Public-Private ITS Initiative / Roadmaps 2020

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SIP

Cabinet Office

Environmental changes in the mobility field

☐ Environmental changes in the mobility field in Japan, and eight topics for the future

Issues will arise in Japan regarding social challenges to be resolved in the future and economic value creation against a backdrop of structural changes to society such as an aging population, low birth rates, and centralization of population in urban areas.

(Social issues)

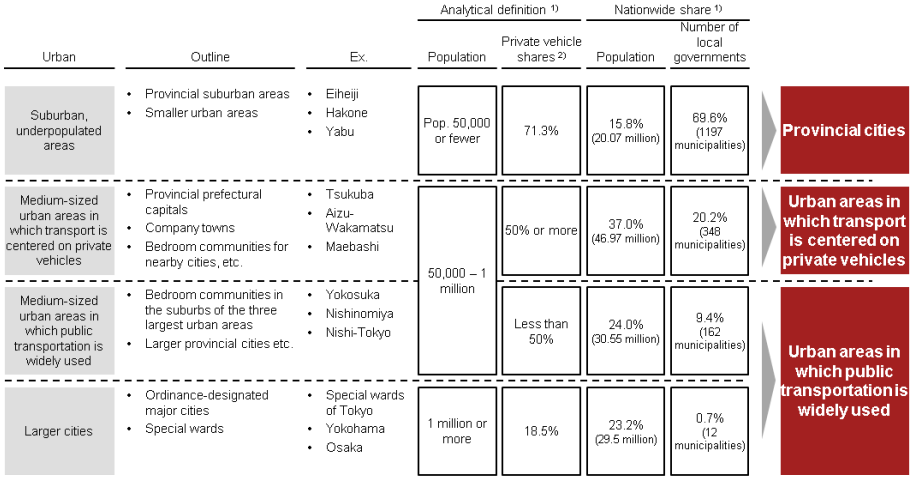
(i) Ensuring freedom of mobility: Freedom of mobility in everyday living is limited due to successive reductions in and discontinuation of public transportation services
(ii) Community vitalization: Reductions in infrastructure or living (retail, schools, hospitals), particularly in rural areas, Steady growth in inbound tourism demand
(iii) Reducing traffic accidents: While traffic accidents are in a decreasing trend, the share of accidents involving elderly drivers is increasing from year to year.
(iv) Improving transit efficiency: Increasingly severe congestion on roads and public transportation due to factors such as population inflows to urban(i) areas and increasing logistics demand
(v) Lessening environmental impact: While CO2 emissions from the transport sector are decreasing, further improvements are necessary to achieve reduction targets
(vi) Solutions to labor shortages: Increasingly severe shortages of drivers for tucks, taxis, and buses, due to growing demand for logistics and aging of the workforce

(Economic value creation)

(vii) More convenient living: Congestion of roads and public transportation lengthens commuting times and restricts time for personal life
(viii) Strengthening industrial competitiveness: The structure of added value in the auto industry will change with the rise of MaaS and other developments

☐ Future issues and needs in Japan's mobility field

At right, Japan's urban centers are grouped into the three categories "provincial cities," "urban areas in which transport is depending on private vehicles," and "urban areas in which public transportation is widely used," based on their populations, rates of using public transportation, etc., and their mobility needs with regard to the above future topics are sorted from the perspectives of individuals and businesses.



Urban	Outline	Ex.	Analytical definition 1) Population	Analytical definition 1) Private vehicle shares 2)	Nationwide share 1) Population	Nationwide share 1) Number of local governments	
Suburban, underpopulated areas	• Provincial suburban areas • Smaller urban areas	• Eiheiji • Hakone • Yabu	Pop. 50,000 or fewer	71.3%	15.8% (20.07 million)	69.6% (1197 municipalities)	Provincial cities
Medium-sized urban areas in which transport is centered on private vehicles	• Provincial prefectural capitals • Company towns • Bedroom communities for nearby cities, etc.	• Tsukuba • Aizu-Wakamatsu • Maebashi	50,000 – 1 million	50% or more	37.0% (46.97 million)	20.2% (348 municipalities)	Urban areas in which transport is centered on private vehicles
Medium-sized urban areas in which public transportation is widely used	• Bedroom communities in the suburbs of the three largest urban areas • Larger provincial cities etc.	• Yokosuka • Nishinomiya • Nishi-Tokyo		Less than 50%	24.0% (30.55 million)	9.4% (162 municipalities)	Urban areas in which public transportation is widely used
Larger cities	• Ordinance-designated major cities • Special wards	• Special wards of Tokyo • Yokohama • Osaka	1 million or more	18.5%	23.2% (29.5 million)	0.7% (12 municipalities)	

The ideal form of mobility for 2030

- **As issues arise with regard to social challenges to be resolved in the future and economic value creation against a backdrop of structural changes to society such as an aging population, low birth rates, and centralization of population in urban areas, future mobility needs are outlined below:**

Provincial cities

Ability to move freely within and between regions and to live a life free from inconvenience even without a car.

<Securing means of transit even in suburban regions where it is difficult to maintain public transportation>

Mobilizing diverse means of transit, such as community buses and taxi sharing, to secure mobility to support living in the community

Linking route buses and automated vehicles to deliver door-to-door services such as automated vehicles traveling on routes around dispersed senior residences.

<Proposing alternative means of transit for isolated regions and remote islands>

Enabling remote working and learning and provision of vehicles for access to convenience stores, restaurants, healthcare facilities, post offices, government services, etc.

Providing transport to meet both cargo and personal transportation needs, transporting agricultural produce, mail, deliveries, and people (mixed use), and using automated vehicles, drones, etc. in delivery and other services, to improve the efficiency of deliveries even under conditions of limited logistics demand.

Urban areas in which transport is depending on private vehicles

Resolving traffic congestion and improving transport efficiency through means such as use of multiple means of transit and dispersion of transport demand.

<Resolution of traffic congestion>

Alleviating traffic congestion through demand forecasting and distributing demand for transit and services while optimizing transit flows.

In cooperation with retail facilities, medical institutions, and other facilities, comprehensively meeting transit demand through automated-driving buses running routes around residential districts, to improve transit efficiency.

<Realizing safe automotive transportation>

Spreading of vehicles equipped with support functions will enable even seniors to drive vehicles with peace of mind.

Improving safety for both vehicles and pedestrians through means such as use of infrastructure to detect and warn of the presence of nearby vehicles and pedestrians.

<Improving efficacy of logistics and resolving labor shortages>

As means of transit between factories and logistics facilities, or within communities, operating automated-driving service vehicles at low speeds to improve logistics efficiency and resolve labor shortages in trucking and other industries.

Urban areas in which public transportation is widely used

Improving convenience while lessening congestion through optimization of use of means of transit, utilizing on-demand transportation, etc.

<Resolving conjugations and improving convenience in urban centers>

Promoting multi modal transportation, combining multiple means of transit to enable seamless transportation in accordance with needs.
Improved convenience through use of on-demand transportation to enable people to get on and off when and where they like.

<More convenient living through service mobility (mobile shops)>

Making living more convenient through flexible provision of various services (mobile shops) event suited to the needs of event attendees in line with having an event

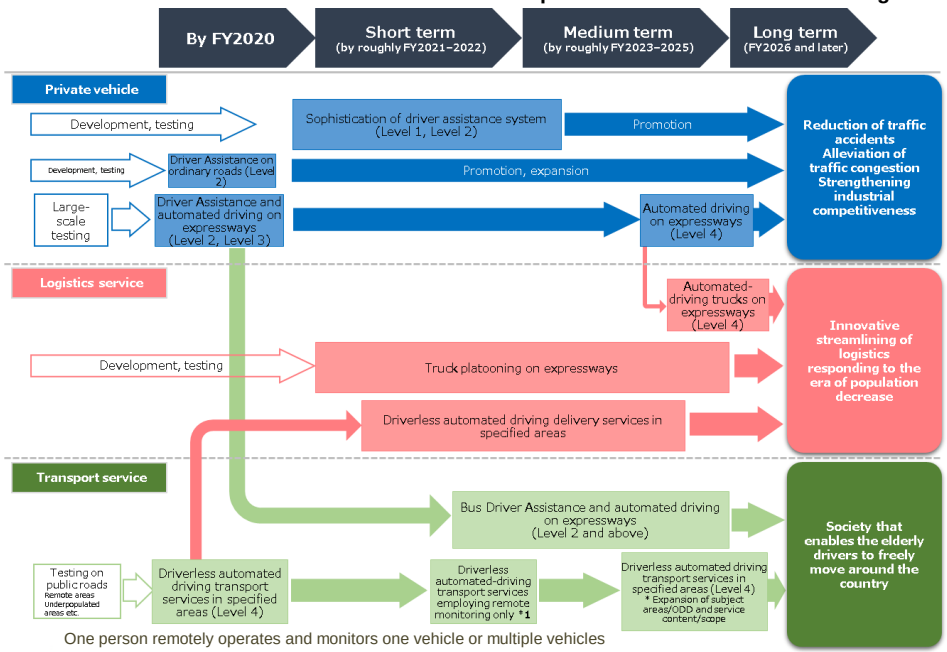
<Improving logistics efficiency through use of new mobility services etc.>

Improving delivery efficiency in office districts by using underground spaces for transportation of deliveries
Use of logistics robots and other technologies for the last mile from the logistics relay point to the delivery destination, to improve delivery efficiency

(Updated) Overall Roadmap
(promotion scenarios and expected timing of commercialization)

- Setting targets related to commercialization of automated-driving technologies and development of related services. Specifically, realizing market introduction for vehicles able to drive themselves on expressways and driverless automated driving transport services in specified areas (such as depopulated areas) by FY2020. Promoting future feasibility studies in accordance with changing social conditions.
- With regard to transport services, driverless automated driving transport services employing remote monitoring only may be introduced by roughly FY2022, and services may spread to 40 or more areas by the rough target of FY2025.

<Scenarios of commercialization and service implementation of automated driving>



*1 When driverless automated-driving transport services are to come true depends on various conditions in the actual cruising environment, such as weather and traffic volume. With regard to the creation of an environment for the realization of those services, each government agency will consider the appropriate timing and the way it should be and take measures, taking into account future technological developments, etc.

<Expected timing of commercialization and service of automated driving systems*1>

	Level	Technology expected to be realized (example)	Expected timing of commercialization*2
Private vehicle	Level 2	Driver Assistance on ordinary roads	By 2020
	Level 3	Automated driving on expressways	Circa 2020
	Level 1,2	Sophistication of driver assistance system	Early 2020s
	Level 4	Automated driving on expressways	Circa 2025
Logistics service	- *3	Driver-assistive truck platooning on expressways	By 2021
		Truck platooning with the trailing truck unmanned on expressways	FY2022 and later
	Level 4	Automated driving of trucks on expressways	From 2025
Transportation Service	Level 4	Driverless automated driving transport services in specified areas	By 2020
	Level 2 and above	Driver Assistance and automated driving of buses on expressways	From 2022

*1 : In addition, the expected timing of commercialization shall be reviewed based on the domestic and overseas industrial and technology trends, including overseas trends in the development of automated driving systems.
(*2) The timing is set as a target time by which the government should make efforts to enable commercialization by private companies.
*3: No level is indicated for truck platooning since it involves operation by the driver of the lead truck under certain conditions (ODD), with the other tucks connected electronically to the lead truck.

Improvement of legal system

<Overview of the charter for Improvement of Legal System and Environment for Automated Driving Systems, and progress thereof>

- **In April 2020, the amended Road Transport Vehicle Act and Road Traffic Act were enacted, resulting in major progress on efforts to develop laws based on the general framework for systemic development related to automated driving**

<Main initiative items based on the institution-development outline>

■ Notions on **securing the safety of vehicles**

i. Safety-related requirements etc. established as guidelines around summer 2018
ii. Formulation of international standards related to vehicle safety, with Japan leading discussions
iii. We will investigate the ideal approach to be taken in formulating measures to ensure the safety of vehicles in current use;

■ **Traffic rules**

iv. Study of measures required to ensure that automated driving systems comply with norms set forth in road traffic act and regulations. Domestic legal and regulatory systems developed swiftly based on matters such as the progress of international discussions (Geneva Convention), in which Japan continued to demonstrate leadership in cooperation with related countries, and technological developments

v. With respect to unmanned autonomous driving transport services, the current framework for field operational testing used for remote automated driving systems will also be rendered usable for commercialization for the time being.

■ **Ensuring safety on an integrated basis** (through the setting of conditions applicable to driving environments)

vi. Study and formulation of driving environmental conditions for ensuring the safety of automated driving (e.g., low speed, limited routes, daytime only)

■ **Liability**

vii. Realizing swift aid to victims in the event of an accident
viii. Clarification of the roles and obligations expected of related parties and considering criminal liability
ix. Considering requirement of drive recording equipment

<Progress through now>

(i)(ii)(iii)(vi)(ix) **Amended Road Transport Vehicle Act** enacted, intended to secure safety uniformly from the design and manufacturing processes through usage of automated-driving vehicles etc. (enacted April 2020)

(iv)(ix) **The amended Road Transport Vehicle Act** establishes provisions related to liability of drivers and others in accordance with commercialization of automated-driving technologies (enacted April 2020)

(v) **Standards on permission to use public roads** were revised **in connection with feasibility testing of automated driving on public roads** (September 2019) Commercialization is possible under frameworks of remote testing and testing of vehicles equipped with designated equipment

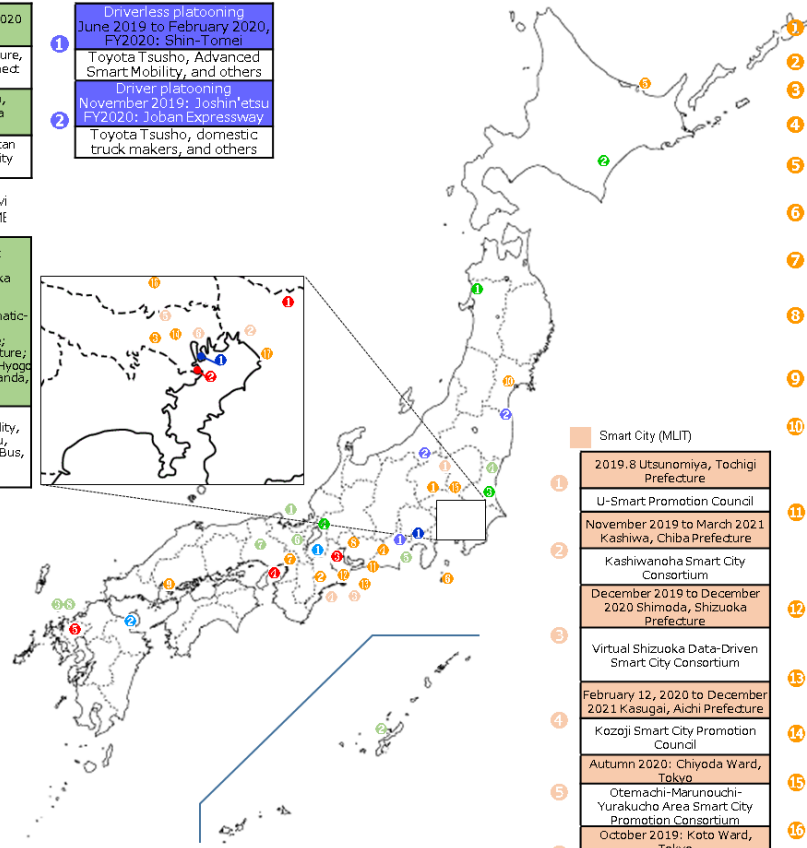
(vii) Under **the Act on Securing Compensation for Automobile Accidents**, **the operator remains liable** for accidents arising while using automated driving systems

(viii) To be studied based on related laws and regulations and the roles and duties expected of related actors

Social implementation

<Main feasibility testing of automated driving>

As of March 2020 (including plans)



Automated driving based on roadside rest areas etc. Services (MLIT/Cabinet Office)

1. December 2018 to February 2019 Kamikoani, Akita Prefecture — Kamikoani Rest Area (Service began November 30, 2019)
2. May to June 2019: Taiki, Hokkaido — Cosmall Taiki Rest Area
3. June to July 2019 Hitachiota, Ibaraki Prefecture — Takakura Regional Transportation Center
4. November to December 2019 Higashiomi, Shiga Prefecture — Okueigenji-Keiryunosato Rest Area

Smart Mobility Challenge (METI and MLIT)

1. November 2019: Otsu, Shiga Prefecture — City of Otsu, Keihan Bus, Advanced Smart Mobility
2. October 2019: Oita, Oita Prefecture — Oita City Hall, Oita Bus, Gunma University

SIP project etc. (Cabinet Office)

1. After October 2019 General roads etc. in the vicinity of the Rinkai area of Tokyo — Domestic and foreign automakers, auto-parts makers, universities, etc.

Automated driving in restricted airport zones (MLIT)

1. October 2019 to March 2020, July 2020 Narita Airport — Japan Air Lines
2. January 2020: Haneda Airport — BOLDLY, Advanced Smart Mobility, All Nippon Airways
3. April to December 2019: Chubu Airport — Aisan Technology, Dynamic Map Platform, AIRO, All Nippon Airways
4. Since July 2020: Kansai Airport — AIRO
5. September to October 2019: Saga Airport — All Nippon Airways

Last-mile automated driving (MLIT and METI)

1. April to December 2019, FY2020 Eiheiji, Fukui Prefecture — Town of Eiheiji, Fukui Prefecture, AIST, Machidukuri ZEN Connect Inc., and others
2. July 2019 to January 2020, FY2020: Chatan, Okinawa Prefecture — Town of Chatan, AIST, Chatan Town Management & Mobility Services, and others

Medium-sized automatic-drivi feasibility study (MLIT and MI

3. February 2020: Compact automated-driving bus Kitakyushu, Kanda, Fukuoka Prefecture
8. FY2020: Medium-sized automatic-driving bus Hitachi, Ibaraki Prefecture; Yokohama, Kanagawa Prefecture; Otsu, Shiga Prefecture; Mita, Hyogo Prefecture; Kitakyushu and Kanda, Fukuoka Prefecture

AIST, Advanced Smart Mobility, Nippon Koei, Ibaraki Kotsu, Kanachu, Keihan Bus, Shinki Bus, Nishi-Nippon Railroad

Truck platooning (MLIT and METI)

1. Driverless platooning June 2019 to February 2020, FY2020: Shin-Tomei — Toyota Tsusho, Advanced Smart Mobility, and others
2. Driver platooning November 2019: Joshin'etsu FY2020: Joban Expressway — Toyota Tsusho, domestic truck makers, and others

Smart City (MLIT)

1. 2019.8 Utsunomiya, Tochigi Prefecture — U-Smart Promotion Council
2. November 2019 to March 2021 Kashiwa, Chiba Prefecture — Kashiwanoha Smart City Consortium
3. December 2019 to December 2020 Shimoda, Shizuoka Prefecture — Virtual Shizuoka Data-Driven Smart City Consortium
4. February 12, 2020 to December 2021 Kasugai, Aichi Prefecture — Kozoji Smart City Promotion Council
5. Autumn 2020: Chiyoda Ward, Tokyo — Otemachi-Marunouchi-Yurakucho Area Smart City Promotion Consortium
6. October 2019: Koto Ward, Tokyo — Toyosu Smart City Council

Local governments, private sector, or universities (* Only main feasibility testing is indicated)

1. May 2019: Kiryu, Gunma Prefecture — City of Kiryu, Gunma University, Mitsuba
2. June 2019: Kuwana, Mie Prefecture — City of Kuwana, Gunma University
3. July 2019: Minato Ward, Tokyo — BOLDLY
4. Starting July 2019: Iwata, Shizuoka Prefecture — City of Iwata, Yamaha Motor
5. August 2019: Shari, Hokkaido — Hokuren, Nippon Express, UD Trucks
6. October to November 2019: Hachijo Island, Tokyo — Aiko Kanko, NTT East, NTT Data, Gunma University
7. October to November 2019: Sakai, Osaka Prefecture — City of Sakai
8. November 2019: Nagakute, Aichi Prefecture — NTT Docomo, Nagoya Railroad, Nagoya University, Nippon Signal, Aisan Technology
9. November 2019: Hiroshima, Hiroshima Prefecture — Hiroshima University, Hiroshima Regional ITS Council
10. December 2019 to February 2019 JR Kesennuma Line — JR East and others
11. December 2019 to January 2020 Matsuzaki, Shimoda, Fukuroi, Shizuoka Prefecture — Shizuoka ShowCASE Project: Promotion Committee, Shizuoka Prefecture Near-future Technological Society Implementation Committee, Future Creation Urban Development Vision Study Committee
12. December 2019: Tobishima, Aichi Prefecture — Aisan Technology, Village of Tobishima, Nagoya University, Tier 4, Sompo Japan
13. January 2020: Minamichita, Aichi Prefecture — NTT Docomo, Aisan Technology, Nagoya Railroad, Nippon Signal, Nagoya University
14. January 2020 to February 2020 Chuo-Chiyoda wards, Tokyo — Hinomaru Kotsu, ZMP
15. January to March 2020: Maebashi, Gunma Prefecture — City of Maebashi, Gunma University, Nippon Chuo Bus
16. February 2020: Kawaguchi, Saitama Prefecture — City of Kawaguchi, BOLDLY
17. March 2020: Chiba, Chiba Prefecture — City of Chiba, Aeon, Aeon Compass, Keisei Electric Railway, Keisei Bus

Past initiatives and future topics in automated driving

Technological level	Technological development		Establishment of laws, regulations, and other systems	Infrastructure development	Other matters
Level 3	**<Automobile manufacturers, etc.>** • Technological development satisfying Level-3 requirements (onboard sensors, dynamic maps, etc.)	**<SIP Phase 2: through FY2022>** • Technologies related to use of transit environmental information • Development of safety evaluation environments in virtual space • Security technologies suited to software updates etc. • Development of HMI requirements suited to advances in automated driving etc. **＜METI・MLIT＞** • Commercialization of driverless automated driving transport services such as small carts in restricted areas • Formulation of safety evaluation methods needed for automated vehicles	**＜MLIT＞** • Amended Road Transport Vehicle Act (promulgated May 24, 2019) → Addition of "automated driving equipment" to the equipment subject to safety standards, formulation of safety standards for such equipment, etc. (completed) • Maintenance of the transport provider's liability for accidents arising while using automated driving systems under the Act on Securing Compensation for Automobile Accidents (completed) **<The National Police Agency >** • Amended Road Traffic Act (promulgated May 28, 2019) → Development of provisions on liability and other matters related to drivers using "automated driving equipment (completed)	**＜MLIT＞** • Infrastructure support for self-identification of location • Securing driving spaces for automated driving • Securing exclusive driving spaces in promotion of commercialization • Support for countermeasures to the reduced GPS measurement precision • Development of logistics facilities • Development of merging support facilities * From the interim summary of the Study Group on Road Spaces Suited to Automated Driving of the Ministry of Land, Infrastructure, Transport and Tourism * These developments will support not only Levels 3-5 but traffic safety as well. **<Telecommunications carriers, etc., MIC>** • Development and promotion of information and telecommunications infrastructure (e.g., 5G) suited to automated-driving needs	**<SIP Phase 2: through FY2022>** • Fostering social receptivity • International cooperation etc. **＜METI・MLIT＞** • Increasing social receptivity (e.g., promoting understanding through dialogue with residents in test areas)
Level 4	**<Automobile manufacturers, etc.>** • Development of risk-minimized transport technologies, such as automatic safe stopping when an abnormality or other issue has arisen • Other technological development satisfying Level 4 requirements		**＜MLIT＞** • Amended Road Transport Vehicle Act (promulgated May 24, 2019) → Addition of "automated driving equipment" to the equipment subject to safety standards, formulation of safety standards for such equipment, etc. (completed) • Maintenance of the transport provider's liability for accidents arising while using automated driving systems under the Act on Securing Compensation for Automobile Accidents (completed) **<The National Police Agency >** • Road-use Permit Standards for Feasibility Testing of Automated Driving on Public Roads (September 5, 2019) (completed) • Study of forms to be taken by rules under the Road Traffic Act in cases in which there is not necessarily a driver present		
Level 5					

Initiatives toward realization of the future vision
(MaaS and other new mobility services)

- **To ensure that initiatives targeting new mobility services will lead to solutions to community social challenges, it is essential both to provide backing for new community initiatives through public-private partnership and to develop an environment in which various stakeholders related to mobility can share and utilize information mutually.**
- **It also is important to promote social implementation of automated driving, including driverless automated driving transport services.**

(1) Ensuring the business potential of mobility services
Supporting public-private initiatives in communities intended to realize sustainable services, such as cooperation among different industries and overlapping of multiple means of transport.

(2) Enhancing alternative transit services
Supporting new initiatives to provide services that themselves have been mobilized in areas where it is difficult to maintain retail and public facilities.

(3) MaaS infrastructure development
To realize "Japanese-style MaaS" linking multiple fields, supporting initiatives through cooperation with public transportation businesses, service providers, and others in the communities.

(4) MaaS-related data coordination
Prompting data coordination among related parties based on the Guidelines, including development of systems to promote use of data by public transportation businesses and opening up data.

(5) Linkage of physical-space initiatives and MaaS platforms
Promoting initiatives such as development of transit hubs and improvements to driving spaces, reflecting urban plans and other factors, through linkage with MaaS platforms.

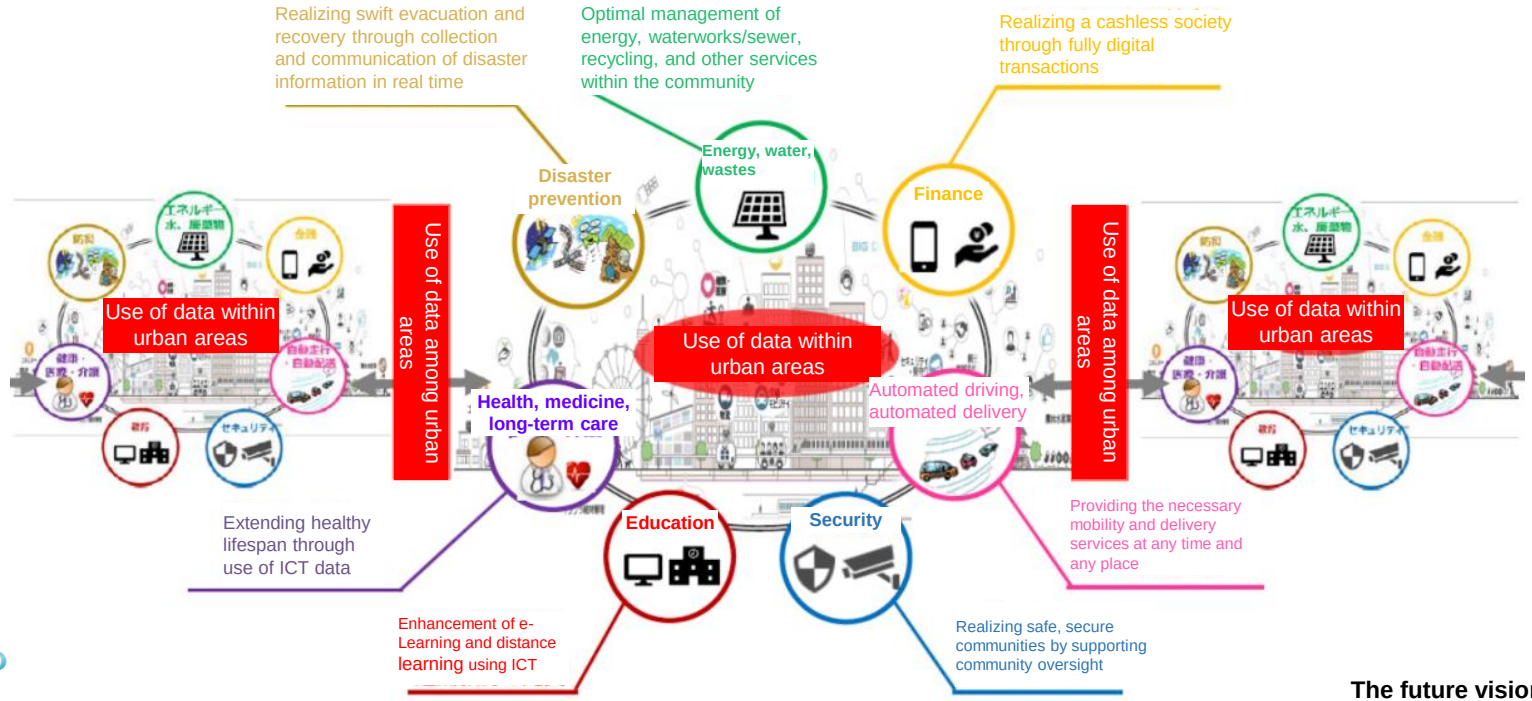
(6) Data linkage and utilization in the logistics field
Advancing studies toward improvements in logistics efficiency, including sharing of truck data and using it in management of driving, through cooperation among shippers, shipping companies, and commercial-vehicle manufacturers

Synergy effects of MaaS and automated driving

【MaaS and automated driving】
Realizing a mobility society in which anybody can move safely and freely with convenience and low cost, through using automated driving to transport people and things as a service. It is important to promote utilization of new mobility services and social implementation of automated-driving vehicles as integral parts of realizing the vision for the future.

Realization of Society 5.0 (coordination with smart cities)

- Contributing to solutions to community challenges and the economic cycle through coordination and use of various data across various fields including mobility. Through coordination of data with non-mobility services in areas such as retail, tourism, healthcare, and disaster prevention, creating new services and realizing sustainable mobility services.
- For this purpose, securing mutual usability and expandability in data collection and use is an important issue.



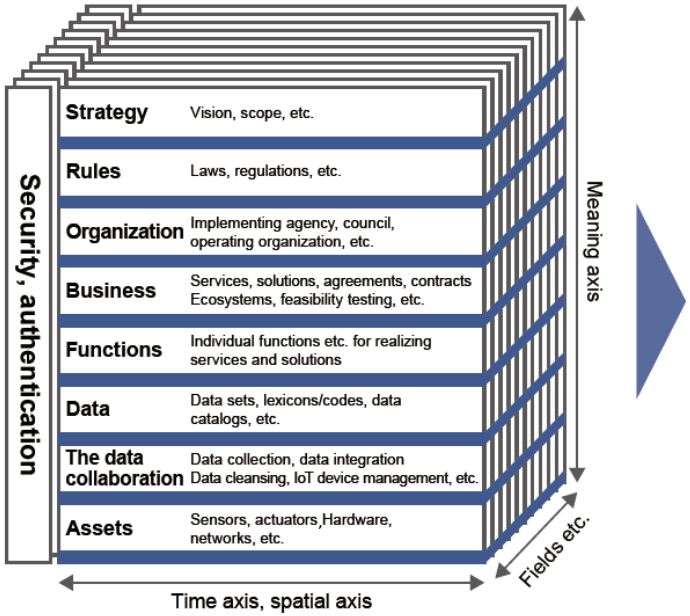
The future vision of the smart city

Source: Documents submitted by the Cabinet Office to the 28th Joint Economic/Financial Reforms Promotion Committee meeting

Courses of action on initiatives toward realization of the vision for the future

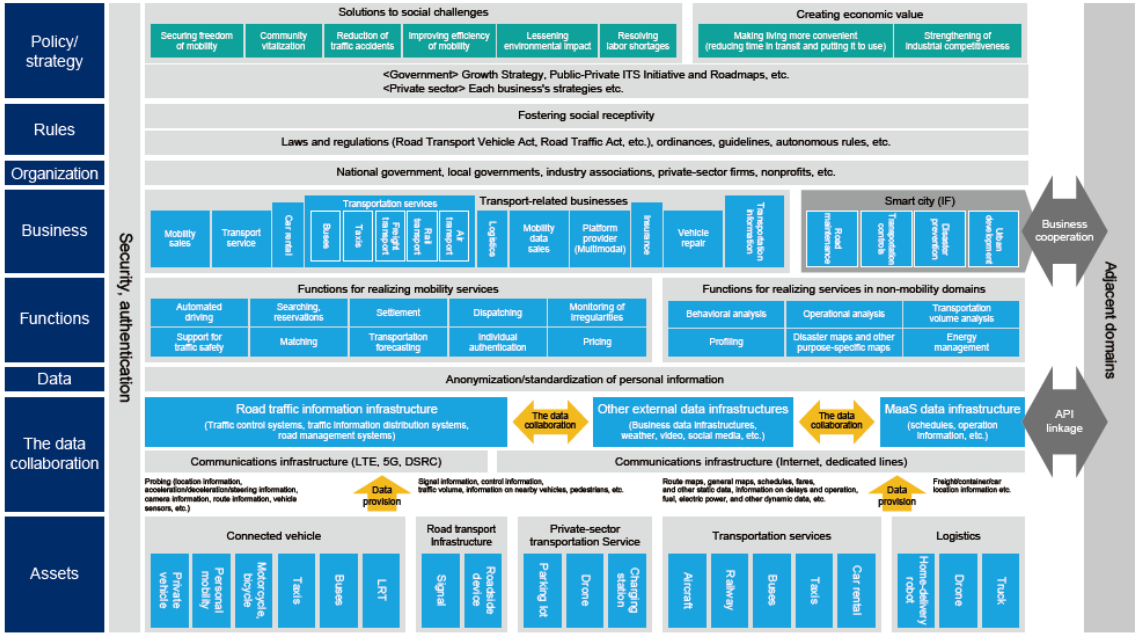
- Referring to the Society 5.0 Reference Architecture, formulating a reference architecture for mobility as a whole, to help realize the future vision.
- Using this architecture to realize the future vision and a framework modeled in detail, organizing future initiatives and promoting development of flexible mobility systems in coordination with other fields.
- Using this for reference in discussions with diverse stakeholders in the future.

Society 5.0 Reference Architecture



Source: Cabinet Office materials

Reference architecture in mobility systems (for transporting people and things)

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Thank you