Automated Vehicles Symposium 2018

SIP-adus : Field Operational Tests and Regulatory Issues

SIP-adus: Cross-Ministerial Strategic Innovation Promotion Program
Innovation of Automated Driving for Universal Services

July 12, 2018

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Chair, International Corporation WG, SIP-adus

SIP Cabinet Office

Technologies for Automated Driving Systems

Vehicle

＜Recognition＞ ＜Judgement＞ ＜Operation＞

Map, ITS info., Sensor　　AI　　Actuator

HMI

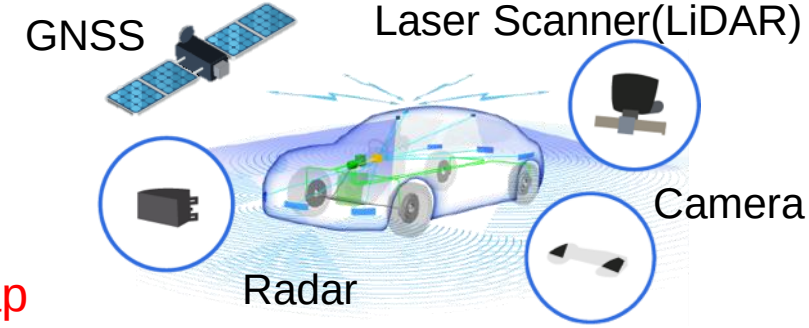
Human Machine Interface

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

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

Objectives of Field Operational Tests

Verification of research results in 5 integrated themes

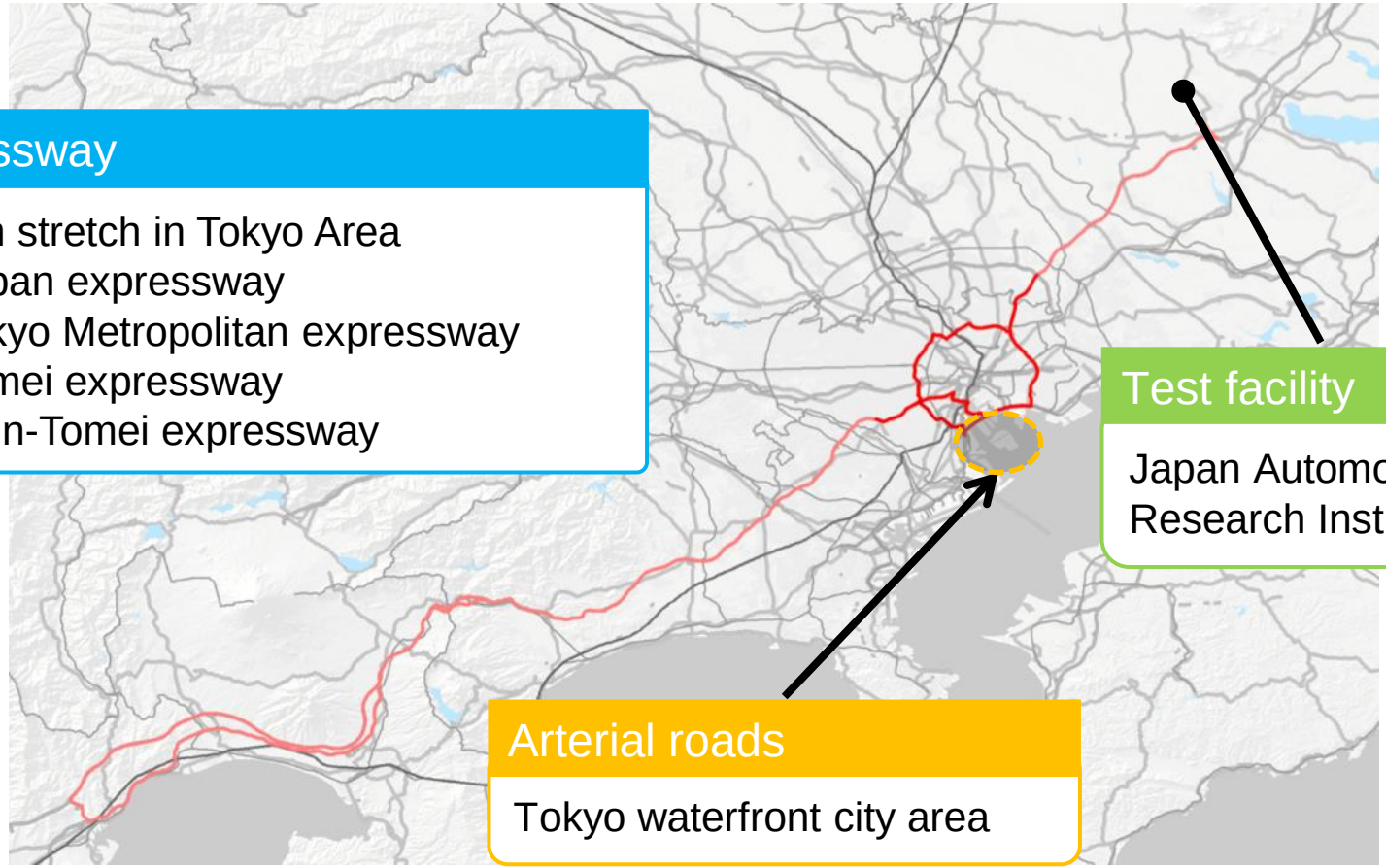
- Dynamic Map
- Human Machine Interface (HMI)
- Cyber Security
- Pedestrian Accident Reduction
- Next Generation Transport

International cooperation sharing the test fields and the data sets

- International participants signed up (OEMs, suppliers and research institutes)
- Concrete evidence acquired through the tests on the common grounds
- In-depth discussions on the specific research topics
- Identification of shared challenges and direction to overcome them

Business model investigation

Field Operational Tests: Test Sites



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

Field Operational Tests: Participants

Alphabetical order

Vehicle Position Detection using Dynamic Map

GNSS

Laser Scanner(LiDAR)

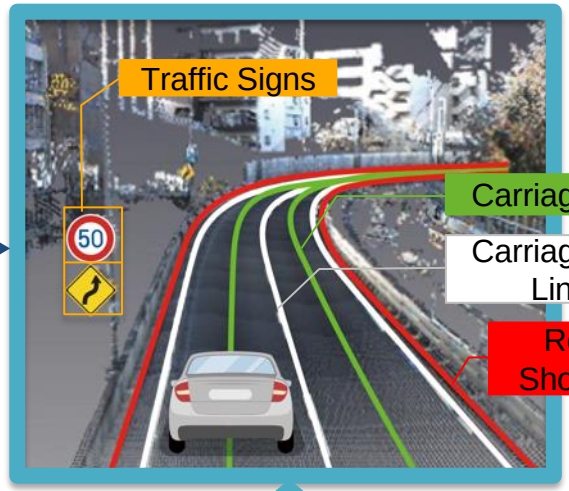
Radar

Camera

Sensed Data

Compare to estimate the position

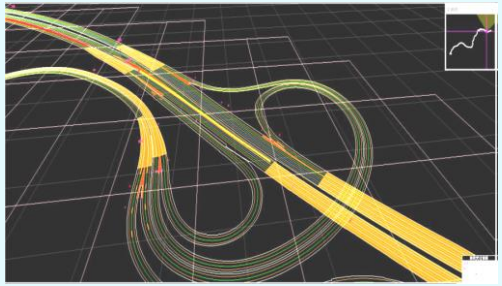
High Definition 3D Map



Estimate the position of the vehicle

Evaluation of 3D Map Data

Prototype 3D Map



Delivered to 19 participants

October 2017

Evaluation

...living driving environment...

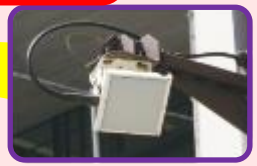
Consensus building

- Basic data elements
- Optional data elements
- Update frequency

Electronic Toll Collection and Connected Services

Equipment

Roadside



3,600 as of Oct. 2016

On-board

DSRC Unit

Navigation

2.42 million as of Jan. 2018

Basic Services

Toll Collection

Safety Assistance

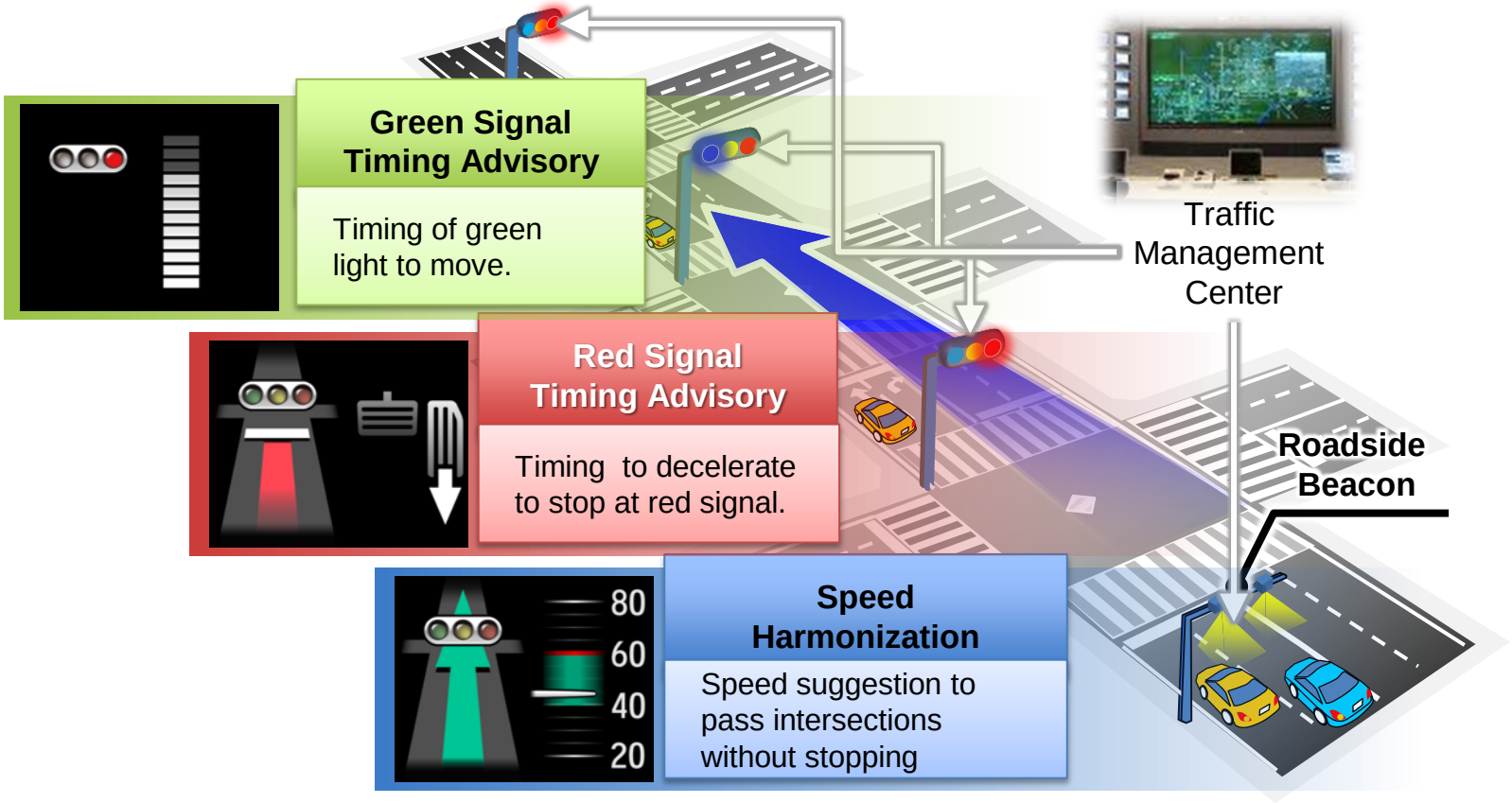
Traffic Information

Dynamic Route Guidance

Nationwide operation since 2011.

Source: Ministry of Land Infrastructure, Transport and Tourism

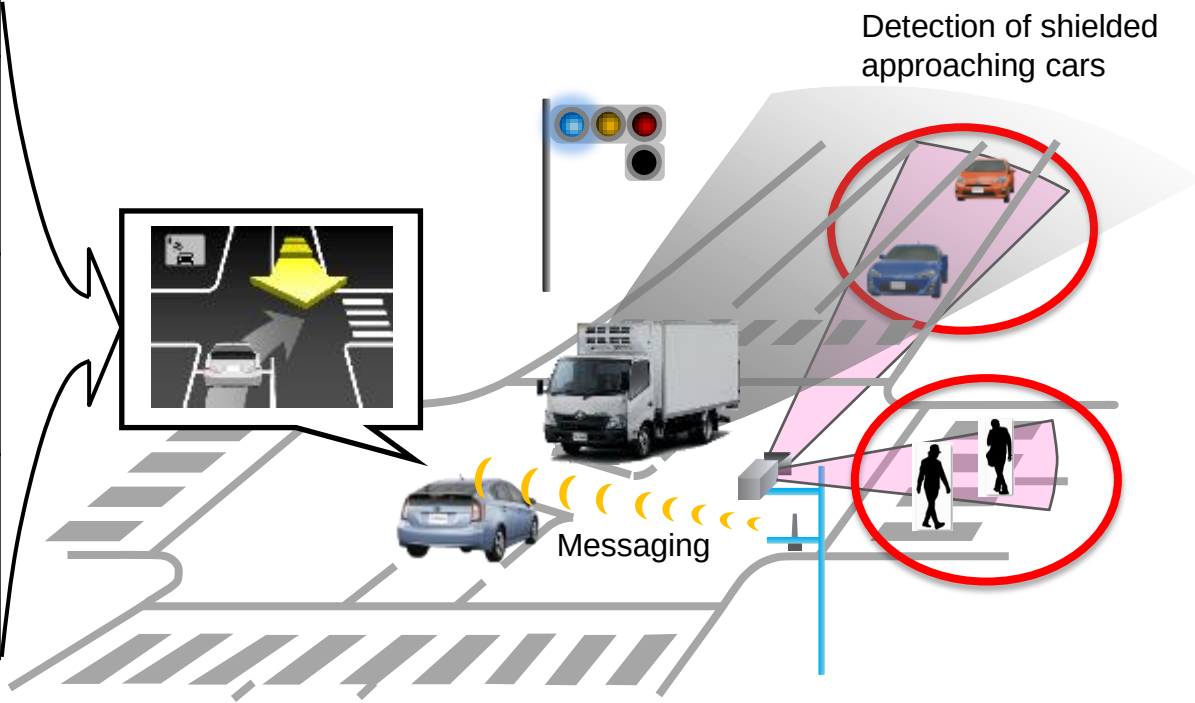
Traffic Signal Prediction Systems (TSPS)



Source: National Police Agency

Right Turn Collision Warning

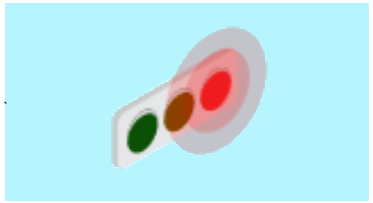
	Display	Sound	Situation
A		-	Clear
B		-	In coming vehicle/s detected
C		beep	Turning against in coming vehicle/s



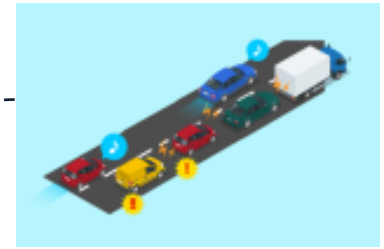
Source: National Police Agency

Dynamic Map Evaluation with Connected Features

Signal Phase and Timing



Probe data

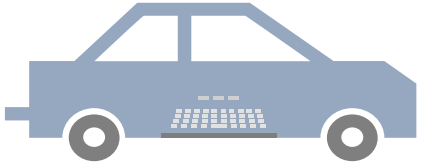


Traffic Regulations

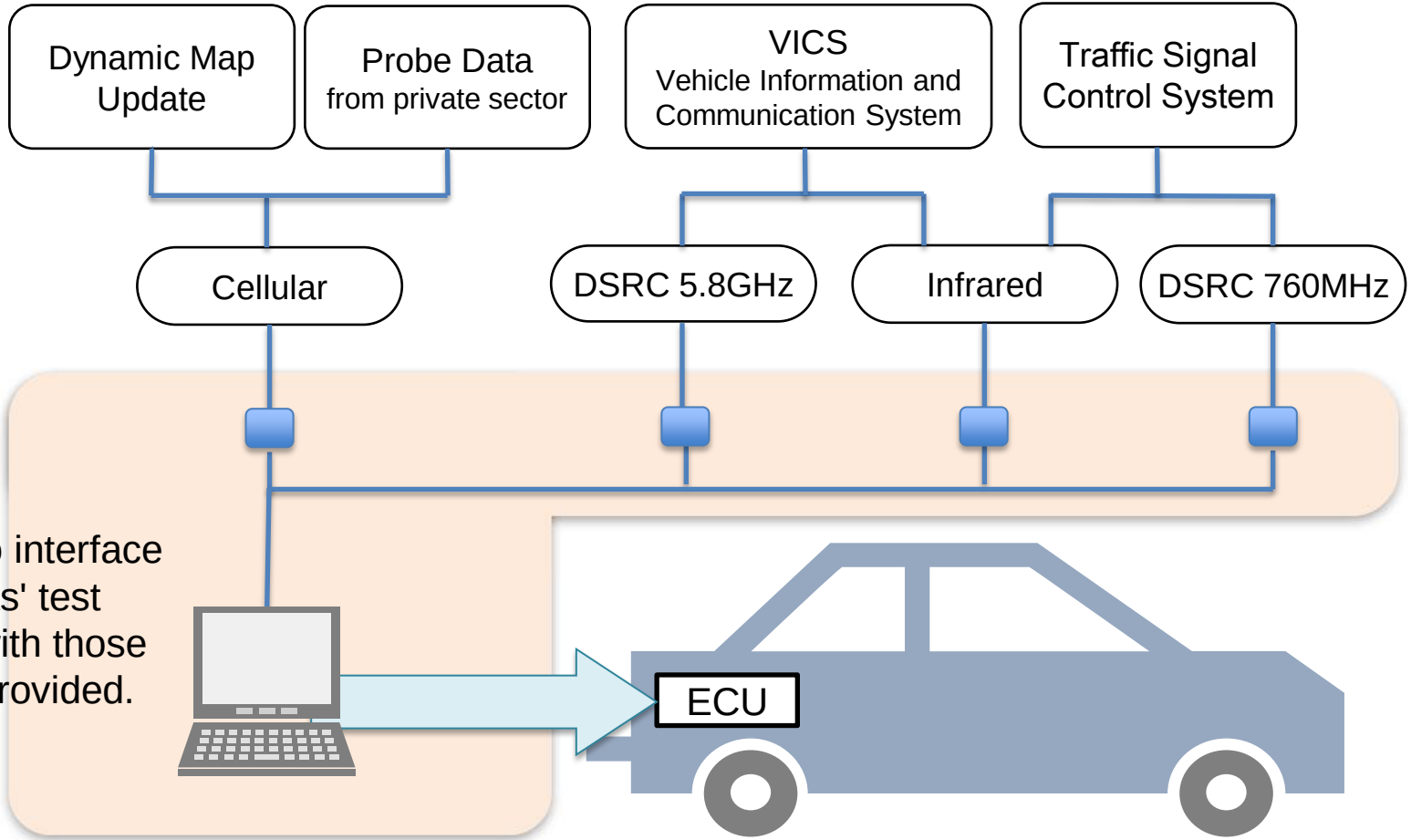
DSRC
760 MHz (DSSS)
Infrared (TSPS)

Cellular

DSRC
5.8 GHz (ETC2.0)



Data Provision through Existing Channels



Devices to interface participants' test vehicles with those data are provided.

The 2nd Phase of SIP-adus (2018-2022)

Objectives: transition from the 1st phase to the 2nd phase

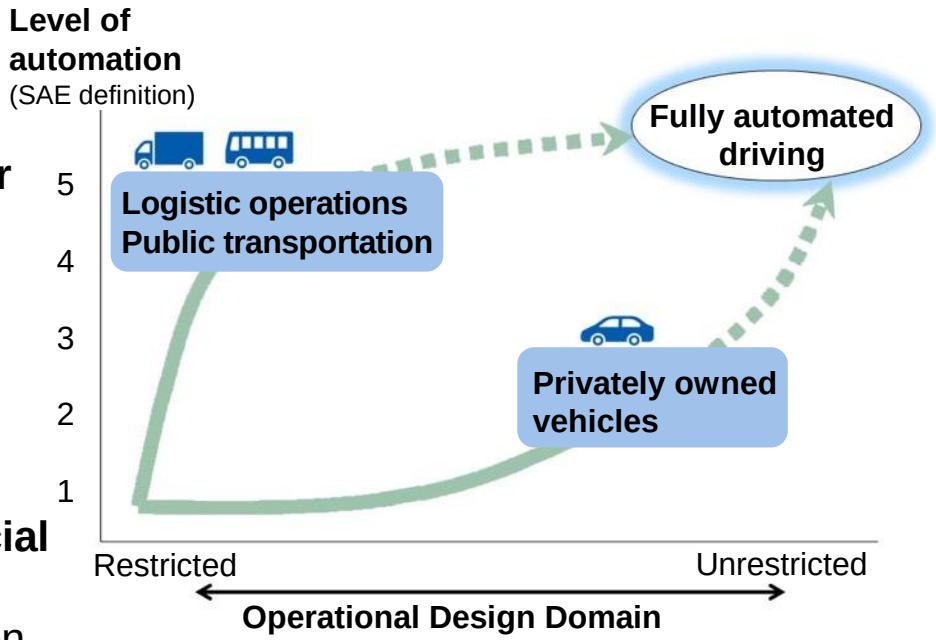
1) Extension of **operational domain** from the highways to the arterial and general public roads
2) More focus on **mobility services** including public transportation and logistic operations
3) Pursuit of **societal benefits** for safety, efficiency, inclusive society and enhanced economy

Deployment Goals:

1) **Tokyo Olympic and Paralympic Games**
2) Public transportation by **local government**
3) Mobility service businesses by **private sector**

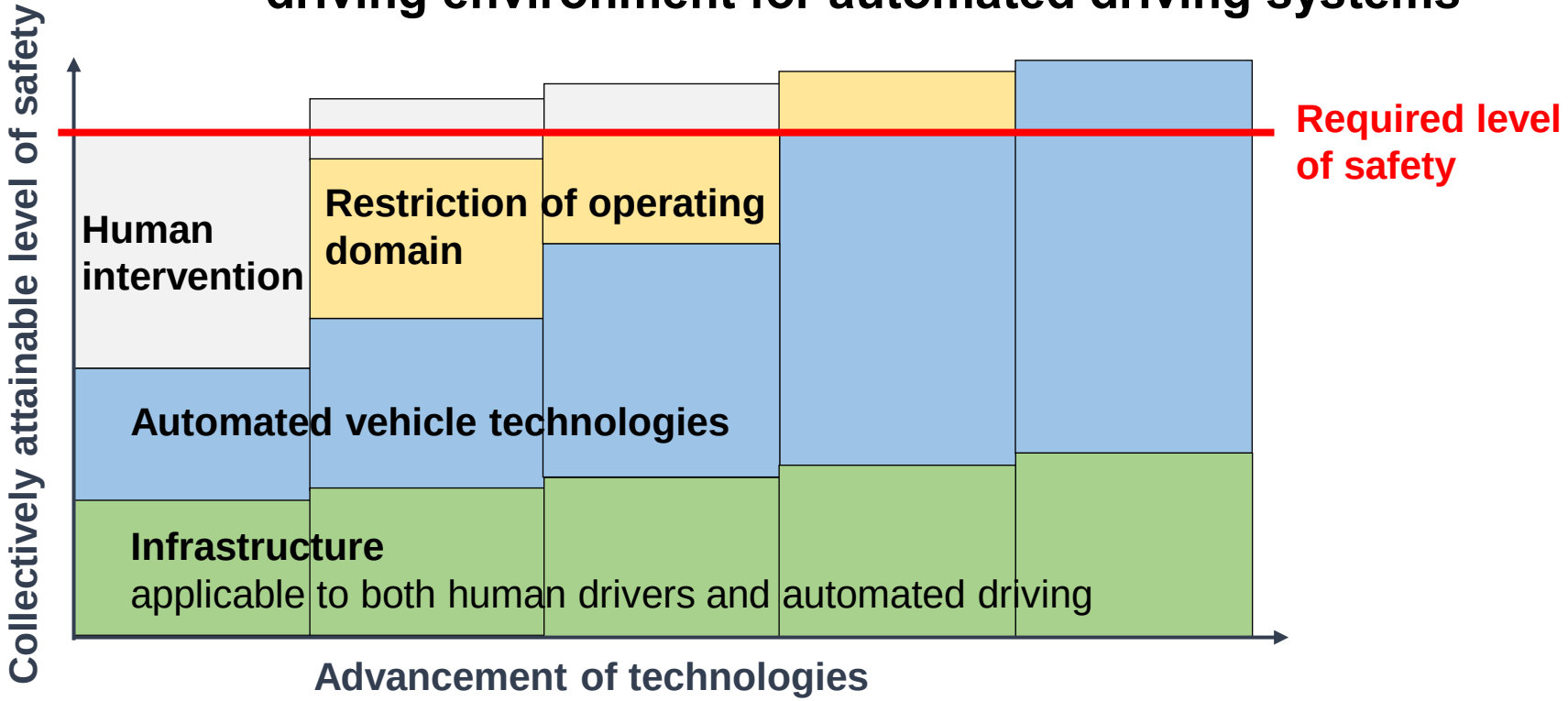
Research Topics:

1) **Validation** of integrated automated driving systems through field operations
2) Foundation for **roadworthiness testing**: data collection, modeling and simulation
3) Quantitative impact assessment to foster **social acceptance**
4) **International collaboration** for harmonization



Holistic Approach for Safety

"The Charter for improvement of legal system and driving environment for automated driving systems"



Source: National Strategy Office of Information and Communications Technology

Regulatory Considerations for Deployment by 2020

Vehicle safety regulations and conformance testing for type approval

- Safety guidelines for automated driving (by summer 2018)
- Vehicle safety regulations for automated driving vehicles

Road traffic rules

- Revision of road traffic rules in line with technology development and international discussion
- Necessary measures for automated driving systems to comply with the traffic rules
- Unmanned operation of automated vehicles with remote monitoring
- Rules for platoon operation of automated vehicles

Liability

- Application of Japanese mandatory automobile liability insurance for immediate relief of victims and their families
- Criminal responsibility based on clearly defined responsibilities of divers entities involved
- Installation of event data recorder on-board the vehicle and requirements of recorded data specifications and their submission

Regulations for public transportation and freight operators

Source: National Strategy Office of Information and Communications Technology

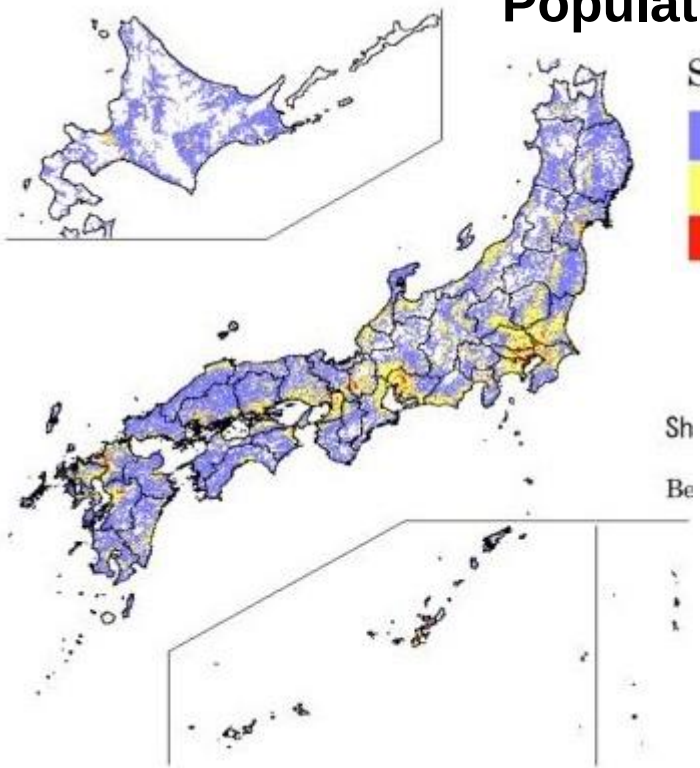
What is automated driving for ?

Societal benefits of deployment for
mobility to sustain daily life and
vitalization of economic activities.

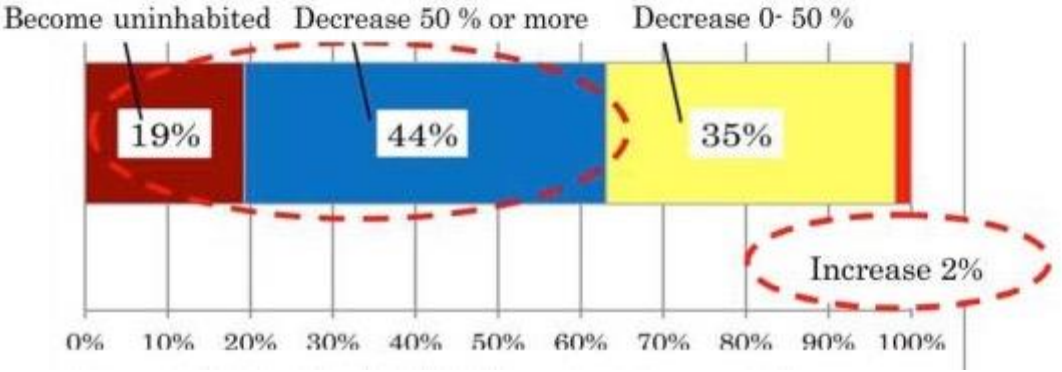
Achieved only if
integrated with social innovations.

Ageing and Declining Population in Japan

Population in 2050 compared with that of 2010

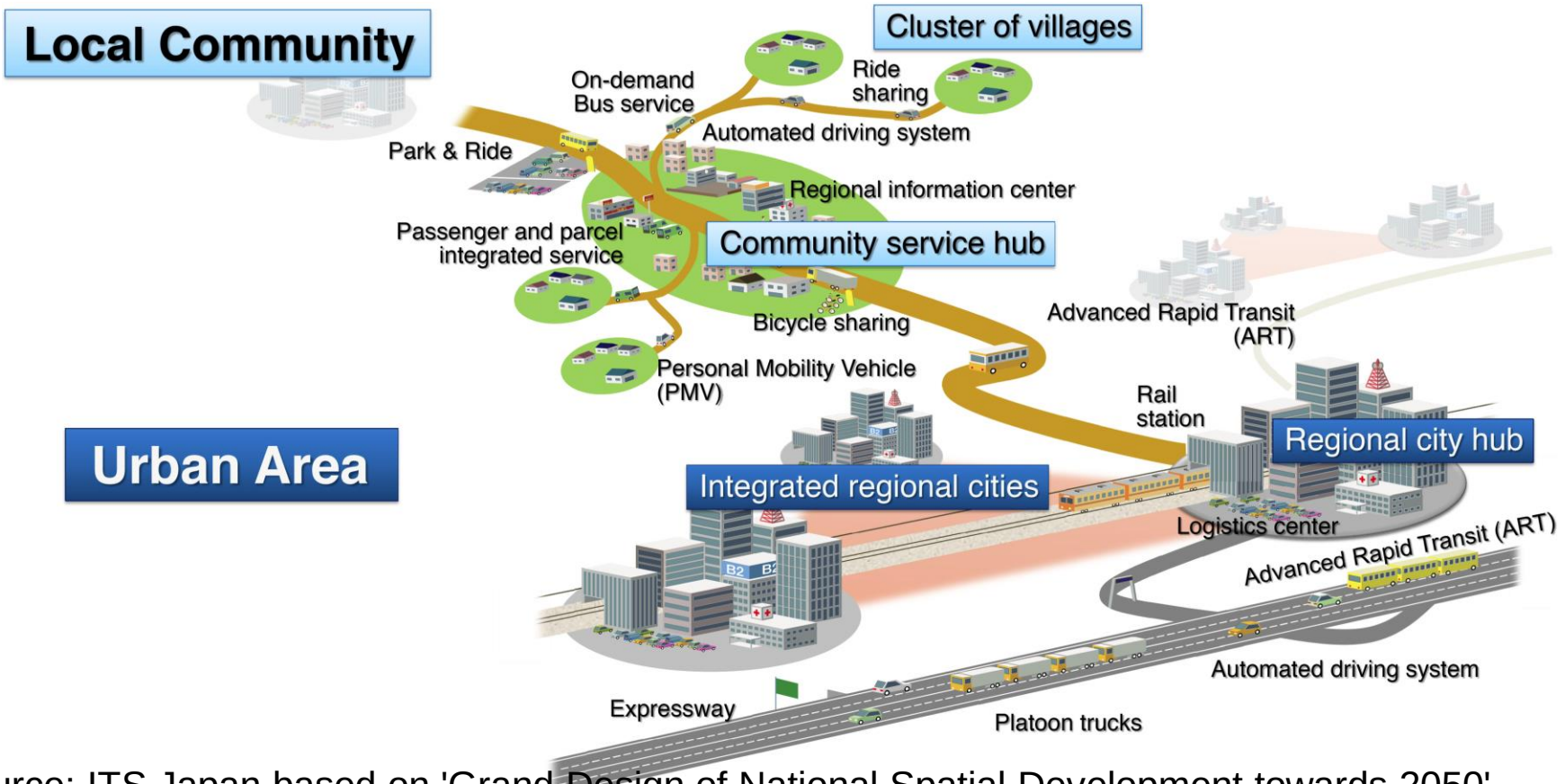


Projected population decrease 2010 to 2050



Source: Ministry of Land Infrastructure, Transport and Tourism

"Grand Design of National Spatial Development"



Source: ITS Japan based on 'Grand Design of National Spatial Development towards 2050'

FOT: Automated Vehicles in Rural Area

People Mobility

Local community

Goods Delivery

Service Hub

Photo: Ministry of Land Infrastructure, Transport and Tourism

Vision: Integrated Mobility for Inclusive Society

Opportunities
for small scale farmers or traditional craftsmen/women

Products

Hub

Hub

Consumers
keen on specialized products

Mobility services
for ageing population and their products

P

Reserved

Residents and visitors

Diversity in workstyle
satellite office and migration of young generation

Businesses
without location restriction

Source: ITS Japan

Sustainable Economic Development

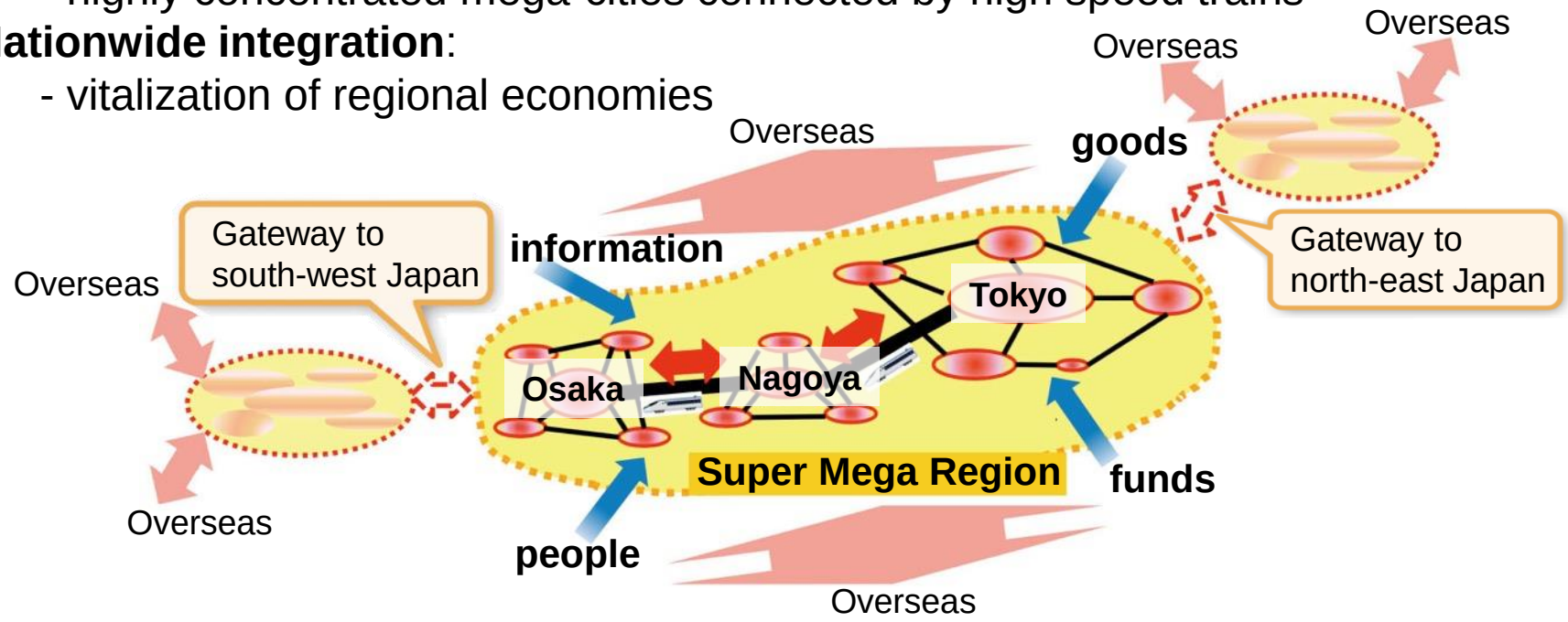
Strategic integration of economic activities with networked transportation

Super Mega Region:

- highly concentrated mega-cities connected by high speed trains

Nationwide integration:

- vitalization of regional economies



Source: Grand Design of National Spatial Development towards 2050

FOT: Truck Platooning

Fully automated platoon

(Unopened section of highway, 2012)

Photo: Japan Automobile Research Institute

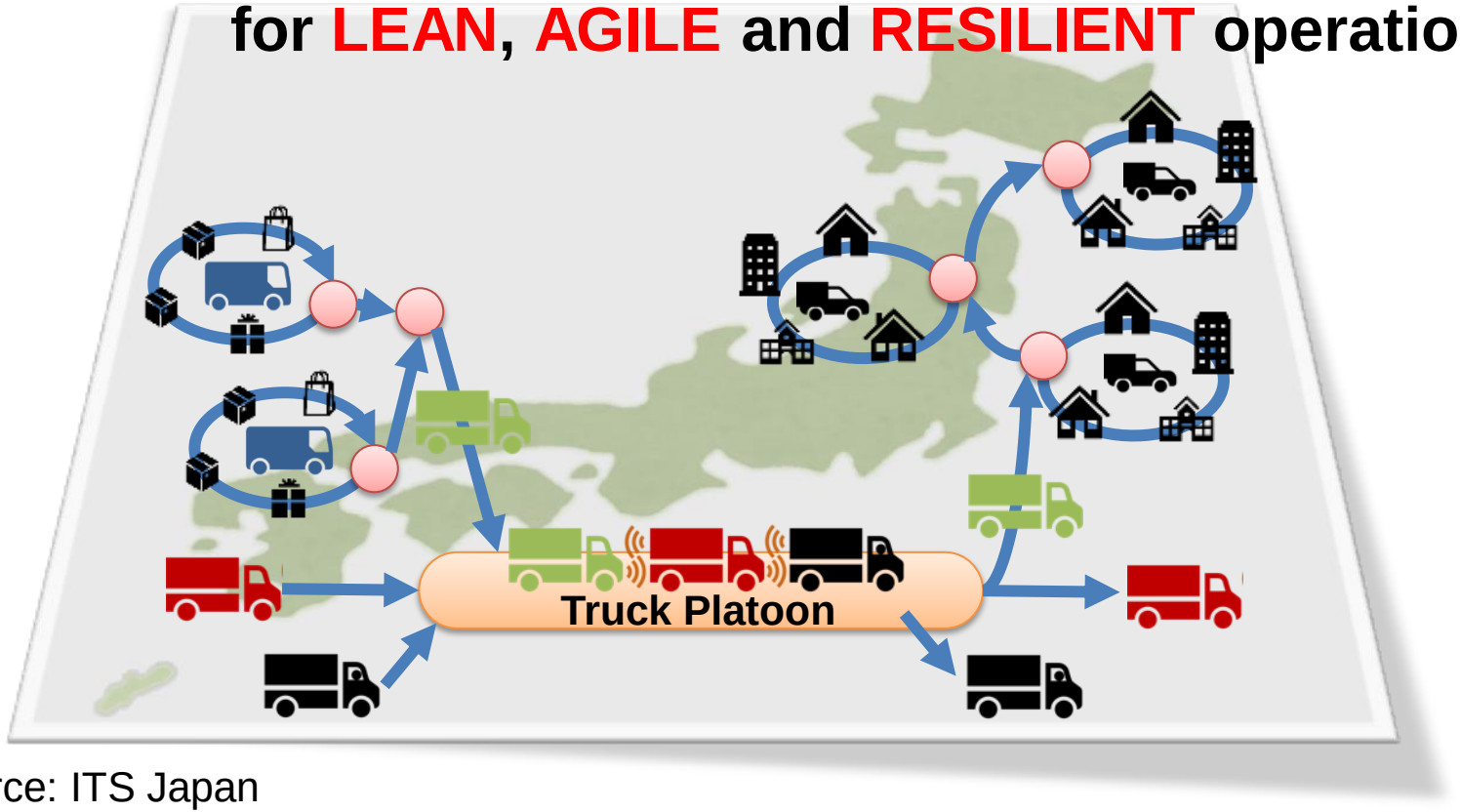
CACC platoon

(Mixed traffic on highway, January 2018)

Photo: Toyota Tsusho Corporation

Vision: Integrated Freight Operations

Connected and Automated Driving for LEAN, AGILE and RESILIENT operation



Source: ITS Japan

Cross-Ministerial Strategic Innovation Promotion program
Innovation of Automated Driving for Universal Services

“SIP- adus”

- Mobility Bringing Everyone a Smile -

Inclusive society, where diverse people in diverse communities actively participate in generating values, will enhance both wellness of individuals and economic development. Automated driving technologies integrated with social innovations should provide everyone with mobility to fully exercise his or her capacity, enabling sustainable development of the society.

5th SIP-adus Workshop

Date: **November 13 – 15, 2018**

Venue: **Tokyo International Exchange Center**

Topics:

1. Regional Activities and Field Operational Tests
2. Report Session from SIP-adus Activities
3. Dynamic Map
4. Connected Vehicles
5. Human Factors
6. Impact Assessment
7. Security
8. Next Generation Transport