



Cross-ministerial Strategic Innovation Promotion Program

SIP Automated driving systems

– Mobility bringing everyone a smile –

April 04.2017
Program Director
SEIGO KUZUMAKI

Outline of SIP

- **Intensive R&D program**
 - ✓ promote 5-years 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**

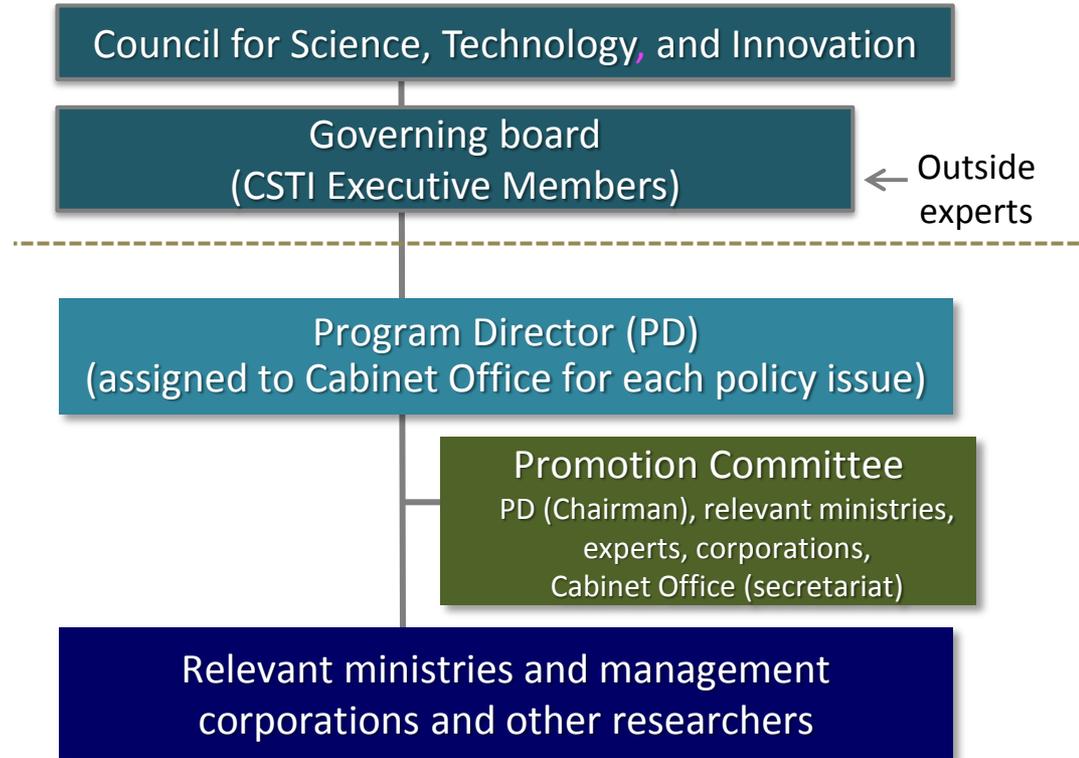
CSTI appointed Program Directors and allocates the budget for each research theme. *

* \50bil in total per year
(65% for SIP 11 themes, 35% for medical R&D)

adus : Automated driving systems
for universal service

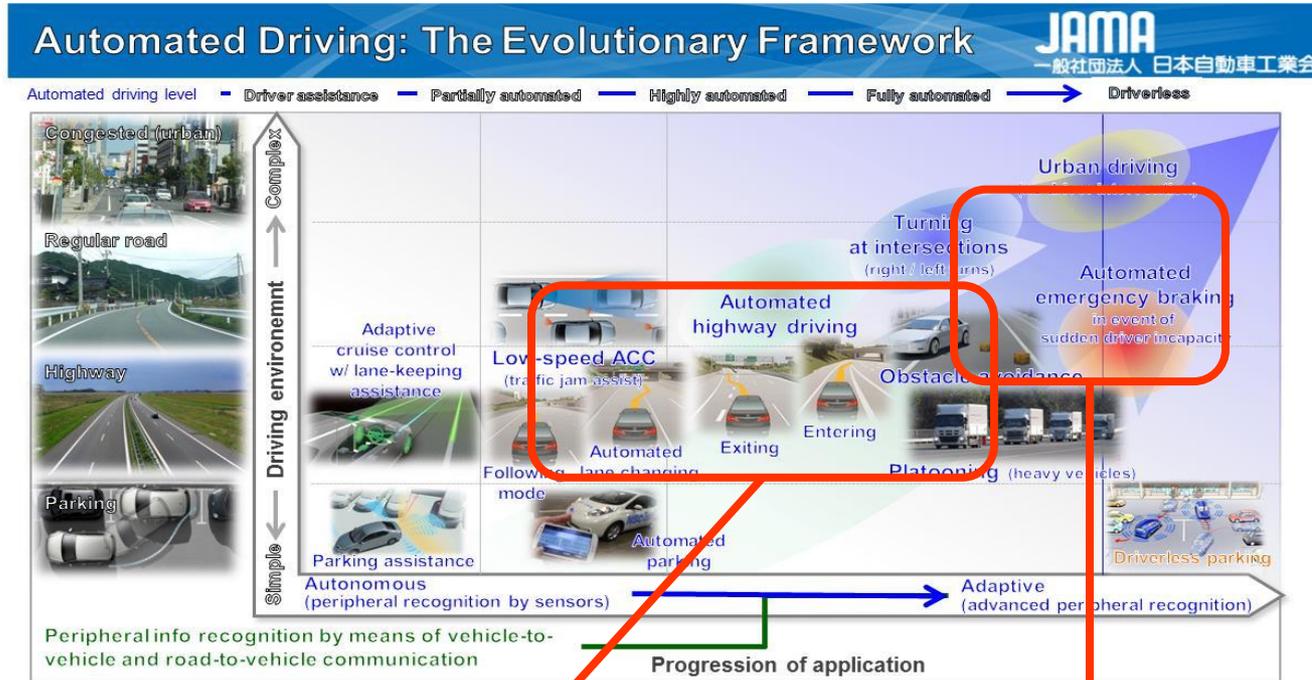


Cross-ministerial Strategic Innovation Promotion Program



Goal & Exit Strategy

1. Ensuring safety and traffic jam reduction on the road
2. Realization and spread of Automated Driving System
3. Realization of advanced next generation public bus service for vulnerable people.



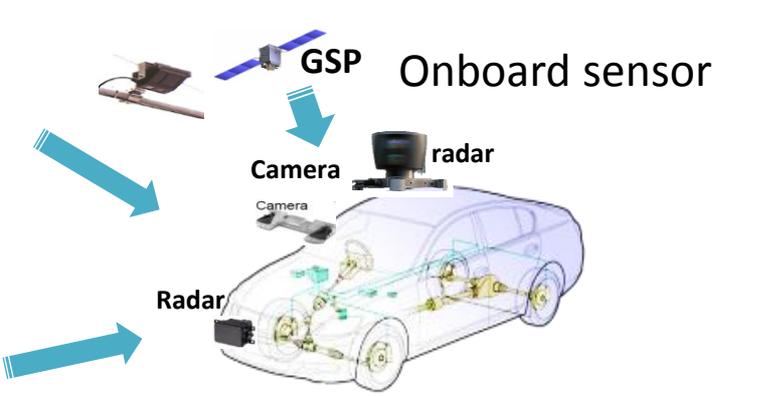
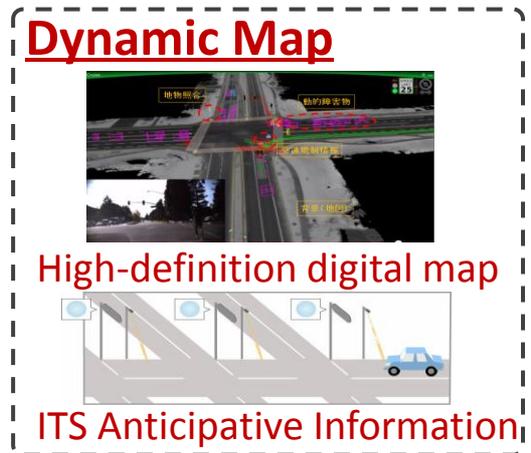
**Realization of Level 2
on highway by 2020**

**Prioritization for next step
Level 2 on regular road**

Technologies for Automated driving systems



- ↓
- A highly self-position estimation
 - Neighboring environmental cognition
- These are important for Automated Driving System



In red : Area of Cooperation
⇒ Main Area of SIP

Basic Tech. **Security, Simulation, Database, etc.**

SIP focus on the R&D in Cooperative area with Industry, Academia and Government

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.(< 1 sec)

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

Semi-dynamic Info.(< 1 min)

Accident, Congestion, Local weather etc.

Semi-static info.(< 1 hour)

Traffic control, Road construction, Weather forecast, etc.

Static Info.(< 1 month)

Road shape, Topological data, etc.

Competitive area

Additional data

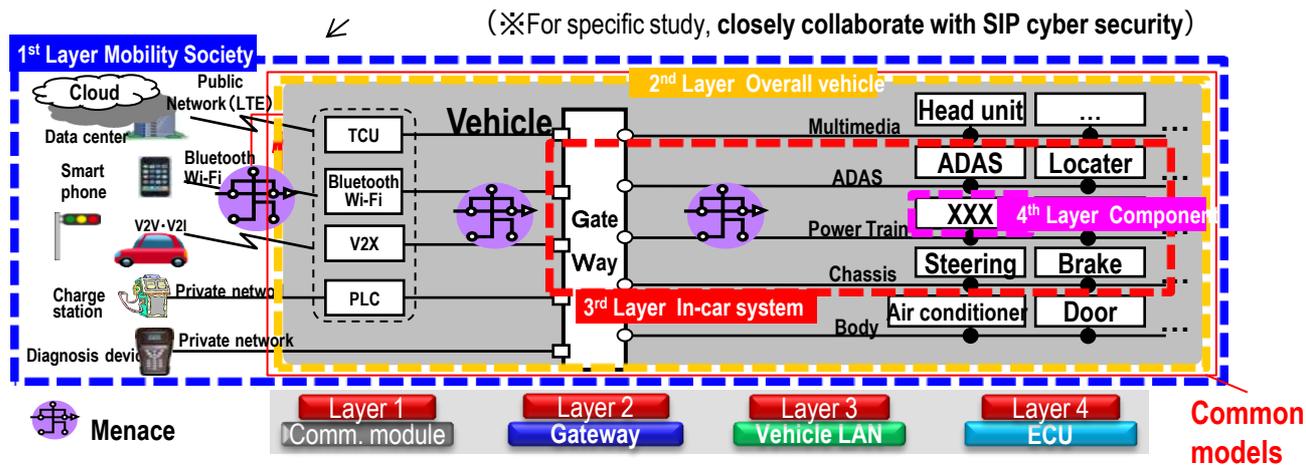
Common (Basic) data

Cooperative area

Dynamic Map Planning Co., Ltd. was established as a result of 2years SIP activity.

Cyber security

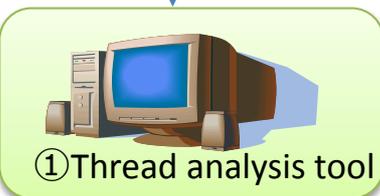
- ① Common Models of AD for thread Analysis
- ② Validation/Evaluation methods and Criteria
- ③ Certificate Validation of V2X communication



① To establish Thread analysis

- ① Common architecture model
- ① Use cases of AD (JAMA)
- ② Thread Info. (JPCERT/CC, Auto-ISAC)
- ② Evaluation (Attack) Info (Auto-ISAC)

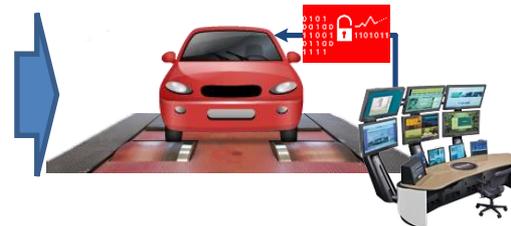
① User friendliness (JAMA)



① Comparison with current Thread analysis (Jaspar)

② To establish Test protocols

- ② Countermeasure
- ② Level of Countermeasure



③ To reduce V2X signature

Human Machine Interface

- 1) To investigate effects of system information on drivers' behavior.
- 2) To investigate effects of driver state on his/her behavior in transition.
- 3) To investigate effective ways to functionalize AV to be communicative

Driver state

- Cognitively distracted
- Physically distracted
- Low arousal
- Lack of SA
- Out of position

↑
Controlled

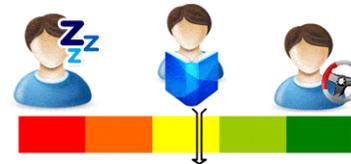
Readiness

- Head orientation and visual performance
- Heart rate and blood pressure
- Body temperature
- Skin conductance
- EEG
- Posture and body

Performance at the event

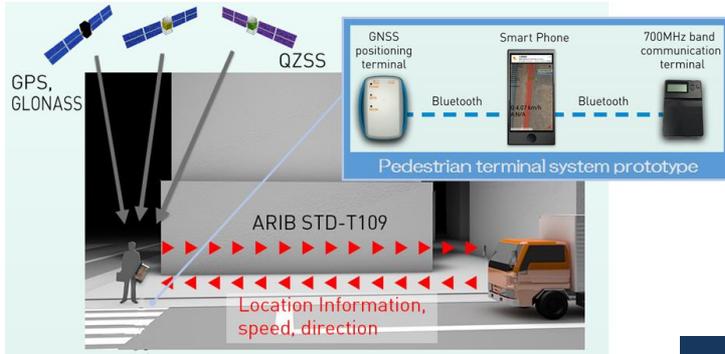
- Longitudinal and lateral control of the vehicle
- Minimum distance and minimum TTC to the hazard
- Time spent to regain control

Correlation



Pedestrian accident reduction

Vehicle-to-Pedestrian (V2P) Communication

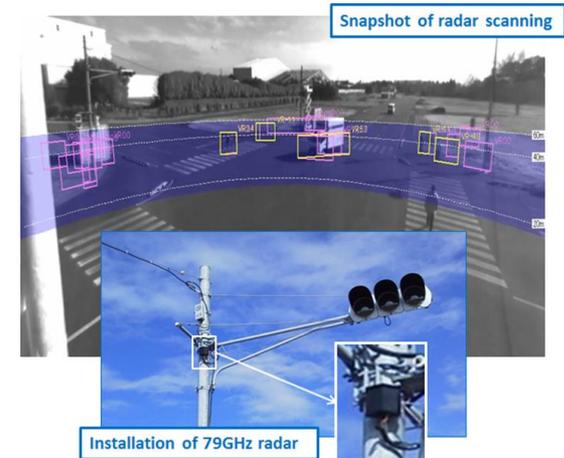
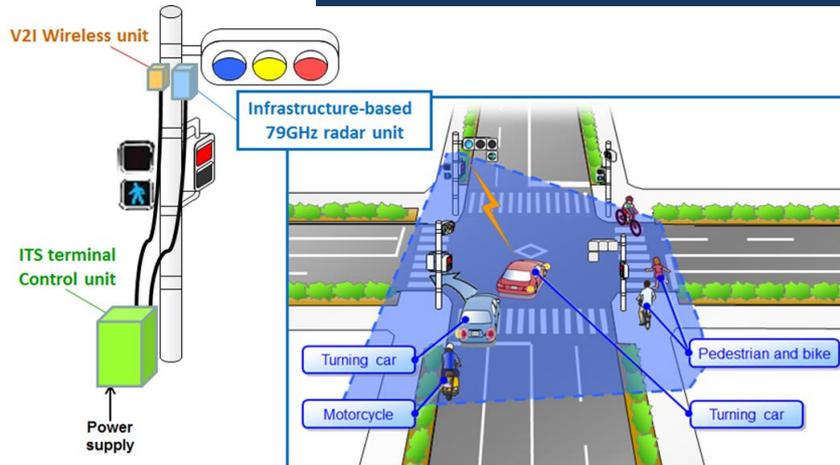


700MHz Direct Wireless Communication

- 700MHz band communication
- High-precision positioning
- Danger identification and pedestrian safety support

Infrastructure radar with V2I communication

79GHz band radar from roadside of intersection



Next generation Transport

ART information center



Information Open Platform for
ART related applications

Application Examples

- * Congestion Prediction
- * Dynamic Connection Guidance
- * Remote Diagnostics

Field Operational Test (FOT)

<<Purpose>>

1. To activate the R&D
2. To prove each elemental technology
3. To enhance international cooperation and harmonization
4. To Build Social acceptance

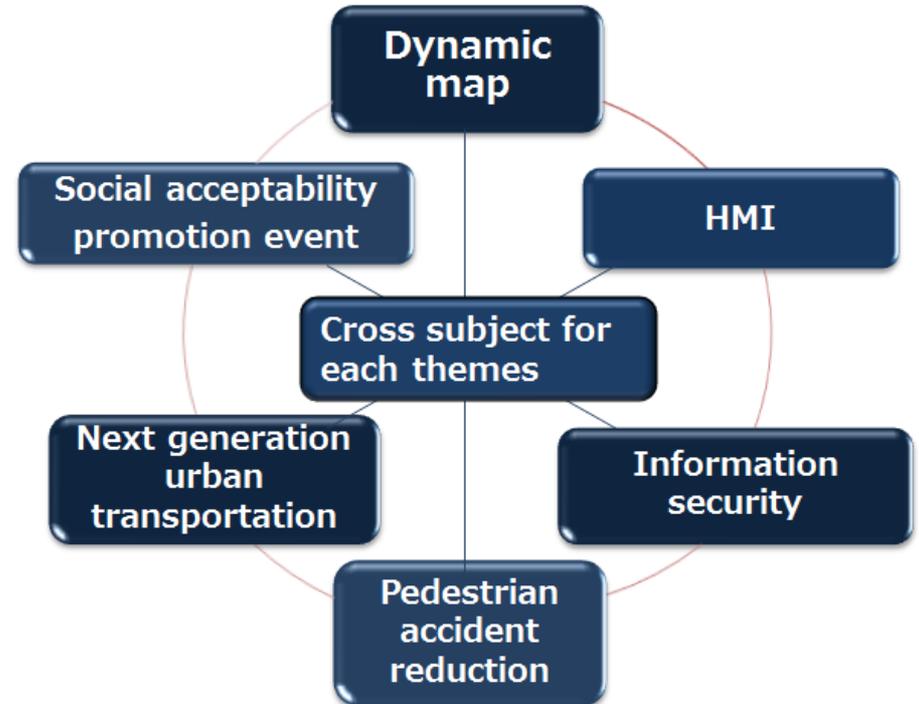
<<Participant>>

- OEM/Supplier
- University/Research organization
- Ministries, government officers
- **Foreign OEM/supplier**
- Journalist

<<Period>>

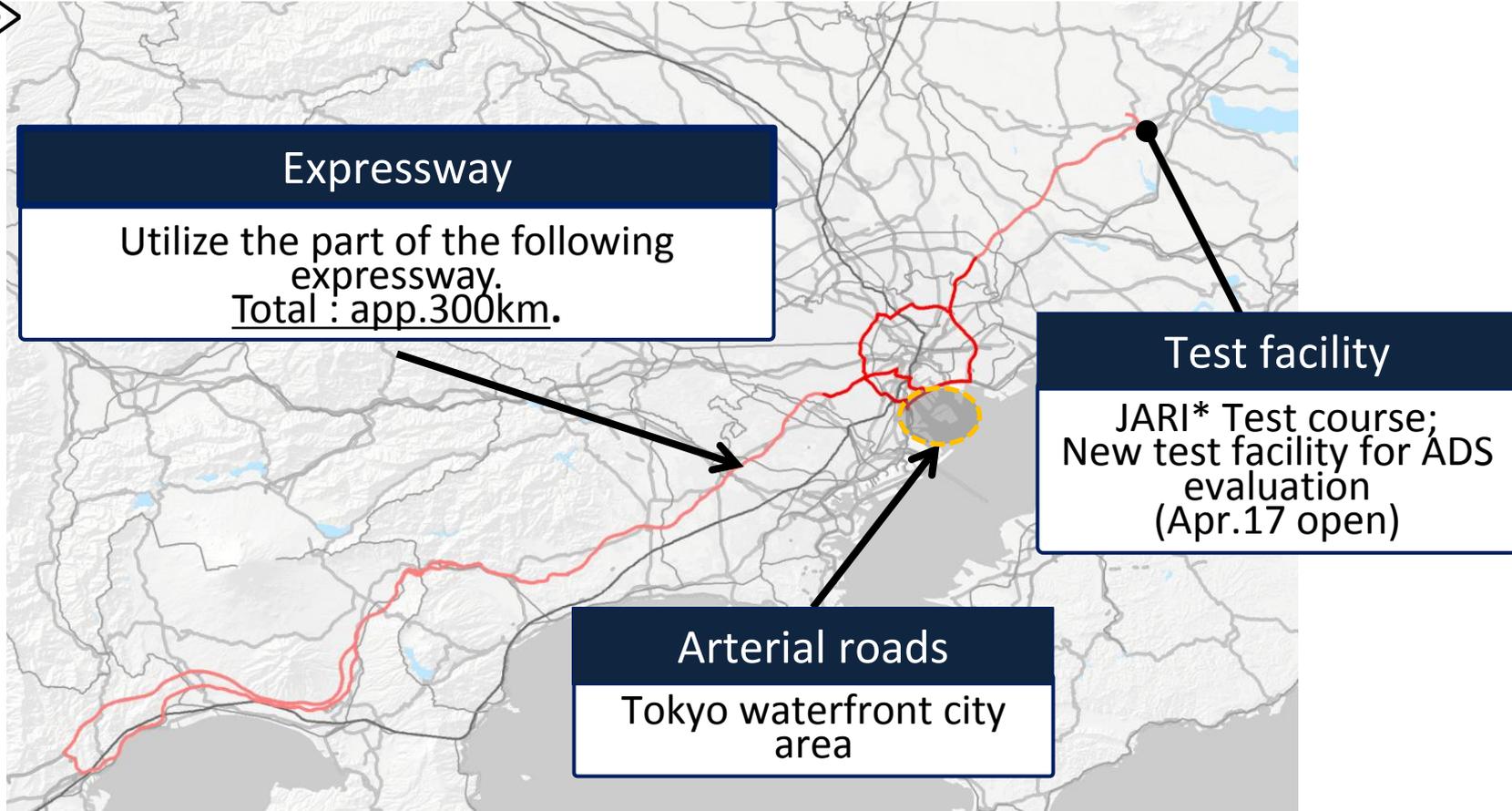
Autumn 2017 ~ beginning of 2019

<<Main themes>>



Field Operational Test (FOT)

<<Test site>>

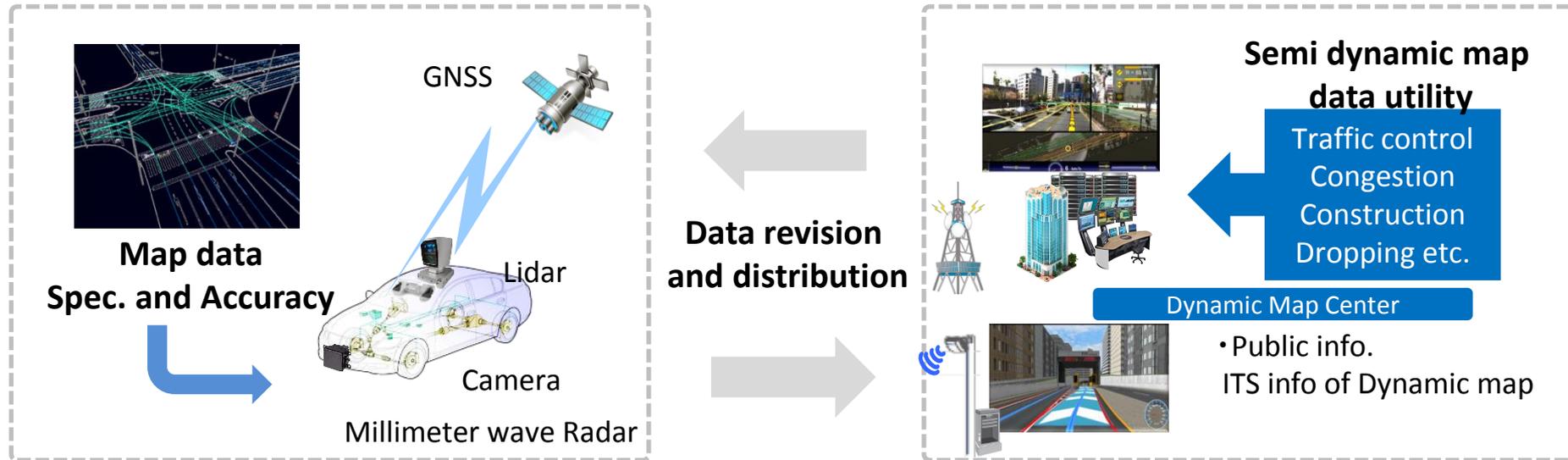


(*JARI : Japan Automotive Research Institute)

Field Operational Test (FOT)

Dynamic Map(Example)

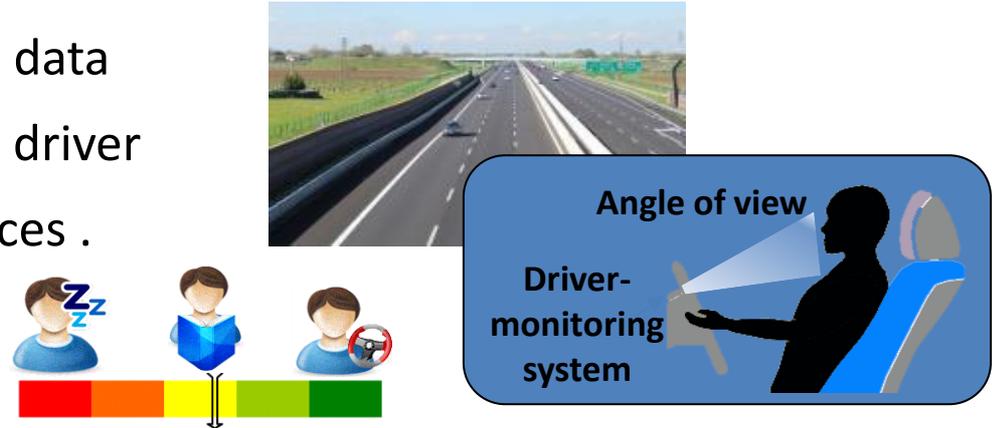
- ❑ To validate 3D high-resolution digital map data
- ❑ To validate data collection and distribution method
- ❑ To verify the utility of semi dynamic information
- ✓ The map data is provided by SIP-adus.



Field Operational Test (FOT)

HMI(Example)

- ❑ To collect and analyze the driver state data
- ❑ To define driving readiness status and driver
- ❑ Verification of HMI methods and devices .



Cyber Security(Example)

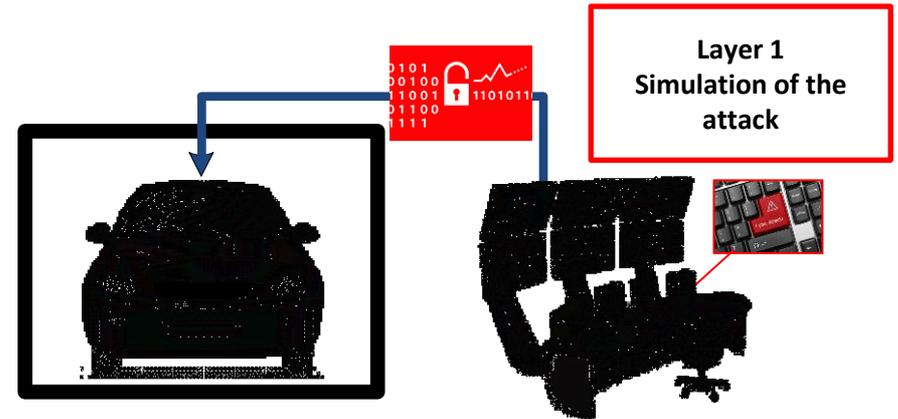
- ❑ To Validate the evaluation method
- ❑ Inspect defense functions of ADV

Layer1: Communication of Out Car

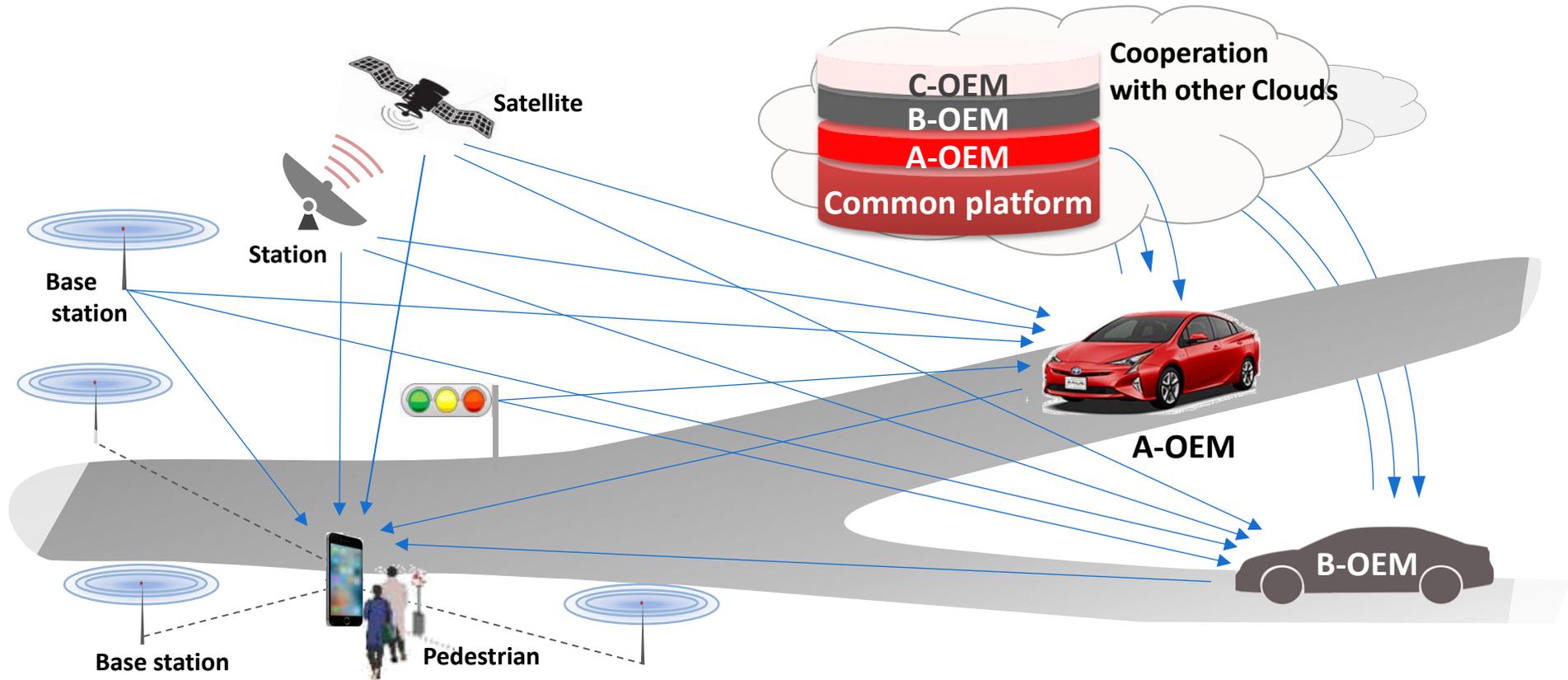
Layer2: E/E Architecture

Layer3: In Car Bus Protocol

Layer4: ECU Software Structure



Common Platform



A common base platform (map, rule etc.) is necessary for keeping safety and the social order.

⇒ Promoting harmonization and standardization



Thank you for kind attention!