Public-Private ITS Initiative/Roadmaps

- Strategies on Automated Driving Systems and the Utilization of Road Transport Data to Build a Society with the World's Safest and Smoothest Road Traffic -

June 3, 2014

The Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society (IT Strategic Headquarters)

Table of Contents

1. Introduction and Definitions
- (1) Introduction
- (2) Definitions of Safety Driving Support Systems and Automated Driving Systems

2. Future Direction of the Progress of ITS

3. Relationship Between Safety Driving Support Systems/Automated Driving Systems and Structure for the Utilization of Road Transport Data

4. Social and Industrial Goal by Japan Through ITS

5. Direction of ITS-Related Measures to Achieve the Goals

6. Strategy Related to Safety Driving Support Systems and Automated Driving Systems
- (1) Overall Strategy Related to Safety Driving Support Systems and Automated Driving Systems
- (2) Strategy Related to Safety Driving Support Systems
- (3) Strategy Related to Automated Driving Systems

7. Strategy Related to the Utilization of Road Transport Data
- (1) Positioning of Traffic-Related Data and Future Direction
- (2) Preparation and Public Disclosure of Traffic-Related Data Through Public-Private Collaboration (Open Data)
- (3) Examination of Preparation of the Structure to Promote Public-Private Collaboration in Linking Information

8. Cross-Sectional Efforts to Prepare the World's Most Advanced ITS

9. Roadmaps

10. Method of and Structure for Moving Forward
- (1) Method of Moving Forward
- (2) Structure for Promotion (Organization to Promote Public-Private Collaboration)

1. Introduction and Definitions

(1) Introduction

(2) Definitions of Safety Driving Support Systems and Automated Driving Systems

(1) Introduction Part 1

The Public-Private ITS Initiative/Roadmaps have been discussed and reviewed at the Road Transport Committee formed under the Specialized Committee to Body for New IT Strategy Promotion of the IT Strategic Headquarters. It is based on the specific description found in the Roadmap of the Declaration to be the World's Most Advanced IT Nation decided by the IT Strategic Headquarters in June 2013: "examining and developing a public-private ITS initiative and roadmaps where goals are set for about 10 to 20 years from now. "

In recent years, we have gone through striking innovation in Intelligent Transport Systems (ITS), particularly Automated Driving Systems. In the 20th ITS World Congress Tokyo 2013 held in October 2013, numerous manufacturers both from Japan and abroad demonstrated their Automated Driving Systems and made a statement about their commercialization efforts, all of which show we are entering the competitive age for practical application and popularization of Automated Driving Systems on a global scale. In November of the same year, the related ministries and agencies worked in concert to conduct a demonstration experiment in a full-fledged Automated Mobility System on public roads, the first such attempt in Japan, with the presence of Prime Minister Shinzo Abe; Minister of Economy, Trade and Industry Toshimitsu Motegi; and Minister of State for IT Policy Ichita Yamamoto. These facts indicate that this fiscal year marks the first year for the popularization of Automated Driving Systems.

We also expect that new next-generation services will be provided, operations become more efficient, and new industries created through the use of a large variety of data (big data) that may be generated, collected, and accumulated as information communications technologies advance. We expect to see innovation in the area of ITS as, for example, the construction of an environment for using traffic-related public-private data would allow us to provide an advanced level of services that has never been seen before.

(1) Introduction Part 2

While Japan's automobile industry has the world's highest level of technology and ITS-related infrastructure built by the government has been the most advanced in the world, it is not easy to maintain the relative advantage that it has enjoyed so far as great innovation efforts in ITS are being made all over the world.

Based on the above idea and the goal of **building and maintaining the world's leading ITS and contributing to Japan and the rest of the world**, the Initiative/Roadmaps focus on (1) Safety Driving Support Systems and Automated Driving Systems and (2) the Utilization of Road Transport Data. The initiative is intended to ride a wave of striking innovation and show the direction to which the private sector and related ministries and agencies should go together as well as specific roadmaps.

Both the private and public sectors are expected to work closely according to the roadmaps to achieve the goals of cutting down on traffic fatalities to 2,500 or lower by around 2018 and realizing a society with the world's safest road traffic by 2020, which were included in the Declaration to be the World's Most Advanced IT Nation. They are also expected to achieve the new goals for 10 to 20 years to come, which are to be set in the future. In addition, the roadmaps will also be reviewed through the yearly PDCA cycle based on the assumption that ITS-related technologies and industries will rapidly change.

(2) Definitions of Safety Driving Support Systems and Automated Driving Systems

- Based on the definitions found in the Plan for the Advancement of Driving Support Systems,* Safety Driving Support Systems are classified into Informational and Automated. Automated systems are then grouped into four levels.

  *: The Plan for the Development of Driving Support Systems was formulated in October 2013 by the Liaison Conference by Related Government Agencies for the Formulation of the Plan for the Advancement of Driving Support Systems.
- Full Automated Driving Systems are different from the conventional concept of automobiles; we assume that they will be used in a completely different manner. We will start from examining how society should be if cars drive down a road with no one inside (including the aspect of social receptivity), and discuss the institutional aspect as necessary.

[Definitions of Safety Driving Support Systems and Automated Driving Systems]

<table>
<tr><th colspan="2">Categories</th><th>Outline</th><th colspan="2">Systems that Realize What is Stated in the Left</th></tr>
<tr><td colspan="2">Informational</td><td>Alerting drivers</td><td colspan="2" rowspan="2">Safety Driving Support Systems</td></tr>
<tr><td rowspan="4">Automated</td><td>Level 1:
Stand-alone</td><td>Any of the acceleration, steering, or braking operations is done by the automobile.</td></tr>
<tr><td>Level 2:
Compounding of systems</td><td>More than one of the acceleration, steering, and braking operations is done by the automobile at the same time.</td><td rowspan="2">Semi-Automated Driving Systems</td><td rowspan="3">Automated Driving Systems</td></tr>
<tr><td>Level 3:
Advancement of systems</td><td>All of the acceleration, steering, and braking operations are done by the automobile. (Drivers respond to emergencies.)</td></tr>
<tr><td>Level 4:
Full automated driving</td><td>All of the acceleration, steering, and control operations are done by the automobile (other than drivers).</td><td>Full Automated Driving Systems</td></tr>
</table>

Note 1: In some cases, Safety Driving Support Systems are considered to include Levels 2 and 3 as they did not used to be clearly defined. However, for the purpose of the Roadmaps, Safety Driving Support Systems are defined as Informational Type and Level 1 systems.

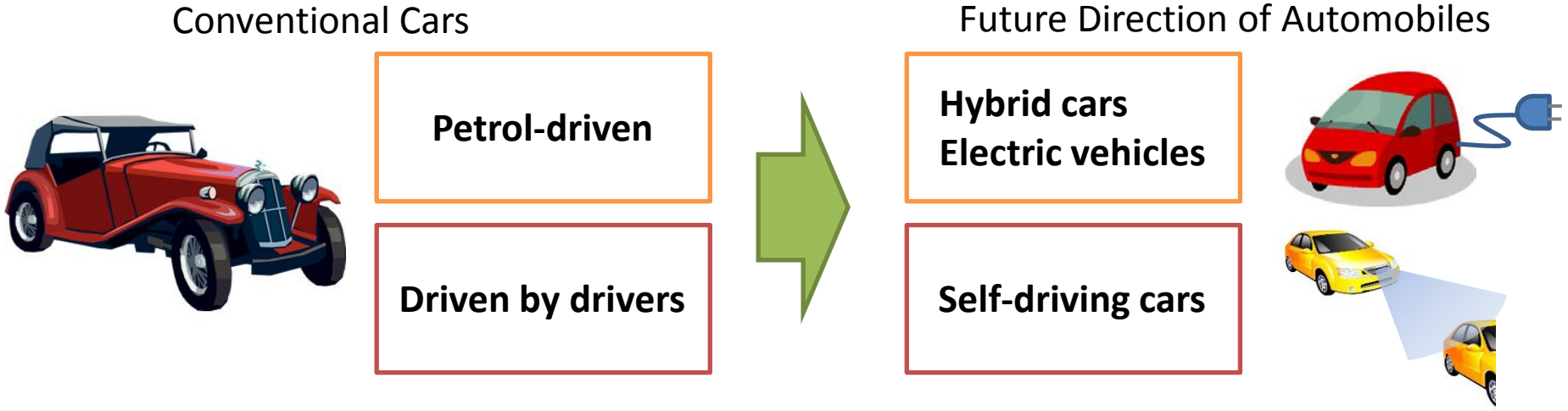
Note 2: Systems of Level 2 or higher are called Automated Driving Systems because we can let the car operate itself for a certain distance as multiple operations of an accelerator (acceleration), a steering wheel (steering), and a brake (braking) are done automatically.

2. Future Direction of the Progress of ITS

2. Future Direction of the Progress of ITS

- While we have seen gradual innovation for over a century since the invention of automobiles, the basic structure (e.g. petrol-driven, human drivers) has remained the same.
- Judging from the trend toward self-driving cars associated with the advancement of IT and networking, along with the trend toward hybrid cars and electric vehicles, we expect that there will be discontinuous and disruptive change and innovation in the basic structure of automobiles for the coming 10 to 20 years.
- In recent years, self-driving cars have drawn increasing attention both in Japan and abroad as there has been a report about some IT companies abroad embarking on the development of self-driving cars.*
- Since the automobile business is the biggest export industry for Japan, it is necessary to adapt to such a major change in innovation and continue to maintain and build the world's most advanced ITS.

[Future Changes in the Structure of Automobiles]



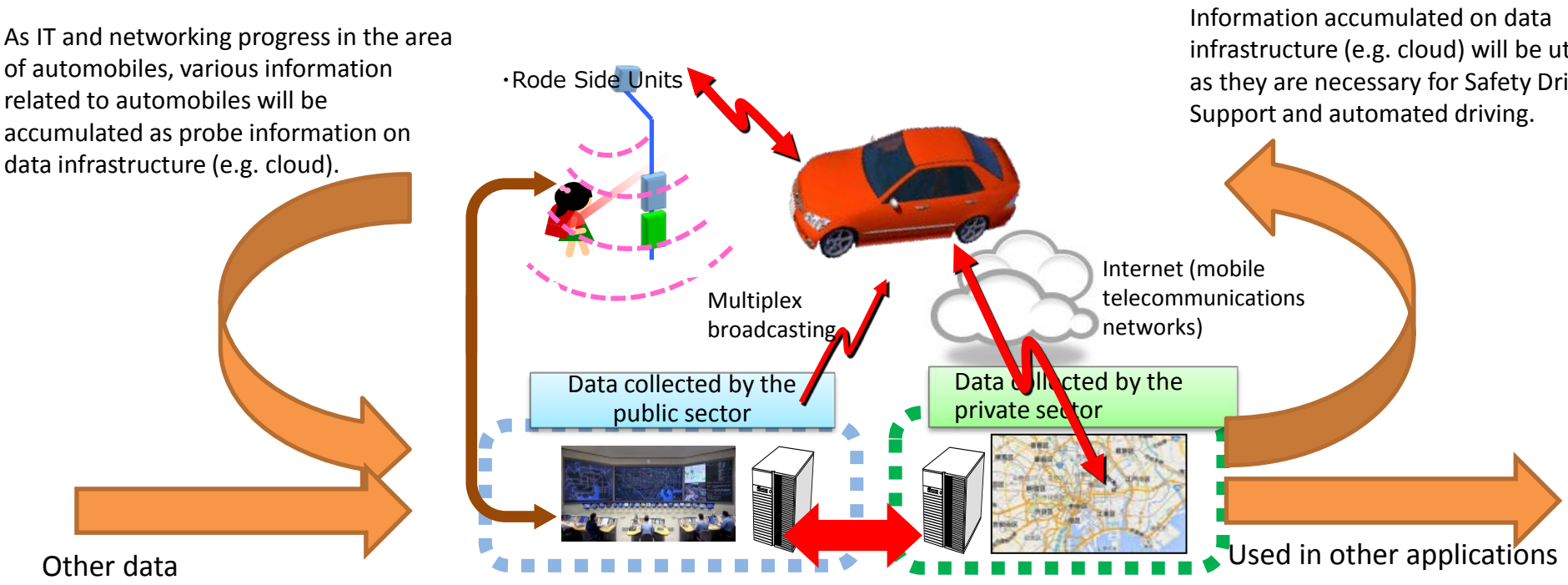
*: Google Inc. has conducted driving experiments on public roads since 2010.

3. Relationship Between Safety Driving Support Systems/Automated Driving Systems and the Structure for the Utilization of Road Transport Data

■ Relationship Between Safety Driving Support Systems/Automated Driving Systems and the structure for the Utilization of Road Transport Data

- As IT and networking will progress in the area of automobiles, it is believed that the structure for the Utilization of Road Transport Data will evolve as information infrastructure along with the development of self-driving cars.
- For this reason, the Initiative targets (1) Safety Driving Support and Automated Driving Systems and (2) the Utilization of Road Transport Data as information infrastructure.

[Relationship Between Automobiles and the Structure for the Utilization of Road Transport Data]



4. Social and Industrial Goal by Japan Through ITS

Image of Society that the Public and Private Sectors should Attain

- Looking further into the coming 10 to 20 years, we have added the following two goals in terms of industry and society, given the prospect of a major change in innovation in ITS, mainly in Automated Driving Systems:
  - Social aspect: Japan aims to build a society with the world's safest road traffic by 2020, and by developing and popularizing Automated Driving Systems and preparing data infrastructure subsequently, it also aims to build and maintain a society with the world's safest and smoothest road traffic by 2030.
  - Industrial aspect: Japan aims to become the major player in innovation related to Automated Mobility Systems (including the preparation of data infrastructure) from 2020 onward through the public-private collaboration in expanding the export of ITS-related vehicles and infrastructure.
- We will strategically exploit opportunities offered by the 2020 Tokyo Olympic and Paralympic Games to become the major player in innovation related to Automated Driving Systems.

Concrete Images of a Society with the World's Safest and Smoothest Road Traffic

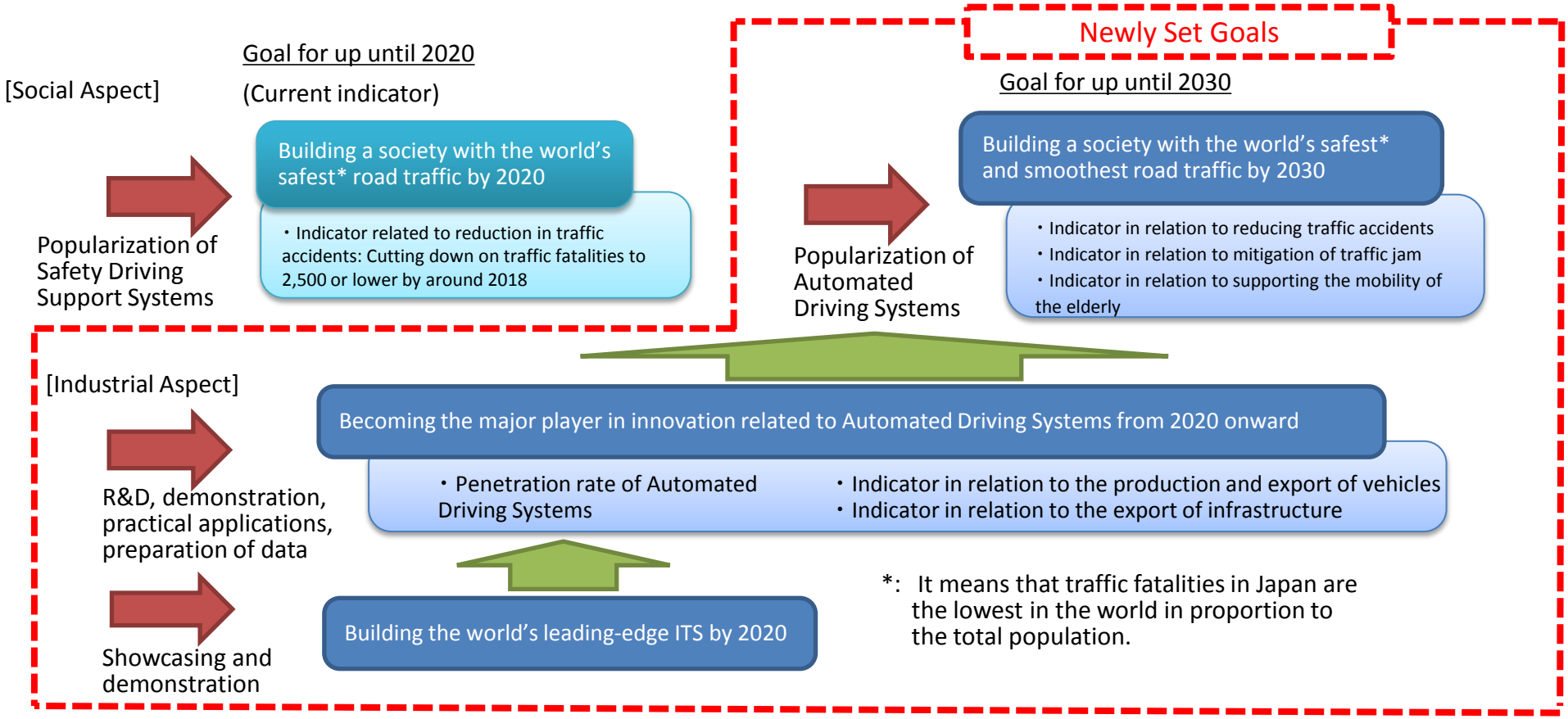
- Automated Driving Systems to be popularized will ensure driving safety that exceeds the level of experienced drivers. If such Automated Driving Systems with this level of capability become popular, the society we live in would be almost free from traffic accidents.
- Individual Automated Driving Systems would decide on the most suitable route and set speed patterns and other parameters with the understanding of the status of traffic congestion in the surrounding and broader areas. As a whole, there would be a flow of optimum road traffic where traffic congestion has been significantly reduced.
- Although they have a driver's license, some people, including the elderly, are unable to drive safely. Such people would take advantage of Automated Driving Systems so that they can go out easily with younger people and be part of society.

4. Social and Industrial Goal by Japan through ITS Part 2

■ Setting Social and Industrial Goals

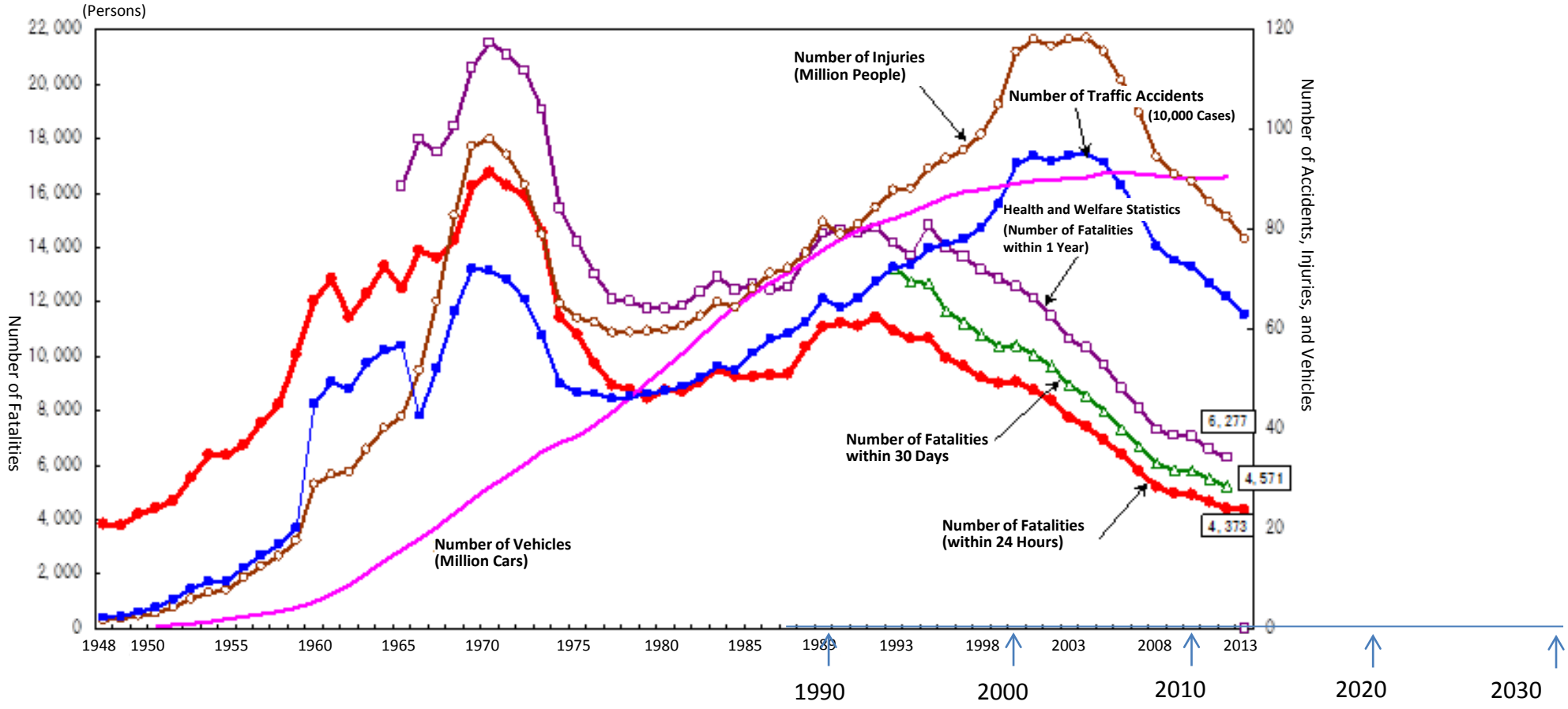
- Before various measures are taken, we will establish indicators for achieving socially important goals from the viewpoints of reducing traffic accidents, mitigation of traffic jam, and supporting the mobility of the elderly. Industrial indicators will also be established in relation to the popularization of Automated Driving Systems, the production and export of vehicles, and the export of infrastructure.
- Specific value to be targeted will be examined and set from the viewpoint of becoming the world's best.

[Society and Indicators for Achieving Important Goals Targeted for the Initiative]



■ Shift in Traffic Fatalities and Other Indicators in Recent Years

- Traffic fatalities in 2013 were 4,373 and the number of injuries was 780,000.
- While traffic fatalities and injuries are on a declining trend in the medium and long term, traffic fatalities are not easily reduced.



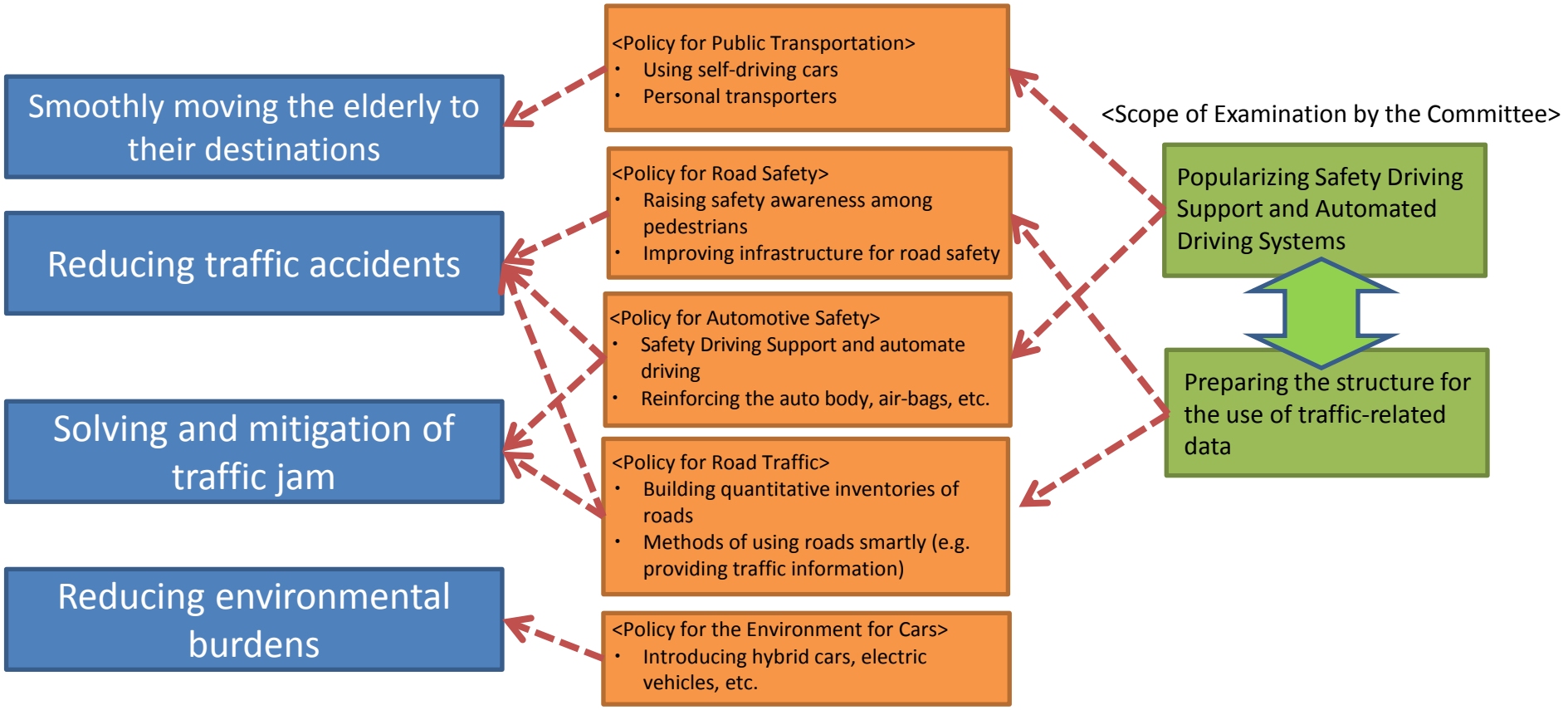
(Source: Characteristics of Fatal Traffic Accidents and Status of Crackdown on Violations of the Road Traffic Act in 2013)

5. Direction of ITS-Related Measures to Achieve the Goals

■ Strategic Priority Measures to Achieve the Goals and Targeted Indicator Levels

- We will strategically focus on the technologies and measures related to the development and popularization of Safety Driving Support Systems and Automated Driving Systems and the preparation of the structure for the Utilization of Road Transport Data, which are effective in achieving the targeted indicator levels.
- It is necessary to clarify a logic model using the various policies for achieving the targeted indicator levels, and then work on achieving the targeted indicator levels in conjunction with these policies.

[Logic Model for Achieving the Targeted Indicator Levels (Examples)]*

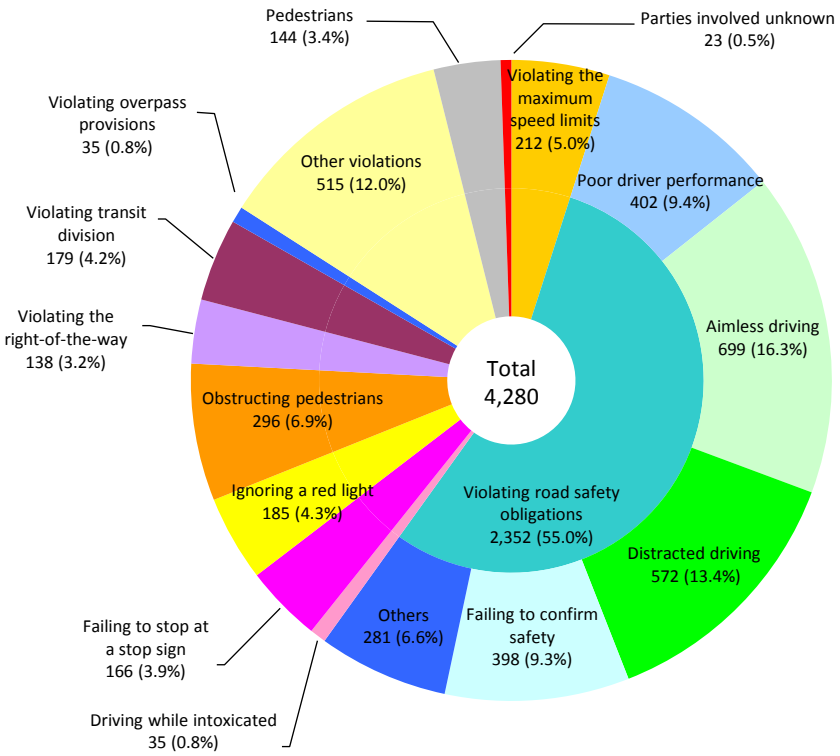


*: The above logic model is for illustrative purposes only and the elements that are not connected with arrows do not necessarily lack connections.

■ Roles of ITS in Efforts to Reduce Traffic Fatalities

- Most traffic fatalities are attributable to violating road safety obligations (including poor driver performance, aimless driving, distracted driving, and failed safety confirmation), failing to stop at stop signs, ignoring a red light, etc.
- Therefore, by introducing safety driving support systems and other measures, we can reduce traffic accidents by providing cautionary information to drivers.

Number of Traffic Fatalities by Specific Legal Violation (2012)



(Source: White Paper on Traffic Safety in Japan 2013)

Categories of Measures Related to Road Safety

<Preventive Measures against Traffic Accidents>

Measures Related to Road Infrastructure

Improving the safety of pedestrians
Improving infrastructure for road safety

Measures Related to Vehicle Safety

Safety standards
Tests, inspection and maintenance
Popularization and development of advance safety vehicles (ASVs)

ITS

Measures Related to People

Ensuring safe driving (driver's licenses, management and guidance for safe driving)
Ideas of road safety (education on road safety, publicity and education campaigns)
Order of road safety (guidance and crackdown, investigation on accidents and incidents, etc.)

<Measures Taken after Traffic Accidents>

Enhancing rescue and first-aid activities
Victims support (helping victims properly making a claim for damages)

■ Approach to KPIs Related to the Promotion of ITS Measures

- KPIs will be set in relation to (1) Safety Driving Support Systems and Automated Driving Systems and (2) the Utilization of Road Transport Data, with the measures contributing to achieve the goals in mind. The existing KPIs in the Japan Revitalization Strategy and other plans will be taken into account, and the indicators will relate to the popularization (e.g. the number of units in use, a penetration rate) and industrial competitiveness (e.g. the global market share, export) of (1) and (2).
- Methods of measuring the new KPIs are to be examined in the future.

[KPIs Related to (1) Safety Driving Support Systems and Automated Driving Systems and (2) the Utilization of Road Transport Data (Examples)]

Categories for ITS	Key Performance Indicators (KPIs) in Relation to the Popularization and Competitiveness of ITS
Development and promotion of (1) Safety Driving Support Systems and (2) Automated Driving Systems	<Popularization and Industrial Competitiveness of Safety Driving Support Devices/Systems> Note: The following two KPIs are from the Japan Revitalization Strategy. • Mounting Driving Safety Support Devices/Systems on 20% of vehicles in Japan (on the inventory basis) and achieving 30% of the global market share in 2020. • Installing Safety Driving Support devices/systems as standard equipment in new cars sold in Japan and on almost all inventories in 2030. <Popularization of Automated Driving Systems> • A penetration rate of Automated Driving Systems installed on vehicles in Japan • A global market share of Automated Driving Systems (e.g. taking or maintaining the No. 1 position by 2030)
Preparation of the structure for the Utilization of Road Transport Data	• Number of categories for traffic-related data made available to the Japanese people • Number of exports of infrastructure and technologies that include traffic data

[Relationship Between Overall Goals/Indicators for Achieving Important Goals and ITS-Related KPIs (Overall Picture)]

・Value will be set from the viewpoint of becoming the world's best.

	Goals	Indicators for Achieving Important Goals
Social goals	・Society with the world's safest road traffic (2020) ↓ ・Society with the world's safest and smoothest road traffic (2030)	• Indicator related to reduction in traffic accidents • Indicator related to the status of traffic congestion • Indicator related to the support of the mobility of the elderly
Industrial goals	・Becoming the major player in global ITS-related innovation (2020–2030)	• Indicator related to the production and export of vehicles • Indicator related to the export of infrastructure

<Logic Model>
- Policy for public transportation
- Policy for road safety
- Policy for automotive safety
- Policy for road traffic

Tokyo Olympic and Paralympic Games 2020

Tokyo will be showcased.

・Value will be set from the viewpoint of becoming the world's best.

ITS Elements Targeted	KPIs
Development and promotion of Safety Driving Support Systems and Automated Driving Systems	<Safety Driving Support Devices/Systems> • Goal for popularizing Safety Driving Support devices/systems • Goal for capturing the market for Safety Driving Support devices/systems <Popularization of Automated Driving Systems> • Penetration rate in vehicles in Japan • Goal for capturing the market for autonomous cars
Preparation of the structure for the Utilization of Road Transport Data	e.g. • Number of categories for traffic data made available to the Japanese people • Number of exports of infrastructure and technologies that include traffic data

Building the world's most advanced ITS by 2020

・Taking advantage of the Tokyo Olympic and Paralympic Games

6. Strategy Related to Safety Driving Support Systems and Automated Driving Systems

(1) Overall Strategy Related to Safety Driving Support Systems and Automated Driving Systems

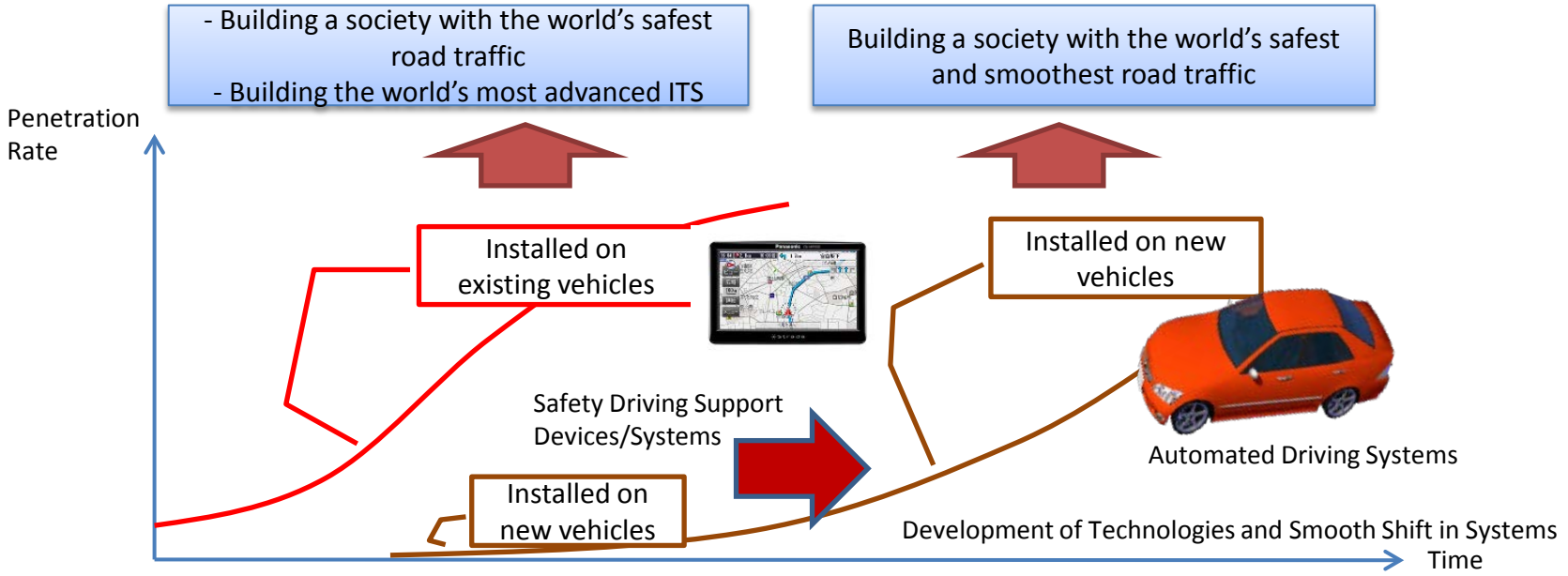
(2) Strategy Related to Safety Driving Support Systems

(3) Strategy Related to Automated Driving Systems

■ Overall Strategy Related to Safety Driving Support Systems and Automated Driving Systems

- As technologies advance, the belief is that the technological level will advance from Safety Driving Support devices/systems to Automated Driving Systems and they will become popular.
- In this regard, the following strategies for development and popularization will be implemented in parallel in the immediate future:
  - Building a society with the world's safest road traffic by 2020 (cutting down on traffic fatalities to 2,500 or lower by 2018) by implementing and popularizing Safety Driving Support devices (Informational Type) mounted on existing vehicles.
  - Building a society with the world's safest and smoothest road traffic by 2030 by popularizing Automated Driving Systems mounted on new vehicles with future deployment to overseas in mind.

[Strategy Related to the Popularization of Safety Driving Support Systems and Automated Driving Systems (Image)]

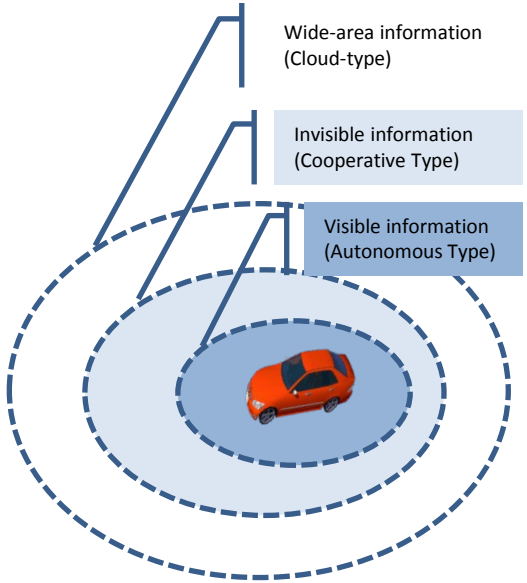


■ Strategy for Autonomous and Cooperative Architecture to Expand Automated Driving Systems (1)

- Safety Driving Support Systems/Automated Driving Systems collect information on the surroundings of the vehicle, including the presence of obstacles, analyze and judge it with its intelligence element, and reflect the result in the operation of the vehicle and provide the information to the driver.
- Methods of collecting information on the surroundings can be roughly classified into Autonomous Type and Cooperative Type.
- Such methods/technologies are not contradictory to each other; introducing more than one technology allows us to makes possible more advanced Safety Driving Support Systems and autonomous systems based on a variety of information.

[Categories of Technologies for Information Collection for Safety Driving Support /Automated Driving Systems]

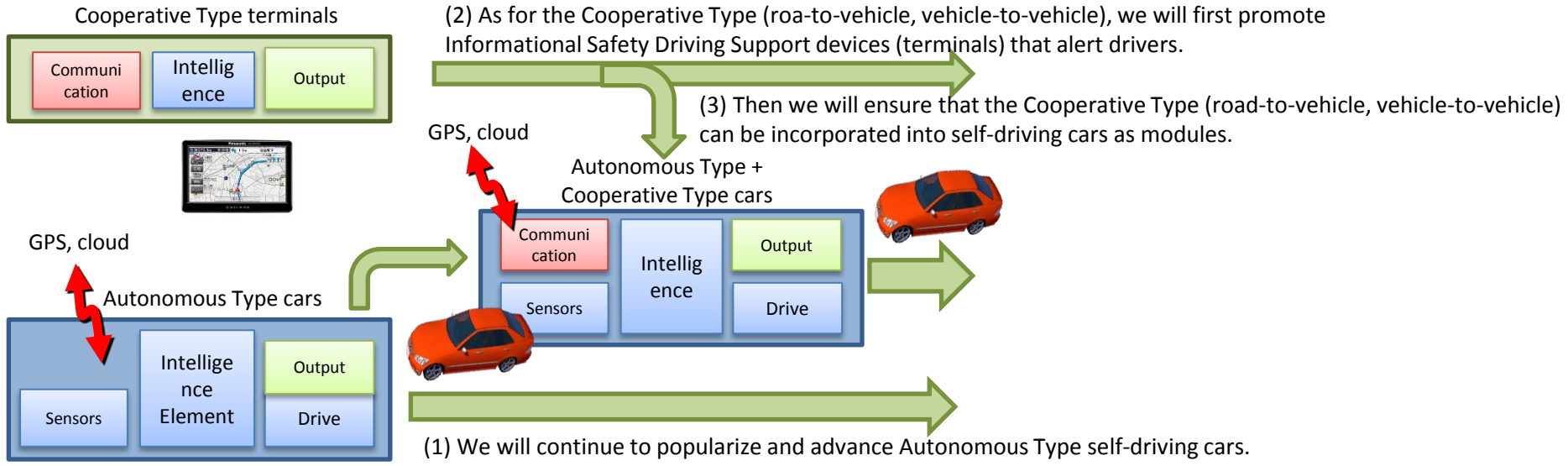
Categories of Technologies for Information Collection		Description of Technology (Method of Obtaining Information)	Characteristics
Autonomous Type		Recognizing information on obstacles and other items via radars and cameras installed on vehicles	・It works in almost all locations. ・Obstacles and other items may be recognized as long as they are visible. Depending on methodology, it is influenced by the weather, contrasting, and other elements in the surrounding environment. ・It is high in immediacy.
Cooperative Type (in a broad sense)	Mobile	Recognizing the positional information via GPS and various information on a cloud-based map	・It works in almost all locations. ・It can collect wide-area information. ・It lacks immediacy.
	Road-to-vehicle communications	Collecting information on the surrounding from the devices installed on the road infrastructure	・It works at the place where infrastructure has been installed. ・Information on the surroundings and the wide area is also available. ・It is high in immediacy.
	Vehicle-to-vehicle communications	Collecting information on the position and speed of the vehicle from the devices installed on other vehicles	・It works when other vehicles have them installed. ・More detailed information than what other vehicles provide is available in invisible locations. ・It is high in immediacy.



■ Strategy for Autonomous and Cooperative Architecture to Expand Automated Driving Systems (2)

- As is the case with overseas, mainly private businesses have taken the lead in developing the Autonomous Type in Japan, while the public and private sectors have worked together to develop the Cooperative Type, and the government has taken the initiative in preparing an environment for the infrastructure.
- We need a strategy to integrate the Autonomous Type with the Cooperative Type as the systems advance from Safety Driving Support to automated driving.
- As a rule, the following steps will be followed in the strategy related to the integration of the Autonomous Type and the Cooperative Type (e.g. road-to-vehicle, vehicle-to-vehicle):
  - Promoting to further popularize and advance Autonomous Type automobiles (Level 1 or higher) while ensuring the basic safety and other elements with Autonomous Type
  - As for Cooperative Type Popularizing Informational Type Safety Driving Support Devices equipped with an alert function along with the preparation of infrastructure
  - Adding and integrating Cooperative Type functions as modules to Autonomous Type vehicles as necessary, keeping in mind the advantage of obtaining more information through Cooperative functions

[Strategy for Integrating Autonomous Type with Cooperative Type (Image)]



■ Priority Measures Related to Safety Driving Support Systems

- Considering we have four years left before achieving the goal of reduction of traffic accidents to 2,500 or lower (by 2018), we have clarified the following priority measures that we should take given the analysis of the status of traffic fatalities (e.g. locations, victims) and needs, and the possibility of realization and popularization in terms of technology, and cost-effectiveness:

[Measures Related to the Roadmaps to Popularize Safety Driving Support Systems]

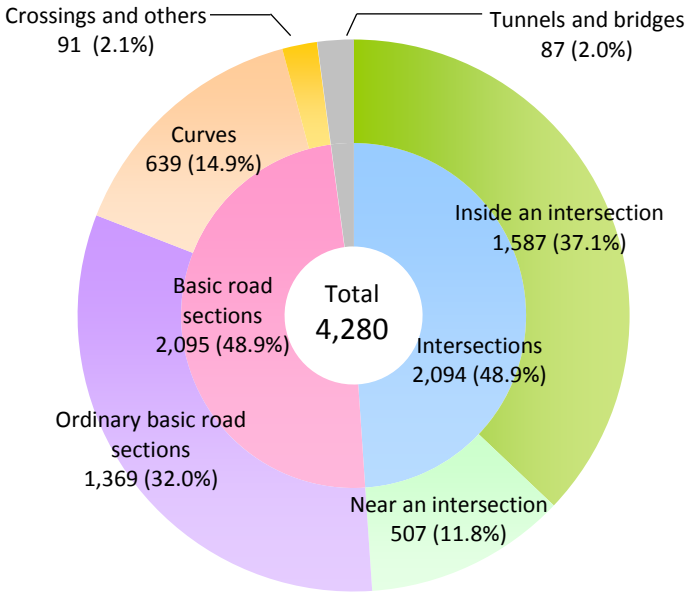
Categories	Outline	
(1) Popularization of automobiles with Safety Driving Support Devices (Level 1)	・We will popularize automobiles with an automatic brake. Many of the automakers have already installed this type into their models. (Heavy-duty trucks released after November 1, 2014, are required to mount it.) Some manufacturers have a high mounting rate in new car sales. ・Assuming all new cars released in the future (five million units) come with these Safety Driving Support devices, the number of vehicles mounted with the devices would be 25 million units (approximately 30% of 80 million units) five years from now (the end of 2018). ・It is necessary to continue to popularize them mainly among private businesses.	
(2) Practical applications and popularization of Informational Safety Driving Support terminals	・The scenario (1) above, which is targeted at new cars, is not sufficient to popularize the devices so as to reduce traffic fatalities by 2018. Therefore, we will attempt to popularize Informational Safety Driving Support Systems to add the said function to existing cars.	
	・Specifically, the types of terminals include (a) map information-type terminals, (b) vehicle-to-vehicle communication terminals, and (c) vehicle-to-infrastructure communication terminals. We will examine which type of terminals we should focus on.	(a) Map-type terminals: Development and popularization of Informational terminals using GPS, map, and other information => It is necessary to prepare and deliver the map-related data including the information on intersections that need caution.
		(b) Vehicle-to-vehicle communication terminals: Development and popularization of Informational terminals that allow vehicles to exchange information on roads with poor visibility => It is necessary to examine and implement a strategy for such popularization.
		(c) vehicle-to-infrastructure communication terminals: Popularization of vehicle-to-infrastructure Informational terminals, including optical beacon- and ITS spot-enabled car navigation systems => It is necessary to improve infrastructure in parallel. (Cost and other elements need to be considered as well.)
(3) R&D and popularization of sensors and systems that support the movement of pedestrians	・Many cases in the scenarios (1) and (2) above, do not sufficiently alert pedestrians, bicyclists, and motorcyclists, who account for the majority of the parties involved in traffic accidents.	
	・Therefore, it is necessary to proceed with R&D and popularization of systems that support the above parties in anticipation of the reduction in traffic accidents after 2018.	(a) Sensing technologies for pedestrians, including the 79 GHz band, infrared rays, and image processing.
		(b) Development of systems that inform vehicles of pedestrian information
		(c) Infrastructure and systems that give warning to pedestrians for ignoring crossing signals, etc.

(Fore Reference) Analysis of Traffic Fatalities Part 3

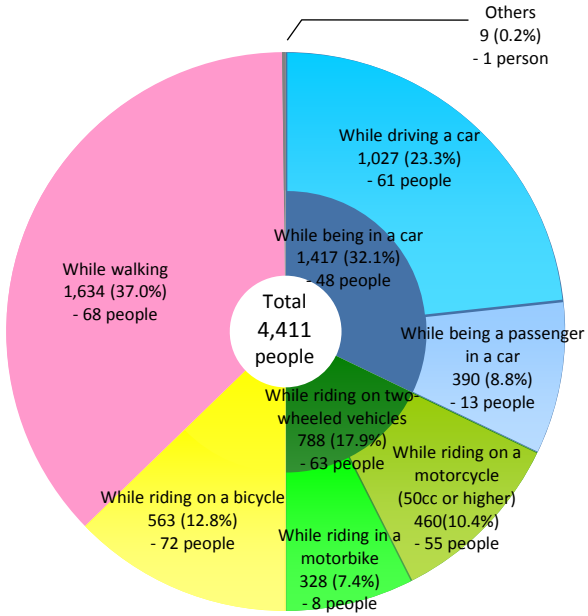
■ Need of Measures for Pedestrians, Bicycles, and Motorcycles in Road Traffic Safety

- About half of traffic accidents take place inside or near intersections. Pedestrians, bicyclists, and motorcyclists account for about two thirds of traffic fatalities.
- For this reason, measures for intersections and other risky locations, and pedestrians, bicyclists, and motorcyclists are also important, in addition to the measures against collisions between vehicles and with objects.

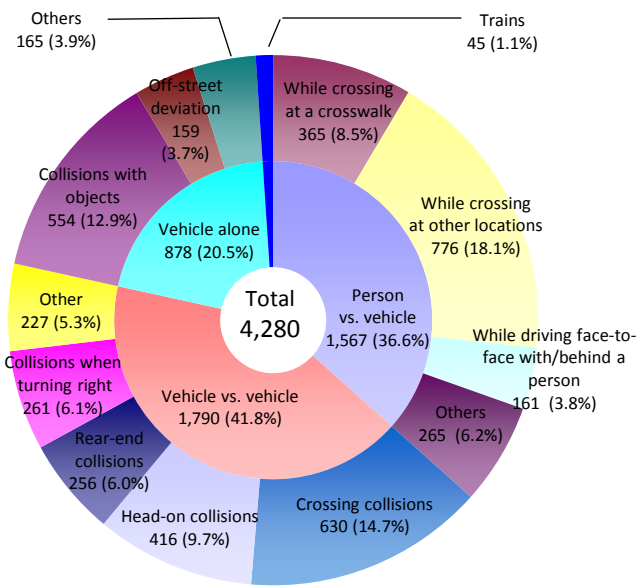
Number of Fatal Traffic Accidents by Shape of Roads (2012)



Number of Traffic Fatalities by Situation (2012)



Number of Traffic Accidents by Type of Accident (2012)



(Source: White Paper on Traffic Safety in Japan 2013)

Note: Traffic fatalities and injuries on expressways were 225 (5.1%) and 19,726 (2.4%), respectively.

(3) Strategy Related to Automated Driving Systems Part 1

■ Expected Time of Commercialization of Automated Driving Systems

- We will advance the technologies related to Automated Driving Systems from the viewpoint of achieving long-terms goals, including achieving a society with the world's safest and smoothest road traffic and becoming the global major player in innovation.
- With the objective of aiming for the world's best, Japan will set the expected time of commercialization of different levels of Automated Driving Systems in a way that is in no way inferior to the rest of the world (the earliest of all or similar to that of other countries), based on the similar goals and roadmaps for commercialization efforts overseas.
- It is important for us to aim for the world's best not only in setting the expected time of commercialization but also in strengthening an industrial competitive edge and popularizing autonomous systems.

[Targeted Time of Commercialization of Self-Driving Cars]

Levels	Technologies Expected to be Realized	Expected Time of Commercialization	(For Reference) Targeted Time in Europe and Other Regions **
Level 2	・Follow-up and tracking systems	Mid 2010s	2013 - 2015
	・Steering for collision avoidance		2017 - 2018
	・Self-driving on multiple lanes, etc.	In 2017	2016
Level 3	・Automated merging, etc.	First half of 2020s	2020
Level 4	・Full automated driving	Second half of 2020s*	2025 – 2028 (expressways) 2027 – 2030 (urban areas)

*: Level 4 (full Automated Driving Systems) is expected to have a trial period. The expected time will be reviewed as necessary due to many uncertainties, based on the examination of commercialization in Japan and abroad as well as the status of various efforts.

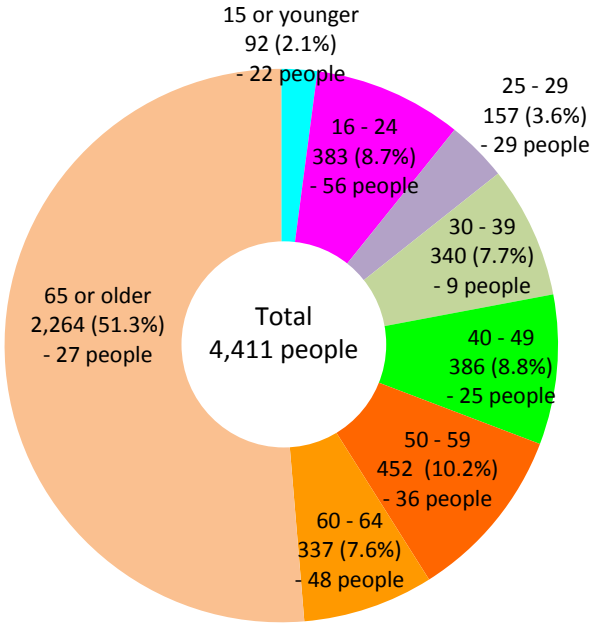
**: The targeted time of commercialization in Europe and other regions was investigated by the Cabinet Secretariat through such channels as the iMobility Forum.

(For Reference) Analysis of Traffic Fatalities Part 4

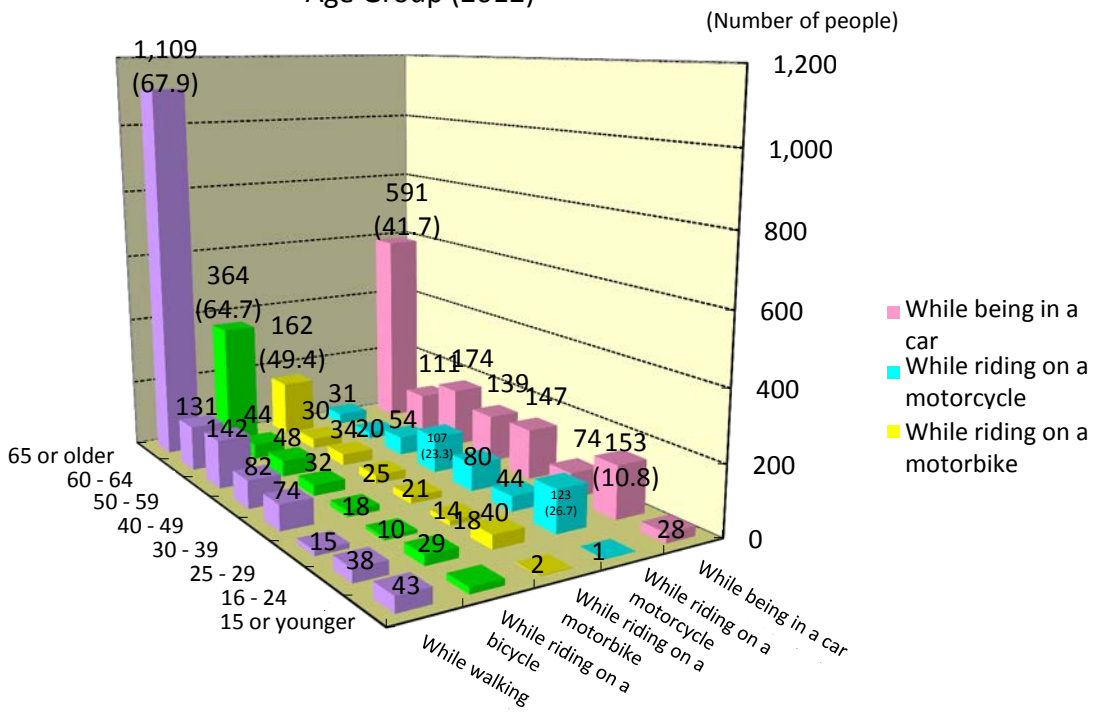
■ Positioning of the Elderly in Efforts to Reduce Traffic Fatalities

- The majority of traffic fatalities are old people when walking or driving cars. For this reason, it is necessary to develop vehicles that they can drive free from anxiety and to take safety measures for older pedestrians.
- On the other hand, injuries from traffic accidents increasingly span all age groups; separate measures are necessary.

Number of Traffic Fatalities by Age Group (2012)



Number of Traffic Fatalities by Situation and Age Group (2012)



Note: Elderly people (aged 65 or older) account for only 14% of all traffic fatalities.

(Source: White Paper on Traffic Safety in Japan 2013)

(3) Strategy Related to Automate Driving Systems Part 2

■ Technological Strategy for R&D and Demonstration Related to Automated Driving Systems

- We will work on the practical application of Cooperative Type systems by trying to popularize Informational Safety Driving Support devices and integrating them into Autonomous Type Automated Driving Systems.
- In the popularization of Cooperative Type systems, it is necessary to integrate the efforts of numerous parties involved in order for the functions of these systems to be actually useful.
- For this reason, in fiscal 2014, we will identify the scenes of using these systems where advanced implementation is expected, examine the structure for execution to integrate multiple parties involved, and calculate cost-effectiveness. Based on these, we will develop and execute an intensive strategy for popularization.

[Scenes where Advanced Implementation is expected for Cooperative Type Safety Driving Support Systems and Automated Driving Systems (Examples)]

Categories	Scenes where Advanced Implementation is Expected
Autonomous + Cooperative (road-to-vehicle)	For example, this type of system is implemented as a public transportation system in lightly trafficked areas (model areas).
Autonomous + Cooperative (vehicle-to-vehicle)	For example trucks driving in a caravan on expressways.

(3) Strategy Related to Automated Driving Systems Part 3

■ Efforts to Popularize Automated Driving Systems in Terms of Social Receptivity and Institutions

- Preparing the environment in terms of social receptivity and institutions is a presupposition of commercialization and popularization of Automated Driving Systems in addition to R&D and technological strategies.

[Agenda to be Examined for the Implementation of Semi-Automated Driving Systems and Full Automated Driving Systems (Examples)]

	Content	Agenda to be Examined (Examples)
Semi-automated driving Systems	Examination of needs, and user and social receptivity	• Needs of use of semi-Automated Driving Systems where the level of involvement of vehicles is high in driving (e.g. what types of drivers have needs to use these systems , and in what scenes). • Receptivity of users to Automated Driving Systems, which are going to be a new technology to society (e.g. a sense of rejection of a new technology) Extend the scope to ordinary vehicles and pedestrians surrounding these systems. Examine the impact of such systems on the entire traffic system if the number of the said systems increases (an issue of mixed traffic).
	Examination of human factors	• Research and study human factors, such as driver behavior in semi-Automated Driving Systems, and HMI. Examine the impact of such factors on driving and traffic. • Specifically, examine the measures for maintaining the driving skills of drivers after they are accustomed to automated driving, in addition to the issues of overconfidence and overdependence.
Full Automated Driving Systems	Examination of how society should be (needs and business models, and user and social receptivity)	• Examine how society should be if it accepts full Automated Driving Systems. • Examine the needs of full self-driving cars (what types of people use these systems, and in what scenes), business models related to the usage of the systems (e.g. carsharing), and the creation of new industries including overseas deployment. • Examine the receptivity of users to full Automated Driving Systems, which are completely different in terms of the relationship of responsibility. Extend the scope to ordinary vehicles and pedestrians surrounding these systems. • Examine the impact of full Automated Driving Systems on the entire traffic system once they are actually implemented (an issue of mixed traffic). • Build an international consensus on these topics.
	Examination of the relationship of responsibility in case of accidents and the legal aspect	• The relationship of responsibility when accidents occur is completely different in full Automated Driving Systems. Examine the drastic review of this topic based on the trends overseas. • Examine the legal review based on the trends of international consensus-building mentioned above. In the immediate future, we will actively participate in forums for international review and understand the trends.

7. Strategy Related to the Utilization of Road Transport Data

(1) Positioning of Traffic-Related Data and Future Direction

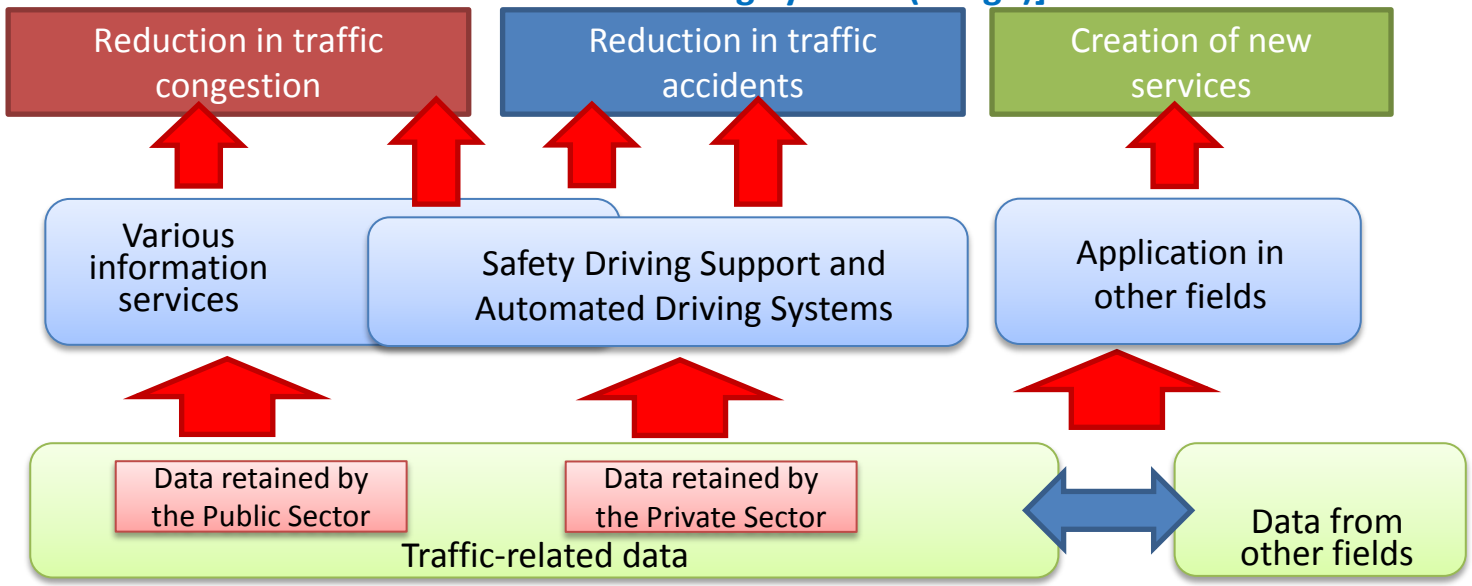
(2) Preparation and Public Disclosure of Traffic-Related Data through Public-Private Collaboration (Open Data)

(3) Examination of Preparation of the Structure to Promote Public-Private Collaboration in Linking Information

■ Positioning of Traffic Data

- In the area of traffic data, the government has played a central part in building a structure for an advanced information service by, for example, offering information to drivers.
- In recent years, private businesses and other entities have been building a more advanced information service for automobile users by collecting probe data, analyzing big data, and combining it with public road traffic information.
- Along with the advancement of IT and networking in the area of automobiles, we will move toward the accumulation of a wide variety of data related to automobiles in the future.
- Traffic data collected by the public and private sectors is becoming positioned as a foundation necessary for Safety Driving Support or Automated Driving Systems and expected to contribute to the creation of new services through the linkage with other information.

[Relationship between Traffic-Related Data, Various Information Services, and Safety Driving Support and Automated Driving Systems (Image)]



■ Preparation and Public Disclosure of Traffic-Related Data through Public-Private Efforts (Open Data)

- It is necessary to start with preparing traffic data with high social effects, including traffic congestion and safety measures, based on the roadmap related to Safety Driving Support. We will establish a forum for exchanging views on how to proceed with the preparation process using the data already owned by the public and private sectors and advance discussions. We will clearly state our requests (e.g. why we need certain data and what type of data we want) and examine measures for preparing the required traffic data as efficiently as possible, while making use of the existing data owned by each other. Subsequently, we will discuss whether to disclose certain data as well as technological conditions of such data (e.g. granularity of data and cost).
- Depending on the nature of data, we will look at various channels for transmitting data to users, which include not only providing data directly to cars through infrastructure or a mobile network, but also making data open as map information to allow various operators to build applications.

[Data for which the Need for Preparation is Recognized for Some Time to Come (Example)]

Examples of Data
✓ Locations where drivers put on brakes based on probe data from the viewpoint of reducing traffic accidents
✓ Data on Roads that are passable
✓ Possibility of signal control using probe information
✓ Availability of probe data for managing traffic demand
✓ Information about traffic regulation on maps (e.g. speed limits and one-way traffic)
✓ Data on locations of sensors and signals on maps

[Efforts to Make Data Open]

Agenda to be Examined
✓ Organizing and publicly disclosing meta-information concerning the data retained by the public sector
✓ Examining and clarifying policies for handling individual data, including how to make it open
✓ Technical conditions related to data disclosure, standardization, etc.
✓ Other

■ Examination of the Structure to Promote Public-Private Collaboration in Linking Information

- Currently, the traffic data platform is prepared and built separately by the public and private sectors. In order to make use of such data, it is necessary to examine what kind of structure we should have to share or link traffic-related information owned by both sectors.
- For this reason, we will examine strategies for promoting the Utilization of Road Transport Data, including how the structure for linking and sharing traffic data in fiscal 2014.

[Points of Argument Related to the Structure for Promoting Public-Private Collaboration in Linking Traffic Data (Examples)]

	Points of Argument
Scope of targeted data	In addition to various traffic data separately retained by the public sector (e.g. detailed transit information) and the private sector (probe data), what kind of data should be discussed as a potential target for linkage? ● Data related to public transportation ● Various data related to the movement of people ● Various data related to cities (Smart City) (e.g. power consumption levels)
Conditions for public disclosure and sharing of data	How should we set conditions to ensure it is easy for the people and users to use and bring the maximum benefit to them, based on the situations of both the public and private sectors? ● Differences in the conditions for public disclosure based on the types and accuracy of data (e.g. paid, free-of-charge) ● Differences in the conditions for public disclosure according to the purpose of use of data (e.g. response in disasters) ● Technical requirements related the public disclosure of data (e.g. technical specifications on data linkage, rules for use) ● Rules for cost burden related to the coordination of data
Structure and functions	In what organization and structure do the public and private sectors work together to link information? What functions should be given to the organization/structure? ● Specify conditions for the provision of data. Do the providers of data interact with users individually? Are we building an organization that acts solely as an intermediary (e.g. receiving requests for use of data, providing data, and receiving compensation)? Or would we build a center that also manages data and adds value? ● If we form an organization, would it be led by the public sector, or the private sector? ● Would the organization act as a single point of contact that covers all over Japan, or would we build regional organizations? ● What functions would we give to the organization (e.g. methods of collecting, managing, and providing data, whether value is added or not, whether compensation is managed, scalability including the ability to link with other databases)?

8. Cross-Sectional Efforts to Prepare for the World's Most Advanced ITS

8. Cross-sectional Efforts to Prepare for the World's Most Advanced ITS

■ For Tokyo Olympic and Paralympic Games

- Looking ahead to the Tokyo Olympic and Paralympic Games 2020, we aim to build the world's most advanced ITS in Japan. We will showcase the Olympic and Paralympic Games for the rest of the world, and examine strategies and structures for packaging ITS-related infrastructure ranging from vehicle-mounted devices to information systems for export.

■ International Collaboration

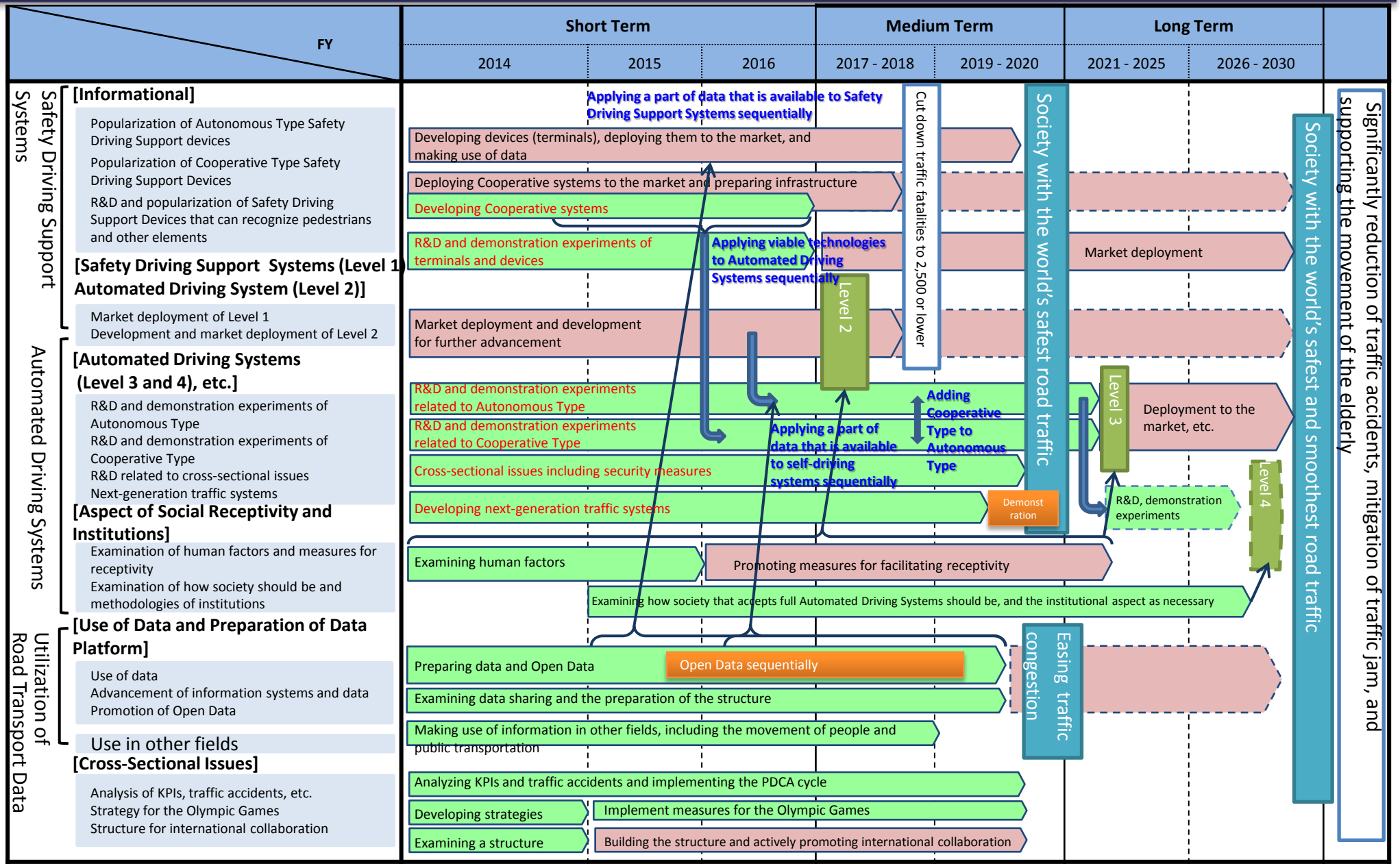
- In order to build the world's most advanced ITS, it is necessary to promote efforts from a global perspective and exercise leadership.
- To promote such international efforts, the industry, government, and academia will work together to further examine the utilization of existing research institutions and the preparation of a core base that is open to the rest of the world to improve a collaborative environment for parties from all over the world.

■ Collaboration in Regional Efforts and Citizen Participation

- In order to build the world's most advanced ITS, demonstration experiments and implementation in specific cities or areas are essential. We need to promote collaboration with these areas, and have the local people understand our efforts and participate in these experiments and the implementation because these are the people who actually live and use ITS there.
- We will also examine the structure for collaborating with demonstration experiments and implementation activities in various areas, and examine how local people participate in the programs.

9. Roadmaps

Roadmap Related to the Utilization of Road Transport Data (Overall Picture)



: Measures mainly related to development

: Measures mainly related to market deployment

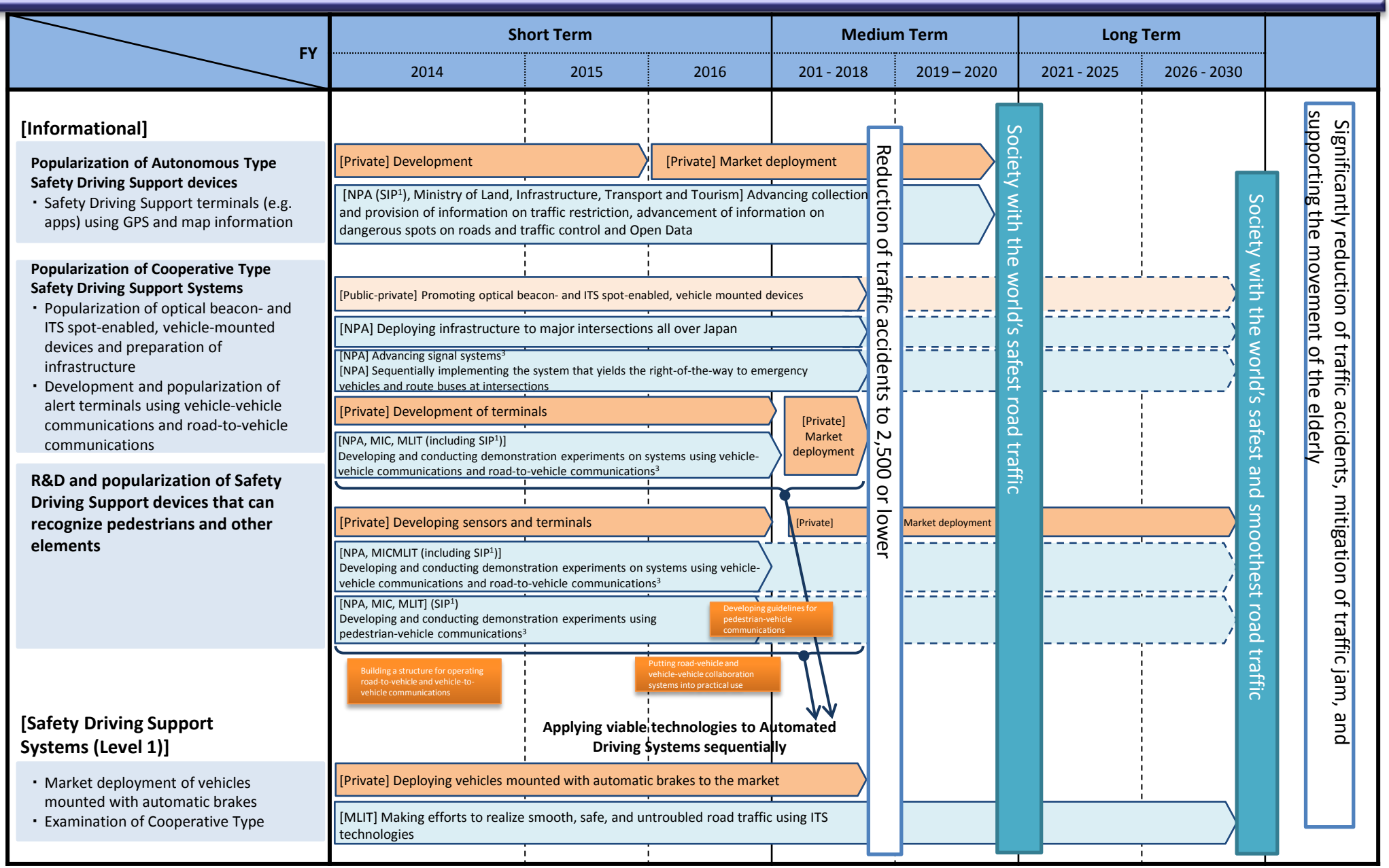
Red font: Items that include SIP

1 SIP: Strategic Innovation Creation Program of Cabinet Office's Council for Science and Technology

2 Measures related to both Safety Driving Support /Automated Driving Systems and the Utilization of Road Transport Data

3 Measures related to Safety Driving Support Systems and Automated Driving Systems

Roadmap Related to Safety Driving Support Systems



:Measures led by the private sector

:Measures led by the public sector

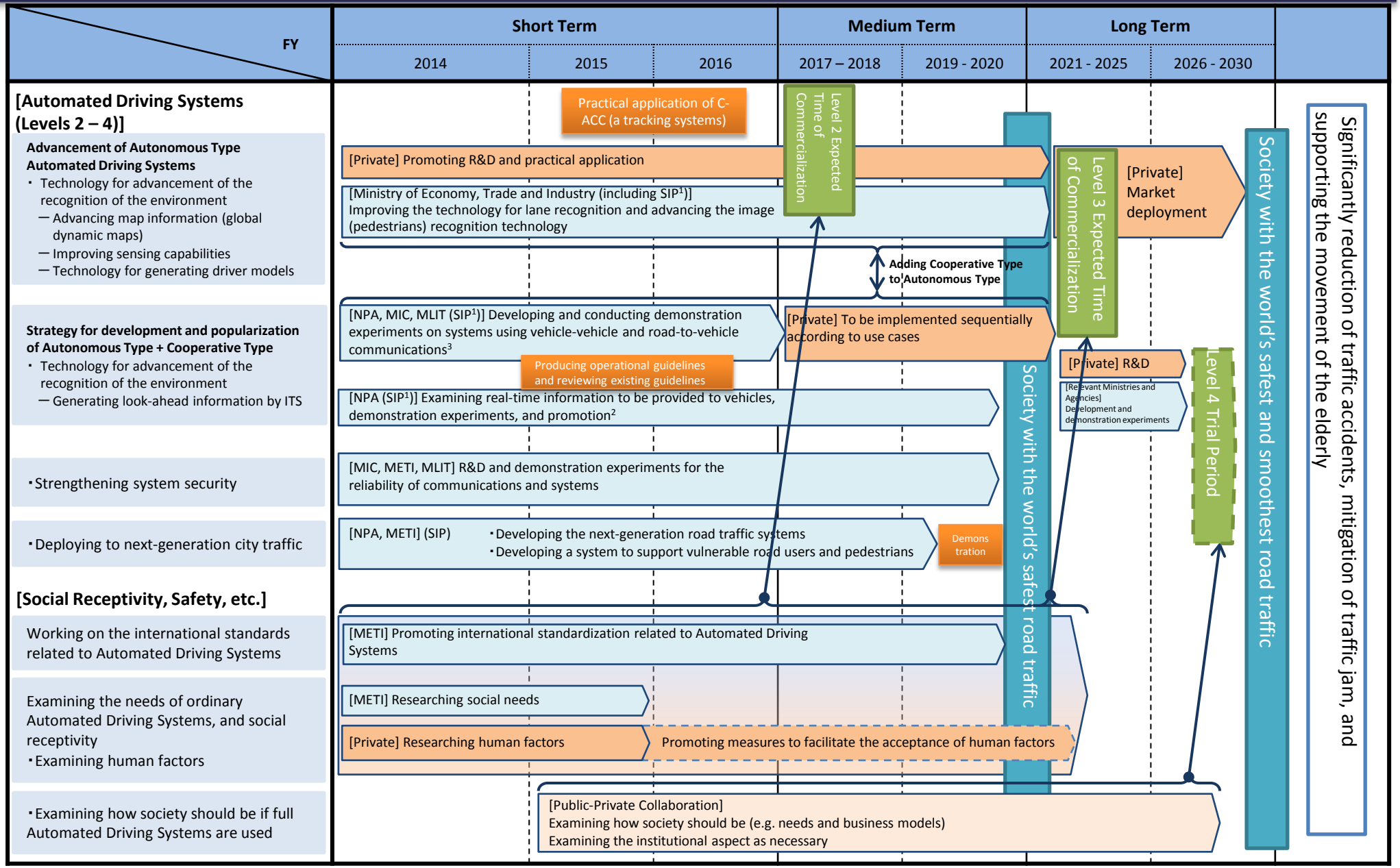
: Measures taken through public-private collaboration

1 SIP：Strategic Innovation Creation Program of Cabinet Office's Council for Science and Technology

2 Measures related to both Safety Driving Support/Automated Driving Systems and the Utilization of Road Transport Data

3 Measures related to Safety Driving Support Systems and Automated Driving Systems

Roadmap Related to Automated Driving Systems



: Measures led by the private sector

: Measures led by the public sector

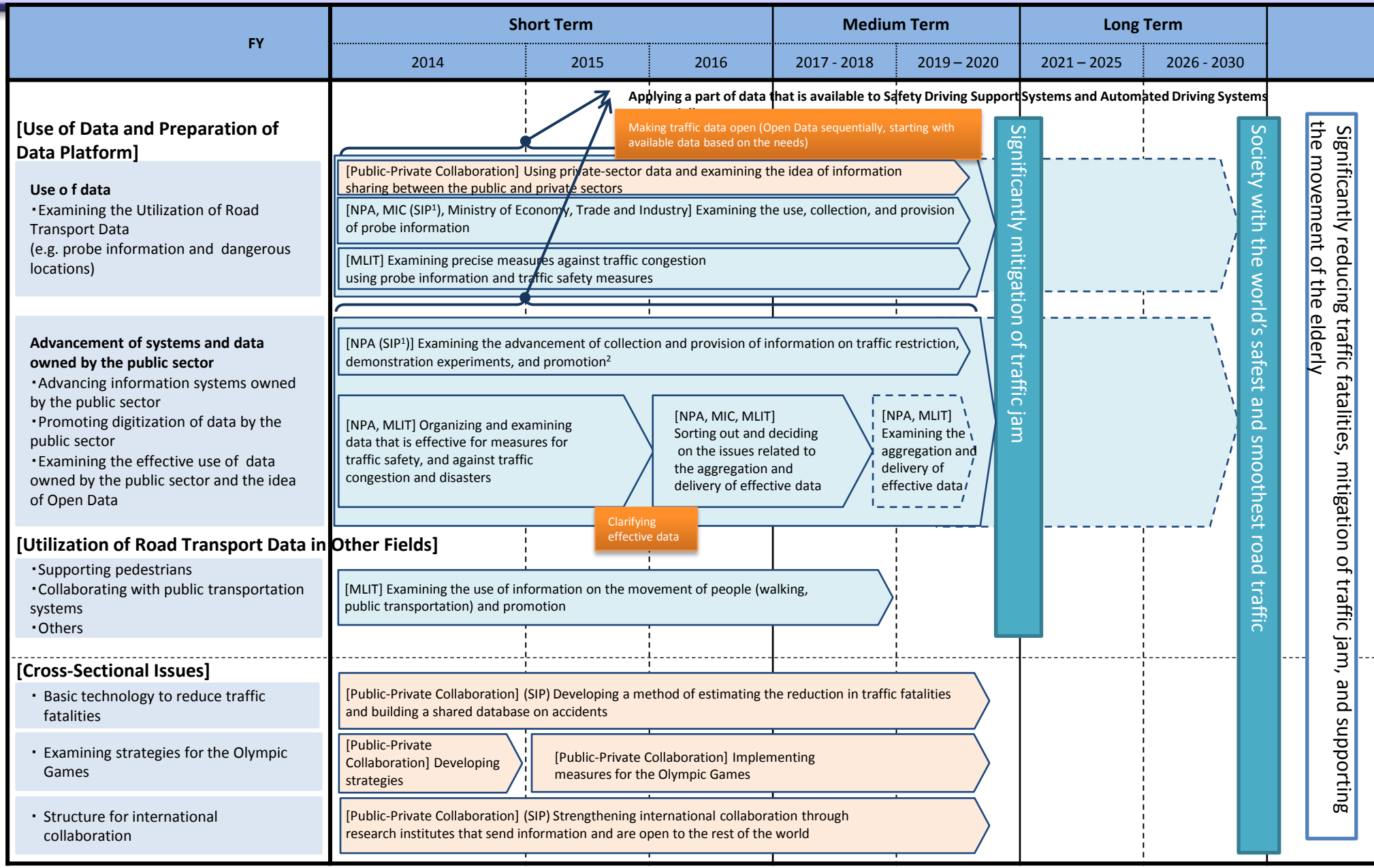
: Measures taken through public-private collaboration

1 SIP : Strategic Innovation Creation Program of Cabinet Office's Council for Science and Technology

2 Measures related to both Safety Driving Support/Automated Driving Systems and the Utilization of Road Transport Data

3 Measures related to Safety Driving Support Systems and Automated Driving Systems

Roadmap Related to the Utilization of Road Transport Data



1 SIP：Strategic Innovation Creation Program of Cabinet Office's Council for Science and Technology
2 Measures related to both Safety Driving Support/Automated Driving Systems and the Utilization of Road Transport Data
3 Measures related to Safety Driving Support Systems and Automated Driving Systems

10. Method of and Structure for Moving Forward

(1) Method of Moving Forward

(2) Structure for Promotion (Organization to Promote Public-Private Collaboration)

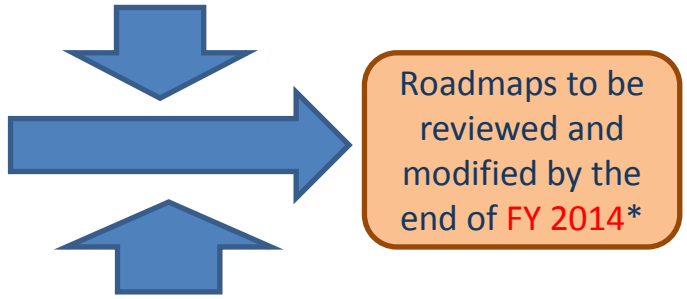
(1) Method of Moving Forward

■ Annual Review of Roadmaps

- The roadmaps developed still have many issues to be examined in the strategic aspect. In fiscal 2014, we will form working groups and a organization for review and continue to examine these issues strenuously to refine the strategies.
- Based on the status of the progress of such review and the measures or subsequent ITS trends overseas, changes in technological trends, and other factors, we will review (once a year as a rule) what needs to be addressed from the next fiscal year onward through the PDCA cycle, and modify the roadmaps as necessary.

[Agenda that Should be Examined Continuously in FY 2014 (Examples)]

Agenda	Description
Examination of indicators for strategies, logic models, and roadmaps	Bring indicators and KPIs for ITS strategies and clarify the targeted value. Examine the effect of various measures based on the logic model and review the roadmaps.
Detail analysis for traffic accidents and the effect of the measures on the reduction of accidents	Conduct present data analysis of traffic accidents to examine the extent of effect of the popularization of technologies driven by the measures on the reduction of traffic fatalities and other indicators, and reflect it in the measures to be focused on in the future.
Architecture for Automated Driving Systems and strategies for popularization	Examine the direction of architecture related to Automated Driving Systems and strategies for popularization, and reflect it in future measures.
Examination of strategies for the Utilization of Road Transport Data	Examine the traffic data that should be given priority for sorting, procedures for making public-private data open, and how to bring the structure for information sharing by the public and private sectors into shape to clarify strategies for future Utilization of Road Transport Data.
Efforts toward the Tokyo Olympic and Paralympic Games	Clarify the concrete content and timeline of the world's most advanced ITS, which should be built for the upcoming Tokyo Olympic and Paralympic Games, while looking at the export of infrastructure in the future.



*: Roadmaps to be reviewed every year

Through the public-private collaboration, we will examine the issues described in the Public-Private ITS Initiative/Roadmaps in detail. As the organization for facilitating the public-private collaboration, we will set up a public-private consultative body while working closely with the structure for promotion in the Council for Comprehensive Science, Technology and Innovation promptly after developing the Initiative/Roadmaps in order to promote ITS-related measures.

This consultative body will consist of the members of the relevant offices/ministries and the business community in cooperation with the Road Traffic Committee, and the Cabinet Secretariat will act as an organizer.

Working groups (WGs) will be formed to intensively and practically address each of the cross-sectional and important topics listed in the Public-Private Initiative/Roadmaps. The WGs will consist of a small number of working-level personnel. In order to ensure flexibility, WGs may be operated by an organizer other than the Cabinet Secretariat, and one of the existing organizations may serve as an organizer.

The formation of such a organization for facilitating public-private collaboration contributes not only to the detailed examination of the Public-Private ITS Initiative/Roadmaps, but also to the PDCA review of the roadmaps through the understanding of new industrial and technological trends in ITS.