Strategic Innovation Promotion Program (SIP) Phase 3 Smart Mobility Platform Construction

The Report of Focusing on social acceptability and stakeholder coordination Social Implementation and Human Resource Development Program Development

March 2025

BOLDLY Inc.

BOLDLY
UPDATE MOBILITY

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Overview of R&D

A ⑦ Development of Road Spaces and Transportation Systems that are Safe, Secure, and Vibrant

(A) ⑦-2 Establishment of a Theory for Street Network Planning in Existing Urban Areas

A prototype micro-traffic simulation model was developed to explore optimal road space configurations assuming the introduction of autonomous vehicles, focusing on Tomakomai City, Hokkaido. In addition, to enhance the micro-traffic simulation, various studies were conducted, including: extraction of pedestrian and slow mobility movement ranges within urban spaces, and analysis of factors triggering the switch from autonomous to manual driving using winter operation data of autonomous buses in Tomakomai.

(B) ⑦-4 Acquisition of Social Acceptance and Cooperation, and Rule-Making Surrounding Residential and Lively Streets

To investigate the social acceptance of autonomous buses, on-site surveys were conducted in regions where such buses have been introduced. Additionally, analysis was performed on survey results from the government-supported project by the Ministry of Land, Infrastructure, Transport and Tourism, alongside group interviews with local residents.

Furthermore, surveys were conducted targeting active senior citizens to support the design of questionnaires focusing on the social acceptance of autonomous buses.

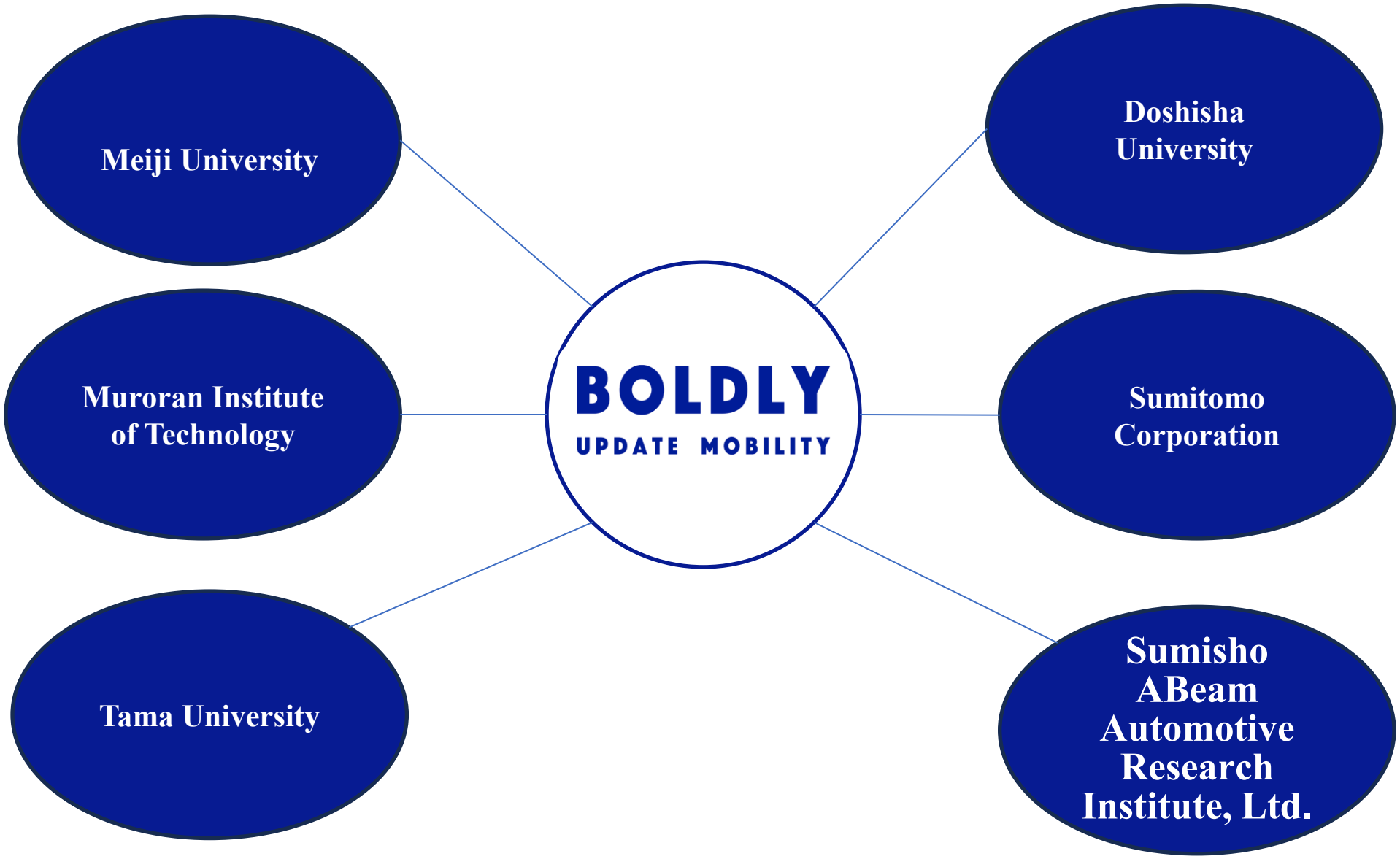
(C) ⑦-9 Proposals for Systems and Rules

At a study group held by Meiji University, stakeholder presentations were conducted to gather diverse technologies, information, and proposals. To achieve overall optimization of the implementation of autonomous vehicles and human social activities, a set of behavioral guidelines titled “Code of Conduct for Building a Society that Accepts Autonomous Vehicles” was compiled for relevant stakeholders to follow.In addition, a mock trial on autonomous driving was held to clarify legal issues. The use of objective data such as Event Data Recorders (EDRs) and Crash Data Retrieval (CDR) systems was also studied.

B ⑲ Human Resource Development for the Social Implementation of Services

We defined individuals responsible for the social implementation of new mobility as "regional producers," and compiled strategies to identify, nurture, and enable them to play an active and sustainable role within their communities.

Implementation Structure



Process

Reseach Items	FY 2023				FY 2024			
	1st quarter	2nd quarter	3rd quarter	4th quarter	1st quarter	2nd quarter	3rd quarter	4th quarter
⑦-2-1 Building a Proto-Model			→	→				
⑦-2-2 Expansion of microtraffic simulations					→	→	→	→
⑦-4-1 Survey design			→	→				
⑦-9-1 Collecting case studies			→	→				
⑦-9-2 Examination and organization of problems in the administration of permits and licenses				→	→	→	→	→
⑦-9-4 Collection and organization of practical application examples of technology			→	→				
⑦-9-5 Collection of case studies in collaboration with other projects related to technology				→	→	→	→	→
⑦-9-8 Collecting case studies in collaboration with other projects				→	→	→	→	→
⑦-9-9 Designing Computational Models				→	→	→	→	→
⑲-1 Collection of case studies and formulation of training programs			→	→	→	→	→	→
⑲-3 Advising and participating in training programs, etc.				→	→	→	→	→

⑦-2 Establishment of a Theory for Street Network Planning in Existing Urban Areas

(A) ⑦-2 Establishment of a Theory for Street Network Planning in Existing Urban Areas

A prototype micro-traffic simulation model was developed to explore optimal road space configurations assuming the introduction of autonomous vehicles, focusing on Tomakomai City, Hokkaido. In addition, to enhance the micro-traffic simulation, various studies were conducted, including: extraction of pedestrian and slow mobility movement ranges within urban spaces, and analysis of factors triggering the switch from autonomous to manual driving using winter operation data of autonomous buses in Tomakomai.

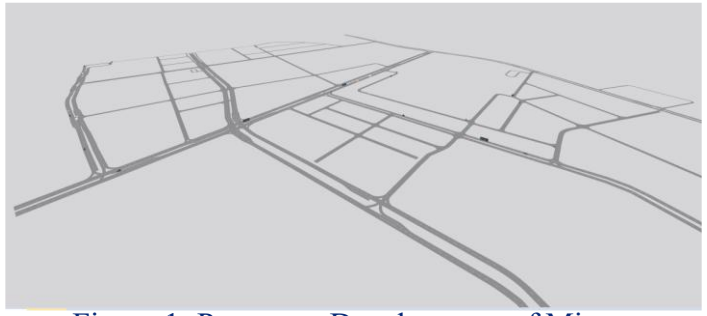


Figure 1: Prototype Development of Micro-Traffic Simulation for FY2023

Figure 2: Winter Demonstration Experiment for FY2024 (Left: Operation during Snowfall, Right: Road Surface Conditions)

3. Block-Level Network Simulation with Mixed Traffic Including Autonomous Buses

Figure 3: Estimation of Travel Demand Using High-Granularity Human Flow Data

Figure 4: Setting of Autonomous Vehicle Travel Routes

Table 1: Simulation Scenario Settings
(Travel Time Changes Due to Mixed Traffic with Autonomous Buses)

Scenario	Description
Scenario 1	Only general vehicles extracted from GAD
Scenario 2	General vehicles plus one autonomous bus operating on the demonstration route
Scenario 3	General vehicles plus one autonomous bus operating on the demonstration route (with dedicated lanes)
Scenario 4	General vehicles plus five autonomous buses operating on the demonstration route (with dedicated lanes)
Scenario 5	General vehicles plus two autonomous buses operating on a circulating route (virtual) within the target area
Scenario 6	General vehicles plus two autonomous buses operating on a circulating route (virtual, winter conditions) within the target area

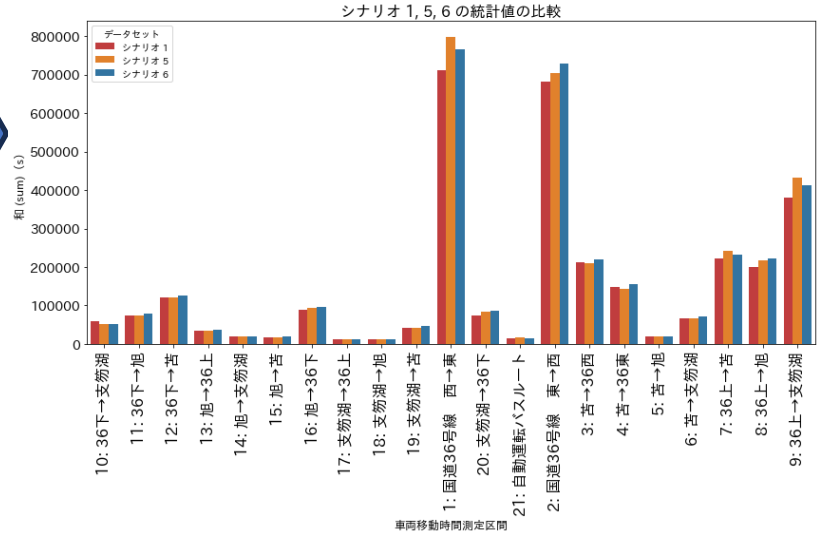


Figure 5: Evaluation of Travel Time Changes by Route Due to Mixed Traffic with Autonomous Buses

2. R&D Results

⑦-2 Establishment of a Theory for Street Network Planning in Existing Urban Areas

1. Development of a Method for Extracting Movement Ranges of Pedestrians and Slow Mobility within Urban Areas

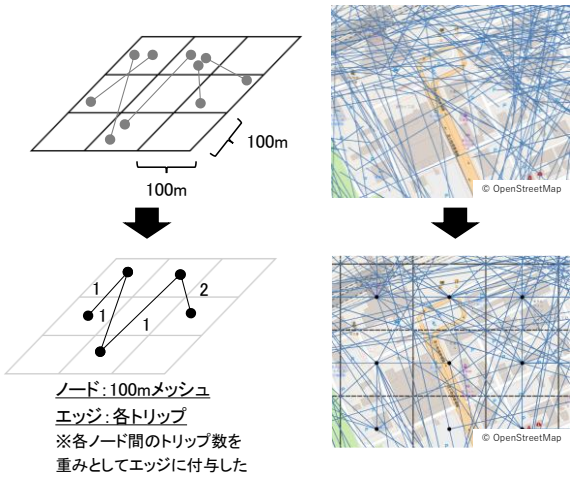


Figure 6: Creation of a Network Graph Using GAD

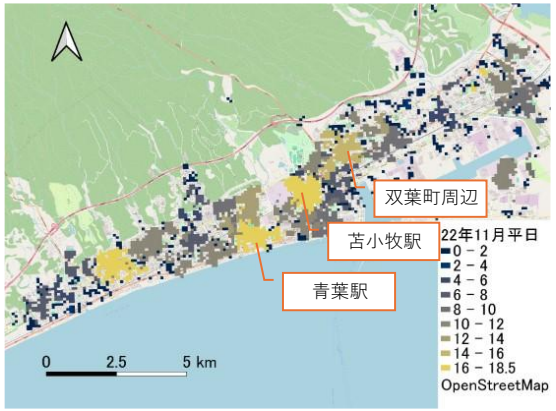


Figure 7: Estimation Results of Pedestrian Density (Entire Tomakomai Area)

Table 2: Estimation of Travel Purpose Shares at Major Hubs

苫小牧駅		青葉駅		双葉町周辺	
移動目的	割合	移動目的	割合	移動目的	割合
帰宅	40.1	帰宅	46.0	帰宅	43.6
その他	18.8	その他	20.3	その他	24.8
食品・日用品	15.5	通勤	13.4	通勤	10.3
通勤	13.9	食品・日用品	7.4	食品・日用品	8.6
食事	5.3	食事	5.6	食事	4.9
通院	2.6	アウトドア	4.1	アウトドア	3.2
エンタメ	2.4	通院	1.8	通院	2.9
買い物	0.9	買い物	0.8	買い物	1.1
アウトドア	0.5	エンタメ	0.6	エンタメ	0.6
歩行者密度	17.7	歩行者密度	16.5	歩行者密度	15.0
平均移動時間7.1分		平均移動時間6.7分		平均移動時間6.7分	

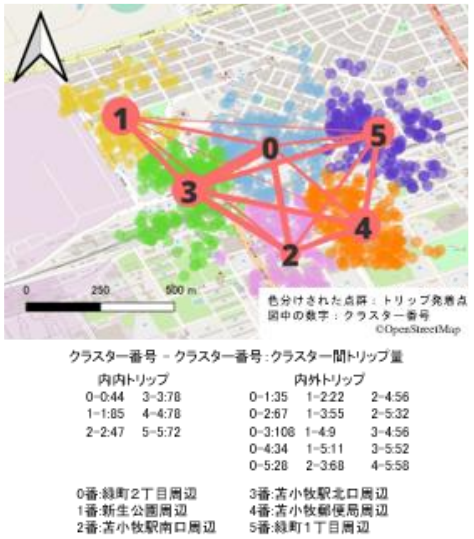


Figure 8: Estimation Results of Pedestrian Density (Station Front: Block Area)

2. Extraction of Factors Triggering Override Events Using Winter Operation Data of Autonomous Buses in Tomakomai City in FY2025

Implementation Period of the FY2025 Winter Demonstration Operation of Autonomous Buses in Tomakomai CityFrom December 5, 2024, to February 16, 2025, operating on Thursdays, Fridays, Saturdays, and Sundays (no operation from December 22, 2024, to January 8, 2025).Operation days: 35 days; Number of trips: 210 trips (counted as 1 outbound + 1 return trip per set); Number of users: 1,117.During the demonstration, the remote monitoring software "Dispatcher" was recorded, and override occurrence locations and causes were identified through visual inspection.

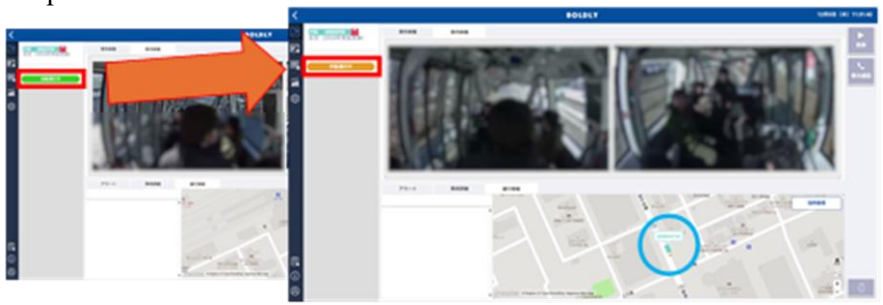


Figure 9: Image Recording Data from Remote Monitoring Software "Dispatcher"

Figure 10: Distribution of Override Occurrence Locations (Left: Normal Conditions, Right: Snowfall Conditions)

2. R&D Results

⑦-4 Acquisition of Social Acceptance and Cooperation, and Rule-Making Surrounding Residential and Lively Streets

- We aimed to quantify the extent to which the introduction of autonomous buses improves the well-being of local residents through a survey.
- Based on the results of group interviews, we considered changing the survey method, but it was not implemented in the consortium's overall plan review.

Item	Plan	Achievements and Progress
Survey design	By the end of fiscal year 2023, we will conduct on-site surveys in areas where autonomous buses have been implemented in society, and develop the basic design for a questionnaire survey to be conducted next fiscal year.	**(a) Field surveys** • We conducted hearing in an area where BOLDLY has introduced an autonomous buses. • The effects of the introduction included the promotion of going out and health, the improvement of traffic manners, and the fostering of civic pride, but it was confirmed that there are issues in quantifying the effects of the introduction. **(b) Analysis of existing surveys** • We analyzed resident surveys in 2021-2023 in areas where BOLDLY has introduced autonomous buses. • The sample size of each survey is was small, the questionnaire items are not standardized. For this reason, we determined that it would be difficult to generalize through quantitative analysis. **(c) Detailed design of the questionnaire** • In preparation for the detailed design of our own questionnaire, which includes measures of residents' well-being, we conducted group interviews with residents in advance. Although we confirmed the high needs and expectations and obtained suggestions for the effects of introduction, we judged that it would be difficult to quantify the improvement in well-being. • As an alternative, we explored a method to quantify the improvement in the acceptance of autonomous buses by comparing the probability of selecting an autonomous bus among multiple modes of transportation differs between the demonstration test implementation area and the non-demonstration test area. • However, this was not implemented due to a review of the consortium's overall plan.

⑦-4 Acquisition of Social Acceptance and Cooperation, and Rule-Making Surrounding Residential and Lively Streets

⑦-4-1 Survey Design (a) Field Surveys

- We conducted hearing in an area where BOLDLY has introduced an autonomous buses.
- The effects of the introduction included the promotion of going out and health, the improvement of traffic manners, and the fostering of civic pride, but it was confirmed that there are issues in quantifying the effects of the introduction.

	①Sakai Town, Ibaraki Pref.	②Kamishihoro Town, Hokkaido	③Nisshin City, Aichi Pref.	④Gifu City, Gifu Pref.
Regional Characteristics	Suburb	Snowfall area	Residential area	Central city area
Start of Operation	2020	2022	2023	2023
No. of Shuttles	ARMA 5 units, MiCa 3 units	ARMA unit	ARMA1 + 1 unit (under demonstration)	ARMA 3 units
Levels of Driving Automation	Level 2	Level 2	Level 2	Level 2
Number of Routes	3	2	1+1 (under demonstration)	2
Route Type	New routes (the area not covered by the existing route buses)	Complement of the existing community buses	Complement of the existing community buses	Complement of the existing route buses
Effects	• Civic pride • Outings/Health • Reduction in the number of on-street parking • Improvement of traffic manners • Synergy with new facility development • PR and site visits	• Reduction in the number of on-street parking • Improvement of traffic manners • PR and site visits	• Outings/Health • Education (to increase interests of students in science and technology)	• Civic pride • Creating liveliness in the city center
Related Measures	• New facility development, etc.	• Town OS (facial recognition) • Plans to introduce AI conductors • Consolidation of freight and passengers • Drone	• Reservation by personal ID + token (points awarded) • Drone	• Decided to continue operation for 5 years

Survey on Mobility among Active Senior Citizens

TAMA UNIVERSITY 多摩大学

○Purpose of the survey

A questionnaire survey was conducted among active senior citizens interested in academic events to clarify (1) their impressions of means of transportation, (2) their current understanding of what means of transportation they use and for what purposes, and (3) whether their willingness to travel changes depending on the means of transportation available to them.

The survey was conducted on 134 participants (118 males and 9 females, more than half of whom were elderly people in the latter half of their lives) of Tama University's public lectures.

Survey period June 2024

○Analysis Results

Changes in travel intention by means of transportation

The willingness to travel increases when walking (less than 15 minutes) is possible.

The willingness to travel is lower when a cab is used.

The willingness to travel by public transportation does not change (bus) or increases (train/subway) for socializing with close friends, hobbies, and learning/self-improvement.

The results of the survey showed that the use of a private car is more likely to be avoided if it is not for daily life, health, or social interaction with close friends.

Implications of the survey results for social acceptance of self-driving cars

The survey results suggest that the social acceptance of self-driving cars is likely to be influenced by the following factors: ・Segregation and differentiation from other modes of transportation are important in considering what types of transportation should be supported by self-driving cars.

Possible to consider the needs of self-driving cars in combination with the purpose of travel.

e.g.) There is a possibility to promote such activities by supporting transportation for daily life, health, and community/social contribution, which are mainly done on foot, with automated vehicles.

⑦-9-1 Collection of case studies

(1)Collected from Mobility DX Study Group (lectures and symposiums)

From the Meiji University Social Implementation Research Group, 'Trends in the legal systems and rules of various countries regarding autonomous driving' is quoted and extracted.

◆AI responsibility, policy trends, and responses in various countries **[62nd, 63rd, 68th, 79th]**

◆Significance of ELSI/RRI for the implementation of autonomous driving **[74th, 78th]**

◆Investigating the causes of autonomous driving accidents and importance of electronic evidence such as event data recorders **[70th, 65th, 72nd]**

◆Local Public Transportation and Autonomous Driving **[67th, 71st, 73rd, 77th]**

◆The Necessity of External HMI (Human Machine Interface) from the Pedestrian's Perspective **[66th]**

Table. 1 lectures and symposiums list

No.		Implementation Study Group / Mobility DX Study Group / Symposium Name.	date	WD	Lecture	D/I	Field	Topics
*	62nd	63rd Second MIAD Overseas Symposium (co-organised by Meiji University Faculty of Law)	17-Aug-23	Thr	I-A-G-C	Dom.	Courts, technology and implementation	Automated driving accident mock trials
1	63rd	2nd MIAD International Symposium	21-Sep-23	Thr	Univ.	Int.	Laws, regulations and technology	Germany AI criminal liability, use of
2	64th	Autonomous Driving and Legal Liability	19-Oct-23	Thr	Univ.	Int.	Laws, regulations and technology	German law Automated driving liability
3	65th	Issues Related to Electronic Evidence such as EDR and DSSAD	16-Nov-23	Thr	Univ.	Int.	Legal/implementation	Civil trials Electronic evidence and its challenges
4	66th	The Utility of External HMI in Autonomous Vehicles	21-Dec-23	Thr	Co.	Dom.	Technical/standardisation	Need for external HMI (Sakaimachi demonstration)
5	67th	Efforts Including Autonomous Driving in Kamishihoro Town	18-Jan-24	Thr	Local gov.	Dom.	Local/demonstration	Local public transport and automated buses
6	68th	Activities of the Innovation Governance Study Committee for a New Mobility Society of Society of Automotive Engineers of Japan	15-Feb-24	Thr	IAA	Dom.	Technical/administrative	German and Japanese automated driving initiatives
7	69th	Autonomous Vehicles and the Automotive Industry	21-Mar-24	Thr	Univ.	Dom.	Technical/industrial	The value of automated driving from a consumer perspective
8	70th	Background on the 'Permit System for Specific Automated Driving' and the 'Preparation of Automated Driving Accident Investigation Reports'	18-Apr-24	Thr	IAA	Dom.	Legislation/administration	Investigating the causes of automated driving accidents
9	71st	Implementation of Automated Driving Vehicles in Komatsu City	16-May-24	Thr	Local gov.	Dom.	Local/demonstration	Automated buses and business viability
10	72nd	Utilisation Methods and Issues of EDR/CDR	20-Jun-24	Thr	Univ.	Dom.	Technical/implementation	Evidence from accident dispute resolution
11	73rd	Future Regional Public Transportation through Transportation DX/GX	18-Jul-24	Thr	Univ.	Dom.	Technical and local administration	Local public transport and the significance of automated driving
12	74th	3rd Mini Symposium 'What is ELSI?'	23-Aug-24	Fri	Univ. & Co.	Dom.	ESLI/RRI/industry	Necessity of ELSI/RRI
13	75th	Issues in Public Transportation and Challenges Related to Automated Driving and MaaS Spreading Nationwide	19-Sep-24	Thr	Univ. & Co.	Dom.	Local/implementation	Local public transport and new transport technologies
14	76th	Aisan Technology Co., Ltd.'s Perspective on Automated Driving	17-Oct-24	Thr	Co.	Dom.	Technical/implementation	Automated driving initiatives and implementation issues
15	77th	Approaches to Local Government DX and Mobility DX	21-Nov-24	Thr	Co.	Dom.	Technical and local administration	Mobility x telecommunications and municipal DX
16	78th	Tama University's Initiatives in Autonomous Driving and Transportation	19-Dec-24	Thr	Univ.	Dom.	ELSI/RRI, technical	Necessity of ELSI/RRI
17	79th	Ethics of AI, Ethics of Robotics, and the Implementation of Autonomous Vehicles	16-Jan-25	Thr	Univ. & R&D	Dom.	Technical/implementation	AI ethics and legislation and the granting of AI legal personality

⑦-9-2 Review and organization of problems and issues in licensing administration

<Identifying issues in law and liability, technology and deregulation>

[A rule of conduct for building a society to automated vehicles]

To optimize the implementation of automated vehicles and human social activities as a whole, Rule of conduct to be observed by each of the parties concerned (hereinafter referred to as the Rule of Conduct).

The use of soft law enables flexible institutional design, based on the premise that the content can be revised from time to time in accordance with the concept of "agile governance".

Use of soft law to enable flexible system design on the premise that the system can be revised sequentially to The use of soft law is envisaged as a means to achieve this.

Outline of Automatic Driving Guideline

明治大学 MEIJI UNIVERSITY

Structure:

1. System for Automated Driving Vehicles (8 items)
2. Autonomous Driving Functions of Automated Driving Vehicles (14 items)
3. Obligations pertaining to other traffic participants (2 items)
4. Obligations for maintaining the driving environment (3 items)
5. The rules for traffic accident treatment, dispute resolution, and insurance (8 items)

The five parts of the document, as described above, are composed of 35 items, We have tried to comprehensively grasp the environment surrounding autonomous vehicles and, as much as possible, to verbalize the principles without neglecting them.

(Points)

- Maintain predictability
- Appropriate allocation of responsibility
- Overall optimization

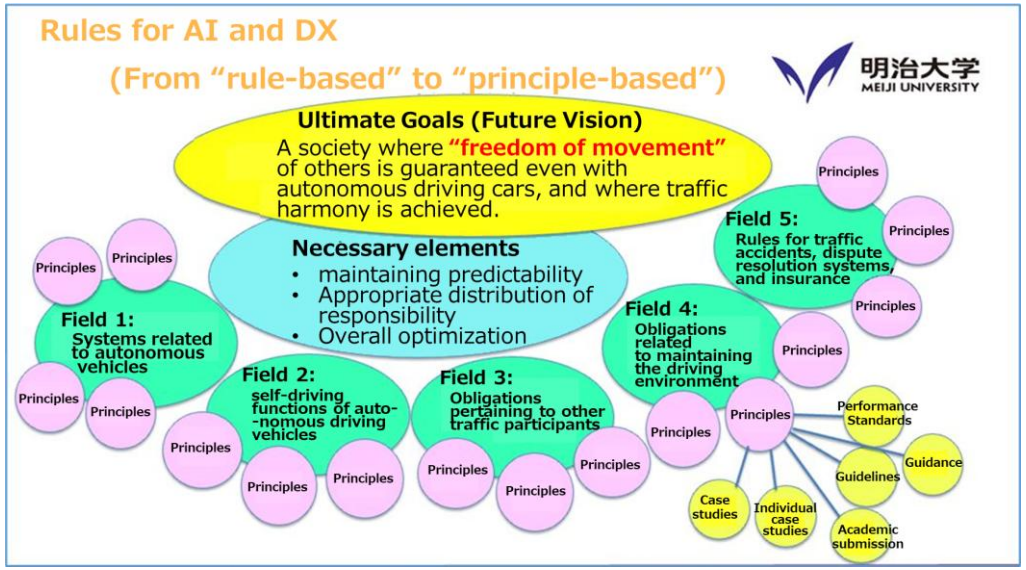
[Legal and regulatory issues relating to automated vehicles]

The complexity of factors such as the lack of established technology, high social utility, and the need for international standards, intertwine with one another.

The social framework surrounding automobiles changes fluidly in response to technological advancements and shifts in social consensus, and 'agile governance' that involves local residents based on 'agreements that are not fully theorised' is important.

Risk-averse behaviour may hinder the social implementation of cutting-edge science, so it is necessary to establish norms appropriate to the level of technology.

Discussions on the social implementation of new technologies should be conducted through collaboration between governments and industry associations, aiming to harmonise international standards, while providing objective data through demonstration experiments and engaging in dialogue with a wide range of stakeholders.



⑦-9 Proposals for Systems and Rules

<Focus on automated driving pseudo trials>

Meiji University Advanced Science ELSI Research Institute held pseudo criminal trial on autonomous driving before.

These questions has been explored from a later public report.

- -Will disputes over accidents be resolved in the same way as before?
- -How will trials involving autonomous vehicle accidents be conducted?
- -What challenges lie ahead?

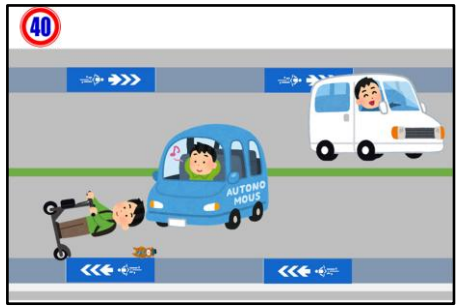
<Judges>
Presiding: Koji Nakayama (Full Prof., Meiji University)
Right Associate: Takashi Higasa (Associate Prof., Tama University)
Left Associate: Koki Nezu (Specially Appointed Assist. Prof., Niigata University)

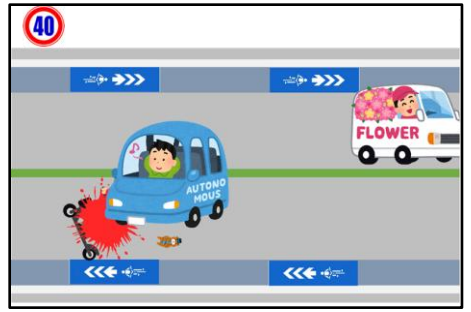
<Prosecutor>
Prosecutor: Yoshio Nakamura (Former Prosecutor/Attorney)

<Defense Counsel>
Defense Counsel: Mr. Kenta Sato (Lawyer)
Defense Counsel: Mr. Shoichi Shibayama (Lawyer)
Defense Counsel: Mr. Naoka Yoshida (Lawyer

<Expert Witness>
Expert Witness: Mr. Tomoki Saji (President, BOLDLY Co., Ltd.)

◆ **Summary of the lawsuit:**
Investigated these cases as suspected cases of negligent homicide and prosecuted the following each suspect for negligence;
(1) Operation manager for specific automated driving, (2) Person in charge of specific automated driving, (3) Manufacturer (designer) of automated vehicles, (4) Person in charge of specific automated driving permits





◆ **Prerequisite facts: accident circumstances**
- The self-driving car detected that the electric kickboard had left the bicycle lane and accelerated to approximately 35 km/h (0.5 seconds later).
- The driver of the modified electric kickboard dropped something and fell over
- The self-driving car detected this, but was unable to stop though breaking, running over the victim, who died.

Key points from this pseudo trial:

- Autonomous driving technology intervened to the previous relation between pedestrians and drivers. A discussion on how the technology itself should perform is needed in the future
- There is no objective evidence regarding the accident situation, as it is based solely on the testimony of witnesses after the accident.
- There are multiple prosecutors, and responsibility may be shifted between them. (This may take a long time to sort out.)

Going forward, it is urgent to adopt electronic evidence and establish a dispute resolution system. We should also increase the number of court cases under the new traffic environment and proceed with mock trials to enable rapid response.

⑦-9 Proposals for Systems and Rules

<Method for clarifying the objective degree of contribution to the cause of an accident 1>

Event Data Recorder(EDR): Adopted as evidence in serious accident trials in recent years.

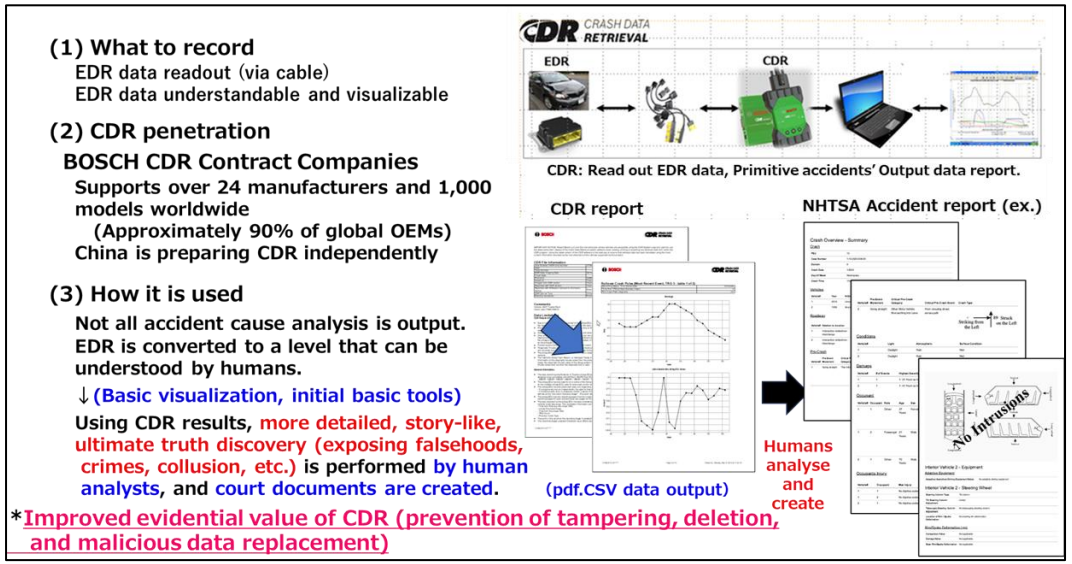
Crush Data Retrieval(CDR): Basic human comprehensible report

CDR report → Analyst analizing → Accident situation estimation (human)

Estimated depth: Ex. determinng who is responsible in a three-car pile-up accident

Fig.1 three cars crush

Fig.3 CDR



EDR/CDR issues

-There are no regulations in Japan regarding CDR preparation.
(No one can take responsibility for preventing EDR tampering.)

-Bosch holds approximately 90% of the CDR market share, but since true analysis is performed by humans, resource shortages are a concern(this becomes even more significant with autonomous driving).

-Tesla's Level 4 autonomous driving system, which operates solely based on video data, may not have an EDR.

-The WP29 standards are being overturned from the EU's perspective on privacy protection.

EDR/CDR, electronic evidence, will become more objective, quantitative and indispensable in court and dispute resolution.

Fig. 2. Actual CDR operation and CDR equipment (Toyota vehicle)

Fig.4 Status of CDR implementation in countries around the world.

Item \ Country	UN	United States, Canada	EU	Japan	China	Korea
Regulatory name	UNR No. 160-00 / 01	CFR*49 part 563	UNR160 compliant + GSR**	Japan: UNR160 compliant	china: 563 base original	Korea: 563 base K-EDR
regulation-based	↑	↑	UNR No. 160-00 / 01	UNR No. 160-00 / 01	CFR*49 part 563	CFR*49 part 563
domestic regulations			GSR No. EU 2022/545		GB39732-2020 Class A/B	KMVSS Art. 56-2
Vehicle Category	M1, N1	PV, CV with a GVWR of 3,855kg or unloaded vehicle weight of 2,495kg	M1, N1	M1, N1	M1	M1, N1
mandatory installation	Mandate	If fitted	Mandate	Mandate	Mandate	if fitted
Retrieval Tool	be defined by each cour	Required	Required	Out of Scope	Required	Required

GSR*: General Safety Regulation
CFR*: Code of Federal Regulation
GVWR**: Gross Vehicle Weight Rating
KMVSS****: Korea Motor Vehicle Safety Standard

N1: Vehicles used for transporting goods with a maximum mass not exceeding 3.5 tonnes.
M1: Vehicles used for transporting passengers, with a driver's seat and no more than eight passenger seats.
PV: Private passenger cars are for personal use, excluding vans and trucks (1 tonne or more) or motor homes and buses (15,000 kilometres or more).
CV:Abbreviation for commercial vehicle, referring to automobiles used for business or commercial purposes.

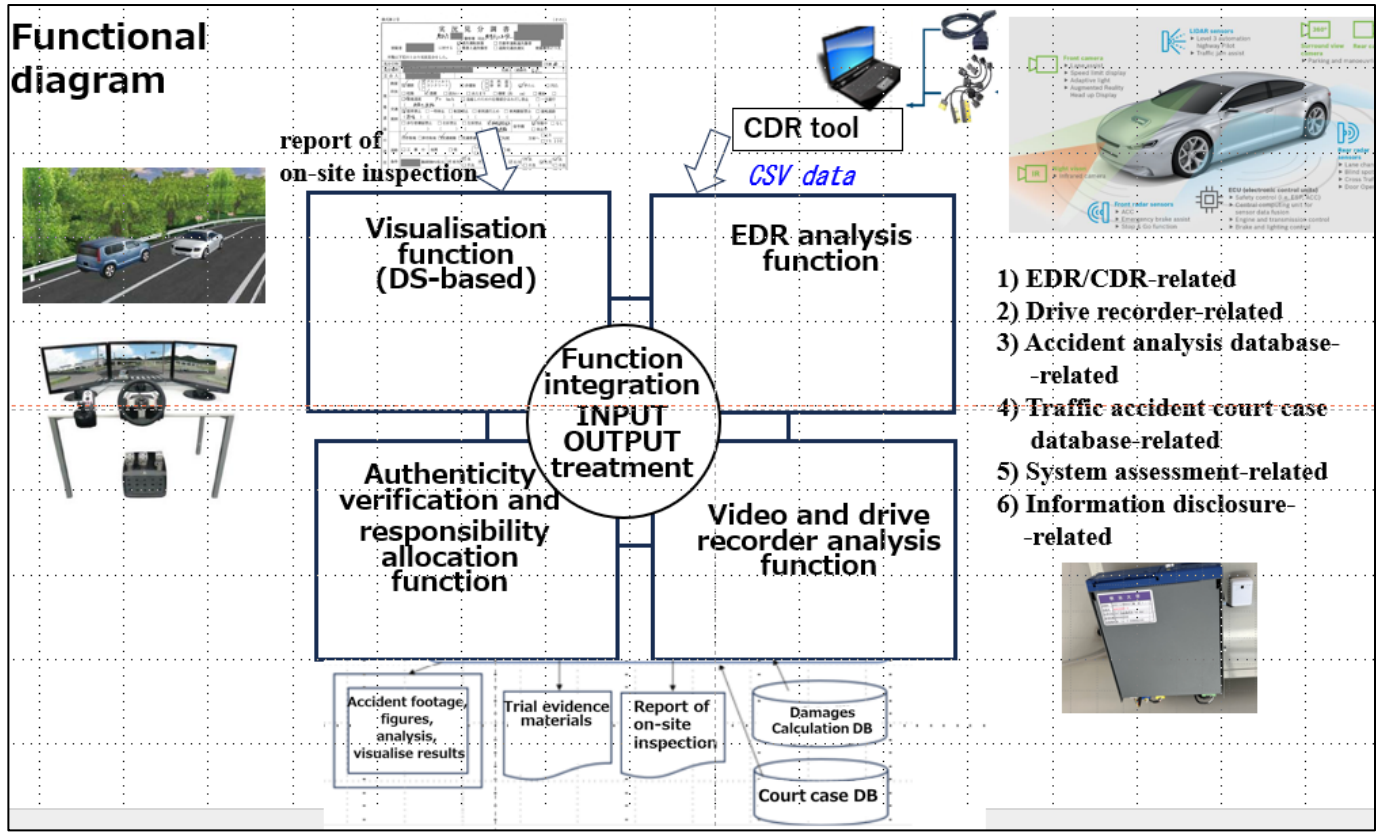
⑦-9 Proposals for Systems and Rules

<Method for clarifying the objective degree of contribution to the cause of an accident 2>

Functional structure and requirements for road accident dispute resolution systems =

Driving simulators, CDRs, decision function units, professional drive recorders, integrated I/O systems.

(The H/W department will actually verify feasibility)



Receive, acquire, and store
Data reception(Video, time, location, sound, vehicle data, etc.)
Device data synchronisation
Synchronisation of all device data
Security functions

Object recognition
Traffic participants (vehicles, motorcycles, bicycles, people, etc.)
Road (roadway, sidewalk, greenery, cones, parked vehicles, etc.)
Landmarks (signals, crossings, etc.)
Signage (crosswalks)
Surrounding Vehicle Information (Position, Speed, Angular Velocity, Acceleration, External HMI, etc.)
Video Privacy Function (Face, Number Plate Removal)

Analysis, Integration, and Construction
Traffic Environment (Road Conditions, Traffic Status)
Accident Situation (Numerical Data, Video, Trends)
Integration and Construction of Required Information Elements (Results Required for Output)
Vehicle On-Board Recording (EDR, DSSAD, Dashcam)
Deep Learning, Analysis DB (accident records, precedents)

Editing, Output, and Reuse
Paper Output (images, digital data (including editing functions))
Video Output (actual video, supplementary videos with maps, abstraction (illustration))
Analysis Output (causes, liability allocation ratios, dispute resolutions, etc.)
DB Output (data reuse via cloud distribution)
Security Functions
Other Utilisation

◆ **EDR analysis function**
-CDR report creation (CDR-based)
-Basic analysis
-Conversion of vehicle driving data to XML data (for visualisation)

◆ **Video/drive recorder analysis function**
-Time synchronisation
-Object recognition (not required if using EDR)
-Conversion of video data to XML data

◆ **Visualisation function (DS-based)**
- Visualisation of various XML data

◆ **Authenticity Verification and Liability Allocation Function**
- Detailed analysis
- Estimation
- Utilisation of various databases

◆ **Function Integration, INPUT/OUTPUT Processing**
- XML data output to DS
- CSV data import from CDR

Issues for social implementation are particularly;

◆ Only Japan has not legislated the obligation to prepare EDR readout tools (CDR)
(This may cause problems with the admissibility of evidence)

◆ Responsibility and regulations regarding the use of AI have not yet been established for future AI implementation
(Research is progressing in other countries, including Germany)

⑦-9-4 Collection and organisation of practical examples of technology applications

<Regarding initiatives including autonomous driving in Kamishihoro>

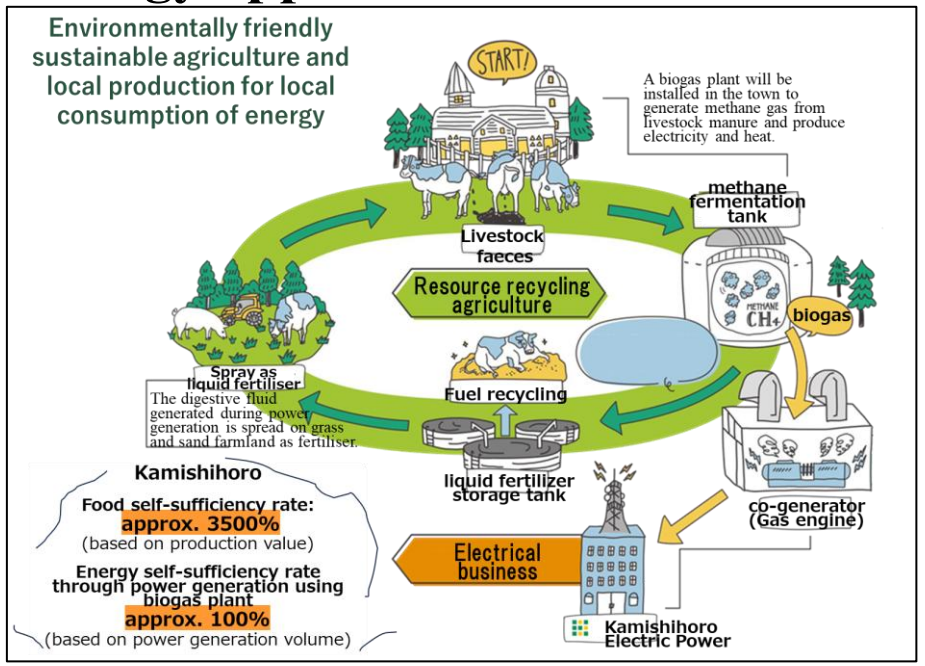
Digital Promotion Section, Kamishihoro Town Hall.
Tatsu Kaji, Manager

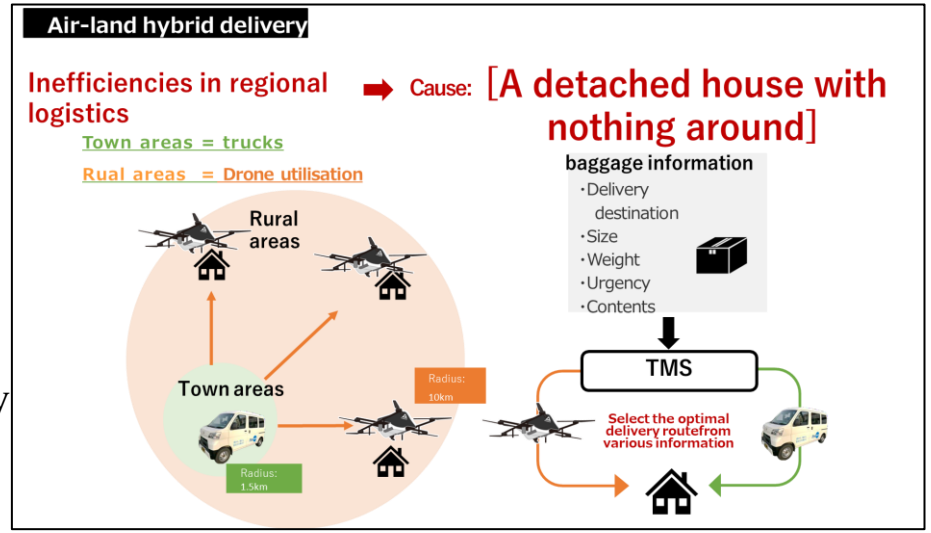
<Project>

- Aiming for sustainable agriculture and energy production and consumption in harmony with the environment.
- Beginning demonstration of a common system (remote monitoring) for the coordination of drones and autonomous buses for tailored to large, densely populated, and scattered residential areas.
- Promoting local government DX to secure customers for the annual public transportation costs of approximately 100 million yen;
  (1) On-demand welfare buses
  (2) Effective use of buses by visualising idle time
  (3) Introduction of a facial recognition system
  (4) Promotion of mixed cargo and passenger transport with logistics companies, etc.
- In the autonomous bus demonstration, the following Level 4 unmanned autonomous driving is targeted;
  (1) Setting of Level 4 zones and demonstration of unmanned autonomous driving
  (2) Demonstration of safe intersection driving through traffic signal integration
  (3) Demonstration of road-vehicle coordination systems
  (4) Establishment of a remote monitoring centre
  (5) Level 4-compatible AI conductors (providing AI-based voice announcements to alleviate anxiety and provide tourist information within the vehicle).

<Issues>

- Autonomous driving level 4 should not only consider use on priority roads, but also take into account use on general roads and residential roads.
- In areas with heavy traffic, it is important to clarify speed limits and implement safety measures. In the future, it will be necessary to introduce speed restrictions tailored to regional characteristics when introducing autonomous driving.





Going forward, reviewing road conditions and regulations in nationwide with a focus on actual use are necessary to roll out Level 4 autonomous driving

⑦-9-5 Examples of collaboration with other technology-related projects

<Implementation of Level 2 Autonomous bus in Komatsu>

Mr. Naohiro Tsuda,,Director, Regional Development Division, Administrative Management Department, Komatsu City

Implementation status

◆ **Background to the introduction of autonomous buses**
(1) Highly convenient transportation system between stations and airports
(2) Creation and expansion of pedestrian traffic in urban areas and economic ripple effects
(3) Realisation of efficient, labour-saving, and sustainable public trans.

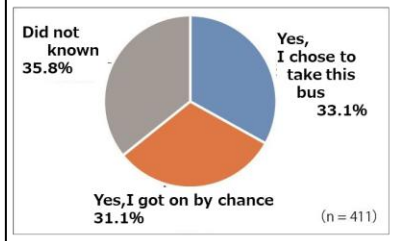
◆ **Implementation and technical achievements**
(1) 4.4 km of general roads (a lane on the sidewalk side of a three-lane road)
(2) Remote monitoring and operation management system
(3) Utilisation of scheduled signal information and implementation of vehicle-road coordination systems

◆ **Operational performance**
(1) Average autonomous driving ratio: 85.43% per day (max.: 92% /68 days)
(2) On-time operation rate: 100% (no delays)
(3) 1 month: 1,769 people (341 trips) Average 57.1 per day (5.2 / per trip)

◆ **Business perspective**
(1) At the forefront of development and demonstration. Safety, security, and stability are top priorities.
(2) Autonomous driving is a means of transportation and requires clear goal
(3) Importance of road and communication infrastructure, and proper driving manners of surrounding vehicles.

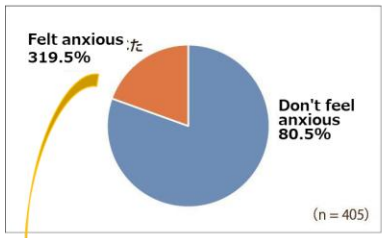
<Citizen questionnaire>
Awareness = 88.2% ←→ Uncertainty of automated bus . = 31.4%
(Reason: vague anxiety → neither cognition nor social acceptability follows)

User questionnaire

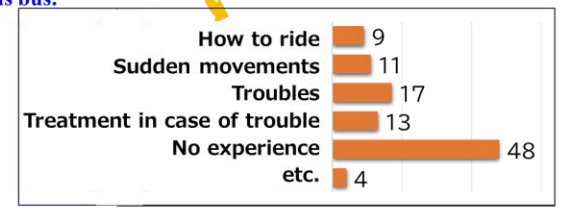


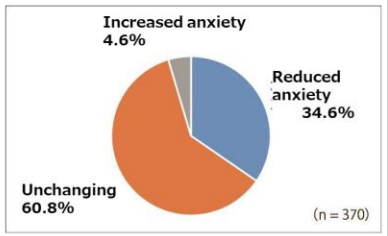
Awareness of automated buses

Approximately 1/3 chose to ride an autonomous bus.



Percentage of people who felt anxious before departure



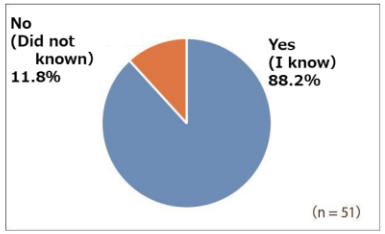


Changes in feelings after riding

Approximately 1/3 reported a decrease in anxiety.

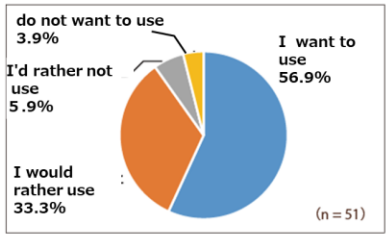
Providing accurate information and opportunities to ride is important for fostering social acceptance.

Citizen questionnaire

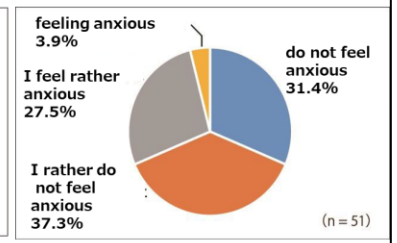


Awareness of automated buses

Around 90% recognise automated buses.



Would you like to use an automated bus?



Do you have concerns about automated buses travelling in the city?

Around 1/3 feel insecure.

It is important to reduce anxiety by providing accurate information and accumulating driving experience.

Improving social acceptance of autonomous driving requires not only technological advances but also the resolution of vague concerns, and it is necessary to identify these concerns.

⑦-9-8 Collecting examples in cooperation with other projects related to deregulation <Standardization of External HMIs>

◆ Trends in international standardization

ISO TC22 (Vehicle) SC39 (Ergonomics) WG8

PAS 23735 ： Road vehicles — Ergonomic design guidance for external visual communication from automated vehicles to other road users → **public specification**

IEC TC100 TA17(Multimedia: Vehicle equipment)

TR 100-54 ：External Visual Systems of eHMI (external Human-Machine Interfaces) for Automated Vehicles

→ **Last international circular stage, in liaison with TC22 (PDTS)**

◆ Dilemma in considering external HMIs

Two opposing opinions

◆ **There are many negative opinions regarding the necessity of eHMI.**

(a) Implicit communication dominates the interaction between pedestrians and autonomous vehicles, leaving no room for interaction that needs to be filled.

(b) The concept of eHMI is diverse, and standardisation and consensus are lacking.

(c) eHMI has the potential to cause various adverse effects, such as distraction, confusion, and over-reliance.

vs

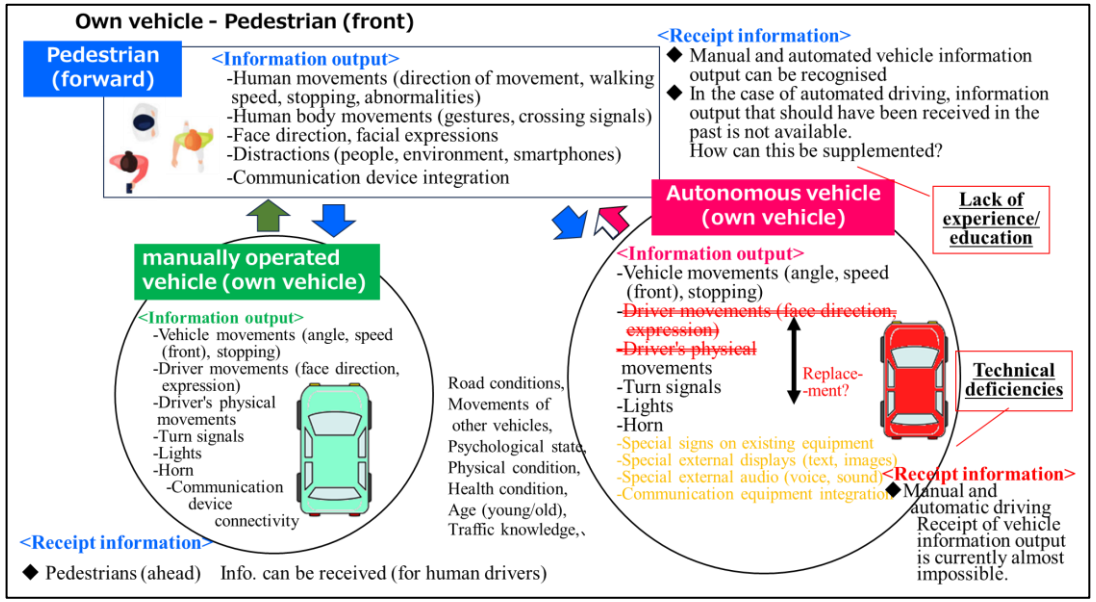
◆ **eHMI is an important function that fills the gap in social interaction caused by the introduction of autonomous vehicles (AVs).**

(a) eHMI can visualise the planned actions of autonomous vehicles, and improve the efficiency of interactions with pedestrians.

(b) Traffic participants highly evaluate the presence of eHMI compared to when it is not present.

(c) eHMI is not necessary displaying instructions or planned actions of autonomous vehicles.

(d) Recent studies have shown that driver eye contact is important in traffic.



Before advanced technologies are accepted by society, a 'gap in awareness between developers and users' occurs.

→ **From manual driving, it is necessary to supplement the lack of communication**

In order to improve social acceptance,

(1) Standardization of 'autonomous vehicle' signage is necessary, even if it is less strict than international standards.

(2) Standardization should be promoted for situations and use cases that are particularly important for interactions between humans and autonomous vehicles.

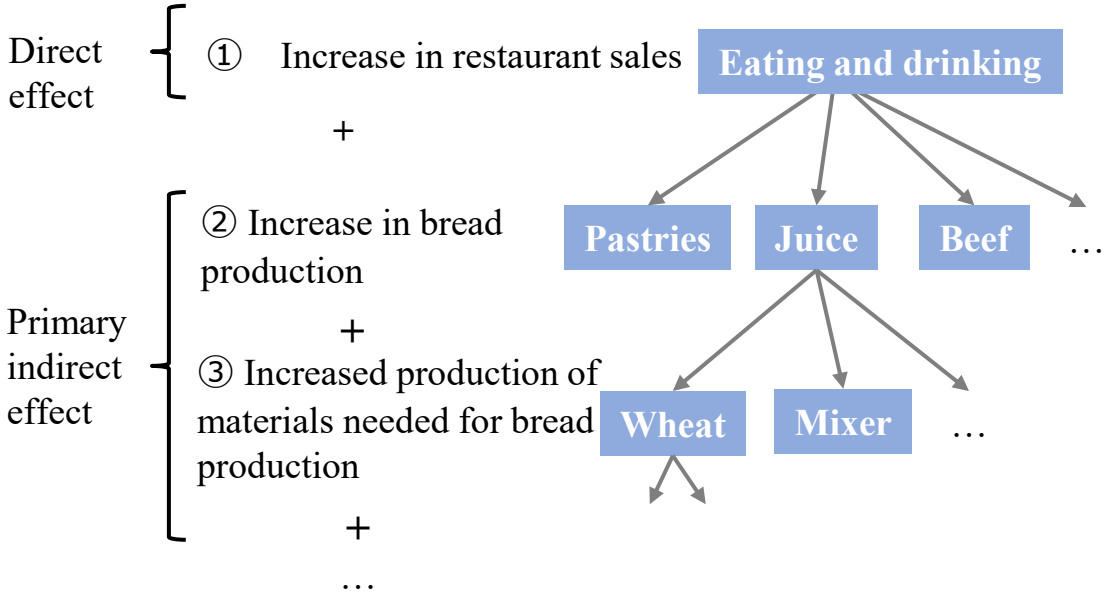
⑦-9-9 Development of a calculation model for the economic impact of autonomous buses <Deregulation>

Concept of Economic Ripple Effect Analysis

- To estimate economic ripple effects (production inducement effects), gross value added inducement effects, employment inducement effects, and tax revenue effects using an input-output table
- To estimate economic ripple effects considering indirect effects

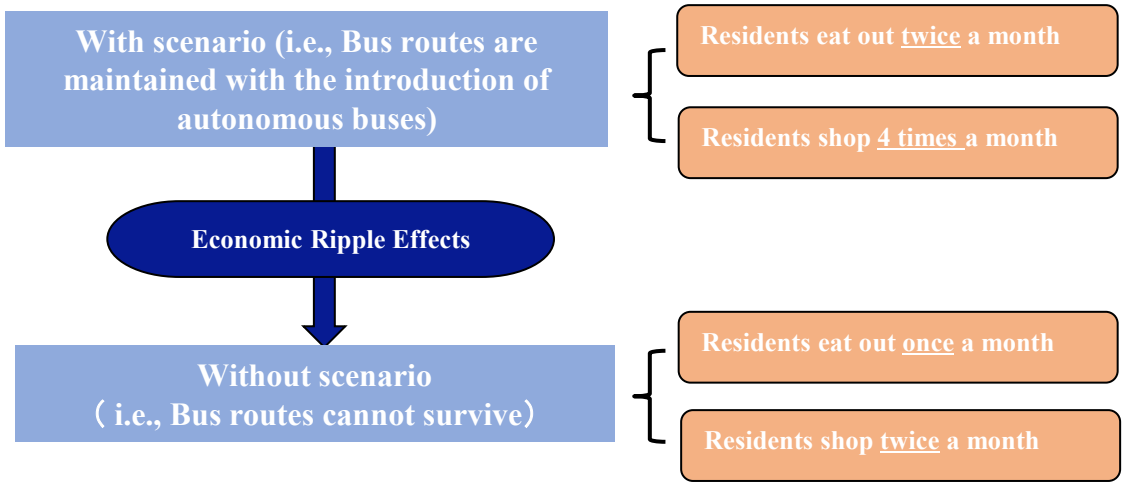
Concept of Economic Ripple Effect Analysis

Increase in outings due to introduction of autonomous buses



Plan

- To develop an input-output table for municipalities implementing autonomous buses from existing statistics.
- To quantify the economic impact of the difference in behavior between the two cases (with and without autonomous buses) using the economic ripple effect analysis method.



⑲ Human Resource Development for the Social Implementation of Services

Consideration of know-how for discovering human resources

①Redefining the workforce

・It is necessary to focus on the diverse human resources who are indirectly involved in mobility issues in the region.
・People who are not government officials or traffic specialists, but who can grasp the lives and issues of the community with a first-hand feeling, have the potential to be producers.

②Systematization of excavation methods

・The need for practical and participatory workshops that bring together a variety of stakeholders in the region.
・The need for a human resource matrix that maps the attributes, fields, skill sets, etc. of human resources in the region.

③Transition Strategies from Discovery to Nurturing

・Consider a short-term intensive training program to develop regional producer candidates.
・The need for a continuous mentoring system and the formation of a community where practical knowledge can be shared.
・The need for private-sector and administrative cooperation to assign the trained human resources to appropriate projects.

④Listing and visualization of areas where you can play an active role

・Organize regional elements that make it easy for regional producers to continue to play an active role:
The mayor's ability to conceive and execute, openness to external human resources and immigrants, and the functioning of an intermediate support organization in the region, etc.
・Consider measures to visualize the recruitment and recruitment market for regional producers.

本報告書には、内閣府総合科学技術・イノベーション会議の下で
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スマートモビリティプラットフォームの構築」（研究推進法人：
国立研究開発法人新エネルギー・産業技術総合開発機構）
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