Cross-ministerial Strategic Innovation Promotion Program (SIP)
Automated Driving for Universal Services
Study on Assessment and Strategy of Promotion for Social and User Acceptance

(FY2019-FY2022) FY2022 Annual Report (the third periodic report)

YUKIKO MIYAKI
Dai-ichi Life Research Institute Inc.

DAI-ICHI LIFE RESEARCH INSTITUTE INC.
Dai-ichi Life Group

POSITIONING AND EXECUTION OF THE RESEARCH PROJECT

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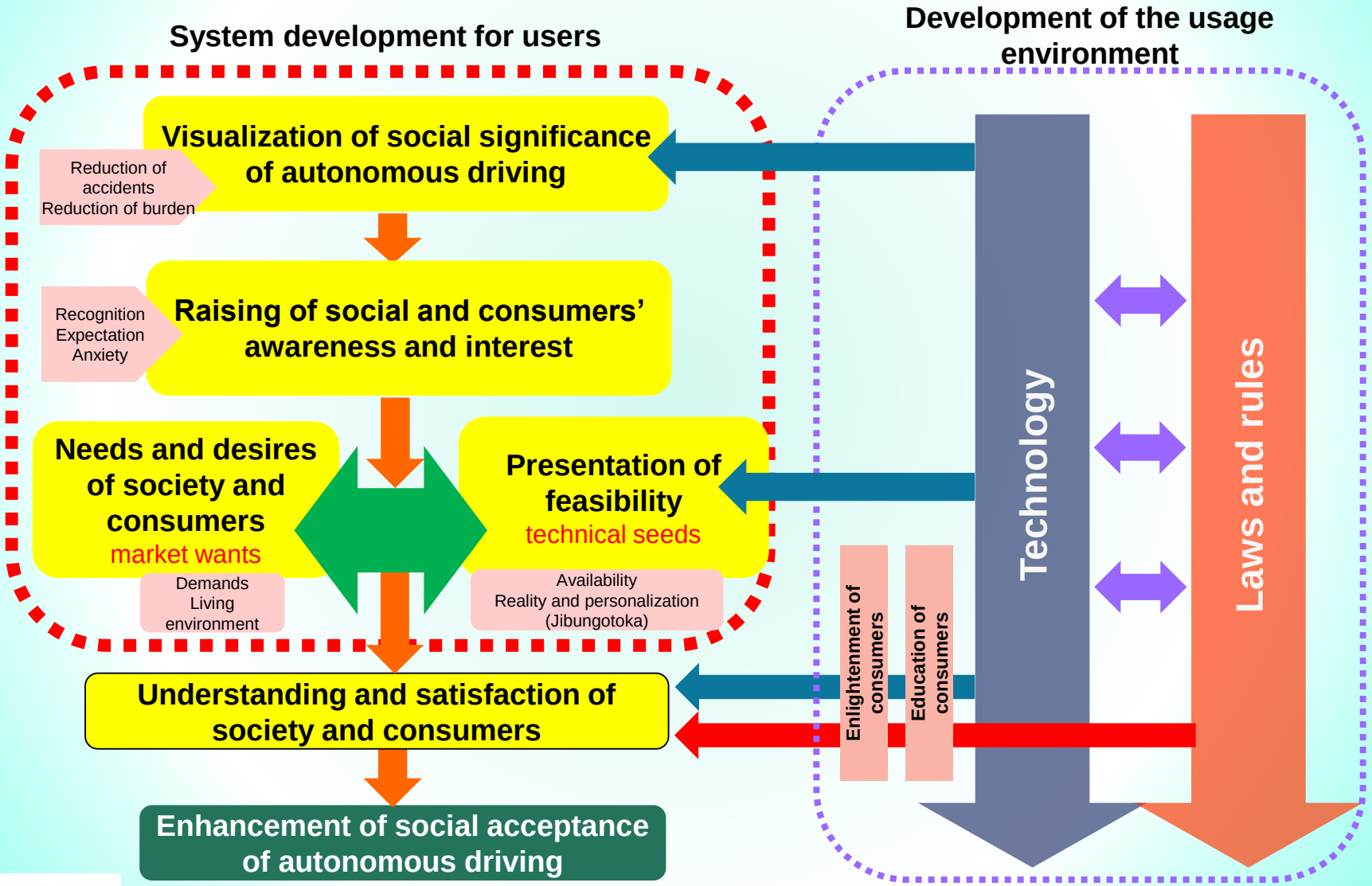
System for enhancing social acceptance of automated driving



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Positioning of the survey

[Collection of quantitative data]

2018 survey
Individual research by Dai-Ichi Life Research Institute Inc.
3,000 samples collected nationwide

2019 survey
METI & MLIT commissioned project
The 1st Questionnaire Survey on Automobiles and automated Driving
12,400 samples collected nationwide

2020 survey
METI & MLIT commissioned project
The 2nd Questionnaire Survey on Automobiles and automated Driving
12,400 samples collected nationwide

2021 survey
METI, MLIT and SIP commissioned project
The 3rd Questionnaire Survey on Automobiles and automated Driving

2022 survey
METI, MLIT and SIP commissioned project
The 4th Questionnaire Survey on Automobiles and automated Driving

Cooperation with SIP

(Joint collection of quantitative data, dispatching information of SIP cafe, etc.)

[Collection of qualitative data]

- Eiheiji Town: World Cafe
- SIP Citizen Dialogue

- Himakajima, Aichi Prefecture: World Cafe
- Hitachi City, Ibaraki Prefecture: World Cafe
- Chatan Town, Okinawa Prefecture: Test-ride & group discussion
- Australia: Test-ride & interview
- SIP Citizen Dialogue

- Collecting follow-up information on past World Cafe locations
- Gathering information through lectures on automated driving throughout Japan

- Interview at Kozo-ji New Town
- Gathering information through lectures on automated driving throughout Japan

2023
Summary
+Cooperation with Hitachi City BRT automated bus project as RttL4

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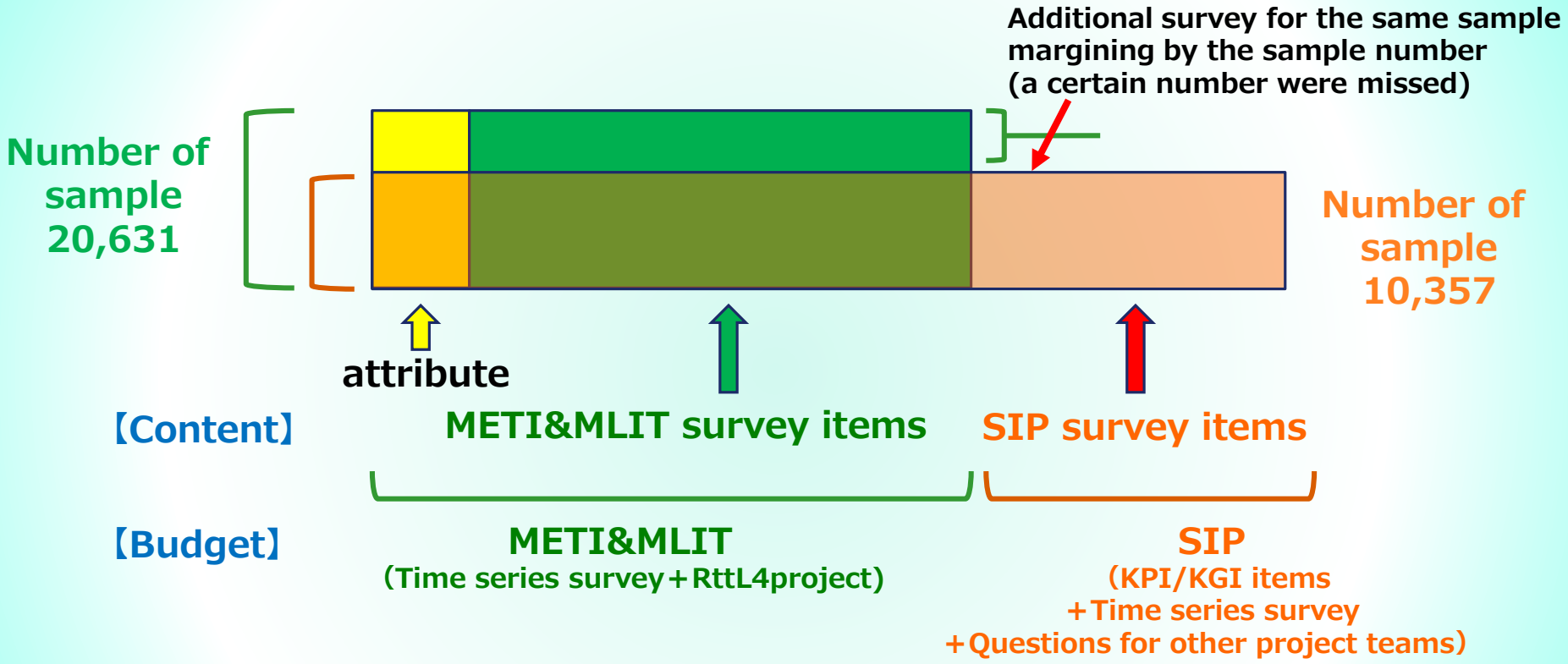
Outline of the Third Questionnaire Survey on Automobiles and Automated Driving



- Target : People aged 18-69 in Japan, 20,631（METI&MLIT)･10,357名（SIP）
- Period : January & February 2022
- Method : Online survey（by Cross Marketing）

The Contents of Surveys (Item Lists)

【METI and MLIT Survey】

- ◆FACE (including life satisfaction)
- ◆Q1 Driver's license, purpose of driving, type of driving
- ◆Q2 Number of cars owned
- ◆Q3 Public transportation (distance to station and burden/issue)
- ◆Q4 Transportation use (past month)
- ◆Q5 Regional characteristics, mobility awareness, mobility in old age
- ◆Q6 Driving assistance functions (recognition, use, awareness, understanding, intention to use)
- ◆Q7 Car lease awareness
- ◆Q8 Intention to use car lease
- ◆Q9 Automatic driving awareness/actual condition
- ◆Q10 Receptivity to automatic driving (A-B preference)
- ◆Q11 Receptivity to automatic driving (4-way)
- ◆Q12 Cost burden awareness
- ◆Q13 Cost Consciousness
- ◆Q14 Speed x Cost Preference
- ◆Q15 Long-distance truck lanes
- ◆Q16 Signaling during automated driving
- ◆Q17 Expectations of Problem Solving by Automated Service Cars
- ◆Q18 Police Agency Items

【Cabinet Office SIP Survey】

- ◆Q1 Attitudes toward place of residence (community commitment/civic pride)
- ◆Q2 Satisfaction with mobility in daily life
- ◆Q3 Accidents and near-misses
- ◆Q4 Overall acceptance Score of automated driving by type
- ◆Q5 Subjective understanding of automated driving
- ◆Q6 Acceptance of automated driving by item (for scale)
- ◆Q7 Consumer Commitment
- ◆Q8 What you should do as a user for diffusion
- ◆Q9 Expectations for specific uses of automated driving
- ◆Q10 Evaluation of being connected (V2X)
- ◆Q11 Awareness of consumer information provision
- ◆Q12 University of Tsukuba Item (Lv Comprehension)

Survey form creation cooperation:

- Cabinet Office (SIP-adus)
- National Police Agency
- Ministry of Economy, Trade and Industry
- Ministry of Land, Infrastructure, Transport and Tourism

JAPAN'S BACKGROUND ON THE SOCIAL ACCEPTABILITY OF AUTOMATED DRIVING

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“Automated Driving" as a Solution

Road Traffic Problem Solving	Reduction of traffic accidents	Increased safety due to system involvement
	Elimination of traffic congestion	Operational efficiency
	Environmental Improvement	Optimization and efficiency of energy consumption
Providing transportation for human issues	Reduce the burden of driving	Substitution of operation by system
	Addressing the Driver Shortage	Reduction in driver load and number of drivers required
	Assistance for people with mobility difficulties	Creation of alternative transportation (Passenger service car) Extension of driving life (Privately-owned car)
Effects on Industry and Employment	Improvement of industrial competitiveness	Growth and sustainability improvement of traditional industries
	Growth and productivity improvement in related industries	Growth and sustainability of new industries
	Job retention and creation	Stability of individual households

Lots of transportation in residential environment.

Urban elderly

Urban youth

Old New Town

Older

Younger

Elderly in mountainous areas

Youth in mountainous areas

Lack of transportation in residential environment

Percentage of elderly will continue to increase for some time yet, but overall population is declining.
Mobility design must be flexible and adaptable to local population distribution and needs.

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MAJOR FINDINGS FROM SURVEY RESULTS

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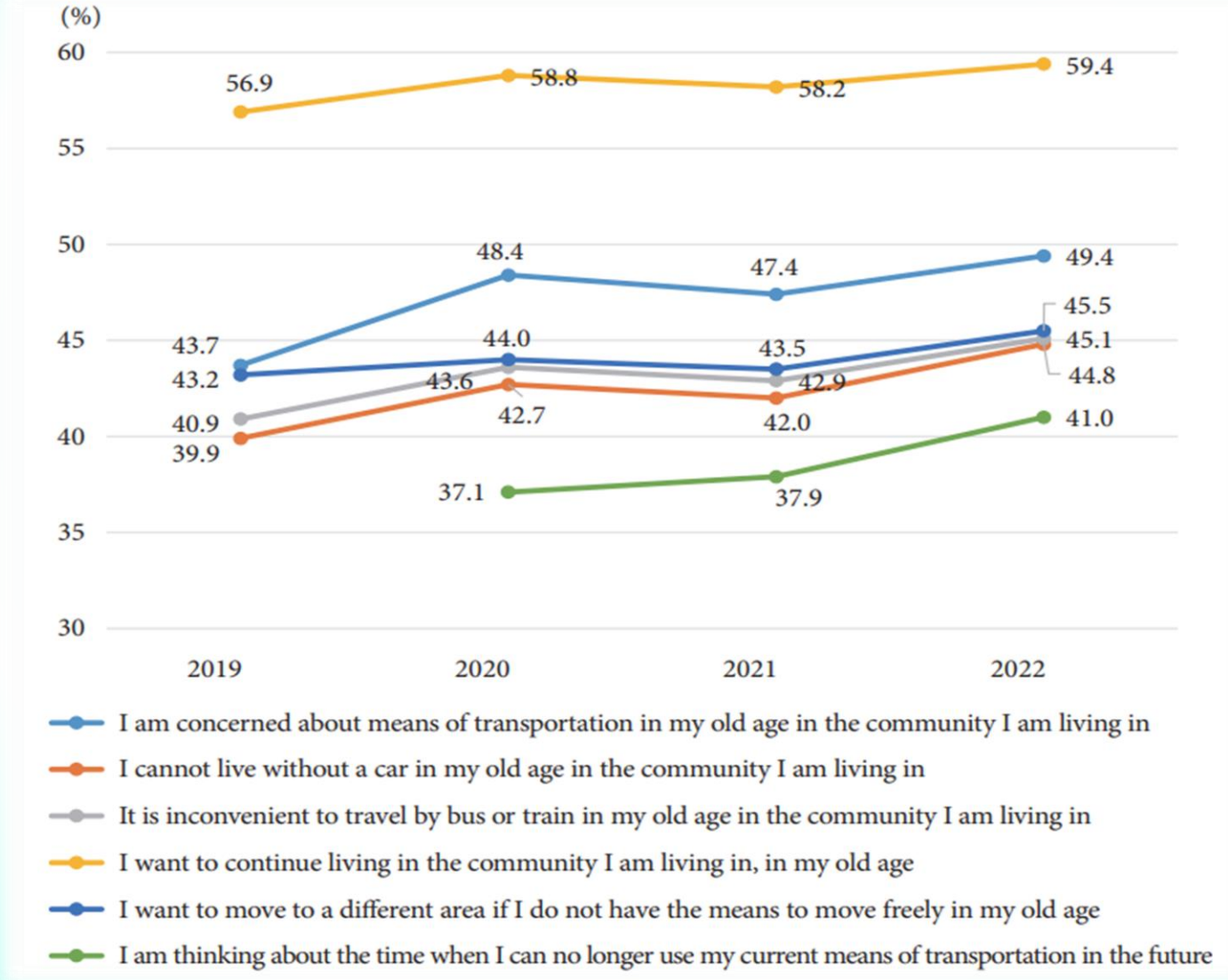
Changes in Attitudes toward Mobility in Older Adults

Mobility anxiety in old age is on the rise as we enter the 100-year life era.



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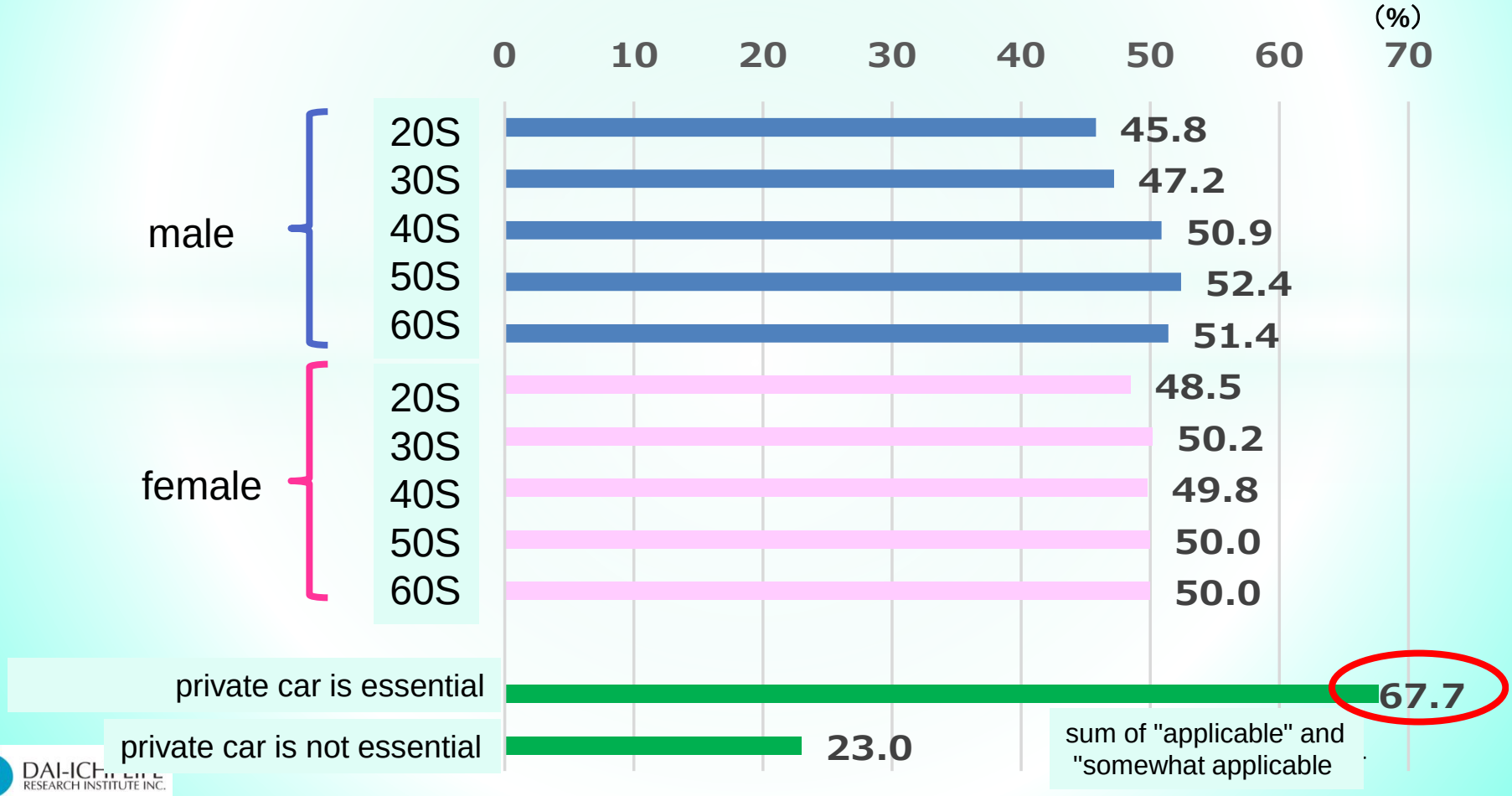
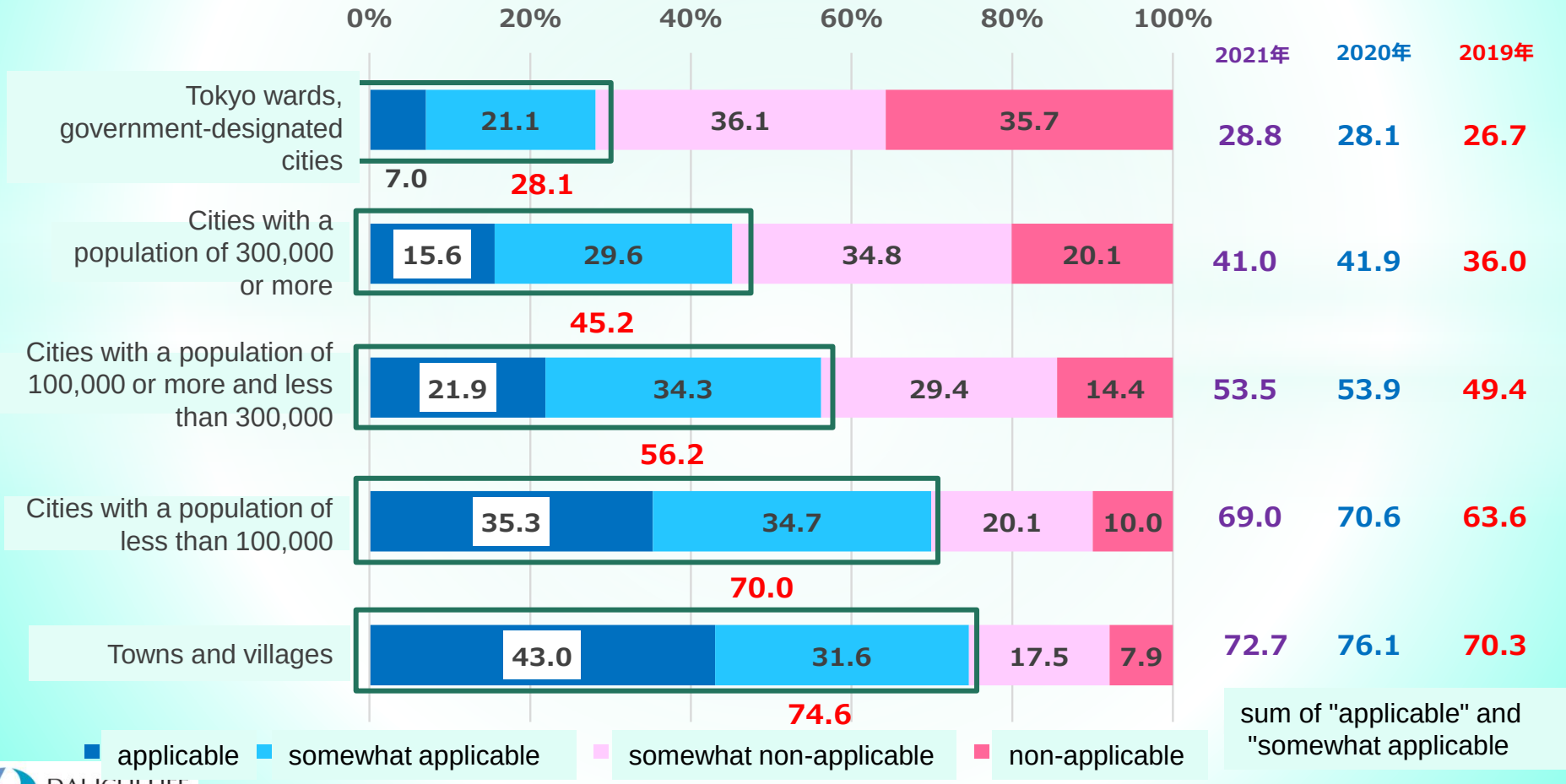
I am concerned about means of transportation in my old age in the community I am living in

Mobility anxiety is not only high among the elderly in old age.
Mobility anxiety is high among those who are highly car-dependent.



I am concerned about means of transportation in my old age in the community I am living in

Mobility anxiety in old age is higher in smaller cities



Among people close to you, who do you think need to surrender their driver's license, and what do you think they will do?

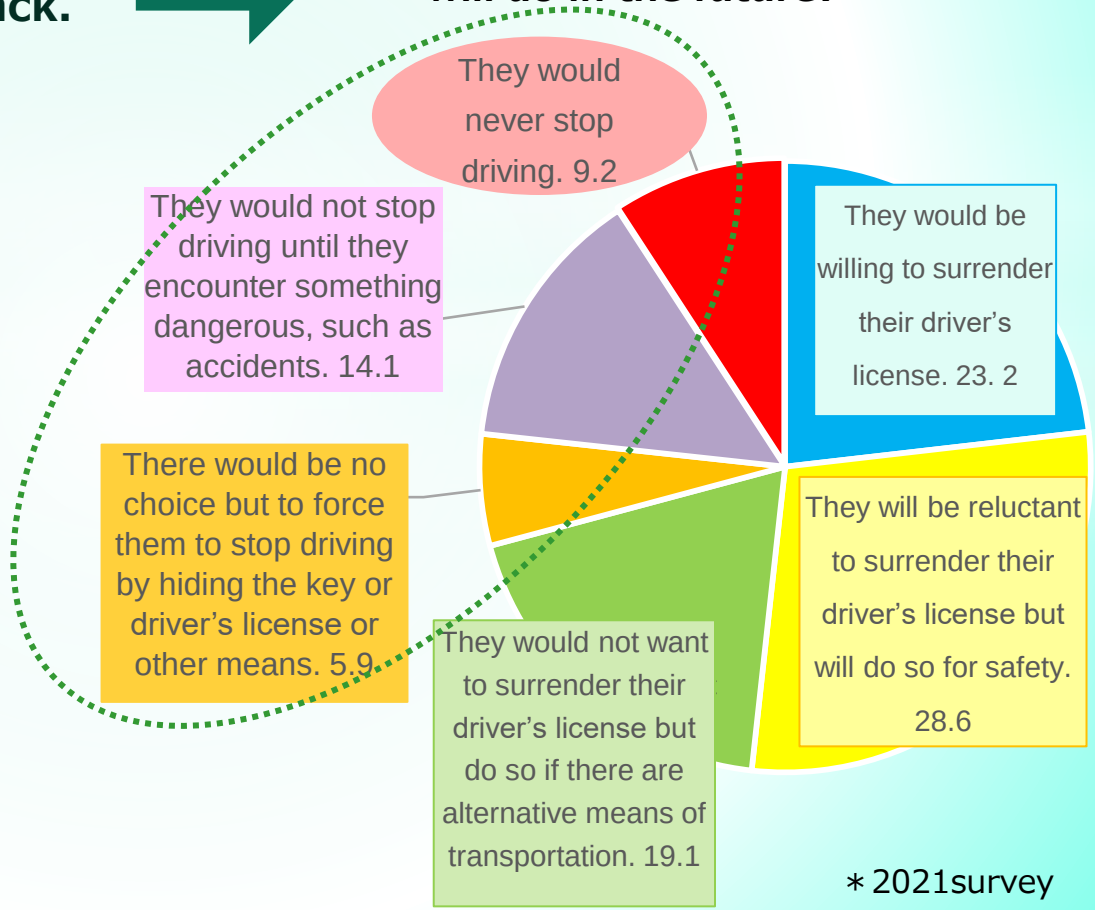
27.4% of the respondents have anyone close to them who they think need to surrender their driver's license, and the largest number of these respondents think their "father" need to surrender their license. About 30% of the respondents think these people should be forced to surrender their driver's license or will not surrender their driver's license.

There is "somebody" close to me who thinks I need to get my license back.

2019 24.1%
↓
2020 29.2%
↓
2021 27.4%

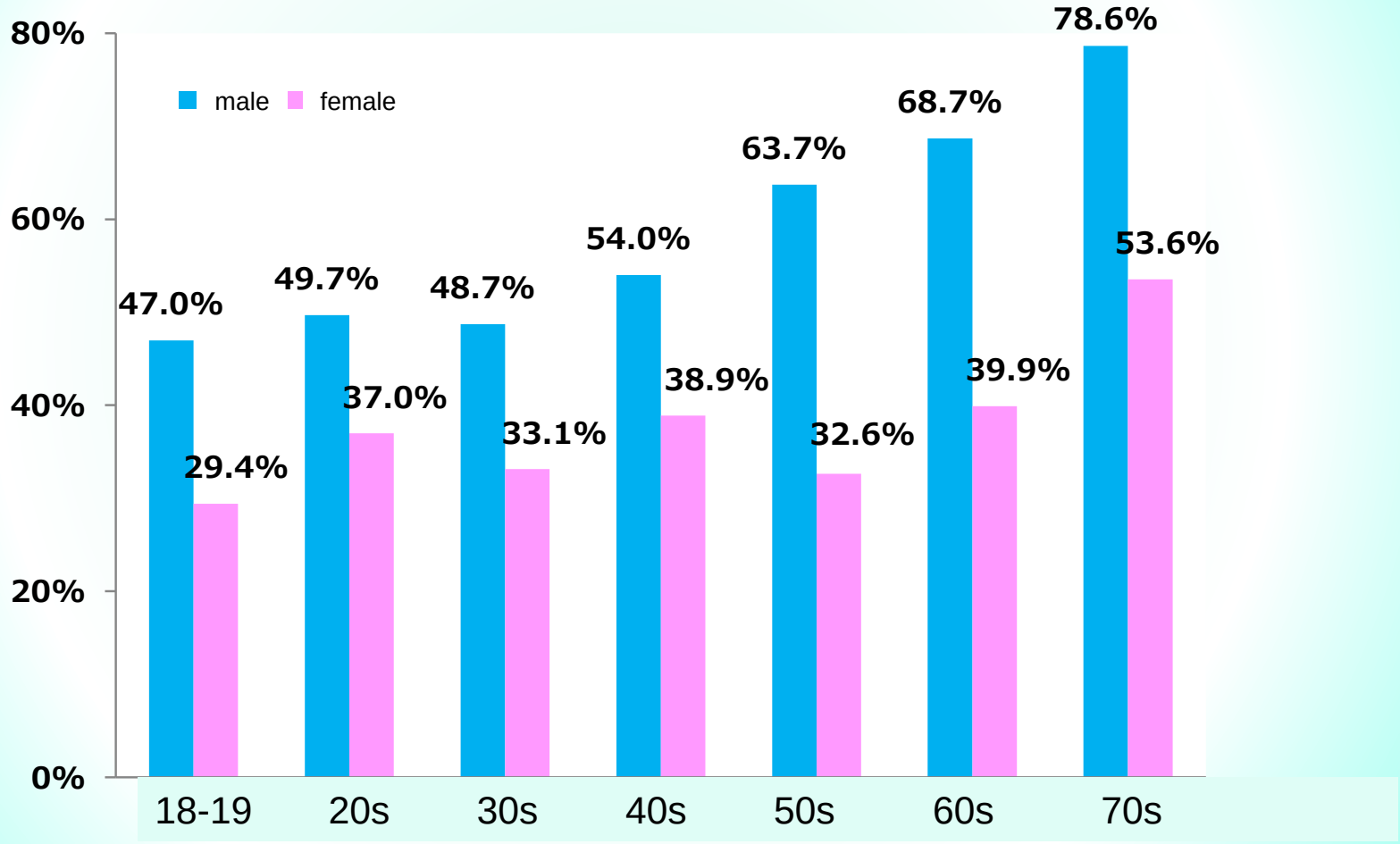
Ranking of those who the respondents think need to surrender their driver's license		
1st	Respondent's father	31.8%
2nd	Respondent's mother	13.7%
3rd	Respondent's grandfather or grandmother	12.2%
4th	Partner's father	9.6%
5th	Myself My partner	8.7%

What do you think that person will do in the future?



＊2021survey

Many older adults are confident in their ability to drive a car.

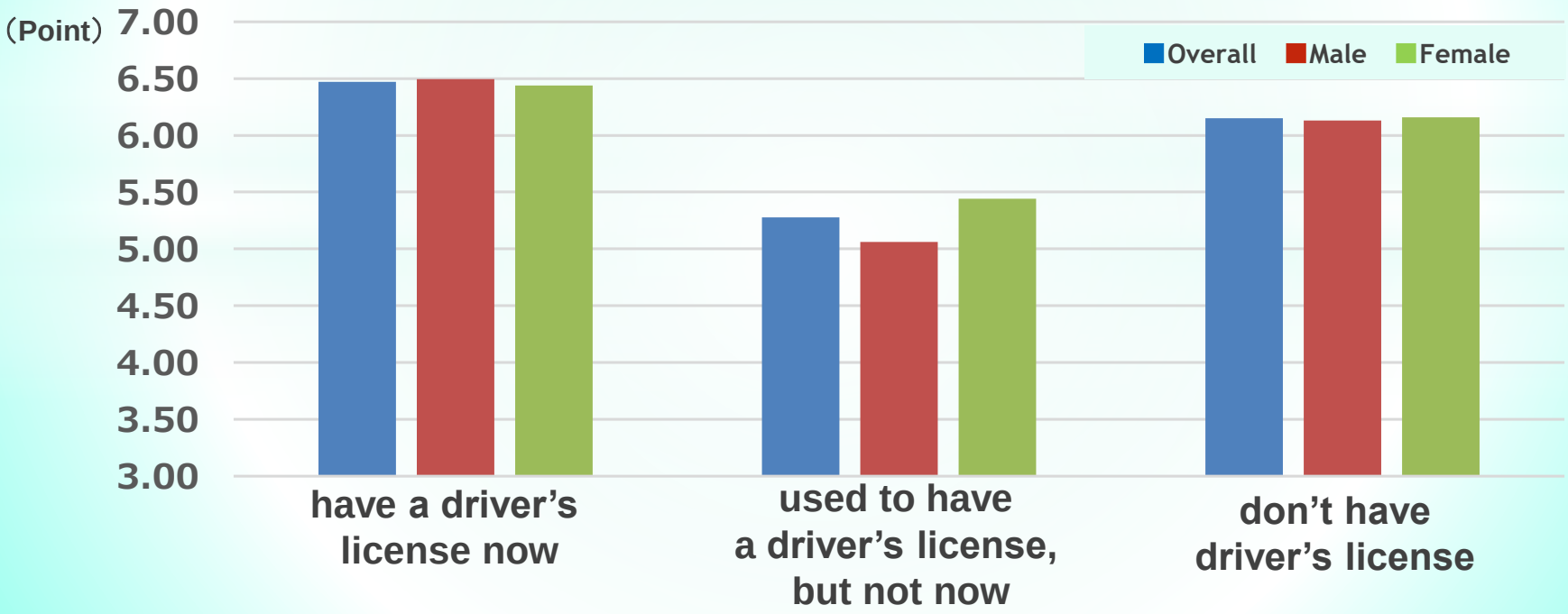


Responses from driver license holders

＊survey of 2019

Mobility Satisfaction in Everyday Life (With or Without a Driver's License)

People who have had driver's license before have lower travel satisfaction than those who do not have it.
Considering that returning a driver's license will greatly reduce the freedom of movement, this may be a major barrier to returning a driver's license for elderlies.



QUESTION STATEMENT:
How satisfied are you with your current mobility situation?
On a scale of 1 to 10, how would you rate your level of satisfaction?

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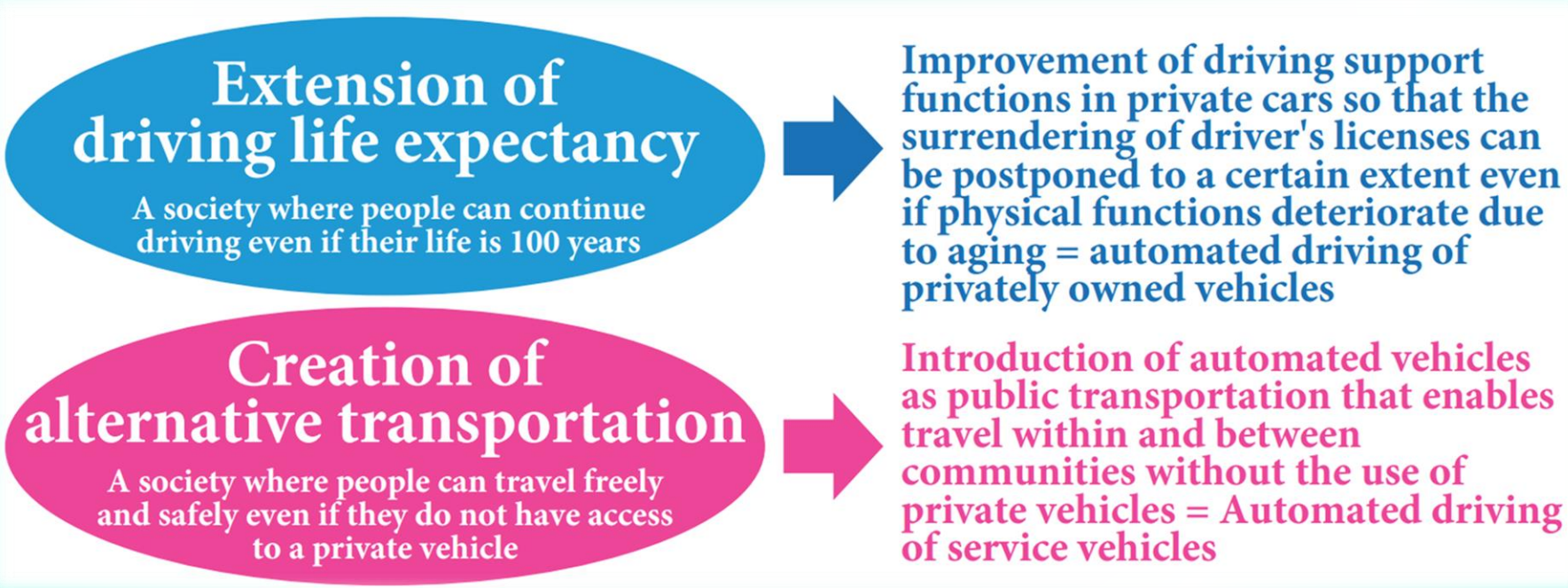
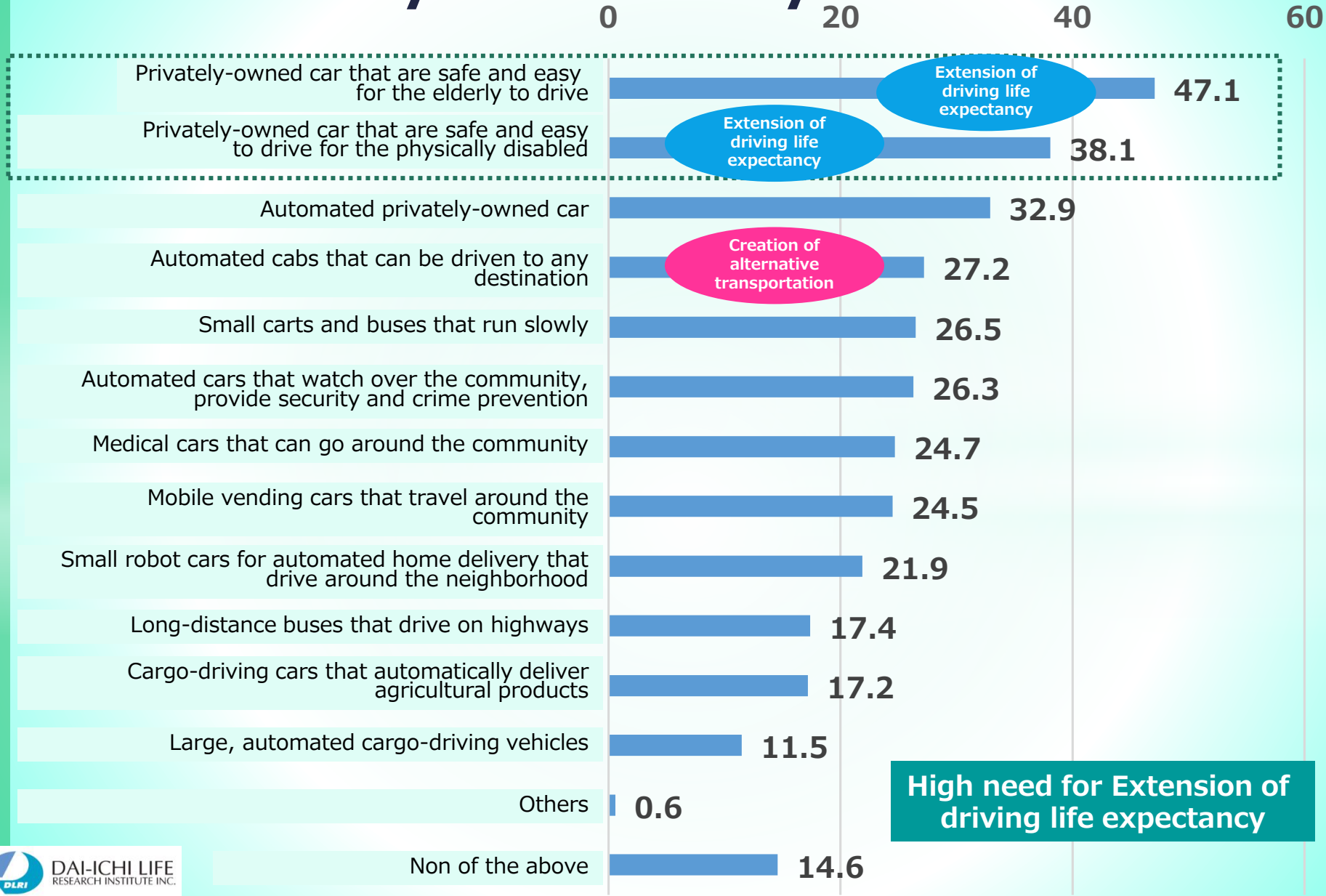
Two solutions aimed at mobility in the era of the 100-year life using automated driving technology

Necessity of proceeding in both directions as the aging society progresses
＝It is important to extend the driving life of private cars,
not just to provide alternative transportation.



What kind of automated driving do you want in your area?



High need for Extension of driving life expectancy

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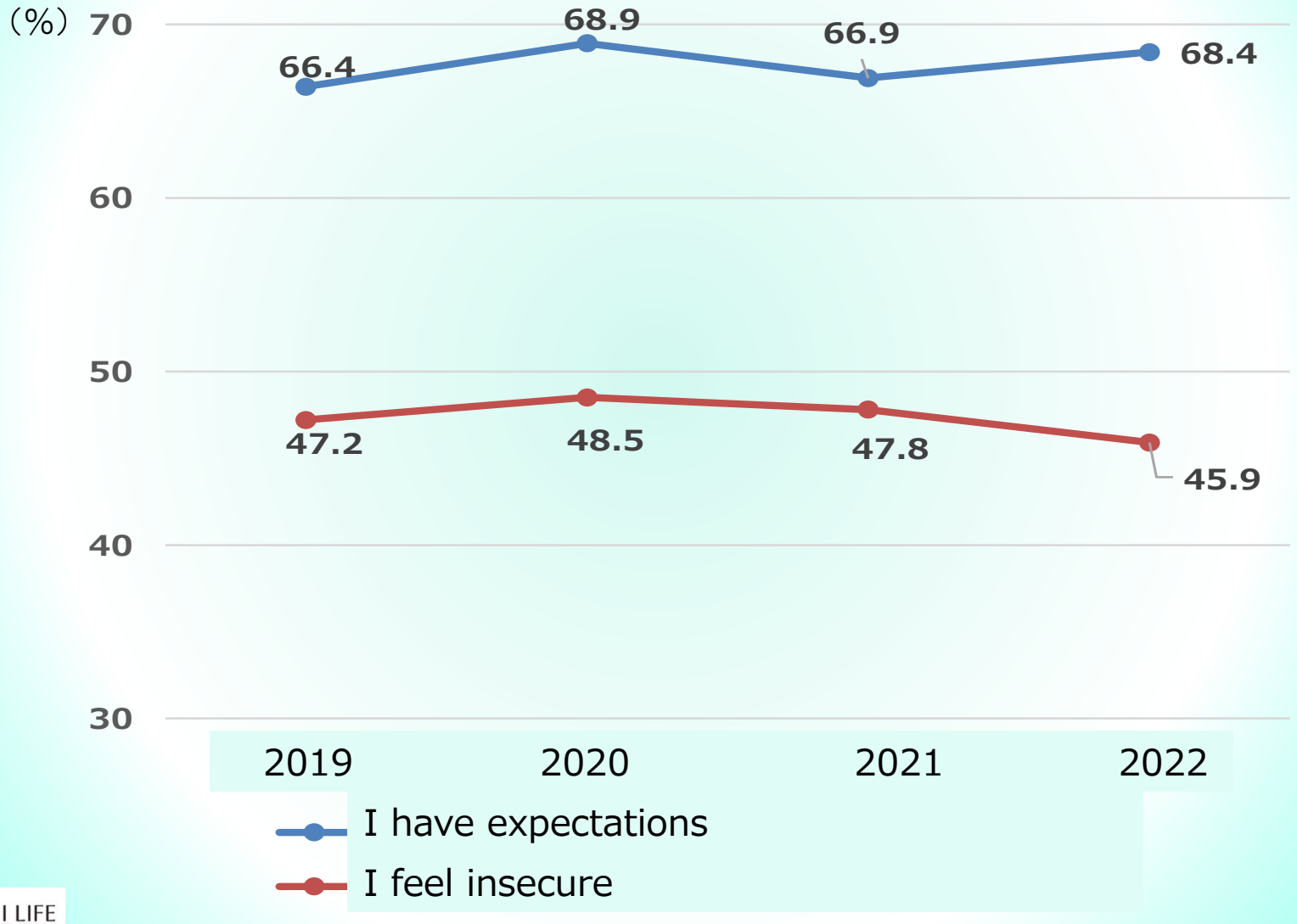
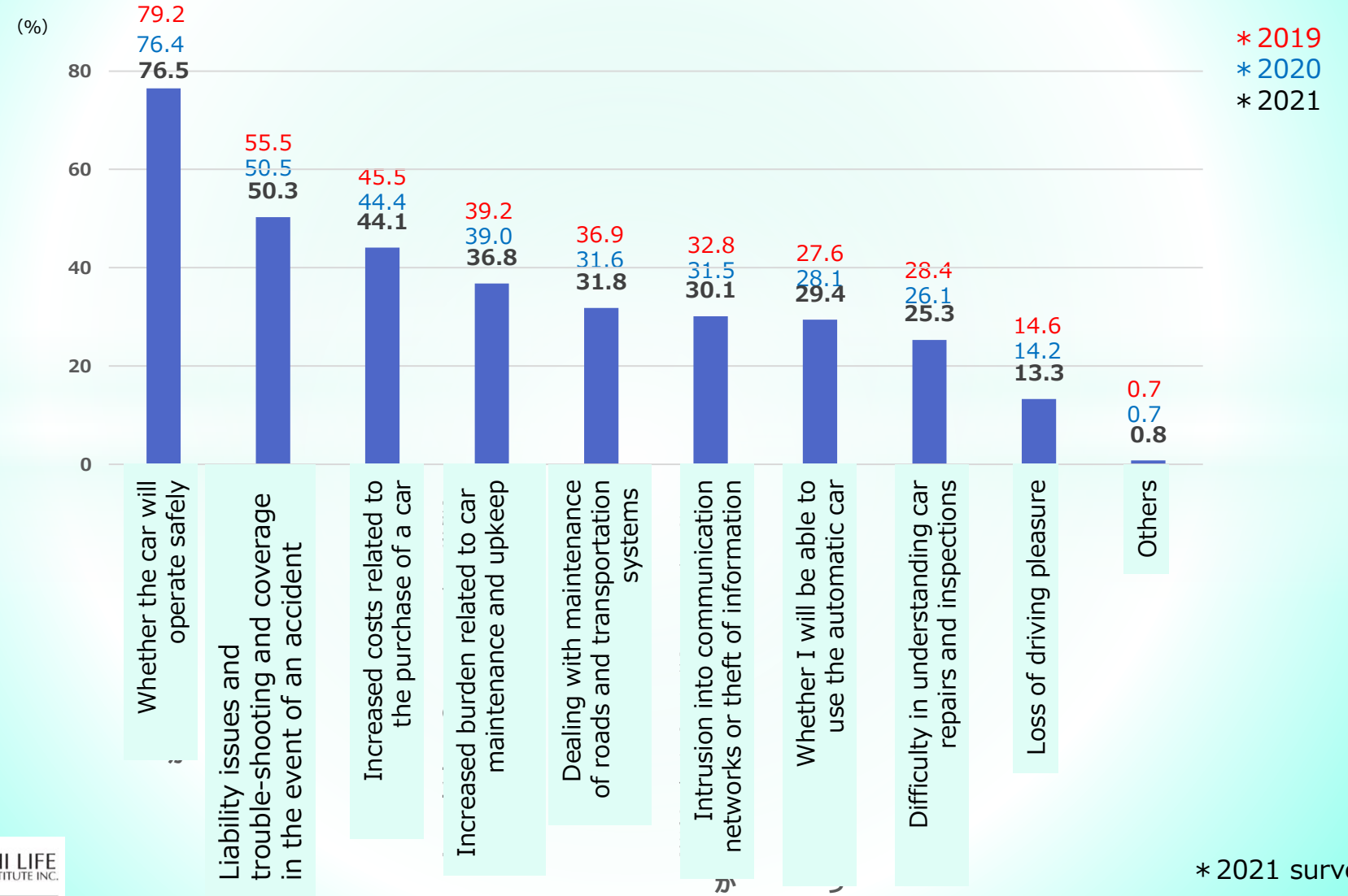
Expectations and Anxieties about the Social Changes that Will Result from the Development and Spread of Automated Driving



Specific concerns about automated driving

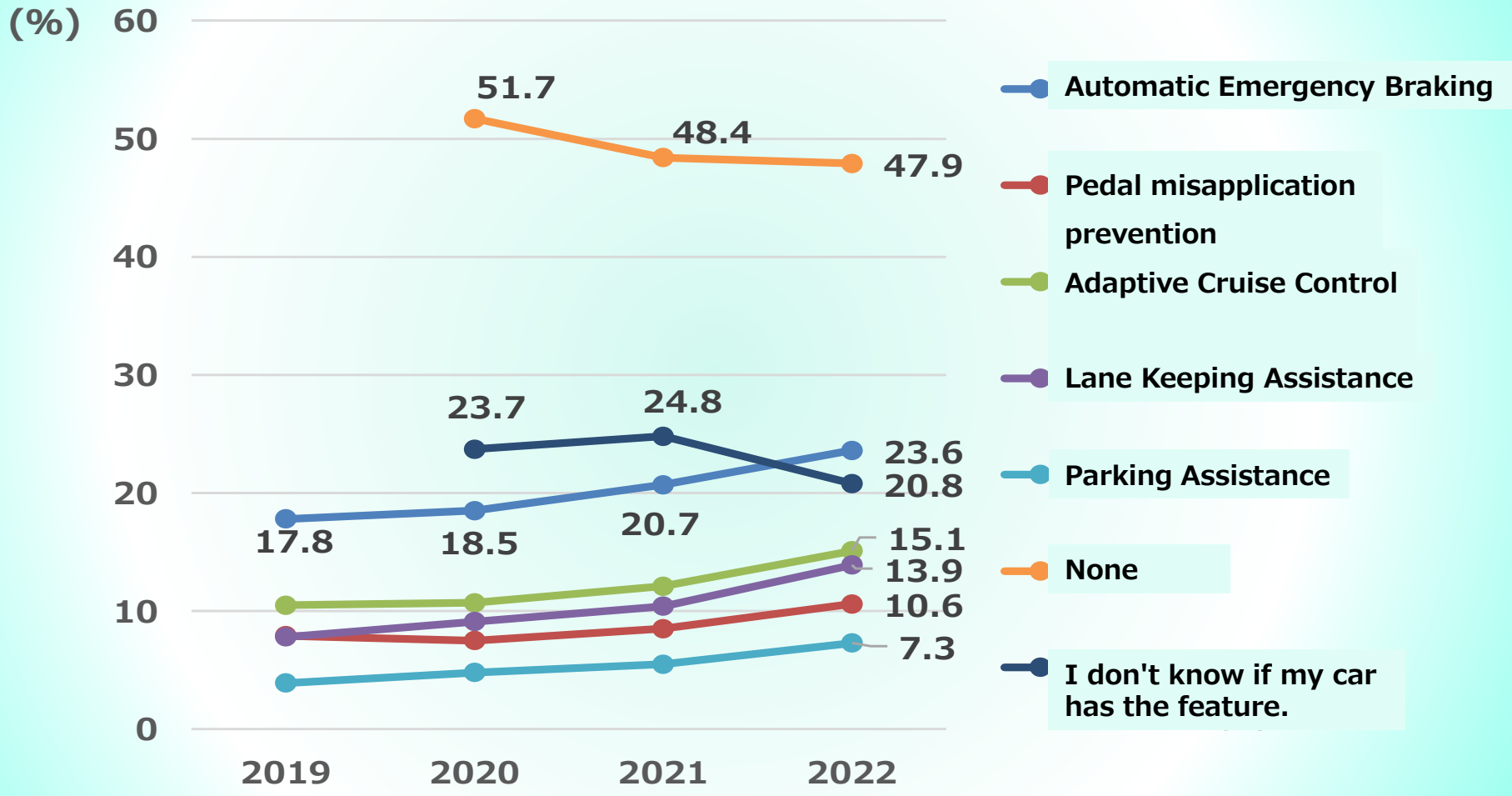
The largest number of respondents answered “Safe operation” as a concern about automated driving, which remains unchanged from the previous survey. “Safety operation” is followed by “Liability” and then “Cost burden,” which also remain unchanged from the previous survey.



＊2021 survey

Extension of driving life expectancy

I "use" vehicles equipped with driver assistance features



Users of each function are steadily increasing.
Increasing awareness and "getting people to know" is important.

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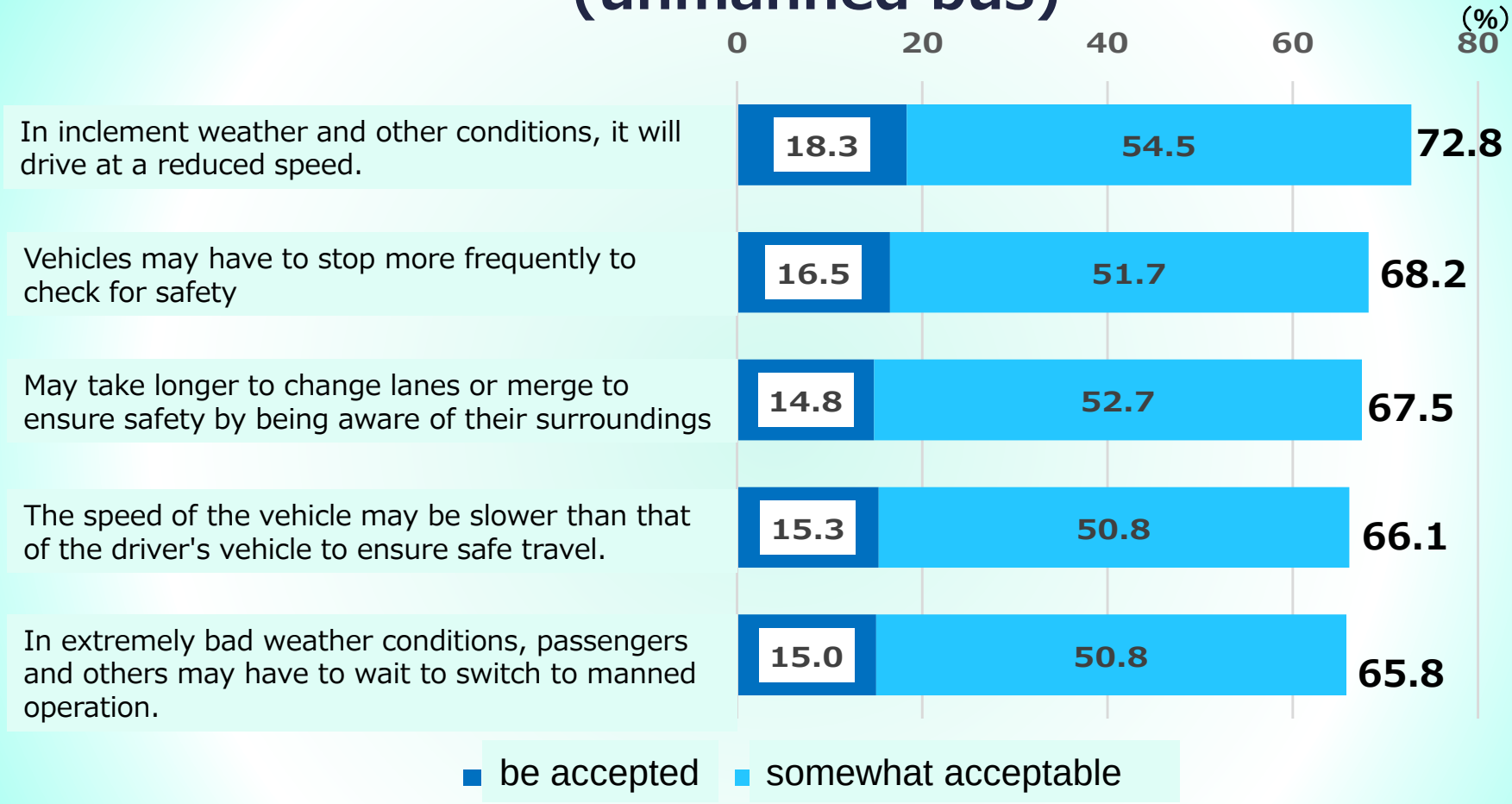
Acceptance on limitations, constraints and challenges of automated driving (unmanned bus)



“Accepting automated driving" means not only acknowledging its existence, but also having an attitude of "using it well" by the users themselves, covering technical limitations and characteristics.

DEVELOPMENTAL DISSEMINATION FROM THIS RESEARCH PROJECT

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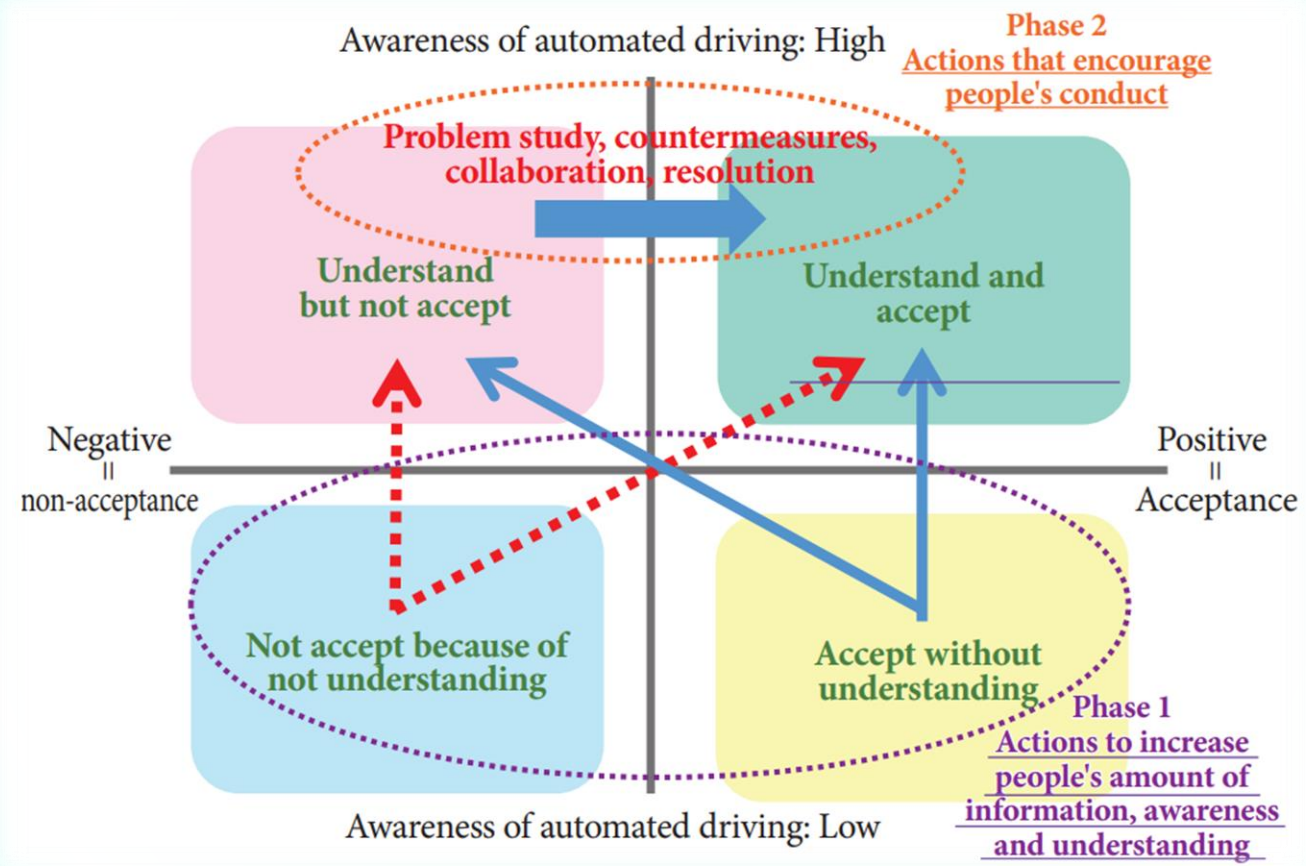
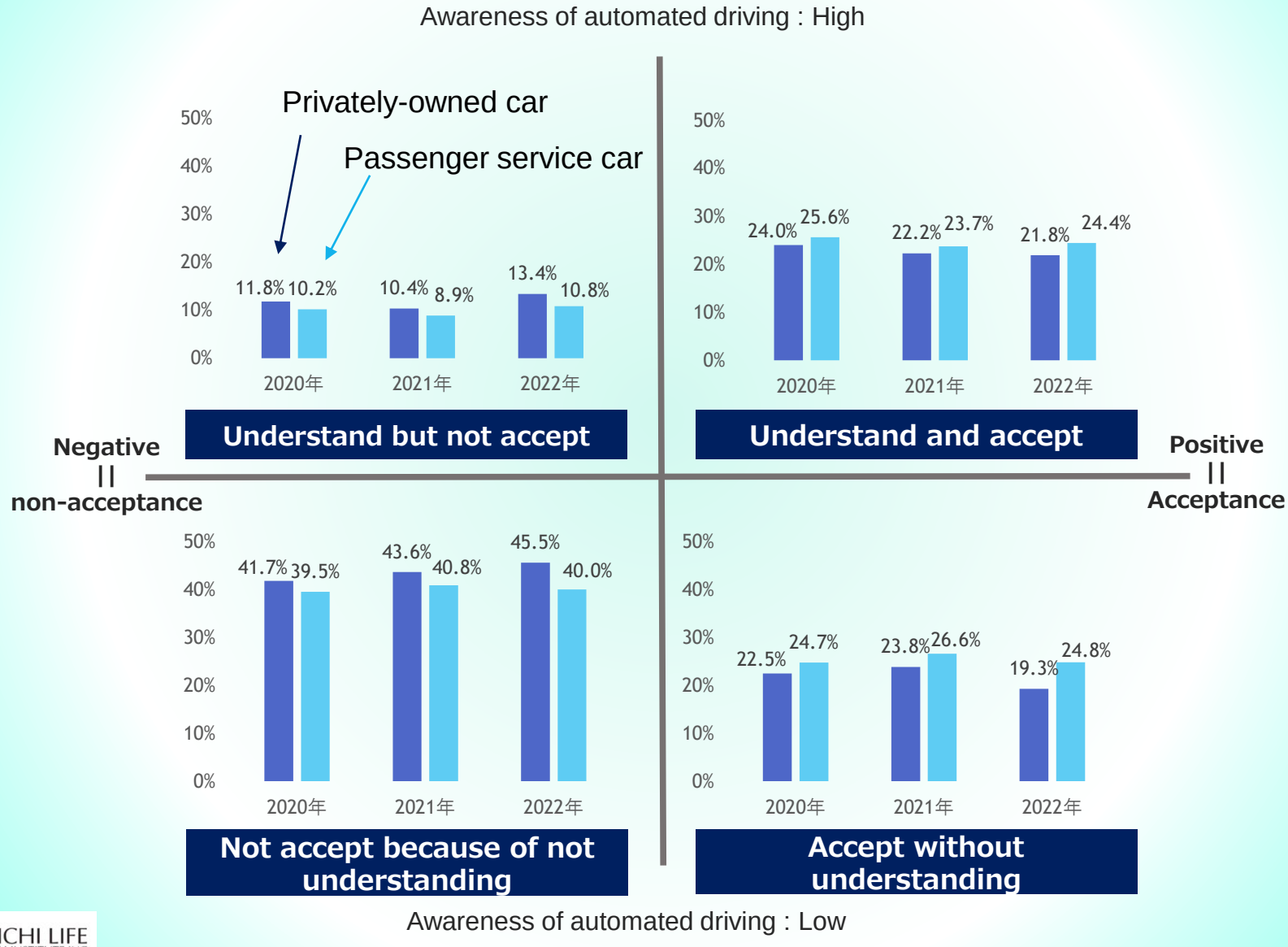
Two phases of understanding and acceptance

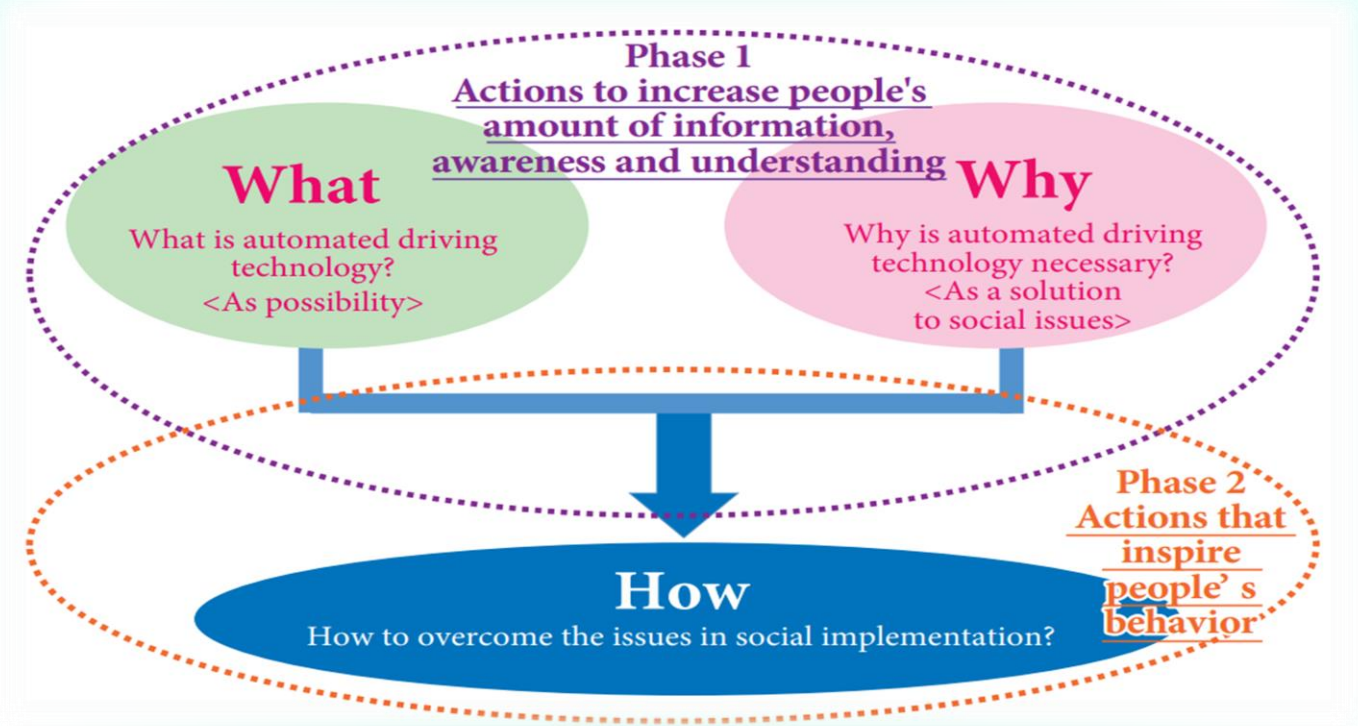


Raising awareness alone will not raise the level of acceptance of automated driving. First, raise awareness as PHASE 1, and then, as PHASE 2, identify issues from the non-accepting segment and seek solutions, including those that can be solved through behavioral changes in consumers.

Understanding and Acceptance



The ‘How’ derives from the ‘What’ and the ‘Why’



★WHY (Why is automated driving necessary in the region?)From the viewpoints of "making the most of (keeping alive)" and "making the most of (effectively utilizing)" mobility in the region.
★ WHAT (what can/cannot be done with automated driving, and what is required of consumers to achieve this)What are the "lifestyle changes," "learning," "costs," and "inherent characteristics/technological limitations" in implementing automated driving, and share them in order of priority according to the region.
★ HOW (how to implement)Local residents themselves will be aware of the need for safe and effective use of the system, and create behavior change as needed.

Visualizing the benefits of local mobility for sustainability

WHY

Viewpoint	Actions	Keywords
Viewpoint of "enlivening" community mobility Maintaining its existence	● Create and maintain means of transportation that fit the community environment and needs ● Development of mobility infrastructure that enables people to continue moving after they have surrendered their driver's license or have lost physical functions due to aging, illness, disability, etc. ● Ensure safety during movement ● Fostering awareness of the use of diverse mobility by a diverse range of people	● Sustainability ● Maintain daily life ● Safety and security ● Acceptance of inconvenience
Viewpoint of "utilizing" community mobility Utilizing it	● Recognition and visualization of the impact (financial and non-financial value) of mobility (1)Economic effects (direct and indirect) Examples: Fare revenue, improved accessibility, community revitalization, reduced social security costs (2)Health Benefits Examples: Disease prevention, maintenance and improvement of mental health, extension of healthy life expectancy (3)Creating connections and fun Examples: Creation of opportunities for face-to-face contact and communication, vehicles as objects of preference	● Economic Effects ● Extension of healthy life expectancy ● Wellbeing ● Improvement of quality of life ● Pleasant, fun, happy experiences ● Awareness of inconvenience

Why utilize automated driving technology / Why is automated driving necessary in this region? Think in the context of local characteristics and situations.

Four elements for public acceptance

WHAT

(1) Lifestyle Changes	(2) Learning
Can the various lifestyle changes due to the spread of automated driving be accepted?	Can the burden of various learning involved in the widespread use of automated driving be accepted?
(3) Cost	**(4) Uniqueness/technical limits**
Can the various cost burdens due to the spread of automated driving be accepted?	Can the particular characteristics and the technological limitations and risks of automated driving be accepted?

What is automated driving?
What can/should be done with automated driving?
What is expected of consumers in the implementation of automated driving?

Capture KPI/KGI indicators qualitatively and in steps

HOW

Step		Activity item	Checklist (2022 updated version)
1	Foundation study	Creation and coordination of the overall framework and strategies for the individual projects (Frame & Strategy)	1. Has an annual activity plan been formulated after devising a comprehensive medium to long-term strategy based on the existing information, situation, and the previous fiscal year's outputs? 2. Has a process with clear goals been formulated for each project? 3. Are projects cooperating so there is no waste or duplication? (comprehensiveness, appropriate target selection, etc.)
2		Information collection and understanding of the targets and circumstances (Target Grasp)	1. Has sufficient information (culture, characteristics, issues, etc.) collection and understanding been conducted in advance about the targets (society, community, people, etc.) in which public acceptance will be fostered?
3	Transmission	Selection, editing, and processing of transmitted information (Adaptation)	1. Has the selection of appropriate information for the target audience been considered for information transmission? 2. Has appropriate information suited to the target audience been edited and processed for transmission?
4		Means, media, and venues for information transmission (Means)	1. Have the most appropriate means, media, and venues been used for information transmission to the targets? 2. Was the Society 5.0 perspective (fusion of the physical and virtual) considered?
5		Experience Opportunity Creation/UX (Experience)	1. Was an opportunity created for the target to personalize the issues through a realistic customer experience in accordance with local issues and needs?
6	Reception and diffusion	Feedback and bidirectionality (Communication)	1. Could the impact of information transmission be verified through the response of the targets and interaction with them? 2. Were areas for improvement of the content and methods of information transmission discovered and new ideas gained through the response of the targets and interaction with them?
7		Information diffusion and social interest (Expansion)	1. Did the activities and information transmission lead to the diffusion of relevant information through mass media, social media, etc.? 2. Did it create the effect of communicating information between people? 3. Were you able to elicit a derivative effect by improving the degree of satisfaction of existing users?
8	Goals	Consumer understanding (Understanding)	1. Verification of whether consumers' understanding ('What') of automated driving and ADAS functions has improved 2. Verification of understanding ('Why') about the background of introducing automated driving and ADAS functions into society 3. Were consumers' intrinsic behavior to understand automated driving and ADAS functions aroused?
9		Consumption and use behavior (Use)	1. Did the consumers understand the social issues and their own situation, and do they show willingness to adopt technology effectively and safely in their own lives? 2. Do the consumers show willingness to think about how they should act in order to effectively and safely adopt technology into their own lives ('How')?
10		Social acceptance among consumers (Acceptance)	1. Do consumers appear to be receptive to each of the factors that may arise from the introduction of automated driving technology? (1) Lifestyle changes (2) Learning (3) Costs (4) Characteristics and technological limitations

Phase 1
Why: Background/needs
What: Instillation of mechanisms and rules

Phase 2
How
* How to implement it in a form that suits the community
* How consumers will be involved and act to achieve this

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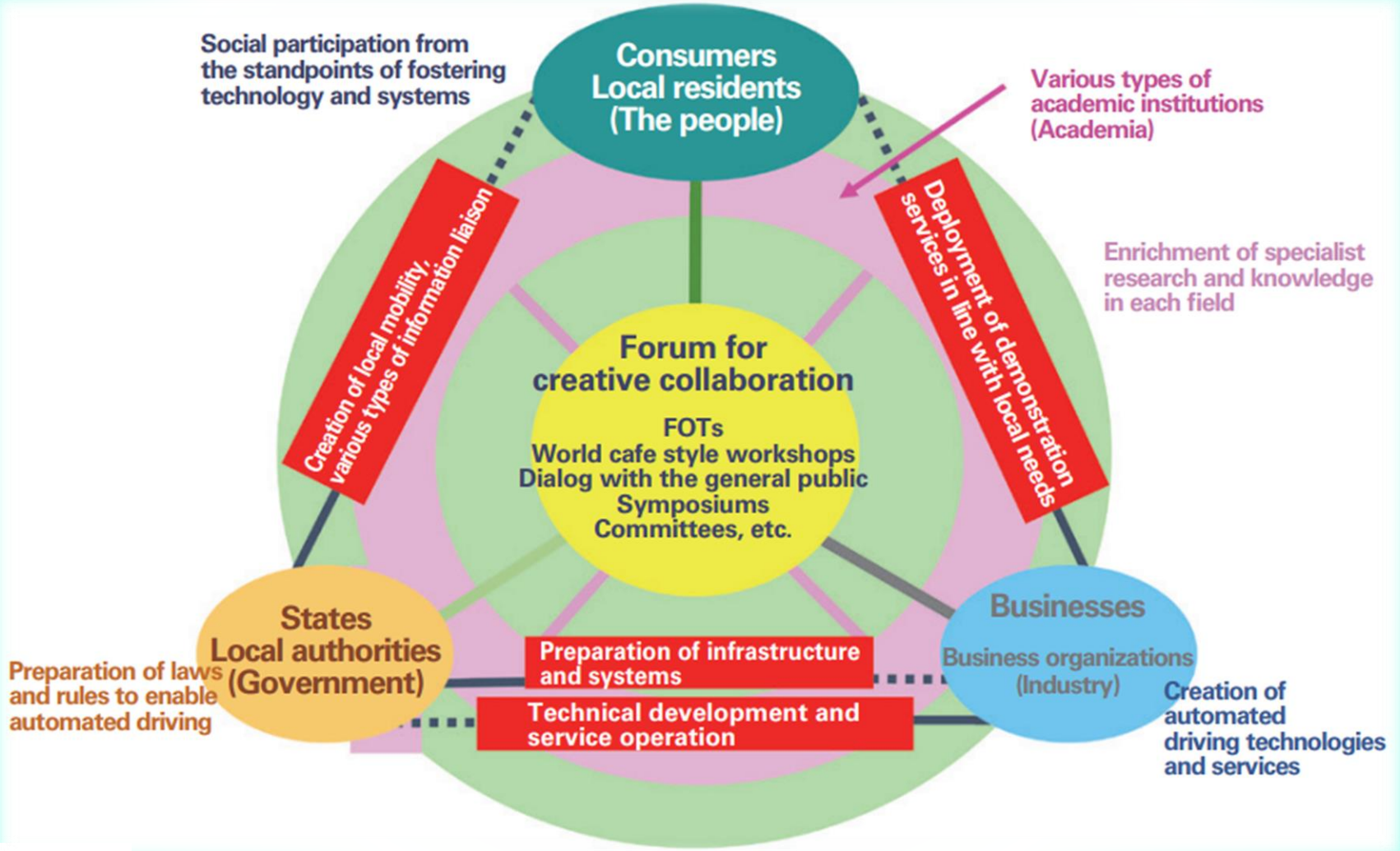
Other Individual Findings

■Need to understand the situation, culture, and environment of each region from multiple perspectives.
= There are many complex backgrounds that are not simply population and mobility status alone.
■ Urban - rural areas / low - high dependence on private cars / low - high mobility challenge scores, etc.
= Regional mobility environment needs to be closely monitored.
■ Need to disseminate information in media suited to local regions.
= Close collaboration with local media, local businesses, and key people
■ Positive correlation between high civic pride and acceptance of technology
= Safe and early social implementation of technology by creating awareness and recognition of issues in the local community
■ Issues of enthusiasm and commitment of chiefs, community leaders, and local business operators
= Securing human resources who will become key persons in the region
= Perspectives considering diversity e.g. young generation, women, people with disabilities, etc.
■Cooperation between businesses, cooperation between businesses and local governments, and cooperation between local governments and the national government
= Minimize waste and loss due to poor coordination
= Regional case studies + horizontal development of communication schemes
= Consolidation of information for collaboration
= Improvement of consulting function
■ Exterior design" as a means of communication
= Is it "new mobility" or "an extension of the automobile"?
= Similarity" may lower the level of acceptance
= Appearance from the viewpoint of "how do you want to be treated by humans" (how it looks)

Shared roles for acceptance and co-creation of an automated society

Necessity of "co-creation space" to create solutions for each region



DISSEMINATION RELATED TO THIS RESEARCH PROJECT

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1. collection of time-series data over a five-year period
2. Information collection and verification through parallel quantitative and qualitative surveys
3. Ensuring a certain scale (10,000 to 20,000 samples) for the quantitative survey
4. Development of a variety of survey items
5. Collaboration with related ministries and agencies and other contractors
6. Diffusion of information and networking through lectures and contributions
7. Development using the resources of the Dai-ichi Life Research Institute

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This report documents the results of Cross-ministerial Strategic Innovation Promotion Program (SIP) 2nd Phase, Automated Driving for Universal Services (SIP-adus, NEDO management number: JPNP18012) that was implemented by the Cabinet Office and was served by the New Energy and Industrial Technology Development Organization (NEDO) as a secretariat.