“RoAD to the L4“

Project on Research, Development, Demonstration and Deployment (RDD&D) of Autonomous Driving toward the Level 4 and its Enhanced Mobility Services

Objective

– Create a sustainable society with mobility systems compatible with major trends in the automotive industry, such as CASE and carbon neutrality.

– Achieve demonstrations and deployments of level 4 autonomous driving mobility systems that contribute to reducing environmental burdens, solving mobility issues and increasing Japan’s economic value

Targets and KPI

①Demonstrations and diffusion of unmanned autonomous driving mobility services.

– Complete the demonstration of autonomous driving mobility services with remote monitoring (level 4) in limited areas and vehicles types by FY 2022

– Expansion of the service to more than 40 locations in diverse areas and vehicle types by FY2025,etc.

②Diffusion of new mobility services (MaaS) using IoT and AI

– Deployment of new mobility services using IoT and AI to solve social issues and vitalize local communities.

③Develop and secure human resources

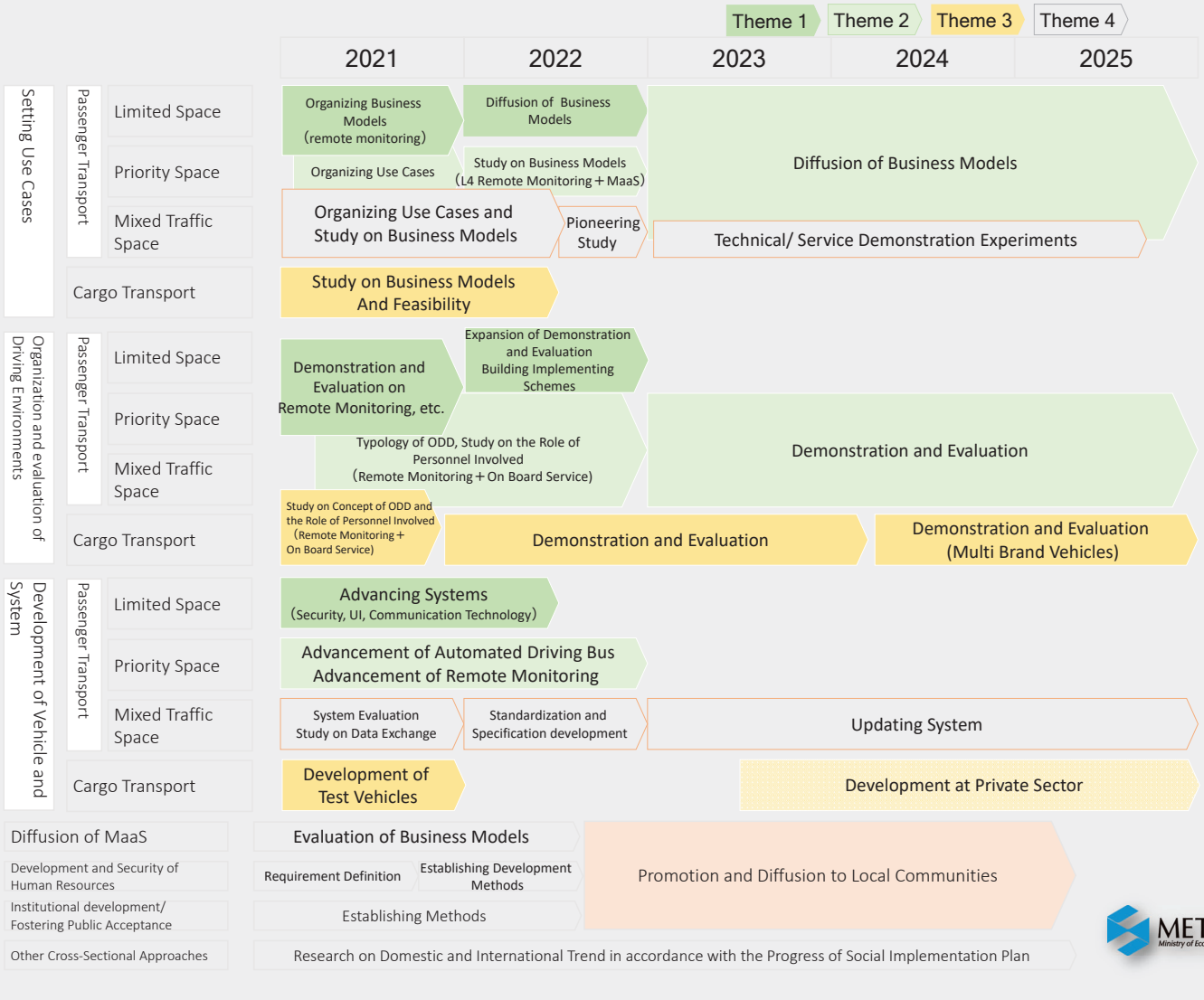
– Develop and secure human resources in various field including engineers for both hardware and software, innovators who can match technological solutions with social issues, etc.

④Fostering social acceptance

– Promote accurate understanding and interest in autonomous driving as well as encourage behavioral change by providing user-friendly information, opportunities to experience autonomous driving in real life and sorting civil liabilities.

Policy of Conduct

– This project aims to socially deploy advanced mobility services including level 4 autonomous driving, in addition to fostering technology development, research and analysis, and demonstration experiment, accordingly to above mentioned Objectives and Targets and KPI.



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Theme 1 Demonstration of an Autonomous Driving Service with Remote Monitoring (Level 4)

Target Result

- **Demonstration of an Autonomous Driving Service on Limited Area and Vehicles with Remote Monitoring by FY2022**
- **Establish Basic Business Models and Institutional Structure for Autonomous Driving Service with Remote Monitoring**

Approach Policy

- This project demonstrates an autonomous driving service with remote monitoring (level 4) at limited locations such as discontinued railway sites using low-speed vehicles.
- It studies the roles of remote operators and their tasks other than driving for establishing technology and the commercial deployment of remotely monitored level 4.
- The result will be shared with other ministries and agencies to build institutional structures and procedures for the deployment of level 4 autonomous driving services.

(Image) Remote-operating Autonomous Driving System in Eiheiji-cho

Main Activities

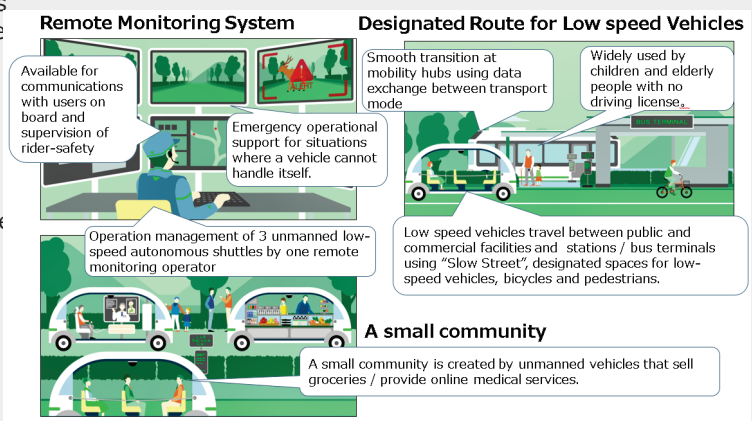
2021

- Organizing business models
- Operation, demonstration and evaluation of systems that enables remote monitoring of 3 vehicles by one person
- Demonstration and evaluation of remote operators' tasks exclude driving
- Advancement to level 4 vehicles and systems
- Evaluation of the security of remote monitoring system
- Improvement of remote monitoring system interface

2022

- Analysis and creation of models for the deployment of business models
- Update the requirements for remote operators to increase the number of vehicle monitored.
- Build structures for tasks excluding driving
- Implementation of safety validation for level 4 vehicles and systems
- Demonstration and evaluation of remote monitoring system and its interface

Future Image



Theme 2 L4 MaaS Service Expansion for multiple Area and Vehicle types, and Improvement of Business Feasibility

Target

- **Deployment of unmanned autonomous driving services to diverse areas and with various type of vehicles (level 4) at more than 40 locations by FY2025.**
- **Establish business models and infrastructure/institutional structure for the deployment of varied services.**

Approach Policy

- Promote the development of vehicles and systems with specification and functions that have appropriate safety for their ODD and operating conditions, assuming autonomous driving services in various areas and with various vehicles.
- Promote efficient rolling out of services by establishing ODD typologies, business models, infrastructure/institutional structures.

(Image) Automated Driving System of Toyota and Hino Motors

Main Activities

2021

- Organizing use cases of unmanned autonomous driving services, and study business models
- Creation of a Typology of ODD for autonomous driving services
- Study on safety assessment in accordance with ODD

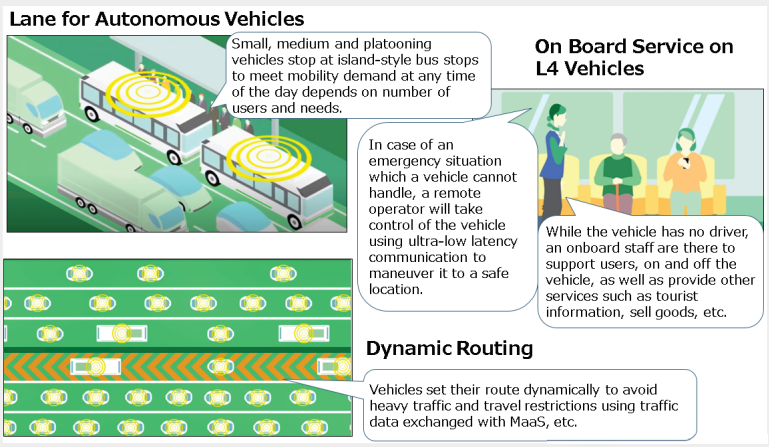
~2022

- Sophistication and diversification in the type of autonomous driving bus
- Advancement of remote monitoring systems
- Examination of connectivity with road infrastructure

~2025

- Increasing number of use cases, and business models
- Demonstration and evaluation of various driving environments and vehicles.
- Deployment of test vehicles developed by private companies

Future Image



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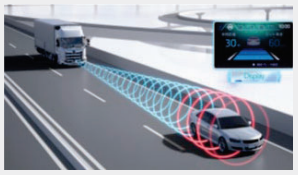
Theme 3 Deployment of High- Performance Trucks including Platooning on Expressway

Target

■Deploy level 4 autonomous driving trucks and its platooning technology on expressway after 2025
■Develop not only vehicle technologies but also necessary environment such as fleet operation management systems, infrastructures and data for business implementation

Approach Policy

- Development of level 4 autonomous driving trucks utilizing results of previous demonstration experiments of unmanned truck platooning.
- Develop fleet operation management systems utilizing infrastructure data that take the needs of large vehicles into consideration .
- The result will be shared with relevant ministries and agencies to improve of the business environment using road infrastructure, data exchange, etc.



(Image) Automated driving on Expressway

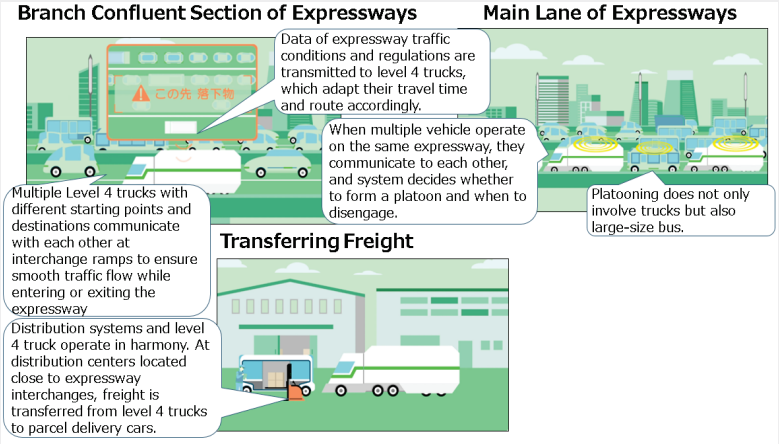
Main Activities

2021
・Evaluate business models for level 4 and their feasibility (e.g. infrastructure support, deployment to other types of vehicles, etc.)
・Development of vehicles and systems to evaluate the ODD of level 4 vehicles.

～2022
・Demonstration, evaluation and establishment of ODD concepts meeting characteristics of large vehicles
・Demonstration, evaluation and establishment of fleet management systems meeting the characteristics of large vehicles

～2025
・Demonstration, evaluation of business models
・Development of systems by the private Sector
・Demonstration and evaluation of collaborative driving of multi brand vehicles

Future Image



Theme 4 Harmonization and interoperability of infrastructure, V2V and V2P communication to achieve level 4 autonomous driving in mixed traffic environment

Target

■Achieve level 4 autonomous driving services in mixed traffic in diverse areas using cooperative system by around 2025
■Create a testbed area where the most appropriate cooperative system, which is adapted to local characteristics such as road environments and traffic situations, may be implemented
■Support lower level of automations (level 3, ADAS, etc.) and other type of mobility also.

Approach Policy

- Promote the implementation of cooperative system in accordance with local characteristics based on analysis and study of regional use cases.
- Develop business models for data exchange schemes that also benefit other types of mobility.
- Promote harmonization and standardization efforts based on domestic and international discussions and technology development

(Image) Driving assistance using data from infrastructure

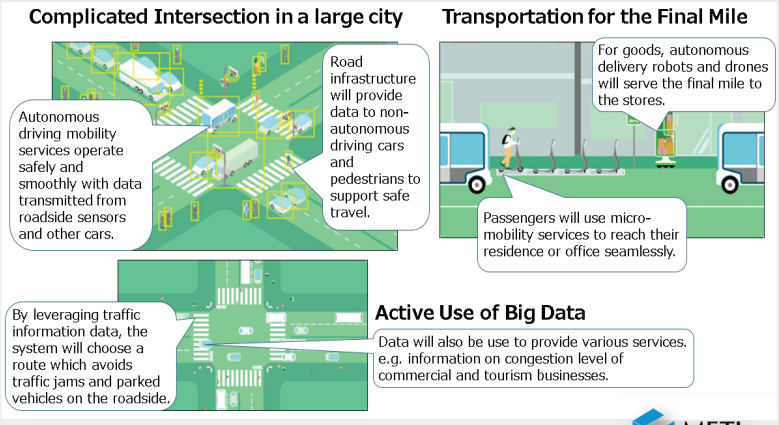
Main Activities

2021
- Study on use cases and business models based on results of preliminary experiments.
- Study and evaluation of cooperative system
- Study on data exchange schemes

～2022
- Identifying specification of data exchange schemes
- Study on Standardization and evaluation environment of cooperative system
- Study on international trend and strategies of cooperative system

～2025
- Technical/ service / operational/ feasibility demonstration at the test bed area
- Proposal of standardization and harmonization for cooperative system
- Verification using test bed and update the system

Future Image



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