 projects per year

Promoting Committee

System Implementation WG

Next Generation Urban Transportation WG

International Cooperation WG



■ Budget ¥100/\$

- FY 2014 : \$25 M
- FY 2015 : \$23 M
- FY 2016 : \$26 M
- FY 2017 : \$33 M

SIP-adus's Project (FY2015)	SIP-adus's Project (FY2016)
<p>Dynamic Map</p> <p>Activity Plan of Dynamic M</p> <p>Research for the advance</p> <p>Development of Vehicle-to</p>	<p>Dynamic Map</p> <p>Surveys and Investigationsfor Prototyping and Evaluation Toward Construction of a Dynamic Map PDF</p> <p>Surveying and investigation toward development of a common platform for dynamic maps PDF</p> <p>Construction of thetraffic regulation information management system for realization automated drive PDF</p>
<p>Connected Vehicle</p> <p>Research for advanced Tr</p> <p>Research for the advance</p> <p>Creation of an internatio</p> <p>Development of V2V,V2I C</p> <p>Development of Infrastruct</p> <p>Development and FOT of</p> <p>Next-Generation Intelligen</p>	<p>Investigation into the International Standardization of Dynamic Map and Overseas Trends PDF</p> <p>Survey on utilization of satellite positioning information for realization of automated driving system PDF</p> <p>Study and consideration to construct the "Dynamic Map Service Platform" PDF</p> <p>Connected Vehicle</p> <p>Establishmentof technology for providing traffic signal information towards the realization of automated driving PDF</p> <p>Establishment of technology for providing vehicle/pedestriandetection information towards the realization of automated driving PDF</p> <p>Creation of an internationally open research and development environment PDF</p> <p>Development of V2V,V2I Communication Technology Toward the Automated Driving Systems PDF</p> <p>Task II Development of Vehicle-to-pedestrian Communicatio+F1n Technology PDF</p> <p>Development of Infrastructure Radar System Technology PDF</p> <p>Next-Generation Intelligent Transport Systems (ITS) utilizing Information and Communication Technology (ICT) PDF</p>
<p>Human Factors</p> <p>Basic Research on Requir</p> <p>Research on Technical Re</p>	<p>Human Factors</p> <p>Human Factors and HMI Research for Automated Driving PDF</p>
<p>Impact Assessment</p> <p>Study on analytical metho</p> <p>order to achieve the gover</p> <p>Development and substan</p> <p>Development of Local Tra</p>	<p>Impact Assessment</p> <p>Study on analytical methodology to estimate the effect of automated driving technology on reduced number of traffic accident fatalities in order to achieve the government target PDF</p> <p>Development and substantiation of simulation technology for estimation of traffic accident reduction detailed effects. (Strategic Innovation Promotion Program:Automated driving system) PDF</p>

◆ Development to FOT

FY2014

FY2015

FY2016

FY2017

FY2018

- ◆ Development Structure
- ◆ R & D Themes

Promoting Committee

System Implementation WG

Next Generation Transport WG

International Cooperation WG

- ◆ Integrated into 5 major Topics

1. Dynamic Map



2. Cyber Security



3. HMI



4. Pedestrian Accident Reduction



5. Next Generation Transport



- ◆ Large Scale Field Operational Test



Enhance Research and Technology Development



Evaluate from various viewpoints



Evaluate practical use



International cooperation and harmonization

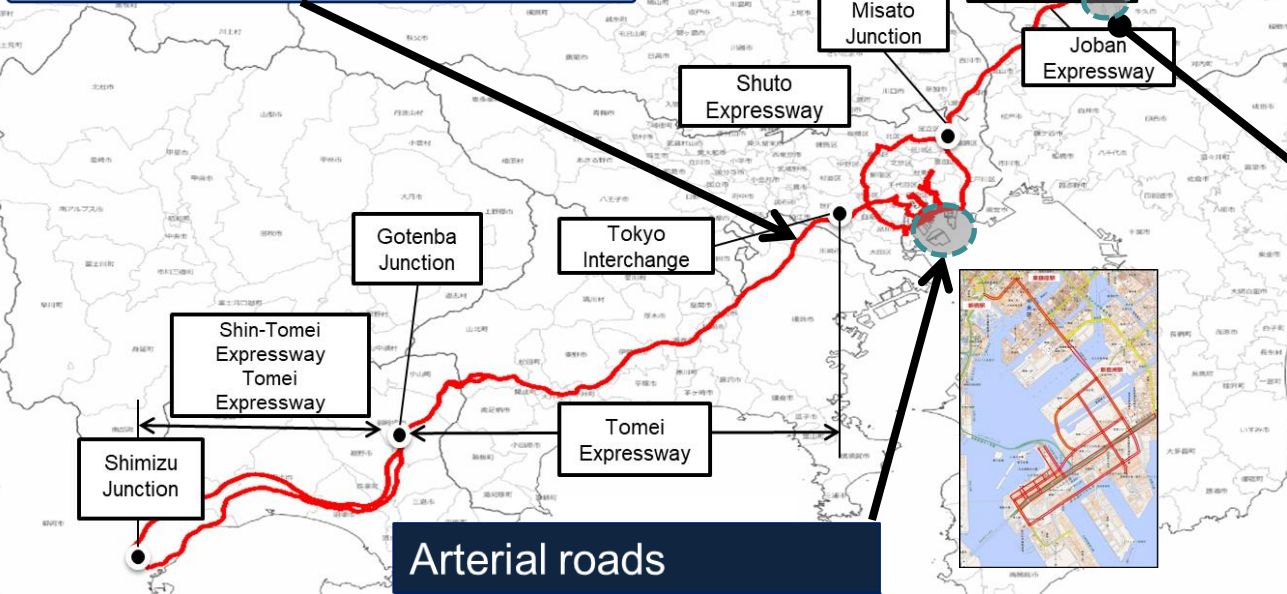


Social acceptability

Deployment

◆ Test Sites

Expressway
 Tomei, Shin Tomei, Joban,
 Tokyo Metropolitan Expressway
 Total length: approximately 300km

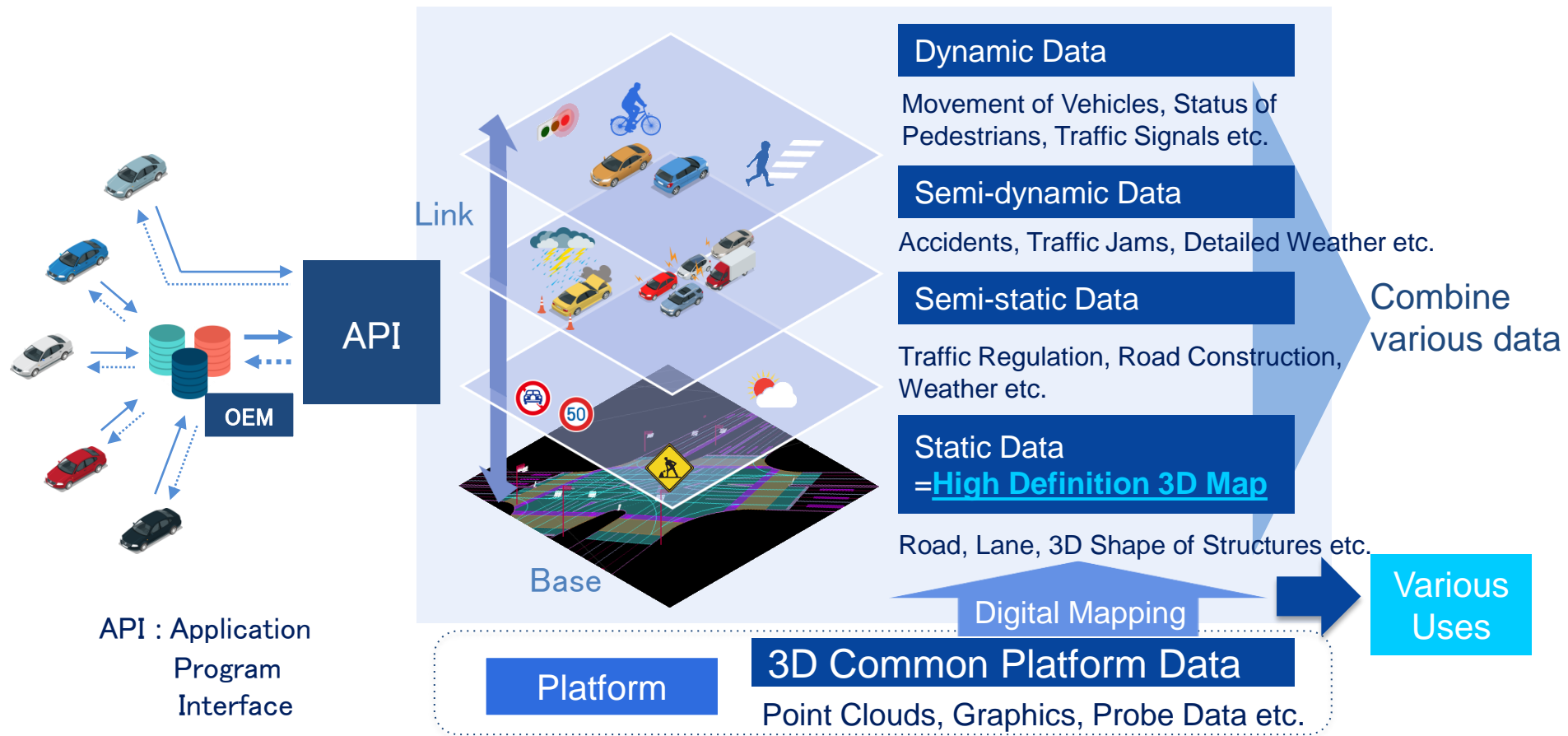


Arterial roads
 Tokyo waterfront city area

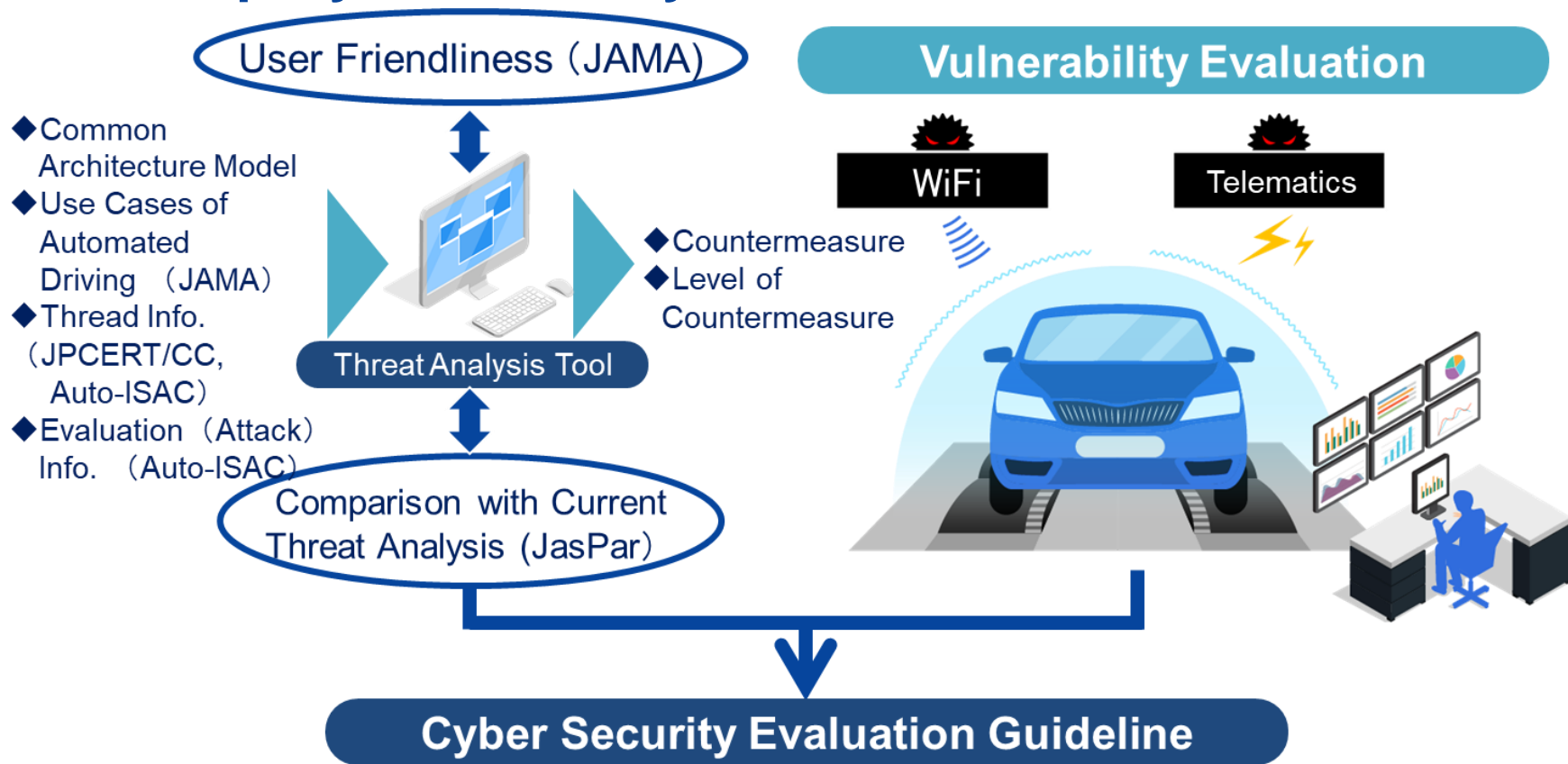


Test facility : Jtown
 JARI* Test course
 New test facility for ADS
 (April 17, 2017 open)

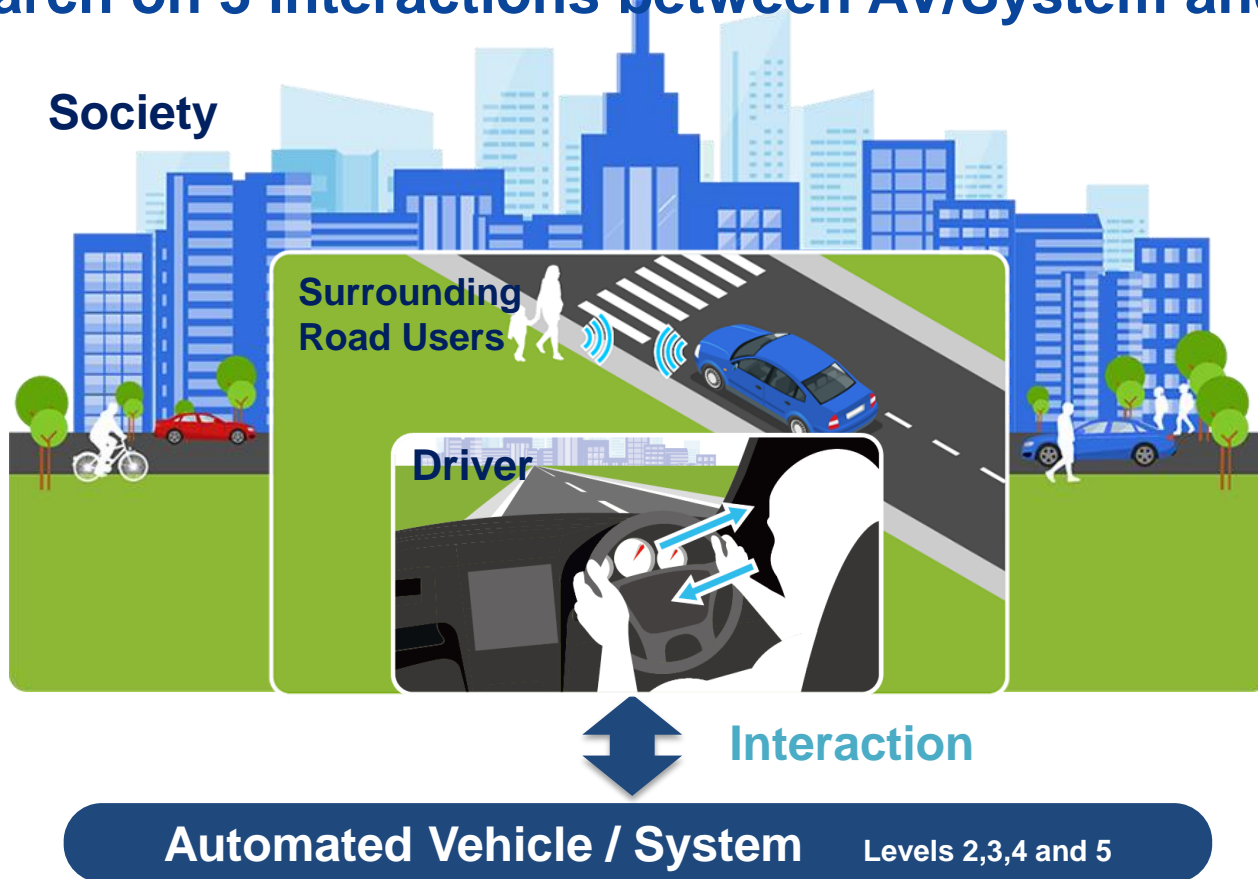
(*JARI : Japan Automotive Research Institute)



◆ Develop Cyber Security Evaluation Guideline



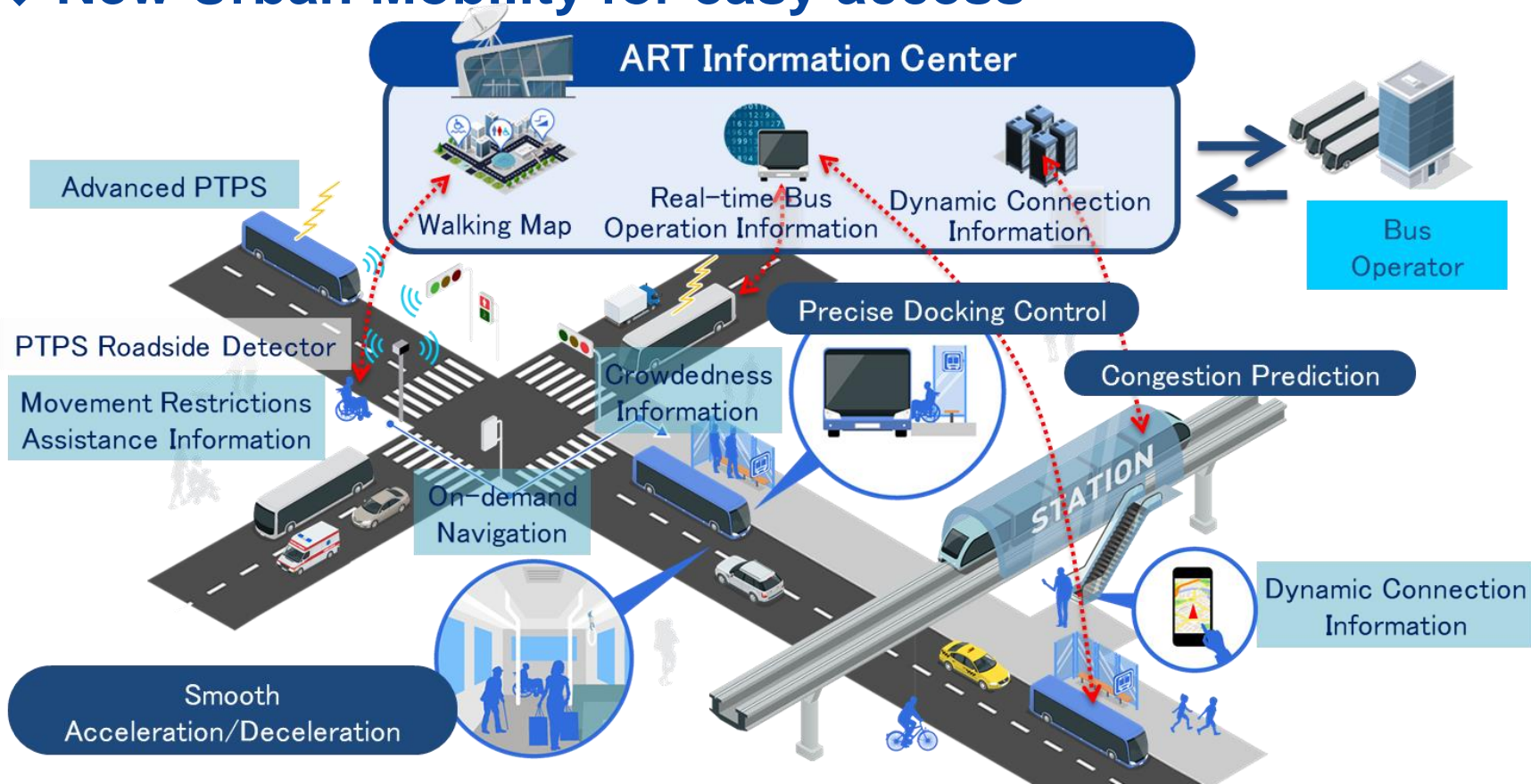
◆ Research on 3 interactions between AV/System and Human



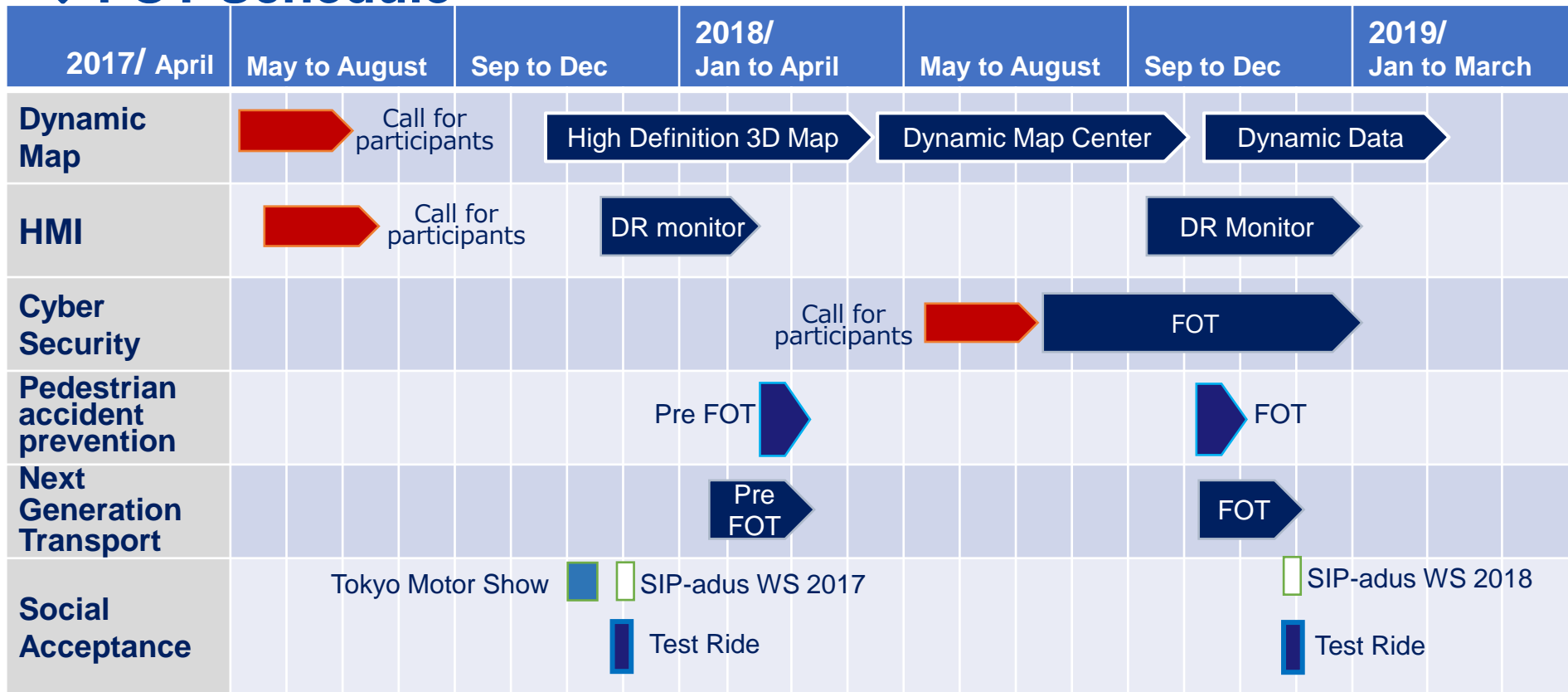
◆ Mitigate Pedestrian Accidents using ITS Technologies



◆ New Urban Mobility for easy access



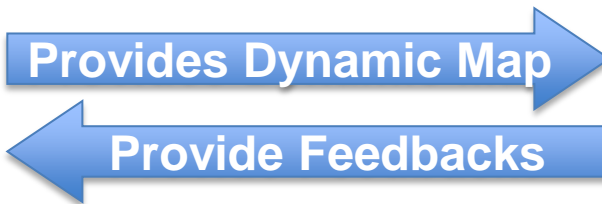
◆ FOT Schedule



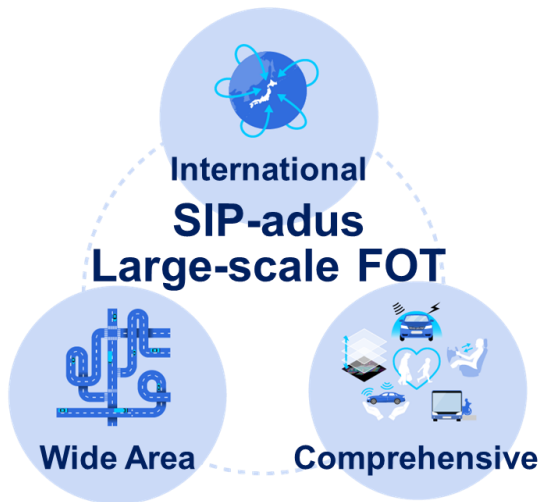
◆ Dynamic Map Evaluation



SIP-adus Dynamic Map



Prepare own test vehicles



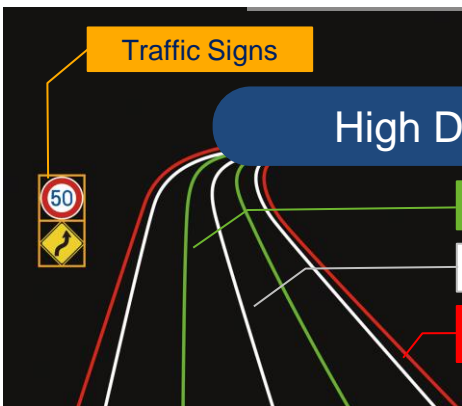
Participants

◆ Data specification, Accuracy, Vehicle Position Detection



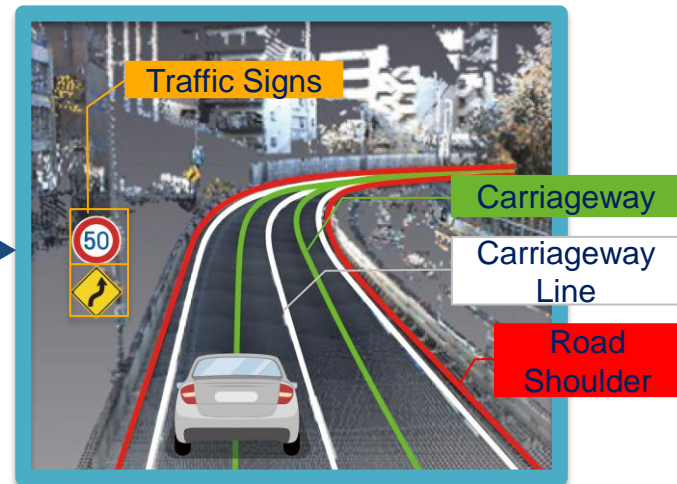
Sensed Data

Compare to estimate the position



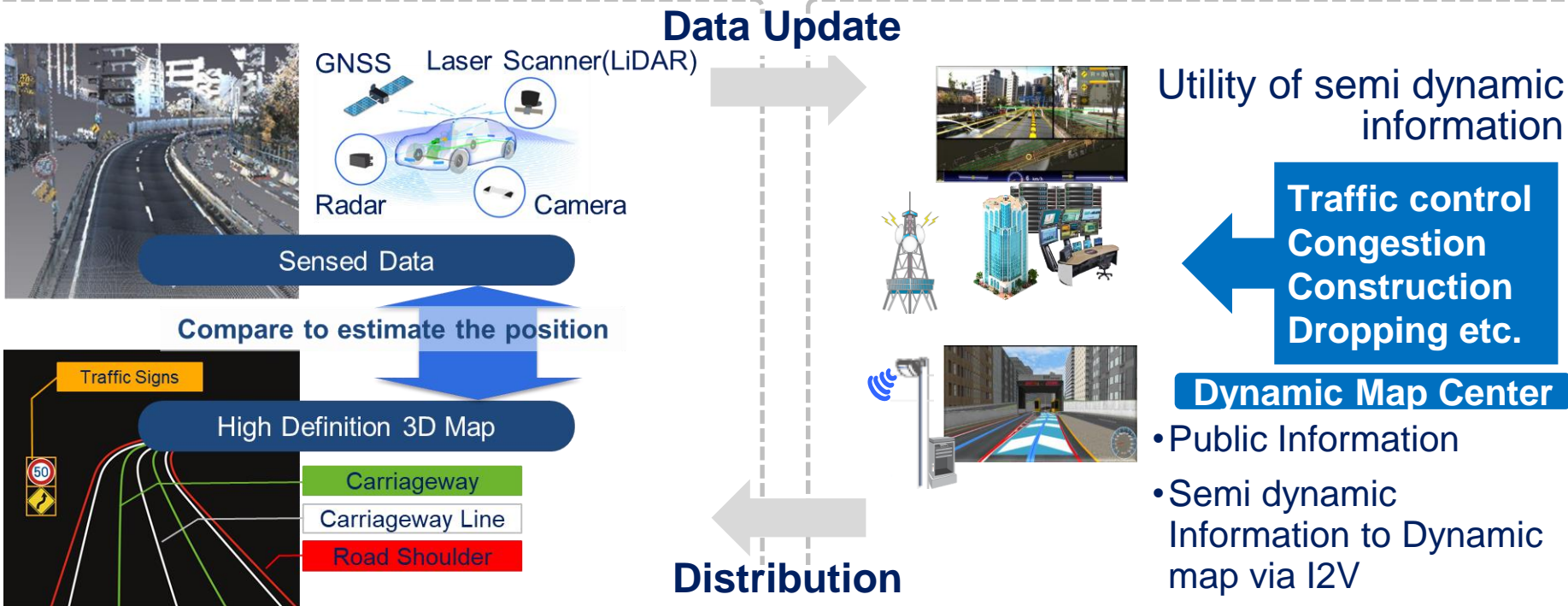
High Definition 3D Map

- Carriageway
- Carriageway Line
- Road Shoulder



Estimate the position of the vehicle

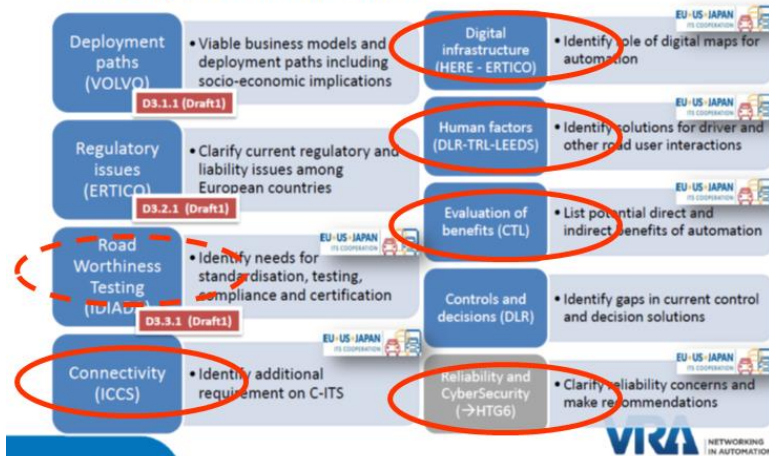
- ◆ Data collection and distribution method
- ◆ Utility of semi dynamic information



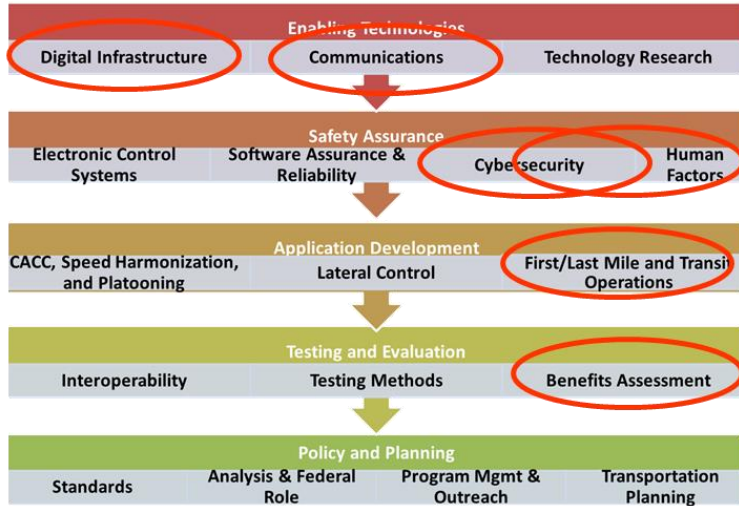
◆ Selected based on EU and US research agenda

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

Sub-WGs of the iMF Automation WG with support from VRA



Source : VRA



Source : USDOT

5 major Topics

1. Dynamic Map
2. Cyber Security
3. HMI
4. Pedestrian Accident Reduction
5. Next Generation Transport

6 Focus areas

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

◆ Experts assigned in Focus areas

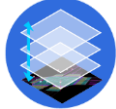
Promoting Committee

System Implementation WG

Next Generation Urban Transportation WG

International Cooperation WG

1. Dynamic Map



2. Security



3. Human Factors



4. Next Generation Transport



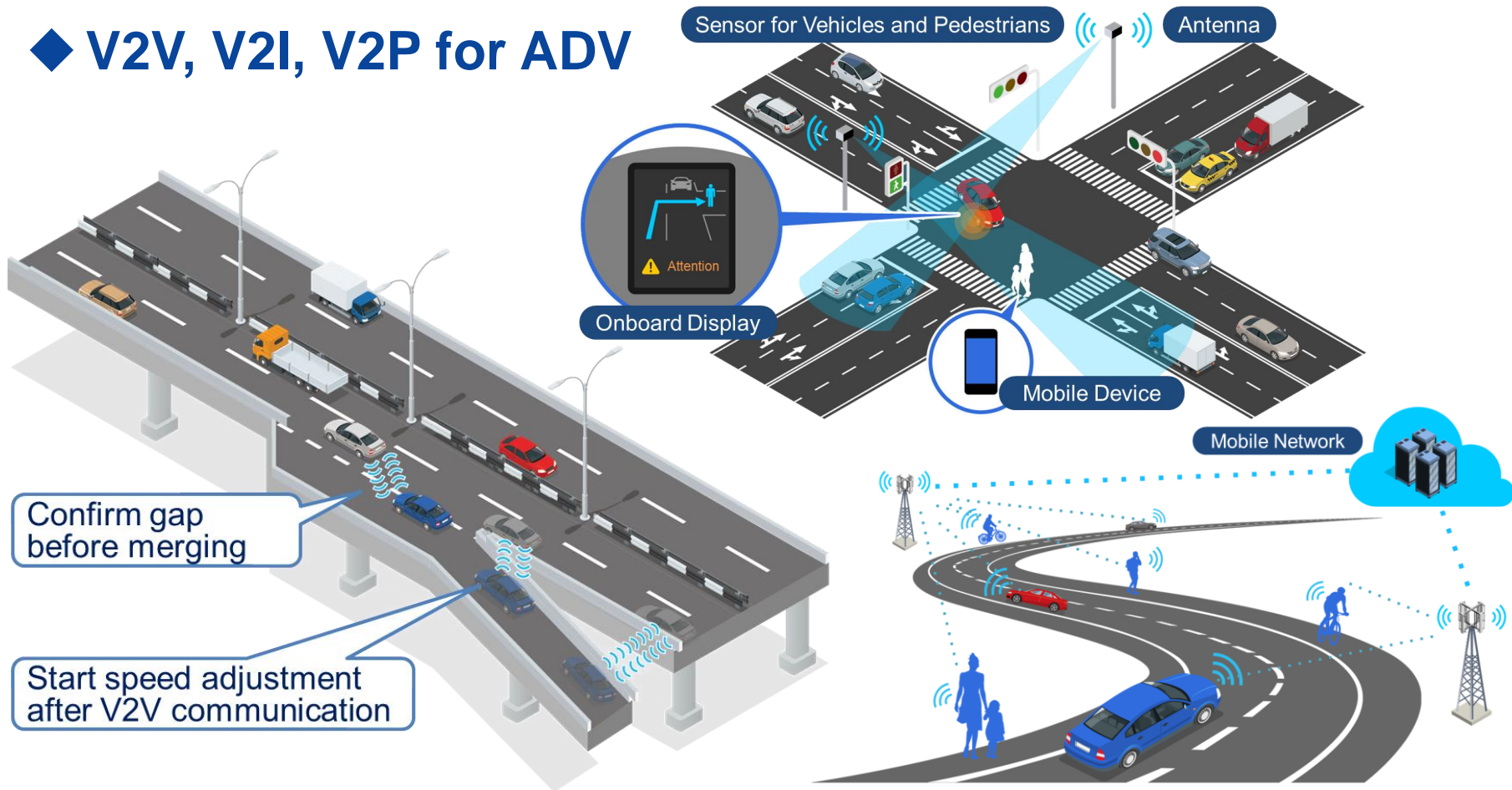
5. Connected Vehicles



6. Impact Assessment



◆ V2V, V2I, V2P for ADV



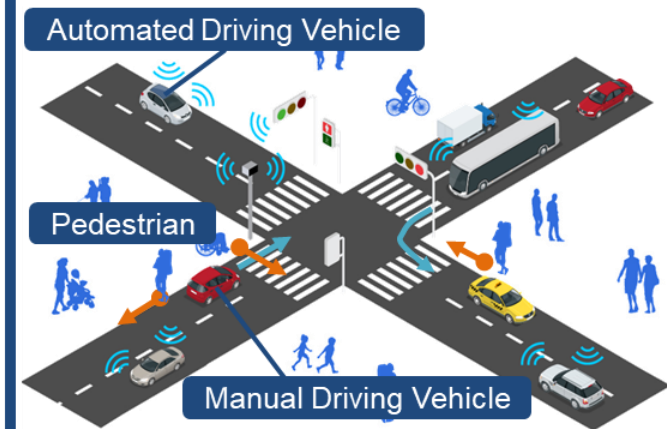
◆ Quantitative Analysis of Accident Reduction

Real Traffic Flow Simulation

Traffic Accident Analysis

Effect Prediction

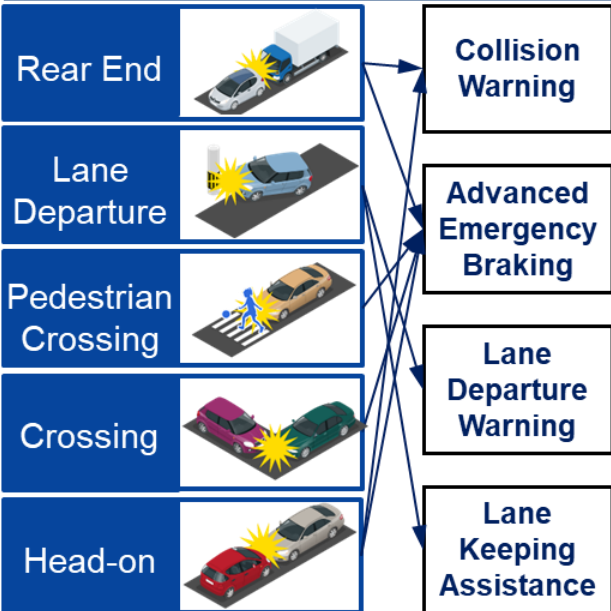
Traffic accidents reduction simulation "Multi Agents"



[Simulation Parameters]

- Levels of Automation
- Diffusion of Automated Driving Vehicle
- Error Action(driver/pedestrian)
- Traffic Flow Density
- Number of Pedestrian etc.

Five major scenarios



Simulation result

Contributions by ADVs

Accident Reduction

- Number of
- Fatality
 - Severe Injury
 - Slight Injury
 - Near-Accident
 - Traffic Jam due to Accident
 - etc.

◆ Workshop on Connected and Automated Driving System



<http://www.sip-adus.jp/evt/workshop2017/>

- ◆ Specialized International Conference on AD
- ◆ Sharing latest information, building friendship
 - Attendees : 425 from 17 countries
 - Speakers : Total 61, 34 speakers and moderators from overseas

Topics

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



Speakers from overseas and
Minister Tsuruho



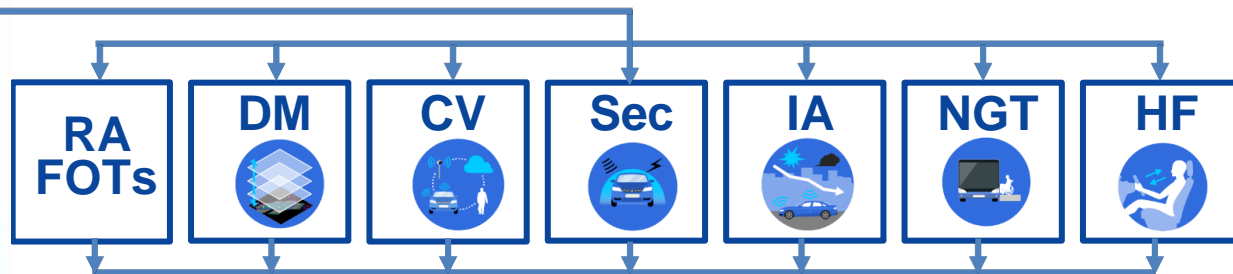
◆ Plenary Sessions and Workshop

	Tuesday November 14	Wednesday November 15	Thursday November 16 (Breakout Workshop)
AM	9:00 ~ 10:00 Opening Session	9:00 ~ 10:30 SIP-adus Report Session	9:00 ~ 12:00 Breakout Workshop
	10:00 ~ 12:40 Regional Activities and FOTs RA FOTs	10:45 ~ 12:30 Impact Assessment IA	
	Poster Session		
PM	13:40 ~ 14:50 DM Dynamic Map	13:30 ~ 15:15 NGT Next Generation Transport	13:00 ~ 15:00 Breakout Workshop
	15:00 ~ 16:40 CV Connected Vehicles		
	16:55 ~ 18:45 Sec Security	15:30 ~ 18:00 HF Human Factors	15:30 ~ 17:15 Breakout Workshop Summary
	Preparatory Meeting for Breakout Workshop		17:15 ~ 17:45 Closing Session

◆ Breakout Workshop

Thursday November 16 (Breakout Workshop)	
AM	9:00 ~ 12:00 Breakout Workshop
	13:00 ~ 15:00 Breakout Workshop
PM	15:30 ~ 17:15 Breakout Workshop Summary
	17:15 ~ 17:45 Closing Session

Seven Breakout Workshops simultaneously



All Breakout Workshop attendees



Breakout Workshop Summary

◆ Opening Session

◆ Regional Activities and FOTs

 Dynamic Map

 Connected Vehicles

 Security

◆ SIP-adus Report Session

 Impact Assessment

 Next Generation Transport

 Human Factors



◆ Operational Session

Speakers from Germany

◆ Research and FOTs



◆ Dynamic Lane

◆ Connected Vehicles

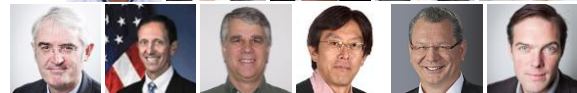
◆ Security

◆ SIP-adus Report Session



◆ New Transportation

◆ Human Factors



◆ Regional Activities and FOTs

- Status of each region
- FOT in each region
- Issues of FOTs
- International Cooperation
- Guidance, Guidelines, Policies, Regulations, Harmonization, Standard, Ethics, etc.



Moderator



Sweden



VW/Pegasus/Germany



Renault/France



Aurora/Finland



Australia



Platooning/Netherlands



Tokyo 2020

◆ Discussions have initiated



◆ Development Structure
◆ R & D Themes

Promoting Committee

System Implementation WG

Next Generation Transport WG

International Cooperation WG

◆ Integrated into five major Topics

1. Dynamic Map



2. Cyber Security



3. HMI



4. Pedestrian Accident Reduction



5. Next Generation Transport



◆ Large Scale Field Operational Test



Enhance Research and Technology Development



Evaluate from various viewpoints



Evaluate practical use



International cooperation and harmonization



Social acceptability



**POST
SIP-adus**



**Thank you
See you in Tokyo**

