SIP-adus Update

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SIP-adus International Cooperation Working Group

October 29, 2017

SIP

Cabinet Office

Contents

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

◆ SIP Structure

11 Programs

CSTI
Council for Science, Technology and Innovation

Governing Board

Program Director

Promoting committee
- Program Director (Chair)
- Related Ministries
- Management agencies
- Experts from academia and public sector

Management Agency
Funding Agencies

Research Organizations
- Universities
- Private companies
- Research institutes, etc.

◆ SIP

- Cross-Ministerial Strategic Innovation Promotion Program

“SIP- adus”

- Mobility Bringing Everyone a Smile -

- Innovation of Automated Driving for Universal Services

SIP-adus
Innovation of Automated Driving for Universal Services

Development Structure

◆Three WGs under SIP-adus

Promoting Committee

System Implementation WG

◆Technology development

Next Generation Urban Transportation WG

◆Development and Deployment of NGUT

International Cooperation WG

◆Communication and Cooperation

◆Social acceptance

Large Scale FOT TF

Dynamic Map Structuring TF

HMI TF

Government Structure

◆ 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

Technologies for Automated Driving Systems

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

Vehicle

＜Recognition＞ ＜Judgement＞ ＜Operation＞

Map, ITS info., Sensor　AI　Actuator

HMI

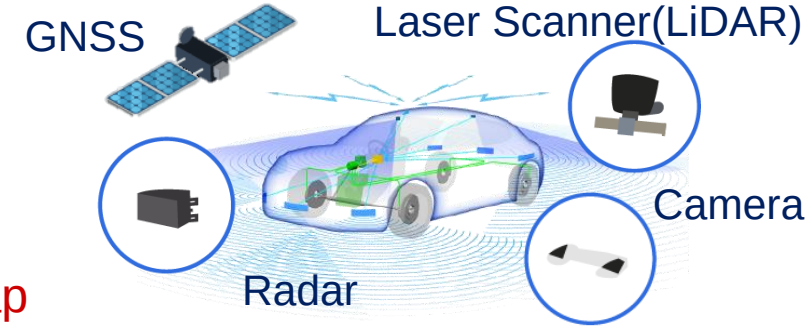
Human Machine Interface

Cooperation w/Human

Important Technologies
- Self-position estimation
- Neighboring environmental recognition

Dynamic Map

Onboard Sensors



Basic Tech. Security, Simulation, Database, etc.

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

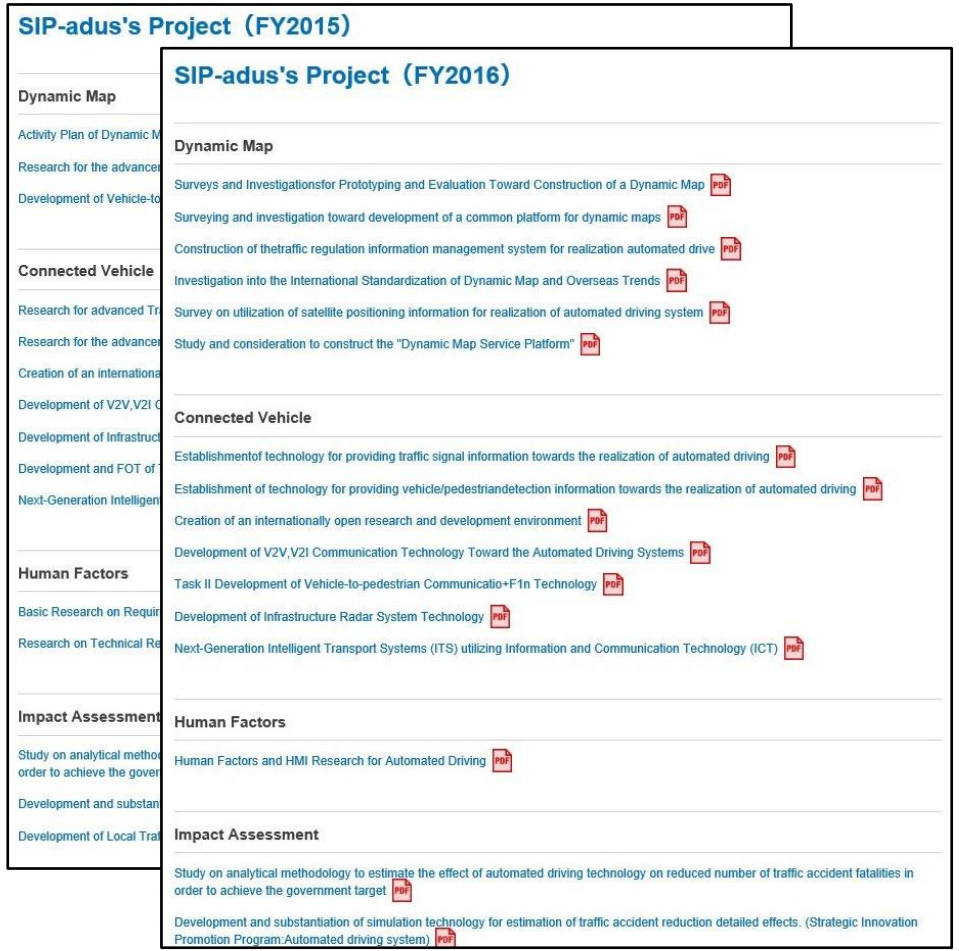
Development Activities

◆ 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）

Dynamic Map

Activity Plan of Dynamic M
Research for the advance
Development of Vehicle-to

Connected Vehicle

Research for advanced Tr
Research for the advance
Creation of an internationa
Development of V2V,V2I C
Development of Infrastruct
Development and FOT of
Next-Generation Intelligen

Human Factors

Basic Research on Requir
Research on Technical Re

Impact Assessment

Study on analytical metho
order to achieve the gover
Development and substan
Development of Local Trat

SIP-adus's Project（FY2016）

Dynamic Map

Surveys and Investigationsfor Prototyping and Evaluation Toward Construction of a Dynamic Map
Surveying and investigation toward development of a common platform for dynamic maps
Construction of thetraffic regulation information management system for realization automated drive
Investigation into the International Standardization of Dynamic Map and Overseas Trends
Survey on utilization of satellite positioning information for realization of automated driving system
Study and consideration to construct the "Dynamic Map Service Platform"

Connected Vehicle

Establishmentof technology for providing traffic signal information towards the realization of automated driving
Establishment of technology for providing vehicle/pedestriandetection information towards the realization of automated driving
Creation of an internationally open research and development environment
Development of V2V,V2I Communication Technology Toward the Automated Driving Systems
Task II Development of Vehicle-to-pedestrian Communicatio+F1n Technology
Development of Infrastructure Radar System Technology
Next-Generation Intelligent Transport Systems (ITS) utilizing Information and Communication Technology (ICT)

Human Factors

Human Factors and HMI Research for Automated Driving

Impact Assessment

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
Development and substantiation of simulation technology for estimation of traffic accident reduction detailed effects. (Strategic Innovation Promotion Program:Automated driving system)

Schedule

◆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 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

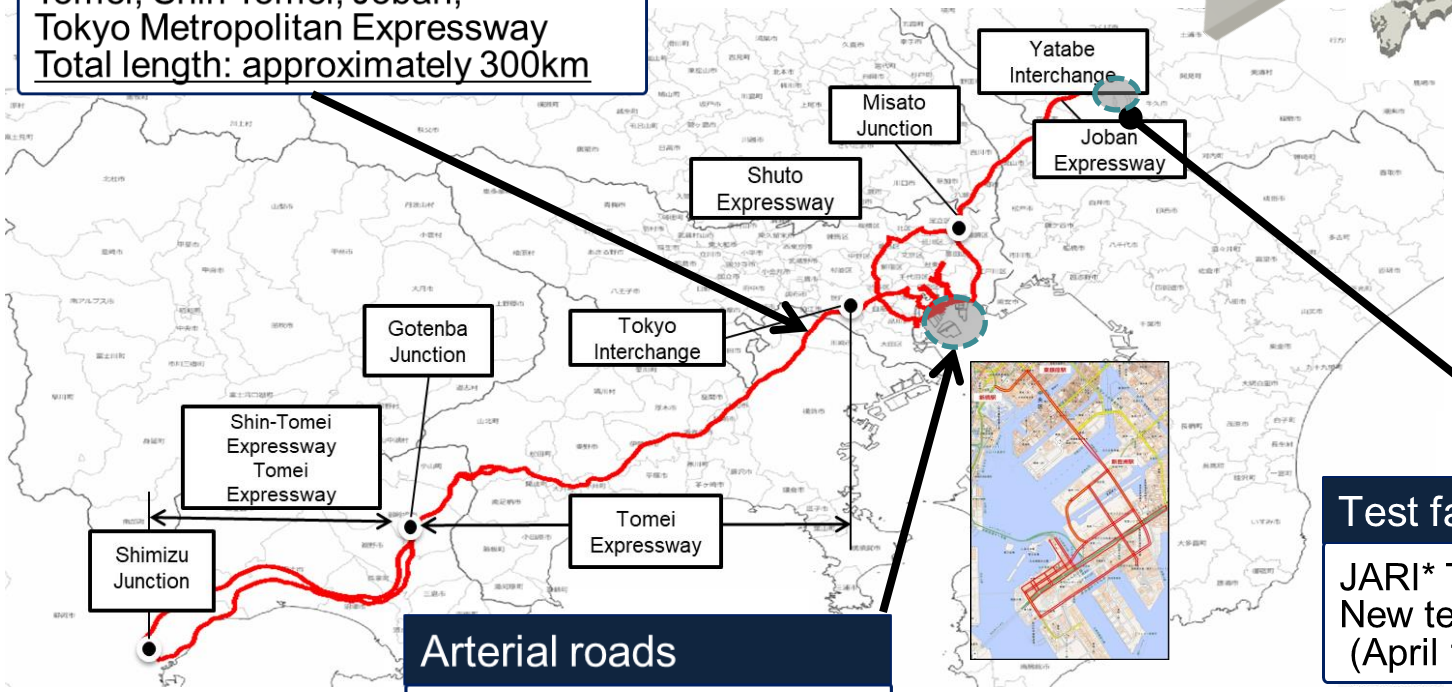
Deployment

Field Operational Tests (FOT)

◆ Test Sites

Expressway

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



Arterial roads

Tokyo waterfront city area

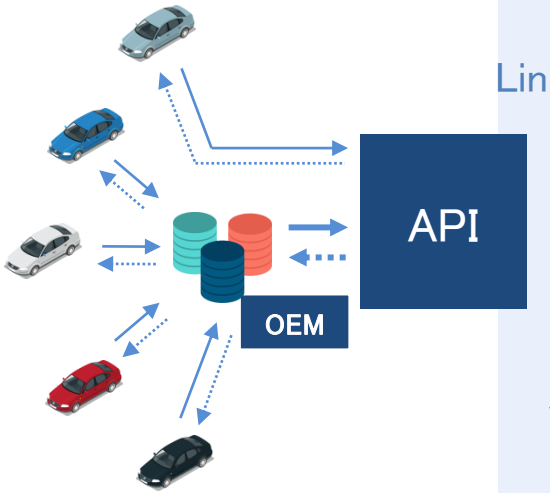
Test facility : Jtown

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

(*JARI : Japan Automotive Research Institute)

Dynamic Map

◆ Map for ADV



API

API : Application Program Interface

Dynamic Data

Movement of Vehicles, Status of Pedestrians, Traffic Signals etc.

Semi-dynamic Data

Accidents, Traffic Jams, Detailed Weather etc.

Semi-static Data

Traffic Regulation, Road Construction, Weather etc.

Static Data
=High Definition 3D Map

Road, Lane, 3D Shape of Structures etc.

Combine various data

Digital Mapping

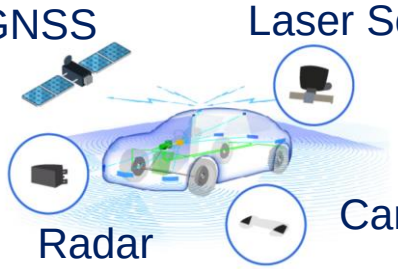
Various Uses

Platform

3D Common Platform Data

Point Clouds, Graphics, Probe Data etc.

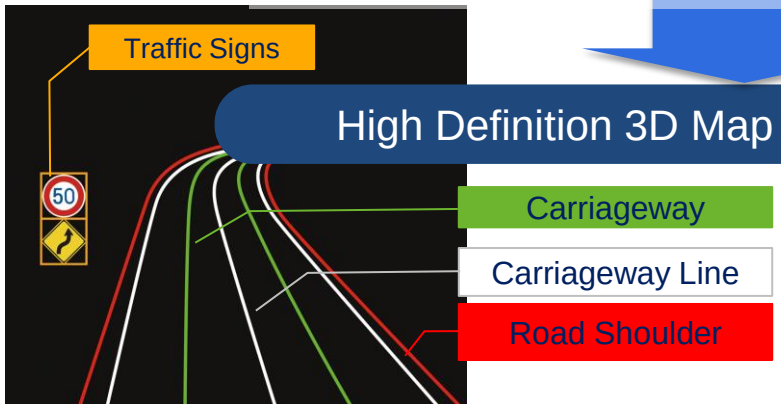
◆ Vehicle Position Detection

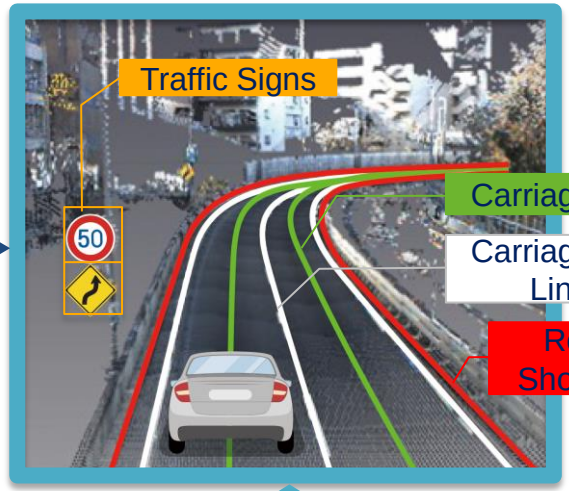


Sensed Data

Compare to estimate the position

High Definition 3D Map





Estimate the position of the vehicle

◆Develop Cyber Security Evaluation Guideline

User Friendliness（JAMA）

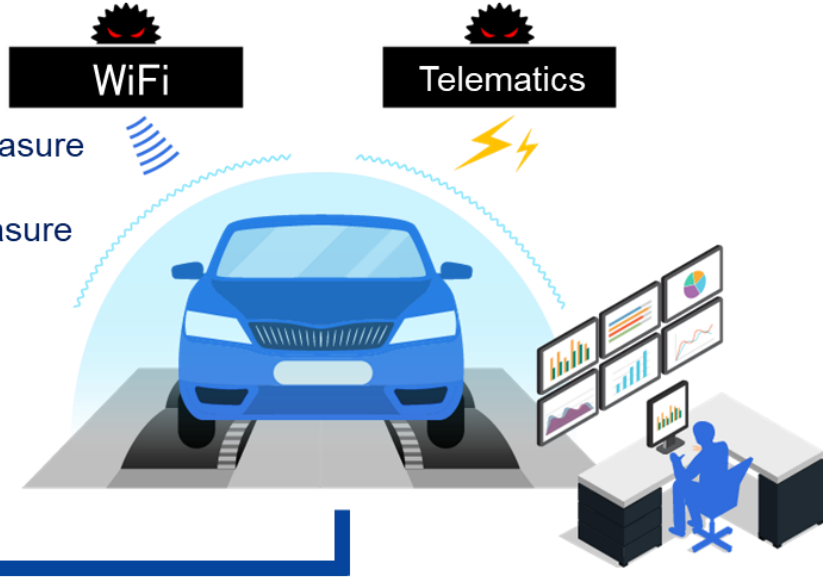
◆Common Architecture Model
◆Use Cases of Automated Driving （JAMA）
◆Thread Info.（JPCERT/CC, Auto-ISAC）
◆Evaluation（Attack）Info. （Auto-ISAC）

Threat Analysis Tool

◆Countermeasure
◆Level of Countermeasure

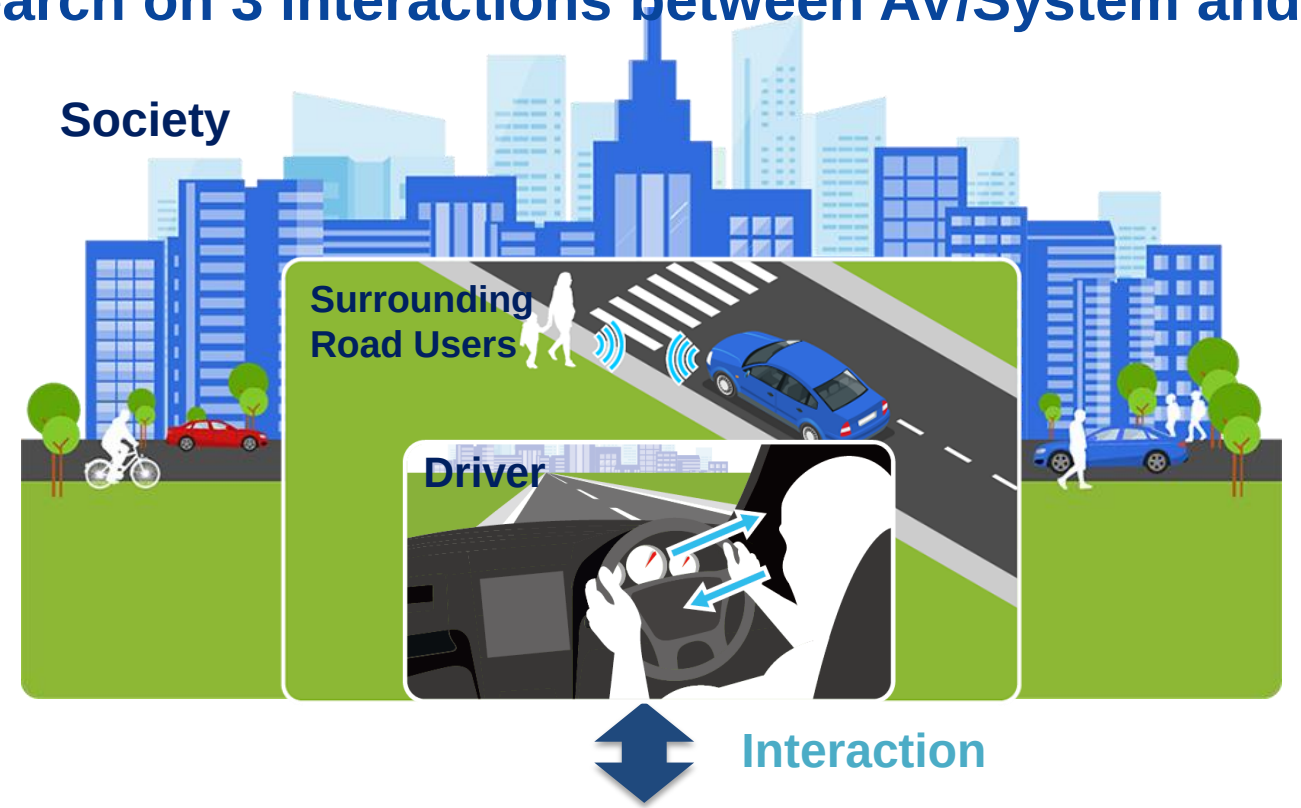
Comparison with Current Threat Analysis (JasPar)

Vulnerability Evaluation



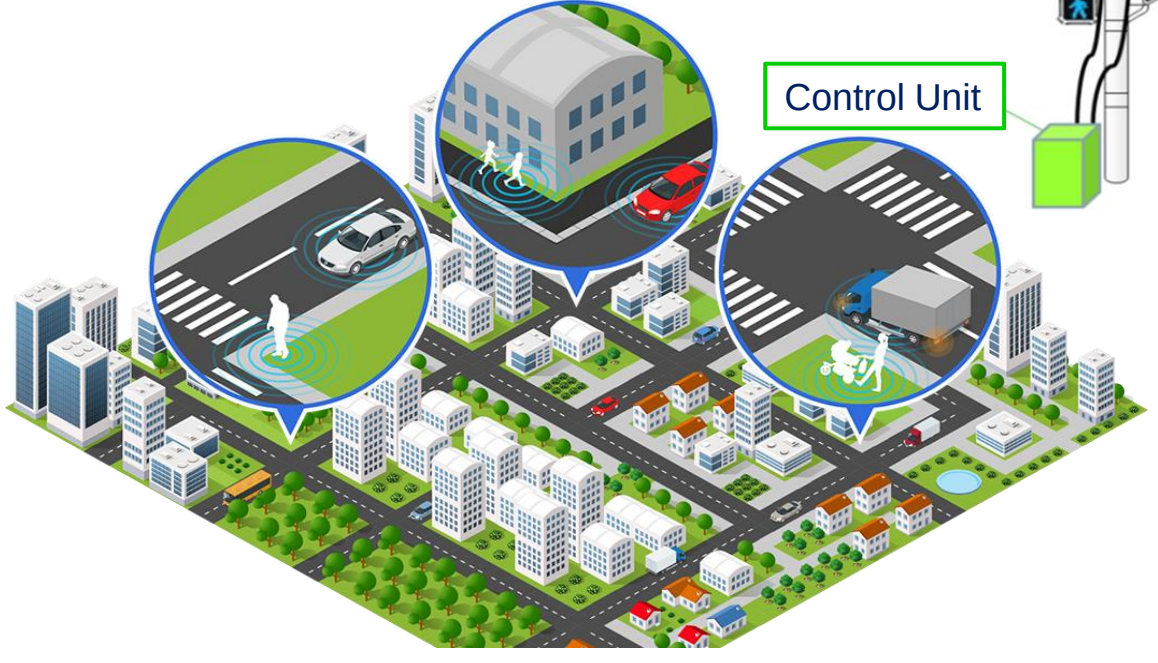
Cyber Security Evaluation Guideline

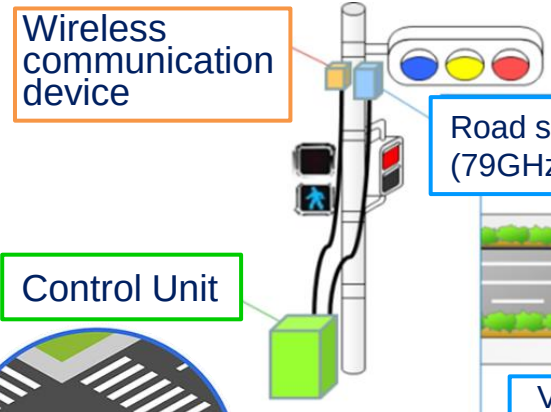
◆ Research on 3 interactions between AV/System and Human

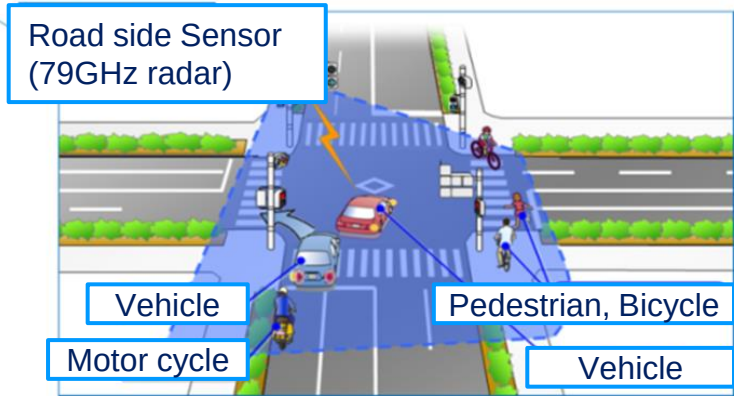


◆ Mitigate Pedestrian Accidents using ITS Technologies

V2P with mobile device

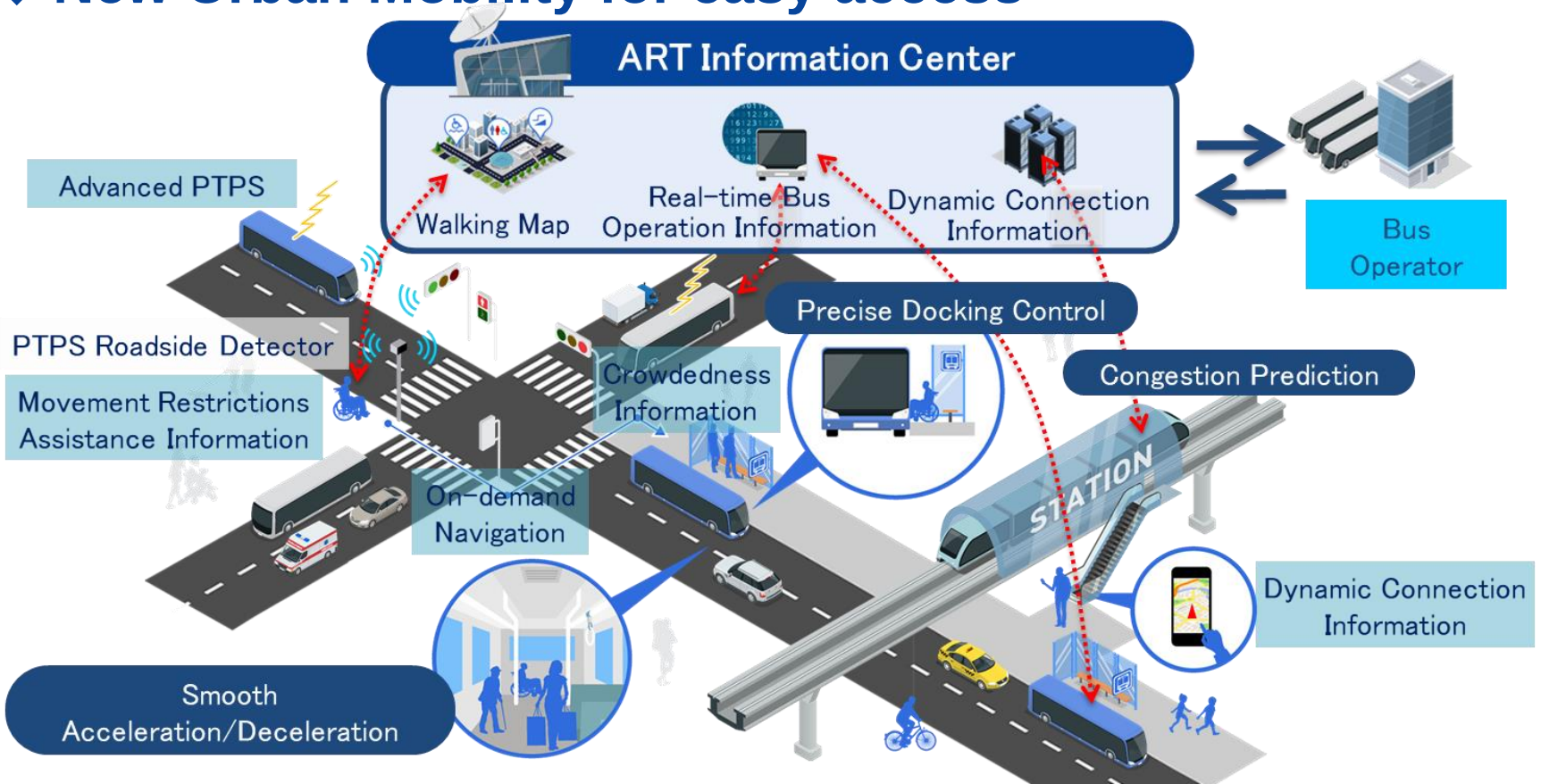




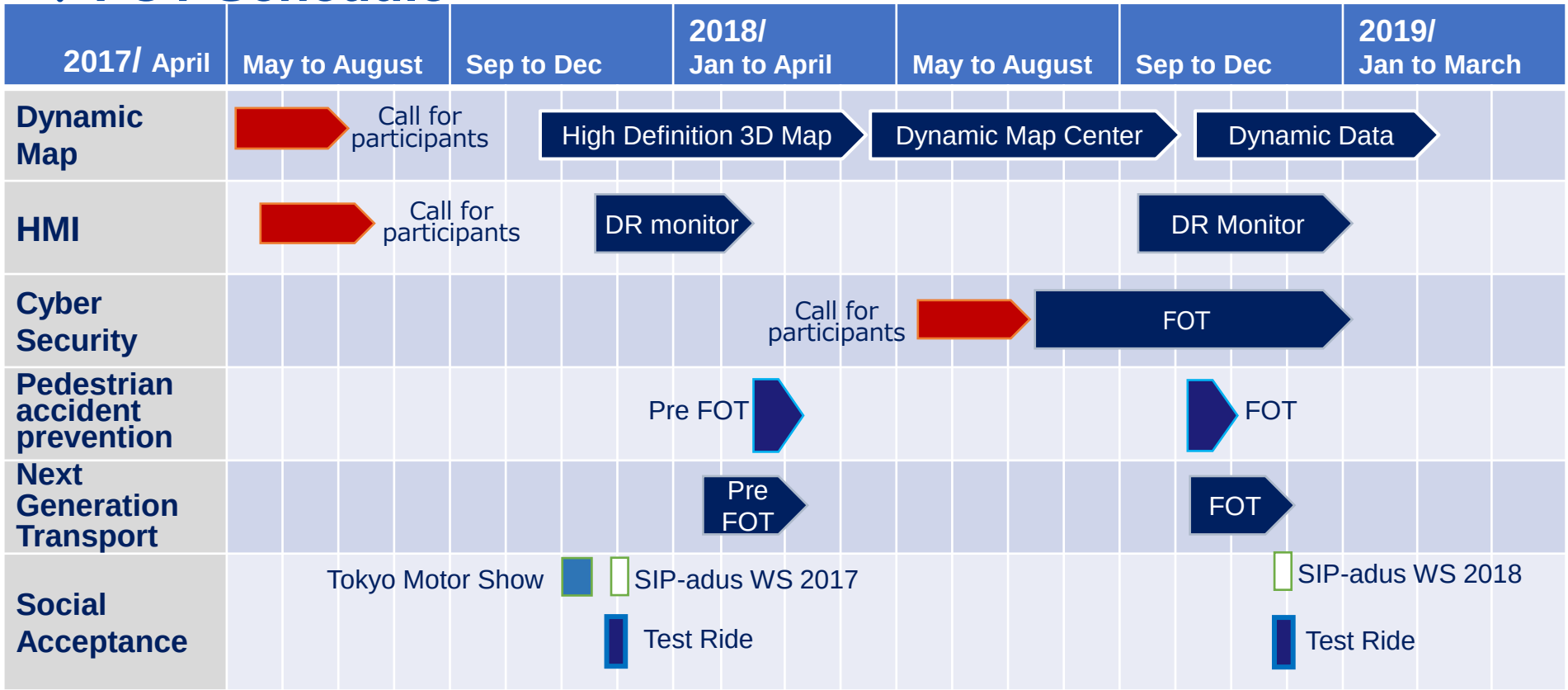


79GHz radar

◆ New Urban Mobility for easy access

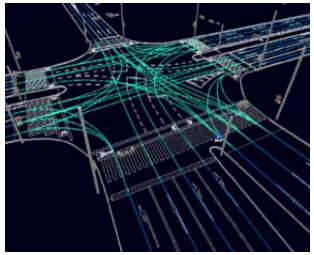


◆ FOT Schedule



◆ Dynamic Map Evaluation

- Validate 3D high-resolution digital map data
- Validate data collection and distribution method
- Verify the utility of semi dynamic information



•Map data Specification
•Accuracy

GNSS

Lidar

Camera

Millimeter wave Radar

Data Update
Distribution

Utility of semi dynamic information

Traffic control
Congestion
Construction
Dropping etc.

Dynamic Map Center

•Public Information
•Semi dynamic Information to Dynamic map via I2V

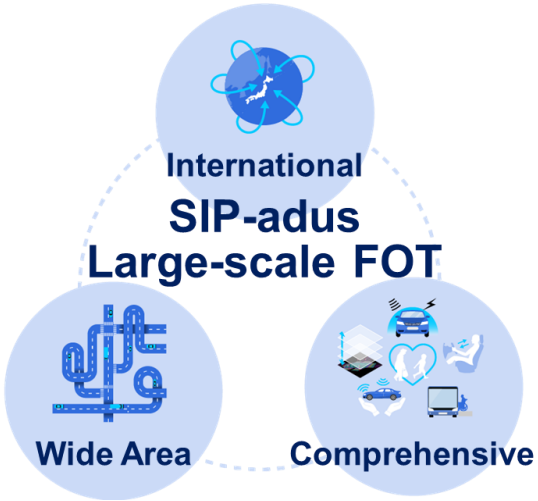
◆ Dynamic Map Evaluation

SIP-adus Dynamic Map

Provides Dynamic Map

Provide Feedbacks

Prepare own test vehicles



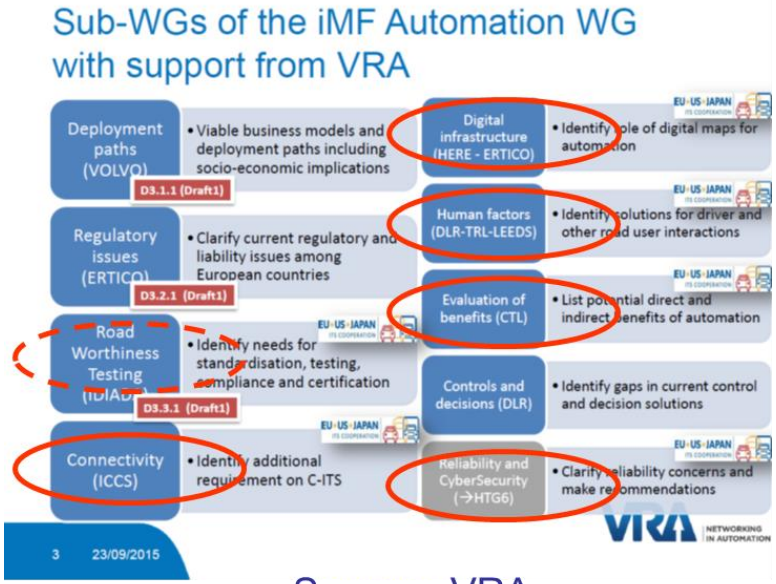
Participants

ALPINE Driving Mobile Media innovation
BMW MINI
BOSCH Invented for life
Calsonic Kansei
Continental
DAIHATSU
HONDA The Power of Dreams
mazda
MLT MEIJI LogiTech
MITSUBISHI ELECTRIC
名古屋大学 Nagoya University
NISSAN MOTOR CORPORATION
OMRON
Pioneer
埼玉工業大学 Saitama Institute of Technology
SUZUKI
SUBARU
TOYOTA
VOLKSWAGEN AKTIENGESELLSCHAFT
ZMP

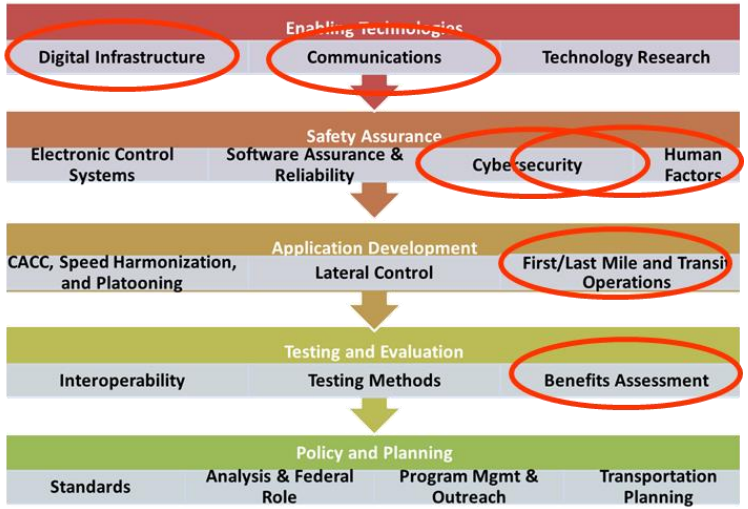
Focused areas for International Cooperation

◆ Selected based on EU and US research agenda

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



Source : VRA



Source : USDOT

International Cooperation activities

◆ Experts assigned in Focus areas

- Promoting Committee
  - System Implementation WG
  - Next Generation Urban Transportation WG
  - International Cooperation WG

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

European Commission

ACEA European Automobile Manufacturers Association

ISO International Organization for Standardization

Transportation.gov U.S. Department of Transportation

EU★US★JAPAN ITS COOPERATION

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES
TRB Annual Meeting Online
2016 & Archived Meeting Content

AUTOMATED VEHICLES SYMPOSIUM 2017
USERS. VEHICLES. INFRASTRUCTURE.

TRA TRANSPORT RESEARCH ARENA

12th ITS EUROPEAN CONGRESS
ITS BEYOND BORDERS
Strasbourg, France | 19-22 June 2017

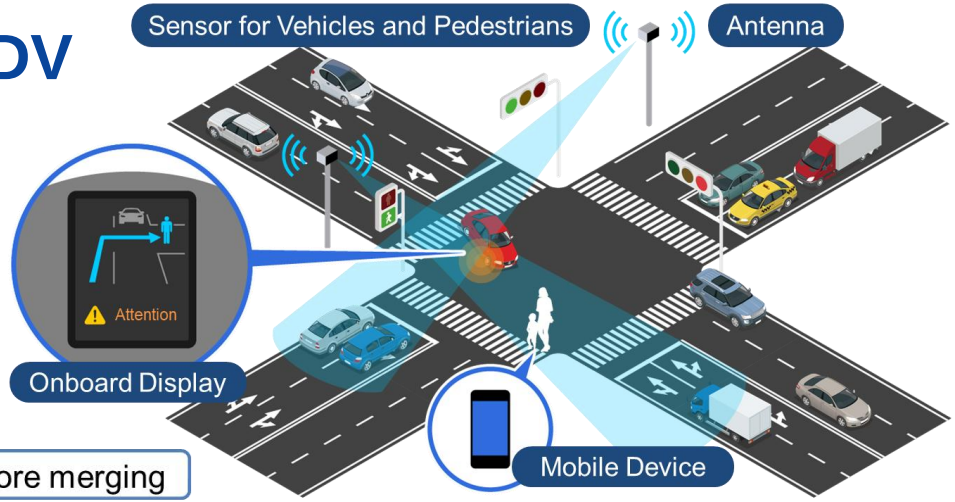
connected automated driving.eu

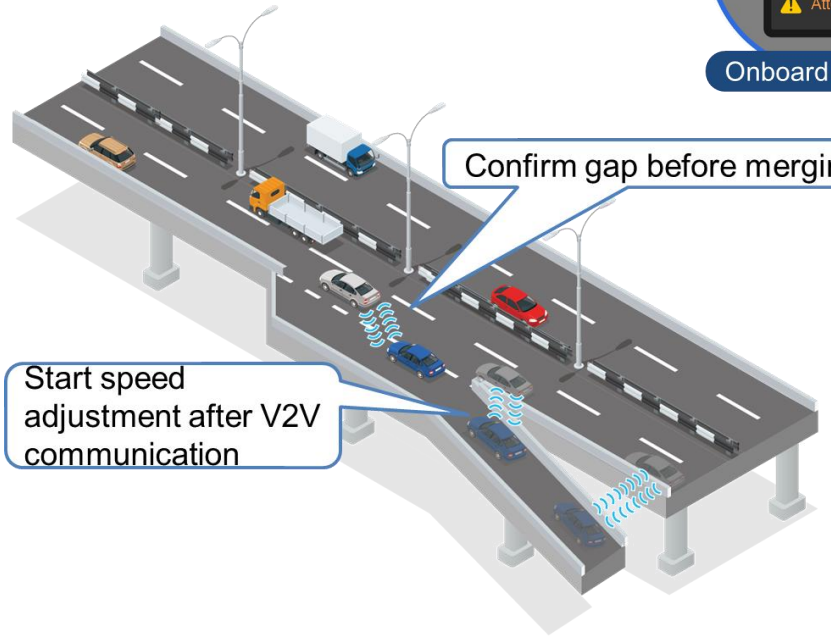
ITS WORLD CONGRESS 2017
Montréal | OCTOBER 29 - NOVEMBER 2

PEGASUS

SIP SIP-adus
Innovation of Automated Driving for Universal Services

◆ V2V, V2I, V2P for ADV

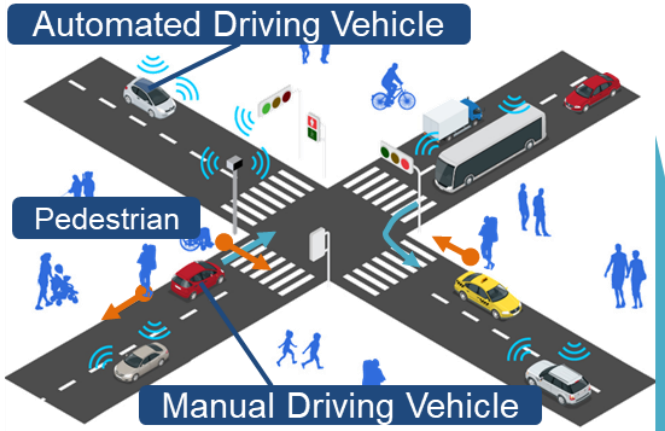




◆ Quantitative Analysis of Accident Reduction

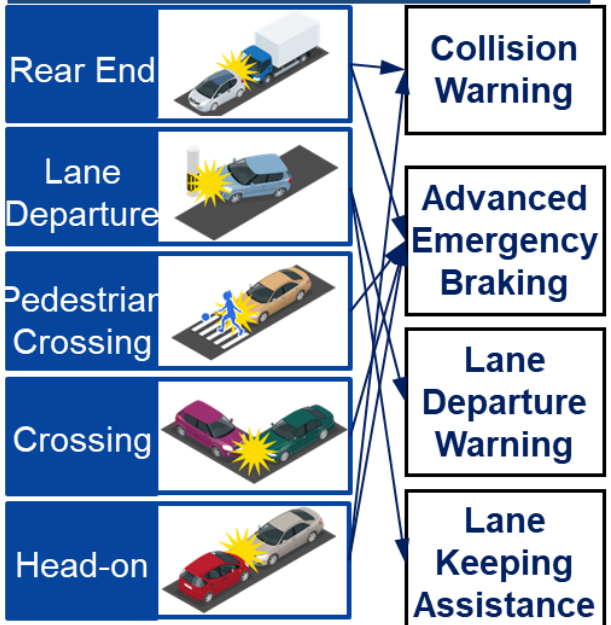
Real Traffic Flow Simulation → **Traffic Accident Analysis** → **Effect Prediction**

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

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**

http://www.sip-adus.jp/evt/workshop2016/

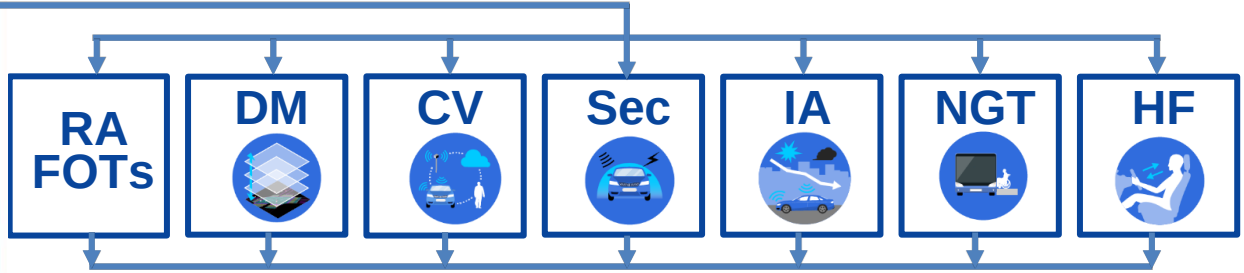
◆ Plenary Sessions and Workshop

	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	10:45～12:30 Impact Assessment	
	Poster Session		
PM	13:40～14:50 Dynamic Map	13:30～15:15 Next Generation Transport	13:00～15:00 Breakout Workshop
	15:00～16:40 Connected Vehicles		
	16:55～18:45 Security	15:30～18:00 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
PM	13:00～15:00 Breakout Workshop
	15:30～17:15 Breakout Workshop Summary
	17:15～17:45 Closing Session

Seven Breakout Workshops simultaneously



All Breakout Workshop attendees

Breakout Workshop Summary

Speakers for SIP-adus Workshop 2017

- Opening Session
- Regional Activities and FOTs
- Dynamic Map
- Connected Vehicles
- Security
- SIP-adus Report Session
- Impact Assessment
- Next Generation Transport
- Human Factors

Speakers for SIP-adus Workshop 2017

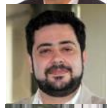
◆ Regional Activities and FOTs

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

Moderator

Sweden

VW/Pegasus/Germany


Roadworthiness/Spain

Renault/France

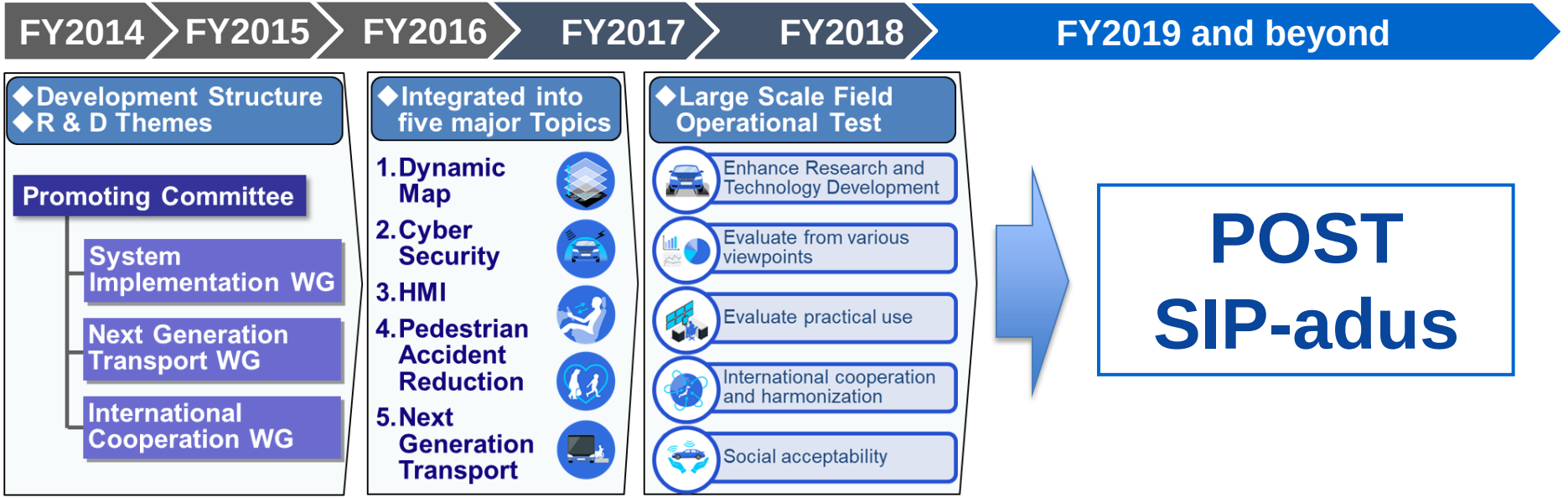
Aurora/Finland

Australia

Platooning/Netherlands

Tokyo 2020

◆Discussions have initiated



Thank you
See you in Tokyo