ITS World Congress 2017
SIS49 : Automated Vehicle Test Sites: Compete or Complement

SIP-adus Field Operational Test

― Mobility bringing everyone a smile ―

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SIP-adus International Cooperative WG

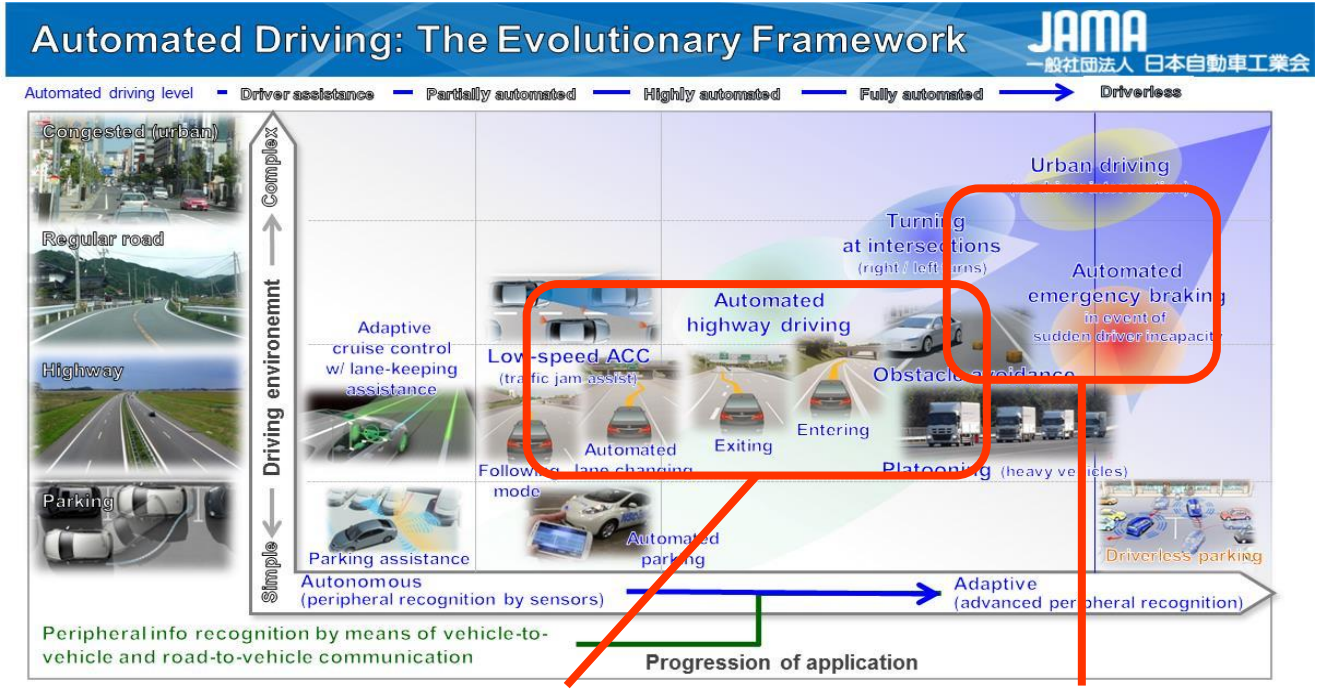
31 October 2017

SIP

Cabinet Office

Goal & Exit Strategy of SIP-adus

- 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 next step Level 2 on regular road

"SIP" means Cross-Ministerial Strategic Innovation Promotion Program

"adus" means Automated Driving systems for Universal Services

Technologies for Automated Driving Systems

➢ SIP places emphasis on 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

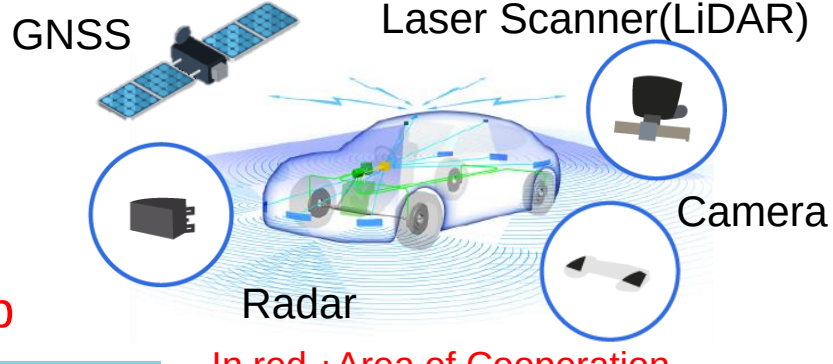
Important Technologies
- **Self-position estimation**
- **Neighboring environmental recognition**

Dynamic Map

ITS Predictive Information

High Definition 3D Map

Onboard Sensors



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

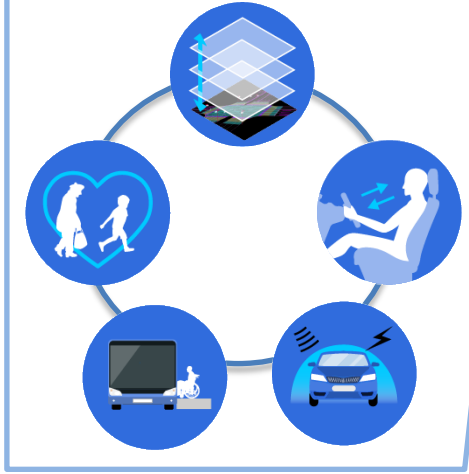
Basic Tech. Security, Simulation, Database, etc.

Steps to the Goal

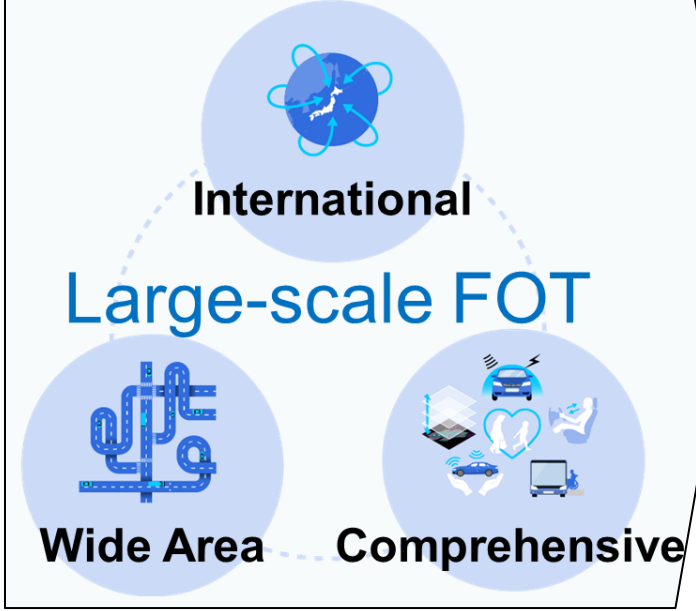
2014 | 2015 | 2016 | 2017 | 2018

- Framework Construction
- Investigation for various R&D theme

- Integration into 5 major R&D theme activity



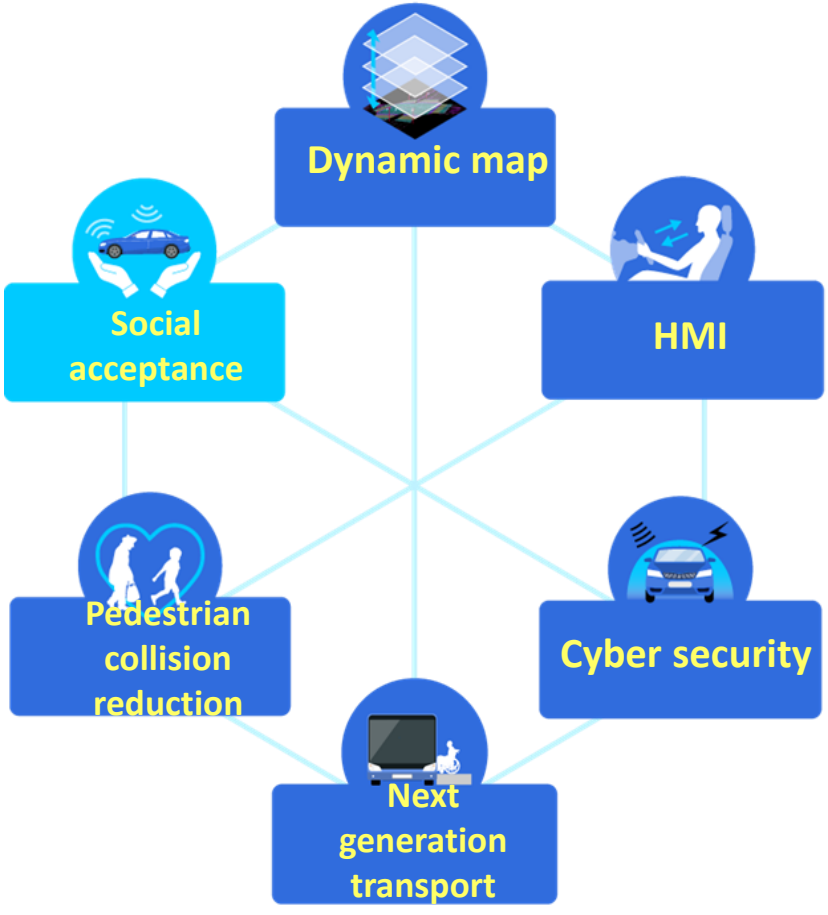
- Final step to the Goal



Implementation

Field Operational Test (FOT)

≪Main themes≫



≪Objectives≫

- Activation of the study / technology development
- An evaluation, a problem is extracted in more viewpoints
- Confirmation of the practical use
- International cooperation and harmonization
- Social acceptability promotion

Participants of FOT

(Each participant brings a vehicle of their own)

≪Period≫

Oct. 2017 ～ Mar. 2019

Test sites of FOT

Test facility

JARI* Test course;
New test facility for
AV evaluation

Expressway

Utilize the part of the following expressway.

Total : app.300km.

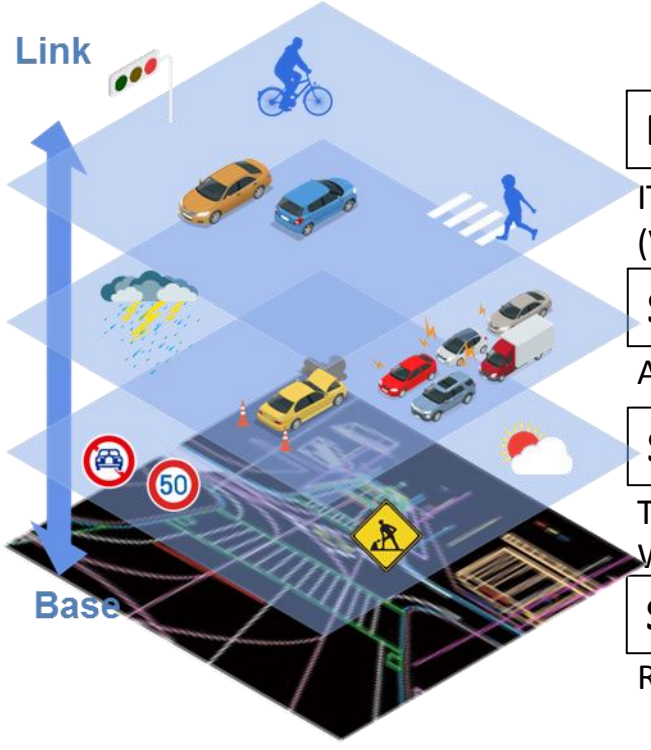
Arterial roads

Tokyo waterfront
city area app.25km

(*JARI : Japan Automotive Research Institute)

Dynamic Map

- Use Dynamic Map as an advanced traffic info. database for all vehicles, not only as a precise map for automated driving vehicle.



Dynamic Info. (Changes in short time.)

ITS anticipative Info.
(V2V, V2P, traffic signal rotation cycle, etc.)

Semi-dynamic Info.(Current phenomenon)

Accident, Congestion, Local weather etc.

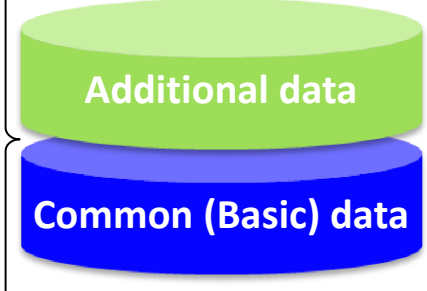
Semi-static info.(Scheduled phenomenon)

Traffic control plan, Road construction plan, Weather forecast, etc.

Static Information

Road shape, Topological data, etc.

Competitive area



Cooperative area

FOT for Dynamic map

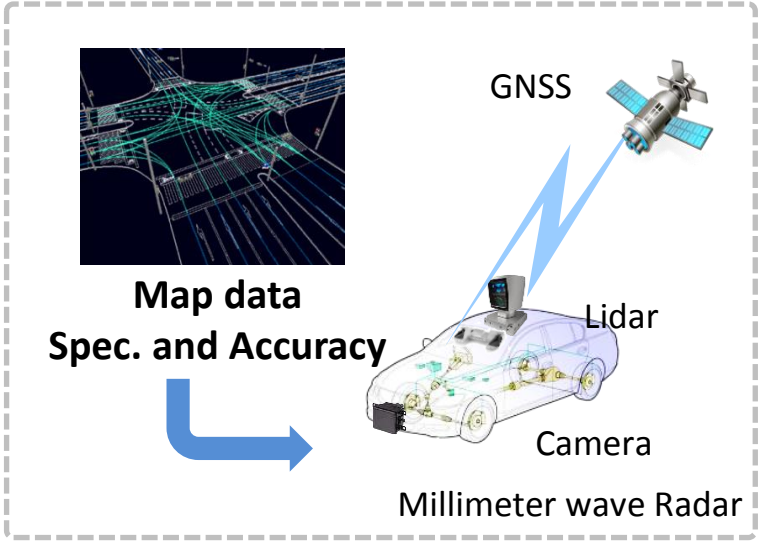
- Dynamic map is evaluated through 3 steps FOT .

(Step 1) To validate 3D high-definition digital map data. (Ongoing)

(Step 2) To validate data collection and distribution method. (FY2018)

(Step 3) To verify the utility of semi dynamic information. (FY2018)

✓ Map data is provided by SIP-adus.



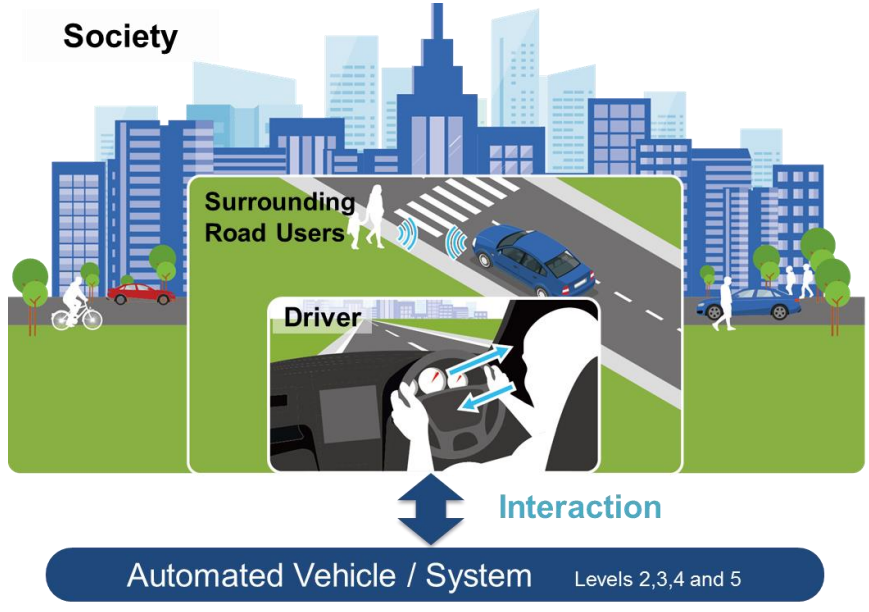
Human Machine Interface FOT

- SIP-adus is focusing on the three major HMI tasks for AV.

Task A: To investigate effects of **system information** on drivers' behavior.（FY2018）

Task B: To investigate effects of **driver state** on his/her behavior in transition. (Ongoing)

Task C: To investigate effective ways to functionalize AV to **be communicative**.(FY2018)

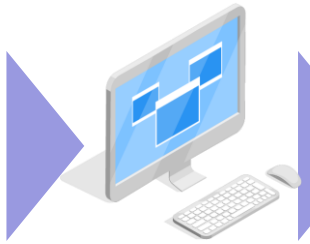


FOT @T/C and real traffic environment

Cyber Security

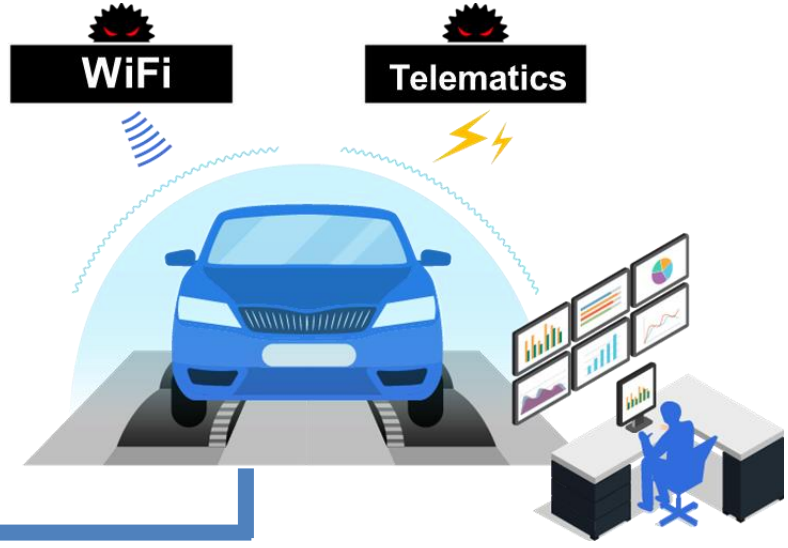
➢ For CV and AV, Cyber security becomes the technology to take the high priority.

◆Common Architecture Model
◆Use Cases of Automated Driving
◆Thread Info.
◆Evaluation（Attack）Info.



◆Countermeasure
◆Level of Countermeasure

Vulnerability Evaluation



Threat Analysis Tool

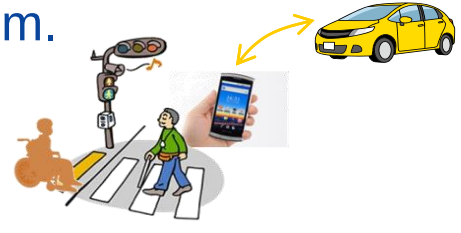
Comparison with Current Threat Analysis

Cyber Security Evaluation Guideline

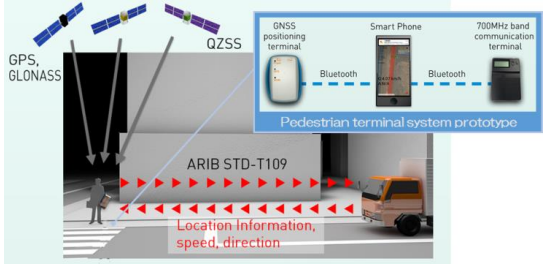
FOT using Evaluation Guideline will start in FY2018

Pedestrian Collision Reduction

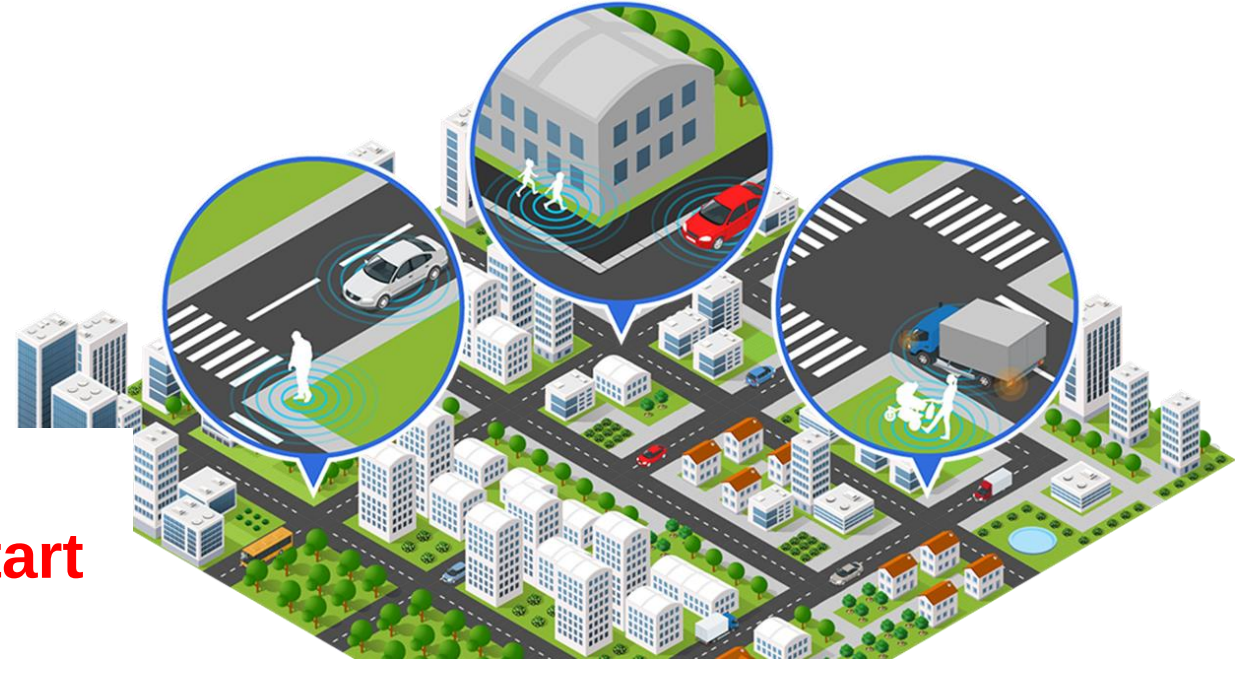
- Mitigate pedestrian accidents using V2P communication system.



- Exchange high accuracy positions and situations between pedestrians and vehicles for support recognition.



- Evaluate system performance and effectiveness under real traffic world.

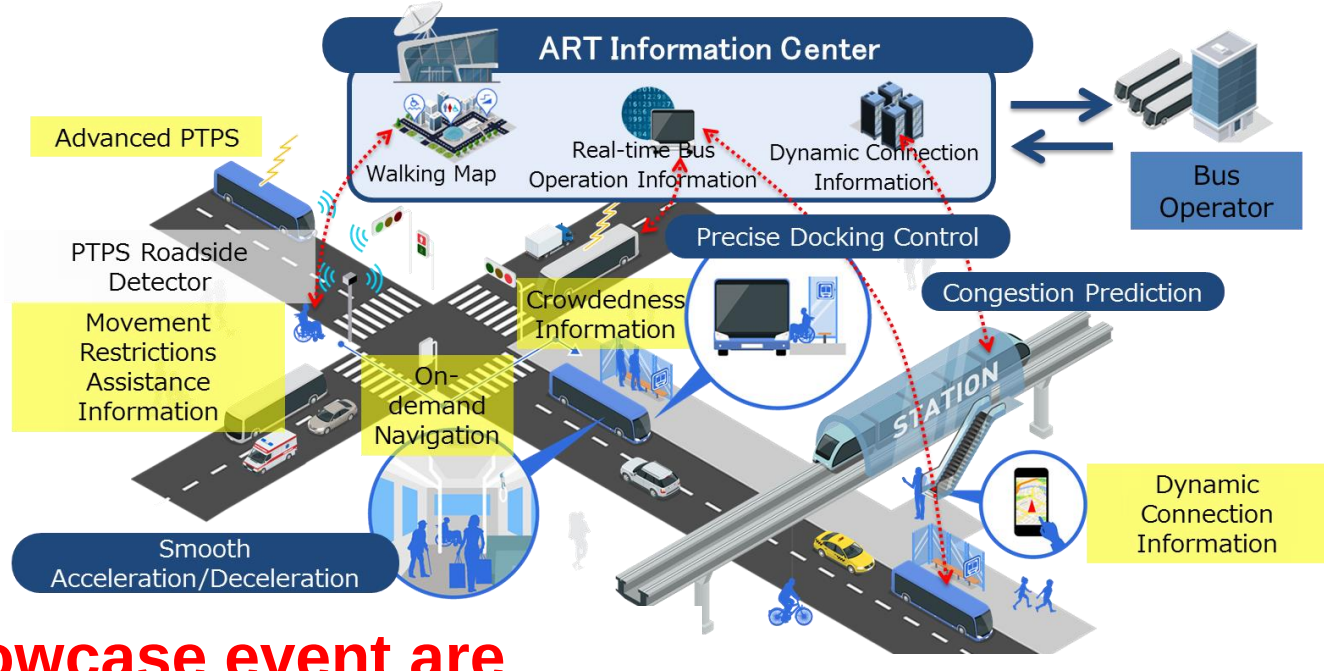


FOT @ Tokyo water front city area will start in FY2018

Next Generation Transport

- Next generation urban transportation is realized by the ITS technologies and the automated driving technologies.

- Evaluate system performance and effectiveness under real traffic world.



FOT and showcase event are planned in 2018

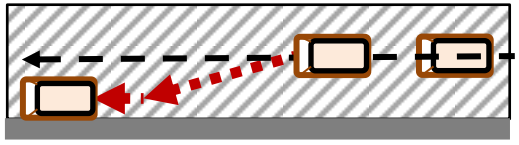
ART: Advanced Rapid Transit

FOT for MaaS

Automated driving Bus FOT

・Technologies
(Quasi-Zenith Satellites System , Precise docking, Magnetic Nail, High-precision Digital Map, Automatic Brake Control)

・Steps of FOT in Okinawa
(Mar.) Shore road→(Jun.) Isolated island→(Nov.) City area

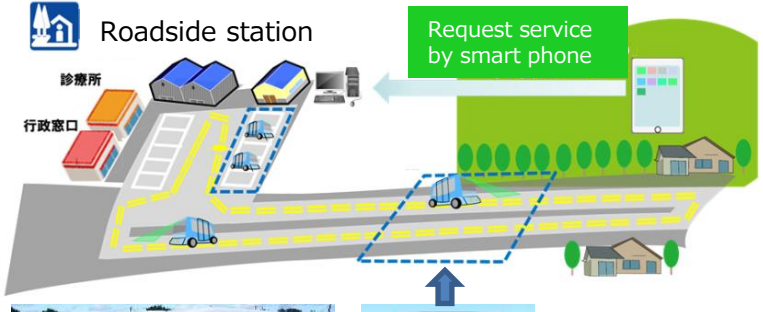


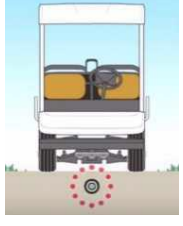
Precise Docking demonstration

Roadside station-based FOT

Public mobility service for people and freight at the local area that have the issues of the depopulation and the aging.

Sep. 2017～ :Total 13 areas are planned





Electromagnetic induction line

FOT for MaaS

Automated driving Bus FOT

■ : Completed ■ : Ongoing

Okinawa

Ishigaki-jima

Roadside station-based FOT

● : Regional assignment ● : Public offering ◌ : Feasibility study

- New type public transportation for depopulated area, isolated islands so on, are being tested in many place in Japan.

Summary

- SIP-adus started Large-scale FOT from Oct. 2017.
- In parallel, FOTs of MaaS are also planned at various locations in Japan.
- Detail and updated information of SIP-adus Large-scale FOT is http://www.nedo.go.jp/english/sip_ai2017.html#overview


Thank you for your attention.
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