

# Automated Driving Activities in Japan

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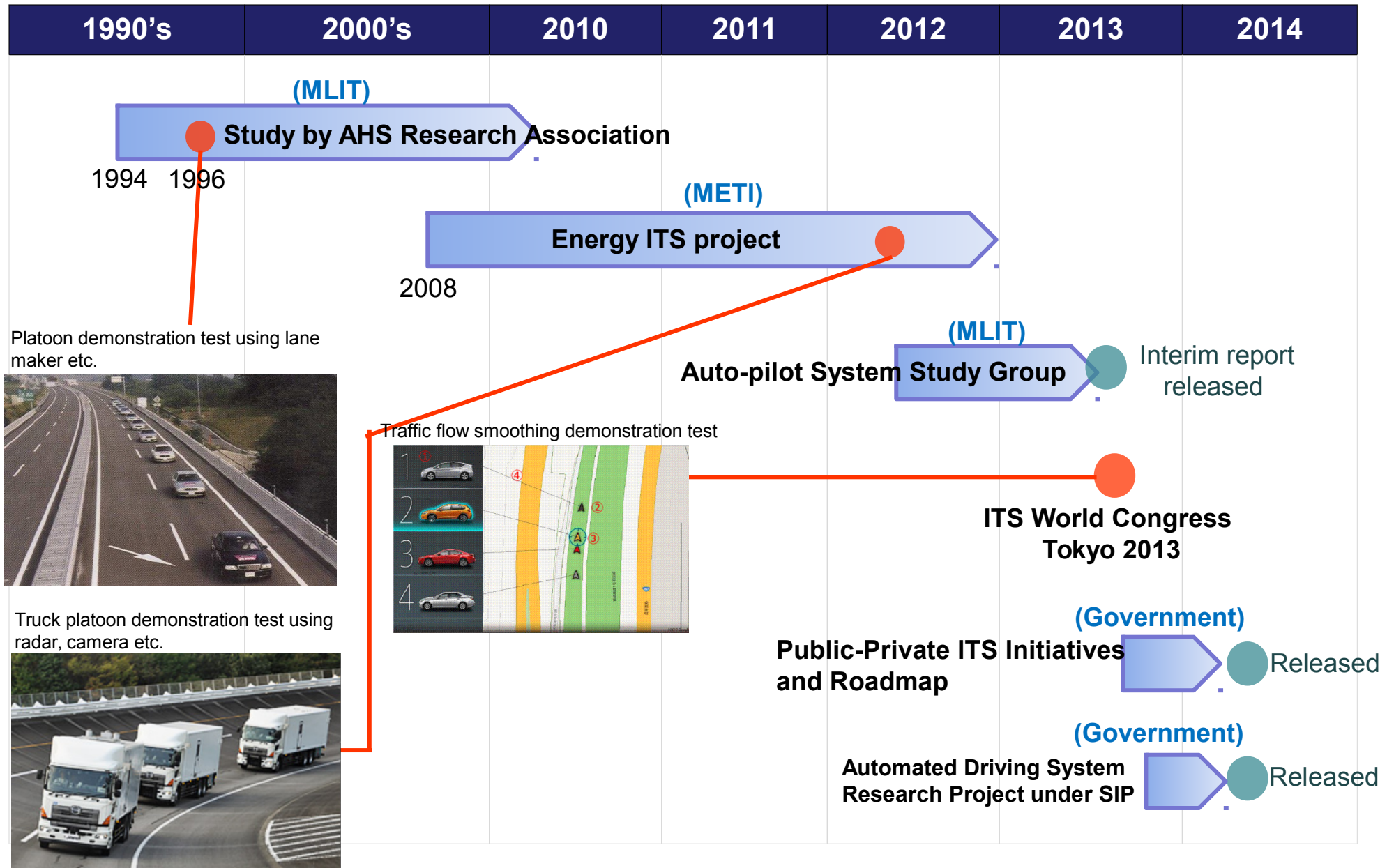
Ministry of Land, Infrastructure, Transport and Tourism ( MLIT )

JAPAN

# Presentation Overview

- 1 . Overview of Automated Driving Activities
- 2 . Auto-pilot System Study Group
- 3 . Tokyo World Congress Demonstration
- 4 . Update on Government-wide Initiatives on Automated Driving
  - Public-Private ITS Initiatives and Roadmap
  - Automated Driving System Research Project under SIP

# 1. Overview of Automated Driving Activity in Japan



## 2 . Auto-pilot System Study Group

- MLIT established the Auto-pilot System Study Group in June 2012.
- The Study Group clarifies and studies challenges to achieve auto-pilot systems

### 1. Purpose

- To compile issues and study the policies needed for achievement in order to make automated driving on expressways (“autopilot systems”) a reality

### 2. Members

- Made up of the Parliamentary Vice-Minister, academia, auto manufacturers, etc

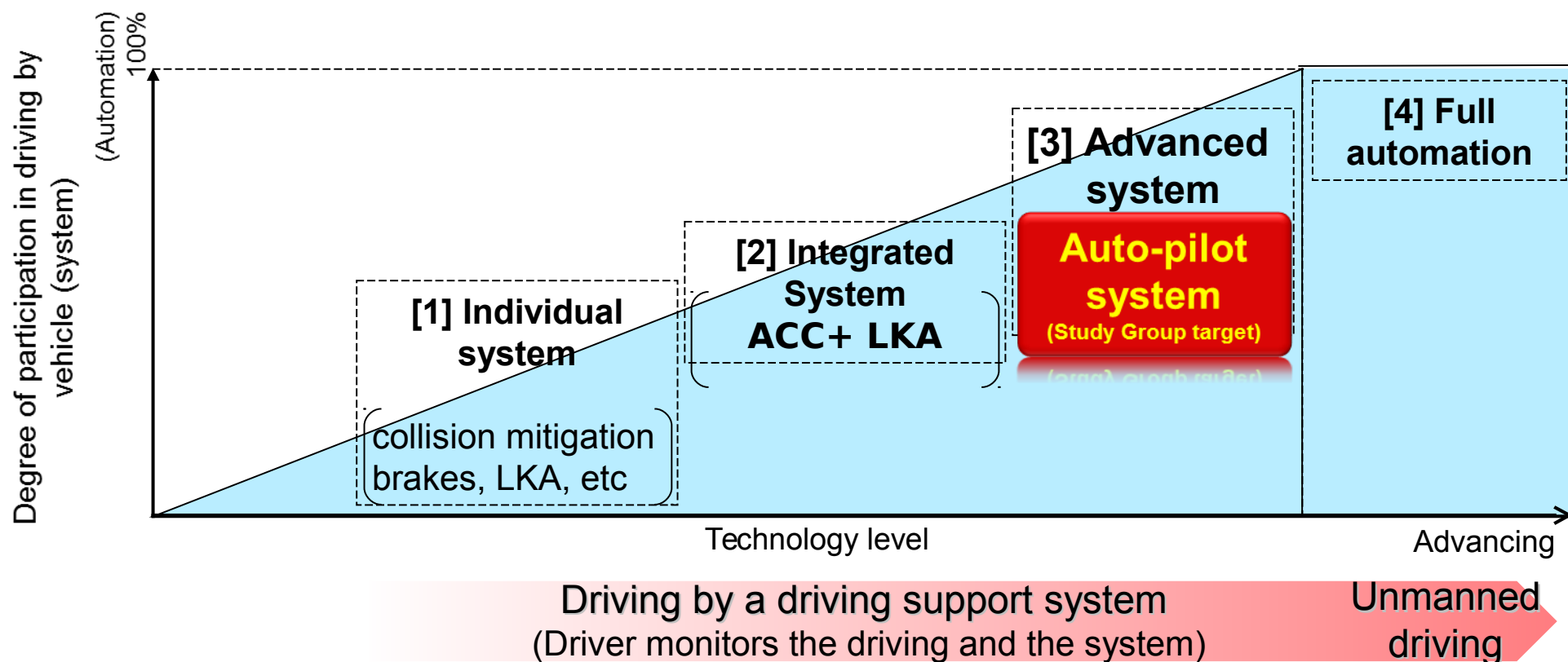
### 3. Principal study contents

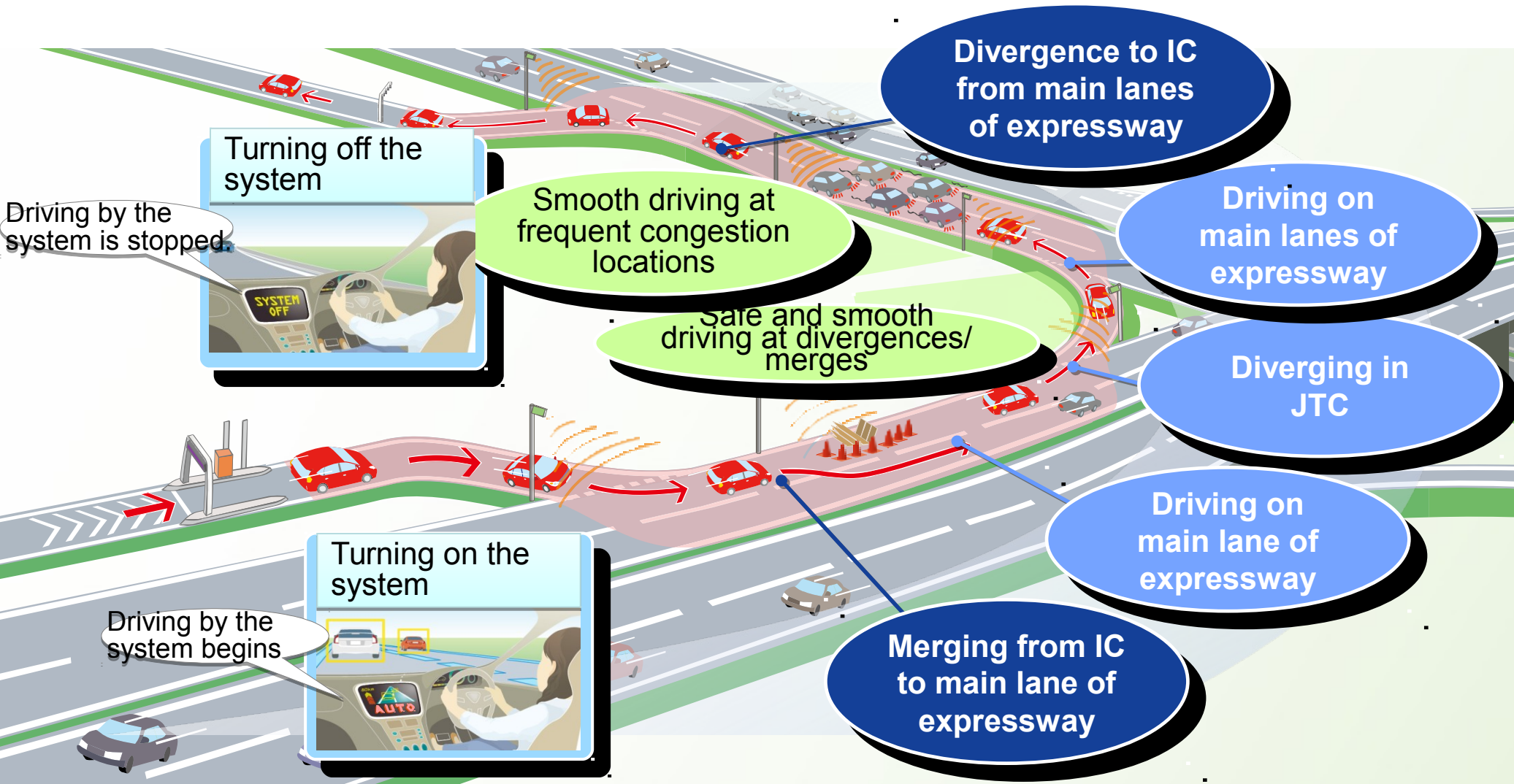
- Study and refine the concept
- Compile matters that must be studied to achieve automated driving



Interim Report was released on October, 2013.

- The Study Group defines 4 levels of driving according to the degree of participation by vehicle system in driving.
- Immediate Target : Level3 on expressways



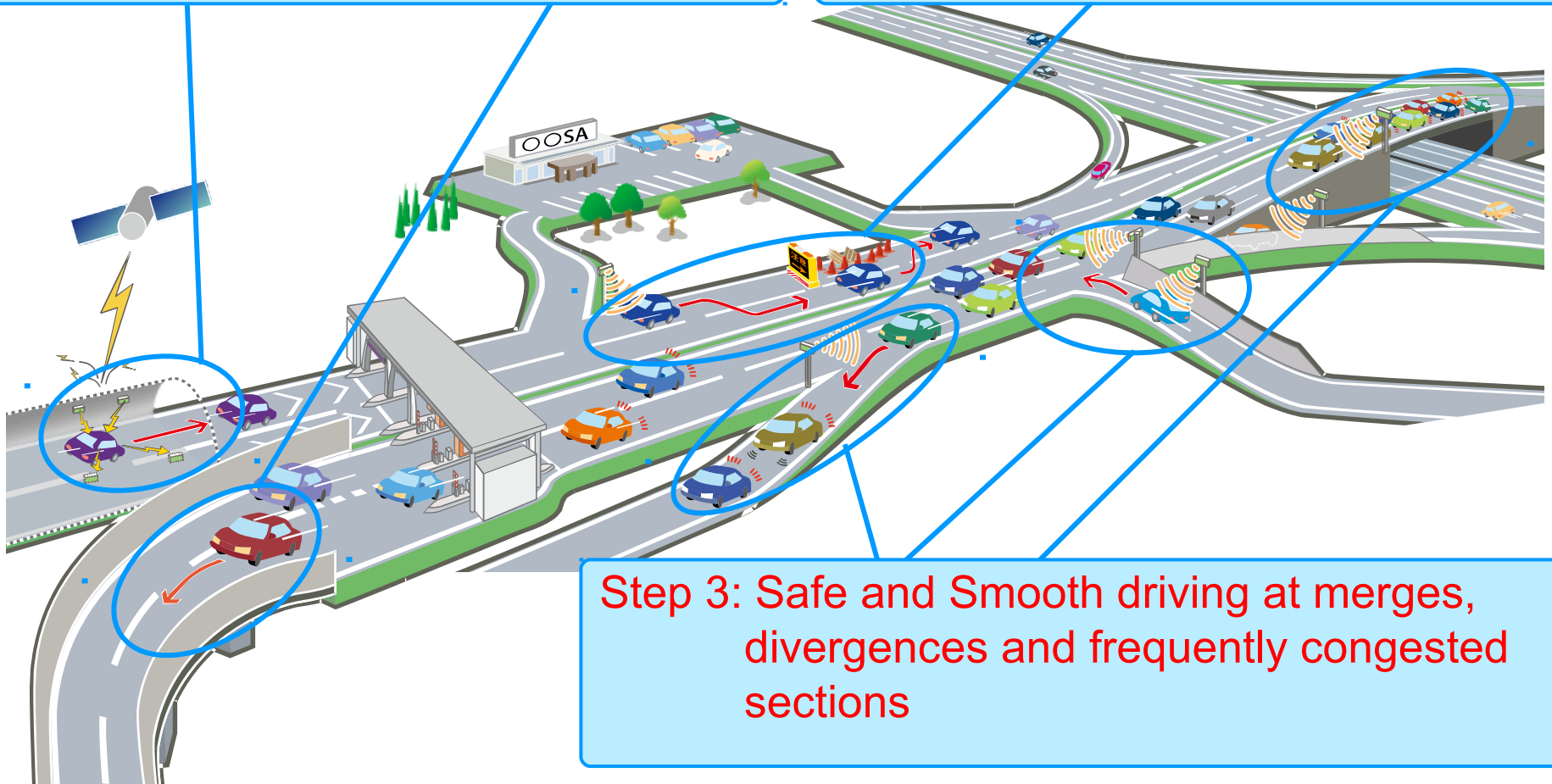


## Step 1: Continuous driving in the same lane

Measures to ensure that there is no loss of ACC and lane departure prevention assistance

## Step2: Driving including lane changing

Measures to make it possible to change lanes in advance)



## Step 3: Safe and Smooth driving at merges, divergences and frequently congested sections



## The cutting edge national cooperative ITS project showcase on the metropolitan Tokyo public road

### Next Generation DSSS (I2V)

Intersection collision avoidance & safe and smooth flow  
utilizing signal information



### Cooperative Advanced Safety Vehicles (V2V, V2P)

Intersection driving support systems by V2V, V2P communication



### Smartway with ACC/CACC (I2V, V2V)

SAG-congestion mitigation service on expressways  
utilizing ITS Spot and ACC/CACC



### ITS Spot Services (I2V)

The world's first cooperative service to support  
safe and comfortable drive



### Mobile and ITS Spot cooperative Services (I2V)

Safe and comfortable urban transportation  
by new traffic information networks





# Increasing social interest

## ■ 3 major tied events

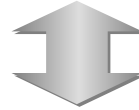
- CEATEC JAPAN
- ITS WORLD CONGRESS TOKYO
- TOKYO MOTOR SHOW

CEATEC : Combined Exhibition of Advanced Technologies

## ■ Prime Minister test ride around the House of Parliament



### 4 ITS-related government agencies



- ※
- National Police Agency,
  - Ministry of Internal Affairs and Communications,
  - Ministry of Economy, Trade and Industry,
  - /
  - Ministry of Land, Infrastructure, Transport and Tourism)

### Government-wide initiatives

#### “Public-Private ITS Initiatives and Roadmap”

IT Strategic Head quarters (Chair : PM) finalized  
In June 3th 2014

- The ITS Strategic Headquarters has established objectives and a roadmap for the use of automated driving systems and traffic data.
  - Definition of automation level for automated driving
  - Clarification of the time of market deployment in accordance with the automation level

Cooperation

#### “Automated Driving System Research Project under SIP”

Council for Science and Technology Innovation  
( Chair : PM ) finalized in May 28th 2014

- Council for Science, Technology and Innovation initiated a research project on automated driving system under “Cross Ministerial Strategic Innovation Promotion Program” (SIP).
  - R&D budget (FY 2014): 2.45 billion yen (: US \$ 24.5 Million)
  - Program Director : Hiroyuki Watanabe, Chairman of ITS Japan

- The following table defines the levels of the automated driving system and the expected time of market deployment for each level.

(Reference) NHTSA Definition	Level	Summary	Technologies Thought to be Needed for Achievement	Expected Time of Market Deployment
<b>Level 0</b> (No-Automation)	Provision of information	Warnings to driver	-	-
<b>Level 1</b> (Function-Specific automation)	<b>Level 1</b> (single function)	One operation (acceleration, steering or control) is performed by the vehicle.	-	-
<b>Level 2</b> (Combined Function Automation)	<b>Level 2</b> (more complex system)	Multiple operations (from among acceleration, steering and control) are performed at the same time by the vehicle.	Tracking / following system	Mid-2010s
			Steering for collision avoidance	
			Automated driving in multiple lanes etc.	Around 2017
<b>Level 3</b> (Limited Self-Driving Automation)	<b>Level 3</b> (advanced system)	All operations (acceleration, steering and control) are performed by the vehicle. (emergency response: driver)	Automated merging etc.	First half of 2020s
<b>Level 4</b> (Full Self-Driving Automation)	<b>Level 4</b> (fully automated driving)	All operations (acceleration, steering and control) are performed by the vehicle (with no assistance from the driver).	Fully automated driving	Second half of 2020s*

※ Assumed period of trial use. However, as many factors are still unclear, the period will be revised as needed.

SIP aims to strongly promote R&D of promising innovative technologies with cross-ministerial coordination

Priority policy issues	Prospective subject	Description
Energy	Innovative combustion technology	Improving fuel efficiency of automobile engines
	Next-generation power electronics	Integrating new semiconductor materials into highly efficient power electronics system
	Innovative structural materials	Developing ultra-strong and -light materials such as magnesium-, titanium-alloys and carbon fibers
	Energy carrier	Promoting R&D to contribute to the efficient and cost-effective technologies for utilizing hydrogen
	Next-generation ocean resources development technologies	Establishing technologies for efficiently exploring submarine hydrothermal polymetallic ore
Next-generation infrastructures	Automated Driving System	Developing new transportation system including technologies for avoiding accidents and alleviating congestion
	Technologies for maintenance/upgrading/ management of infrastructures	Developing low-cost operation & maintenance system and long life materials for infrastructures
	Reinforcement of resilient function for preventing and mitigating disasters	Developing technologies for observation, forecast and prediction of natural disasters
Local resources	Technologies for creating next-generation agriculture, forestry and fisheries	Realizing evolutionary high-yield and high-profit models by utilization of advanced IT etc.
	Innovative design/manufacturing technologies	Establishing new styles of innovations arising from regions using new technologies such as Additive Manufacturing

## Objectives

(1) Achievement of the national goal of reducing traffic accidents

Yearly Traffic accidents fatalities target : 4400(2013) → less than 2500 by 2018

(2) Creation and dissemination of an automated driving system

- |   |                                     |  |
|---|-------------------------------------|--|
| • | Around 2017                         | Level 2 to market  |
| • | First half of 2020s                 | Level 3 to market  |
| • | Second half of 2020s and thereafter | Trial use of Level 4<br>(fully automated driving system) |

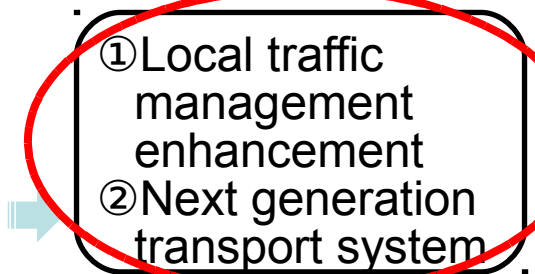
(3) Dramatic improvement with the Tokyo Olympics and Paralympics as a milestone

## Policy

- Cross- Ministerial & Public-Private collaboration with the participation of ITS related ministries and five auto manufacturers(Toyota, Nissan, Honda, Mazuda, Subaru)



## [III] International cooperation



## [IV] Deployment for next generation urban transport

- Area of Cooperation  
= Area of SIP

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## Steering Committee for SLP Automated Driving Research Project

### System Implementation WG

- Development of technologies for the advancement of map data
- Development of technologies for micro and macro data analysis and simulation (to reduce traffic accident fatalities and reduce traffic congestion)
- Research into the roles of the driver and the automated driving system
- Use of pedestrian communication terminals to determine pedestrian movement tendencies and provide assistance for pedestrian movement

### International cooperation WG

- Building of international cooperation
- Building of an open international research and development environment (open international research center)
- Fostering of social acceptance of the automated driving system

### Next Generation Urban Transportation WG

- Advanced management of local transportation systems
- Development of a next-generation public road transport system
- Development of systems to assist pedestrians and vulnerable road users

More detailed and updated information on SIP AD Research Project:

## ITS World Congress    Detroit 2014    SIS72

- Date : Thursday, September 11, 8:30-10:00
- Title : Automated Driving Technology Research in Japan
  - Strategic Innovation Promotion Program
- Moderator :        Hajime Amano, President and CEO of ITS Japan
- Speaker :    -Hiroyuki Watanabe, Program Director of SIP AD Research Project

-others

## International Workshop on Connected and Automated Driving system

- Date :        November 17-18, 2014
- Venue : Tokyo, Japan

***Thank you for your kind  
attention***