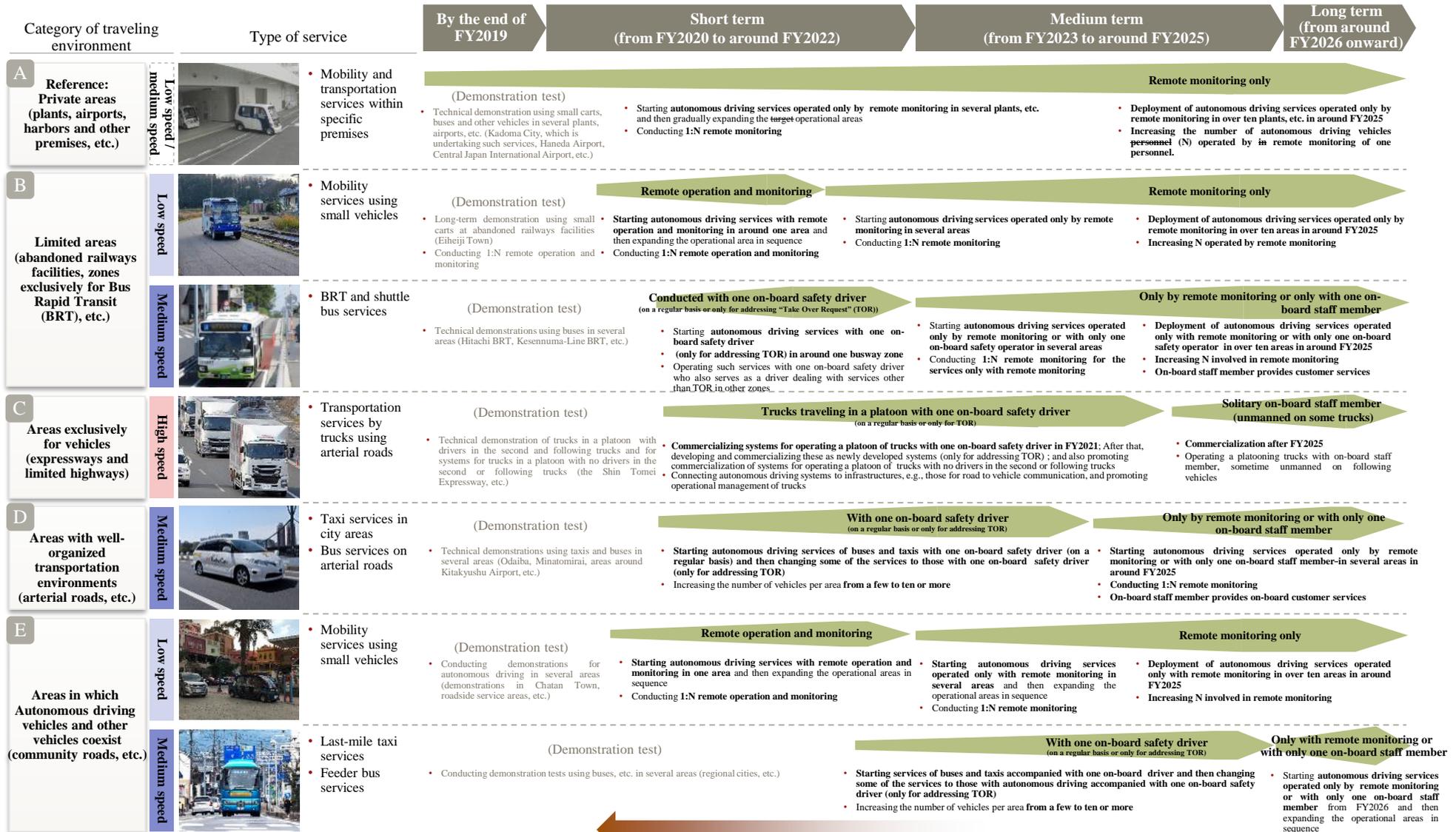


“Progress report on efforts to support the development of autonomous driving technologies and create adequate policies version 4.0.” Compiled by the Subcommittee on Business Discussions on Autonomous Driving Technologies (Summary)

1. Introduction (outline of the subcommittee)

- Aiming to lead the world in the field of autonomous driving and contribute to solving social challenges, the subcommittee was inaugurated in February 2015 as a study group bringing together the Director-General of the Manufacturing Industries Bureau of the Ministry of Economy, Trade and Industry (METI) and the Director-General of the Road Transport Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). In FY2019, as one of its efforts needed to be discussed under the framework of All-Japan initiatives by the industry, academia and government sectors, the subcommittee studied and discussed; (i) the Roadmap for Deployment of Autonomous Driving Services, (ii) demonstration tests for sophistication of autonomous driving, and (iii) efforts for harmonization areas and published the discussion results as a report titled “Progress report on efforts to support the development of autonomous driving technologies and create adequate policies version.”

2. Roadmap for Deployment of Autonomous Driving Services



Notes:

- This roadmap was prepared by referring to the results of interviews with related businesses. Concerning the development of environments for achieving these goals, the ministries will hold discussions on appropriate timing and ideal approaches and carry them out bearing in mind future technological development and other perspectives.
- The term "starting [autonomous driving] services" refers to conducting businesses, e.g., transportation, in a continuous manner by gaining a certain amount of revenues (not limited to freight revenues from passengers and including indirect burden of expenses that municipalities, private companies and other entities bear).
- Consideration of the timing for achieving unmanned autonomous driving services in the respective categories is handled differently depending on a variety of conditions, e.g., weather and traffic volumes in the target traveling environments.

Examples of measures for accelerating achievement of unmanned autonomous driving services and expanding the service-provided areas

- [i] Developing cooperation and reaching consensus with local residents (demonstrating caution in running vehicles with autonomous driving systems)
 - [ii] Connecting autonomous driving systems to infrastructures at intersections, boarding and alighting points, etc. (providing such systems with signal information, developing departure and arrival points exclusively for target vehicles, etc.)
 - [iii] Autonomous driving services in which drivers remotely control the vehicles for specific zones where operation only by remote monitoring is difficult, e.g., intersections and boarding and alighting points
- Developing traveling environments through these efforts

3. Demonstration Tests for Sophistication of Autonomous Driving

* Only METI and MLIT projects are explained here.

1. Demonstrations for mobility services using autonomous driving;

Goal: Deployment of driverless autonomous driving mobility services in FY2020

Small electric-cart models: Eiheiji Town, Fukui Prefecture, and Chatan Town, Okinawa Prefecture

- Based on the results of the long-term demonstration over six months, METI and MLIT confirmed seasonal variations, changes in demand by day of week and other situations (for discussing development of bus schedules).
- The ministries developed vehicular technologies based on the results of the long-term demonstration and other efforts (for improving recognition technology, etc.).
- They will conduct demonstrations for and assessment of: out-of-service operation of unmanned vehicles and operation of three or more vehicles by one remote operator.



Bus models: Hitachi City, Ibaraki Prefecture; Otsu City, Shiga Prefecture; Yokohama City, Kanagawa Prefecture;

Sanda City, Hyogo Prefecture; and Kitakyushu City and Kanda Town, Fukuoka Prefecture

- The ministries changed the target buses from small buses to mid-sized buses to improve business feasibility and developed two mid-sized buses with autonomous driving systems.
- They selected five transportation businesses as operators of demonstration tests using mid-sized buses with autonomous driving systems in October 2019. In response, the selected businesses have begun preparations for demonstration tests which will start from FY2020.
- One of the businesses conducted a pre-demonstration test using small buses (in one area) for about one month in February 2019 and successfully completed the test with no accidents.

2. Demonstration test for operating truck platooning;

Goal: Achieving technologies for operation of truck platooning with no drivers in the second or following trucks on expressways in FY2020

[System for truck platooning with no drivers in the second or following trucks]

- The ministries demonstrated operation of target trucks by expanding the distances of test operation and in a variety of road circumstances (night operation, tunnels, etc.) and confirmed that the system successfully worked showing no troubles.
- They developed technologies to make the system meet the requirements for electronic towing technologies and demonstrated operation of truck platooning with no drivers in the second or following trucks on a test course.



[System for truck platooning with drivers in the second and following trucks]

- Toward commercialization of the system, they conducted a demonstration in which a large vehicle merged into the space between target trucks during night-time operation of the truck platooning and found that trucks in a platoon tend to travel in a more stable manner during the night.

4. Efforts for Harmonization Areas, etc.

Efforts in FY2019
Efforts in FY2020 onward

Harmonization areas	Ideal goals to be achieved and polices for efforts
I. Maps	Aiming to develop highly-accurate maps in a quick manner tailored to the timing of commercialization of the systems in order to enhance the performance of estimating and recognizing the current position of drivers' vehicles; developing maps of expressways by FY2018, developing data on the maps updated as needed and providing updated data; promoting discussions on and preparations for development of maps of state-run national roads as public roads; and deciding on policies for developing maps of specific regions by 2021 and continuing to promote dissemination of such maps to other countries and cost reduction through developing automated mapping, etc.
II. Communication infrastructures	Aiming to improve the safety of autonomous driving by being coordinated with communication infrastructure technologies as well as improving autonomous vehicle technologies in order to achieve sophisticated autonomous driving as early as possible, in FY2019, having developed ITS roadside units, etc. for providing drivers with signal information and other purposes and started demonstrations bringing together 29 organizations, e.g., automobile manufacturers at home and abroad, as part of the demonstration test in the Tokyo Waterfront Area; and promoting discussions on international harmonization and standardization as well as sharing of the results of demonstrations under industry-academia collaboration in the future.
III. Recognition technology IV. Decision-making technology	Developing test courses which can reproduce traveling environments that may appear on actual roads as an effort for improving the efficiency of development of the technologies; having been collecting data contributing to discussions on indices of transportation infrastructures, which are minimum requirements for the Levels 3 and 4 Autonomous Driving Technologies, and on performance of recognition and judgment technologies as part of the demonstration test in the Tokyo Waterfront Area taking advantage of the open research framework in universities under the Second Round of the Cross-ministerial Strategic Innovation Promotion Program (SIP) organized by the Cabinet Office (CAO); and determining the indices and performance in around FY2020.
V. Ergonomics	Having been promoting international standardization for a variety of requirements and other criteria with an eye on global development of ergonomics for drivers, based on the physiological and behavioral indices of drivers and the fundamental concepts of driver monitoring systems and in light of the assessment results of the large-scale demonstration test as part of the CAO First Round of SIP conducted from FY2017 and FY2018 as well as the efforts conducted under the CAO Second Round of SIP; and continuing to advance these efforts.
VI. Safety	Establishing methods of assessing events caused by accidents involving vehicle systems, etc., performance limits and misuse; in FY2018, having prepared a handbook explaining past lessons and case examples as a reference for use by a wide variety of people; and having been promoting efforts to encourage the public to make use of the handbook since FY2019.
VII. Cybersecurity	To ensure safety and aiming at harmonization of development and assessment methods in order to improve the efficiency in development of functional safety; in FY2019, having utilized an assessment environment (test bed) constructed under the FY2018 project in research and other programs of the National Police Academy; promoting further utilization of the environment in around FY2020; and advancing discussions on enhancement of information-sharing systems and establishment of a framework for cyber-physical security measures in the future.
VIII. Human resources with expertise in the field of software	Aiming to promote discovery, securing and fostering of human resources with software expertise in order to overcome shortages of such human resources in the field including cybersecurity, a core element for developing software; cultivating programs for fostering human resources satisfying the Skill Standards formulated in FY2018 and aiming to have the programs certified as those under the Program for Certifying IT-Skill Training Courses to Meet the Era of the Fourth Industrial Revolution in around FY2020; and continuing to hold competitions in recognition accuracy and other measures of performance of vehicles in autonomous driving on test courses and promoting introduction the competitions into international events.
IX. Social acceptability	Addressing issues related to accidents that are unique to autonomous driving in terms of compensation for victims, pursuing responsibility and investigating causes involving such accidents; in FY2019, having described the liability related to autonomous driving, i.e. property damages and updating of software; having been raising public awareness of key points that people need to recognize and implement concerning autonomous driving through symposiums and other events in parallel with confirming public opinions and the level of people's understanding by conducting world cafés style workshops, questionnaire surveys and using other means as efforts for encouraging public understanding of autonomous driving technologies as users and for fostering public acceptance of such technologies; and continuing to advance these efforts.
X. Safety assessment	Considering it necessary to formulate new approaches to safety assessment tailored to autonomous driving systems' operation of vehicles, which are additional approaches to the conventional approaches to safety for vehicles driven by people; having discussed preparing a scenario explaining Japan's traffic environments for expressways and submitting it as Japan's proposal for new international standards to the International Organization for Standardization (ISO) in collaboration with other member countries; having discussed ideal approaches to a scenario on public roads and also discussed a framework to advance development of approaches to safety assessment in a continuous manner; as part of the CAO Second Round of SIP, having started building environments for assessing in virtual spaces created by computer simulations for safety assessment, which requires enormous data for developing vehicles with autonomous driving systems; and continuing to advance data collection and analysis and activities for international standardizations of such safety assessment.