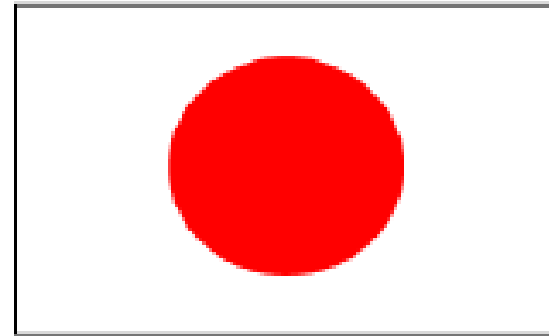


Outline of Smart Logistics Services



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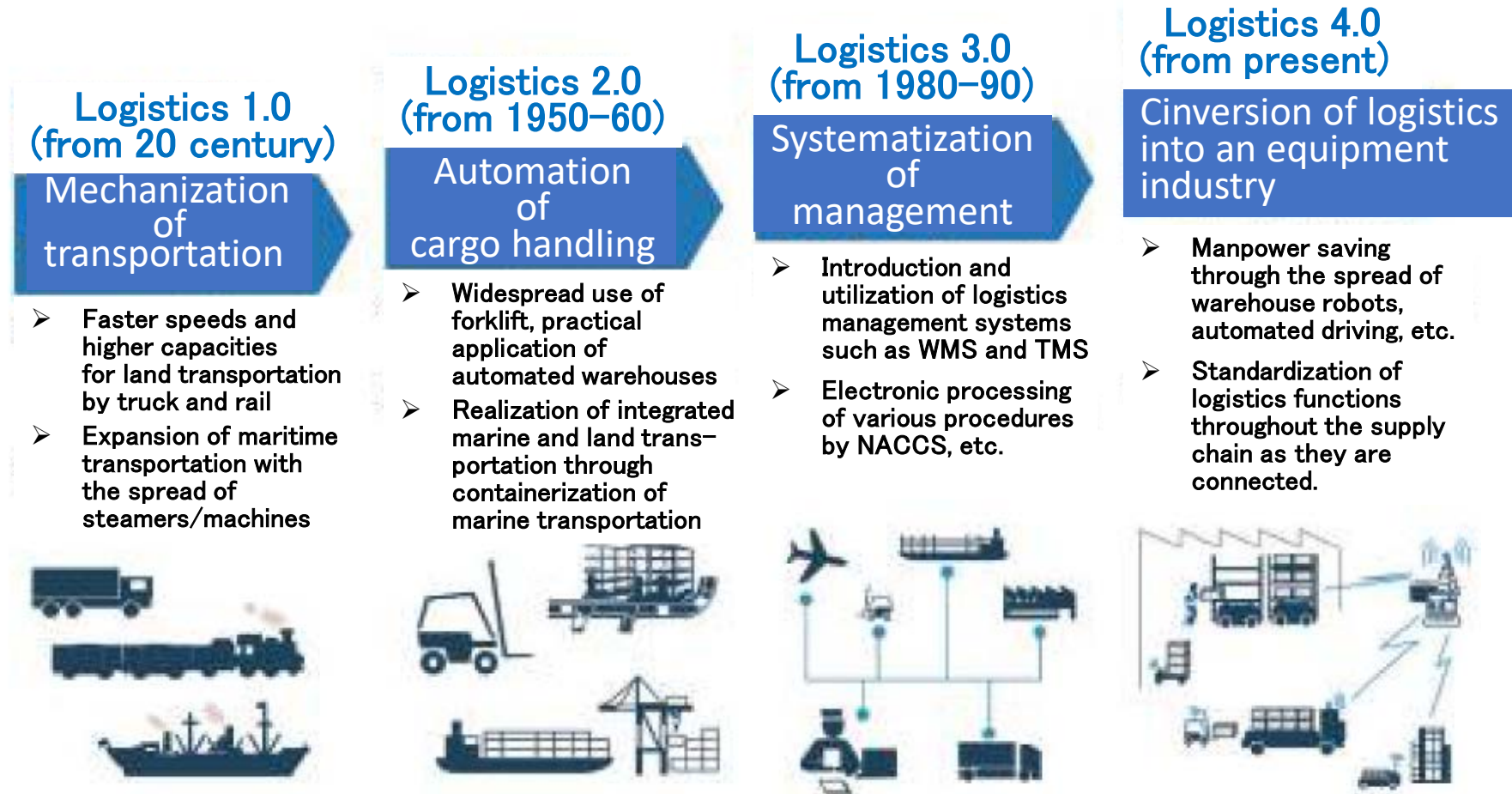


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1. Japan's Logistics Challenges and Goals

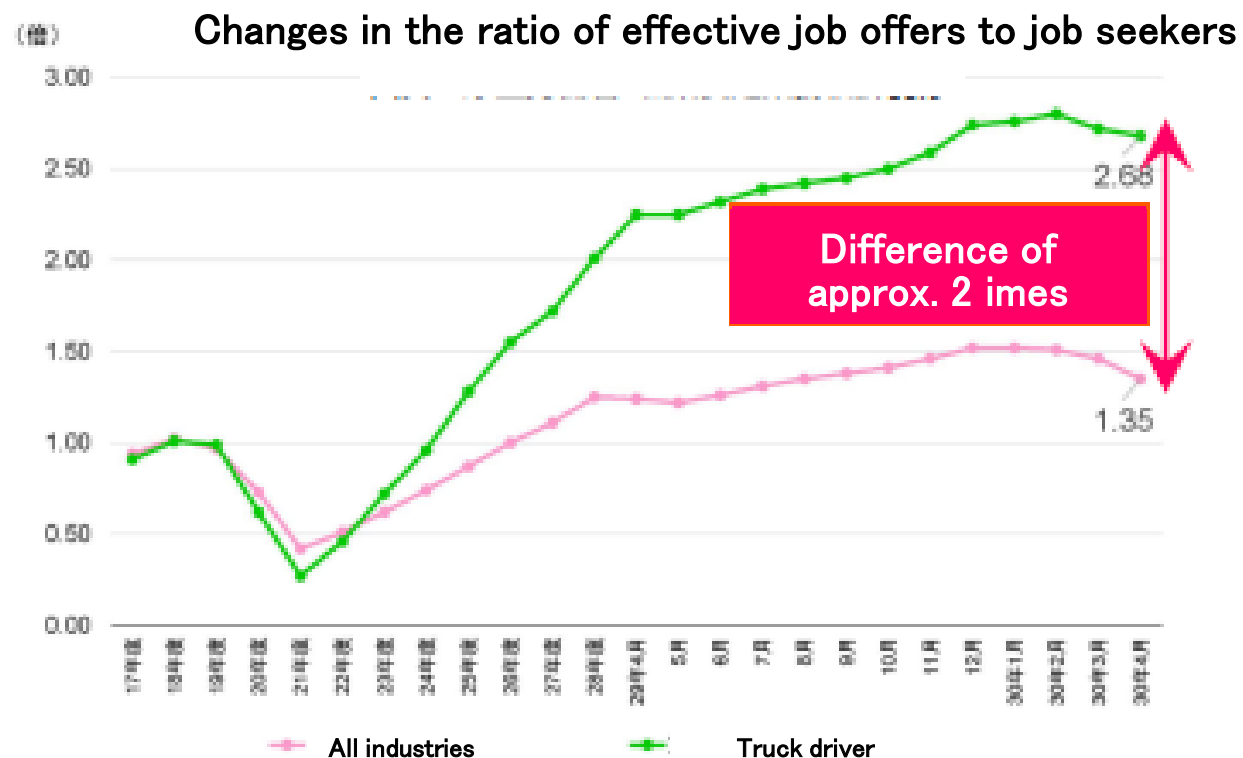
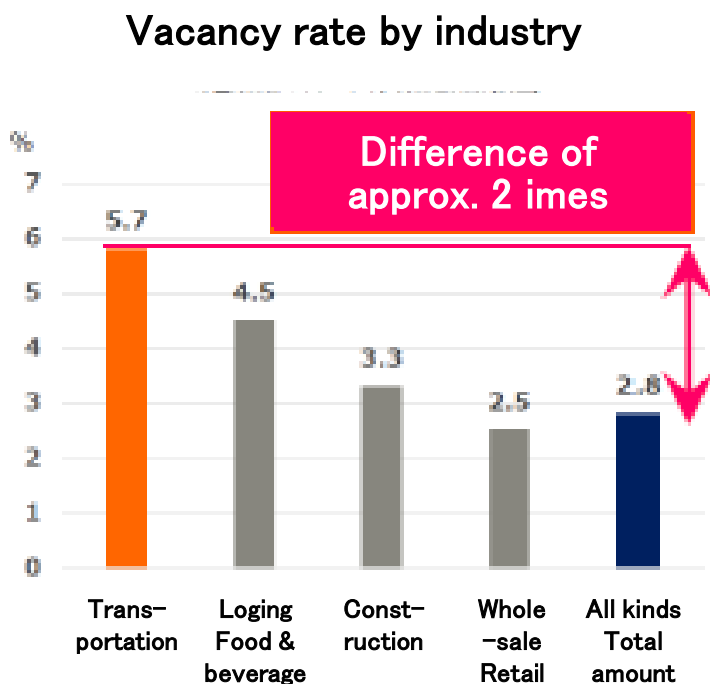
Innovation in Logistics in Transition

- ◆ Currently, logistics is becoming an equipment industry, known as Logistics 4.0, with warehouse robots, automated operations, etc., greatly reducing the amount of work that requires human intervention.



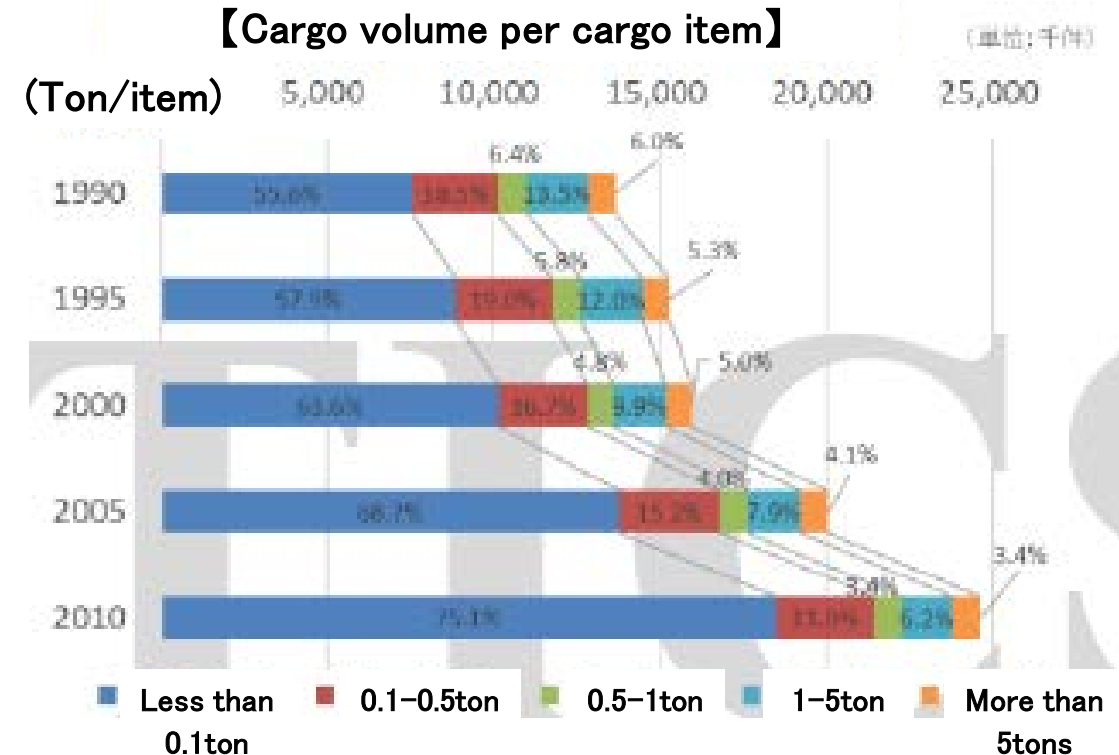
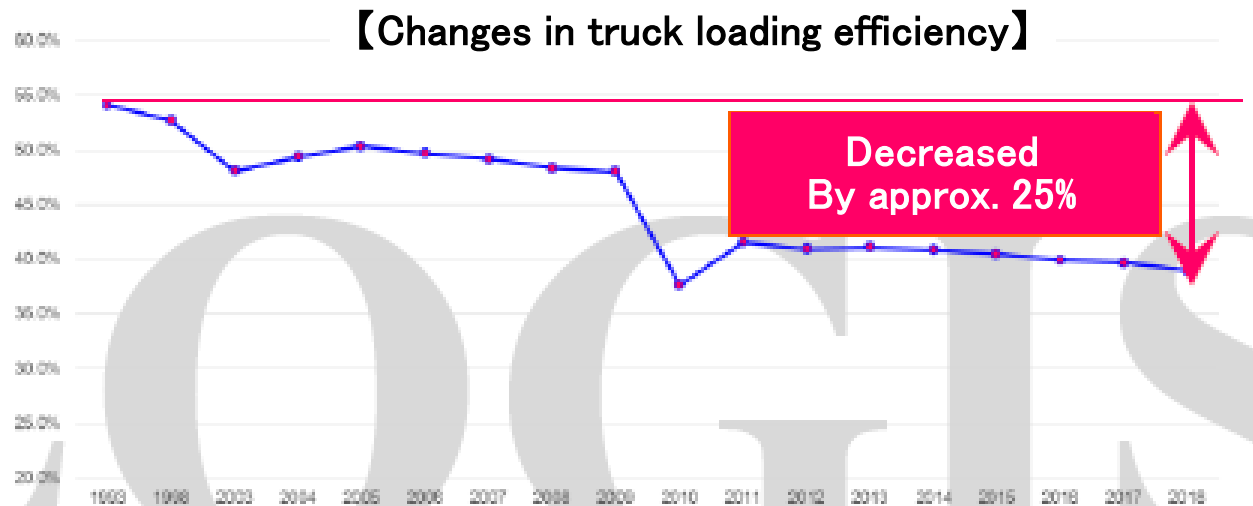
Japan's Logistics Challenges - (1) Shorthanded

- ◆ When evaluated in terms of vacancy rate by industry and the ratio of effective job openings, the difference between the transportation industry (truck drivers) and all industries is approximately two times greater, indicating that logistics issues are becoming more apparent.
→ The response to the 2024 problem (maximum working hour limits) needs to be realized as soon as possible.



Japan's Logistics Challenges - (2) Diversification of needs

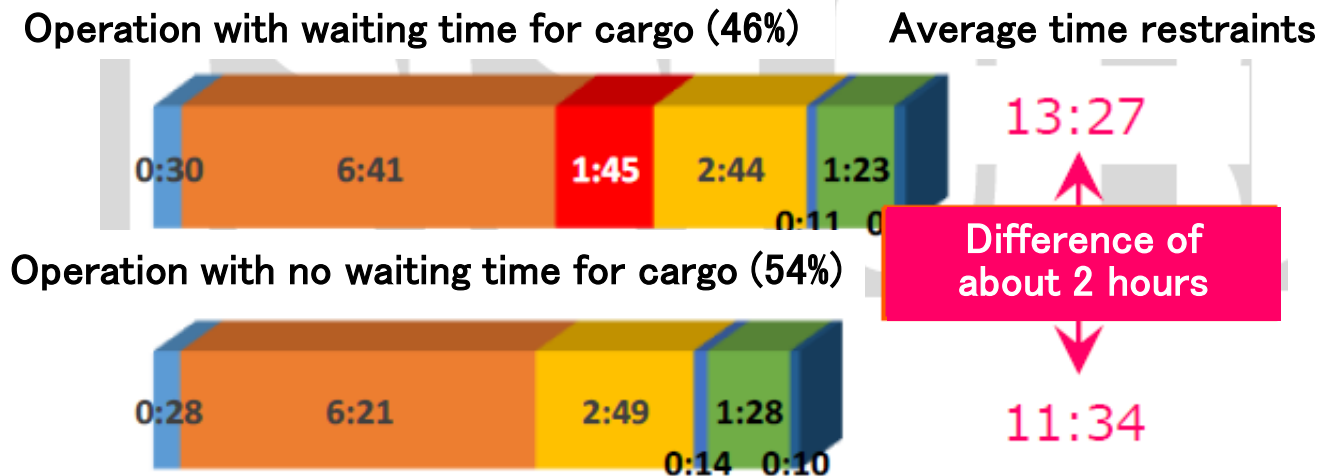
- ◆ With the rapid spread of TA-Q-BIN, there has been a significant increase in lightweight and small-sized cargo, and a marked trend toward high-frequency, low volume transportation. As a result, truck loading efficiency (transportation efficiency) is declining year by year.
→ This is contrary to the movement to reduce CO2 emissions.



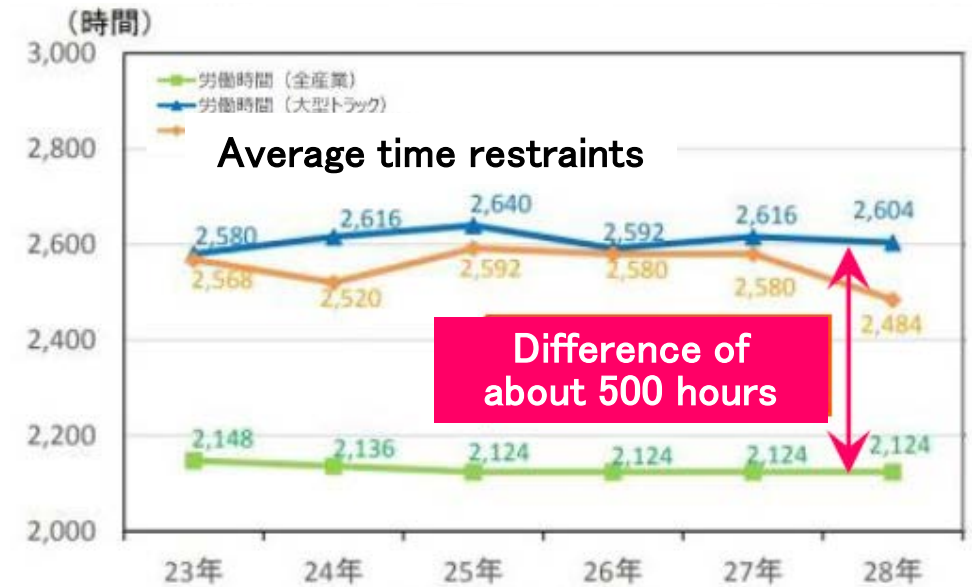
Japan's Logistics Challenges - (3) Unique business practices

- ◆ If consignors require waiting for cargo, the detention time increases by approximately 2 hours per operation, which is the cause of the difference of approximately 500 hours in terms of annual labor hours.
 - From the standpoint of the transportation provider, refusal could lead to cancellation of the order.

【Average time restraints per operation and its breakdown】

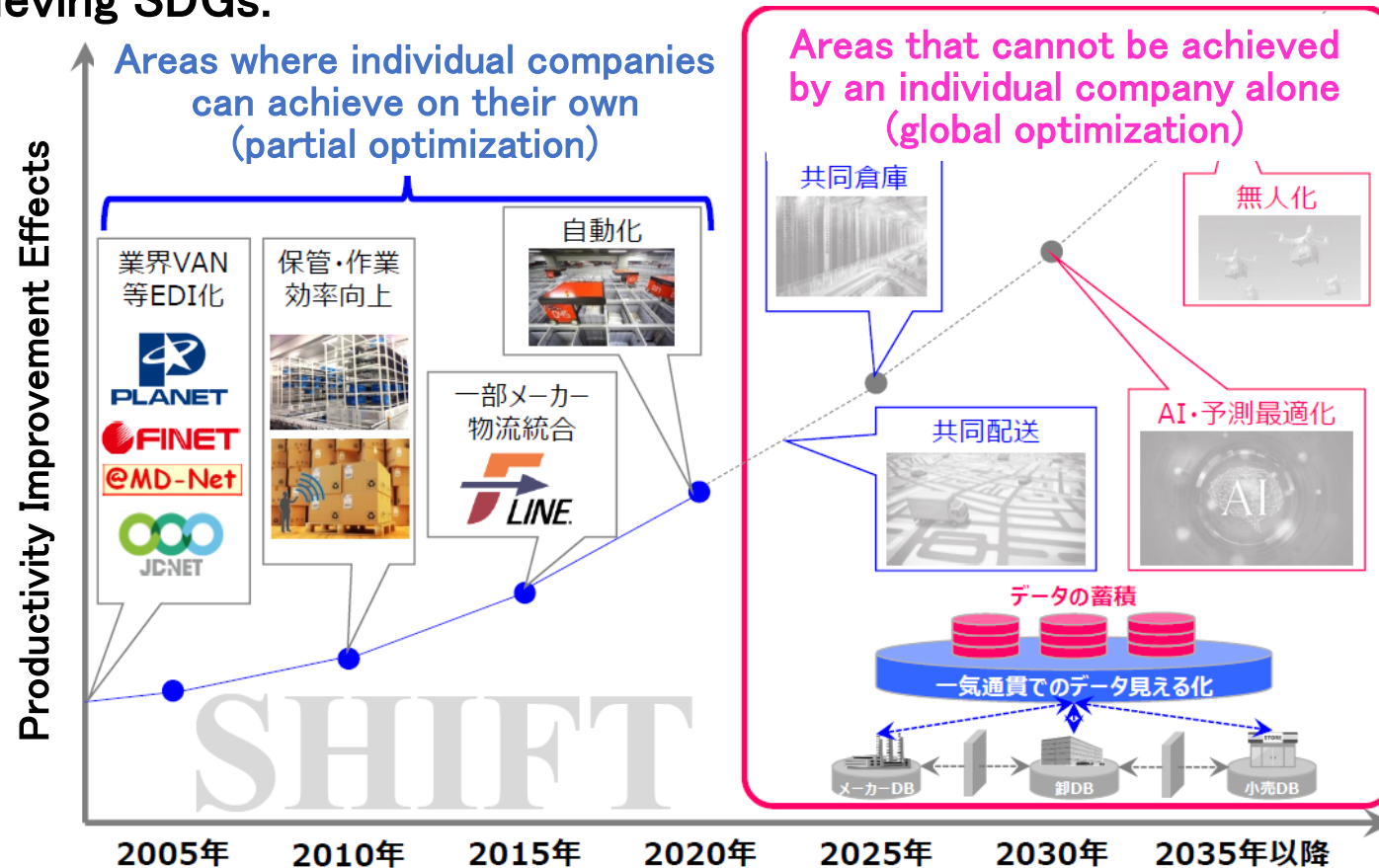


【Annual working hours】



Japan's Logistics Challenges – From partial to total optimization

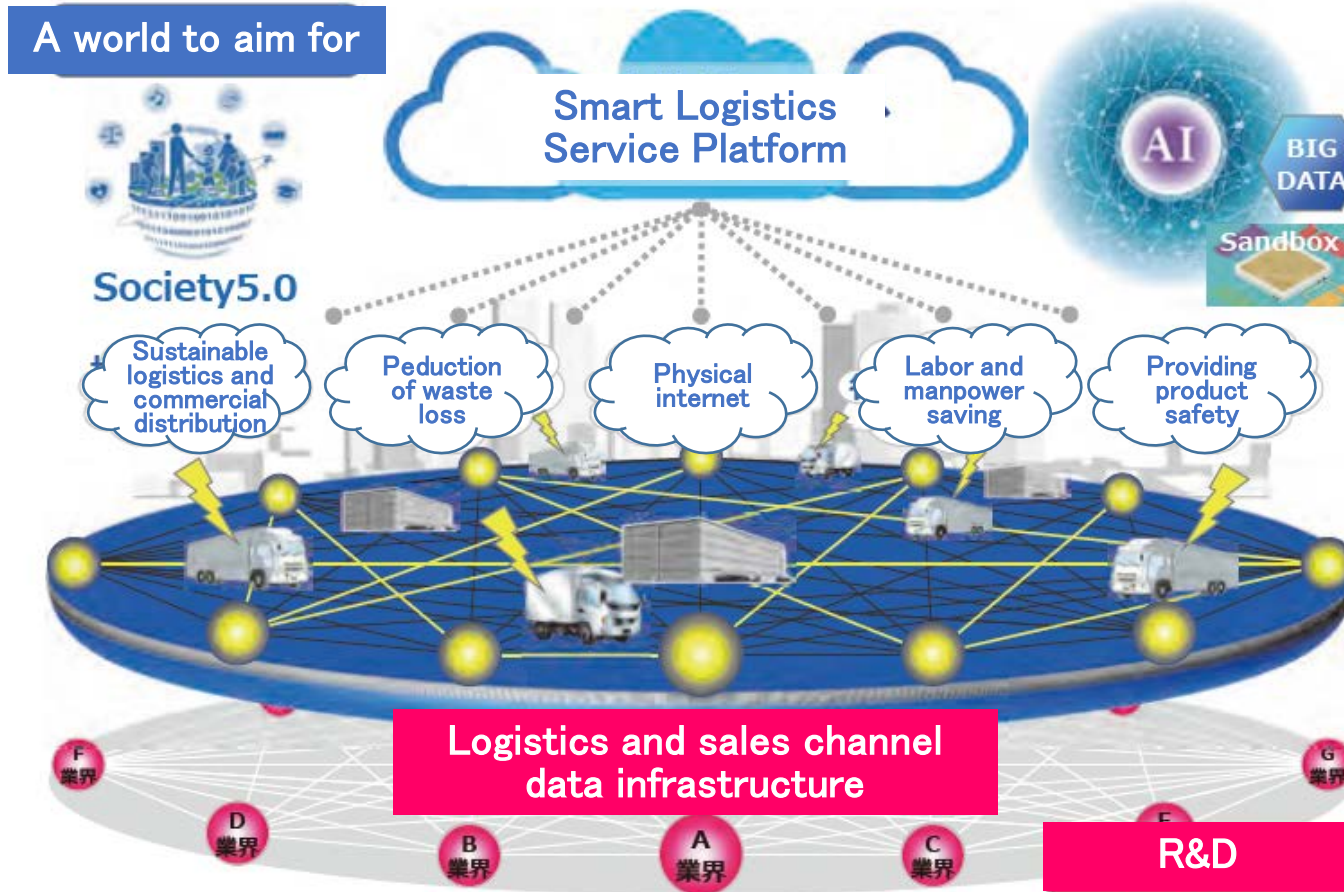
- ◆ The time has come for a shift from partial to total optimization at the national policy level toward achieving SDGs.



→In the future, it will be essential to have a holistic optimization mechanism for joint delivery, warehousing, unmanned operations, AI predictive optimization, etc.

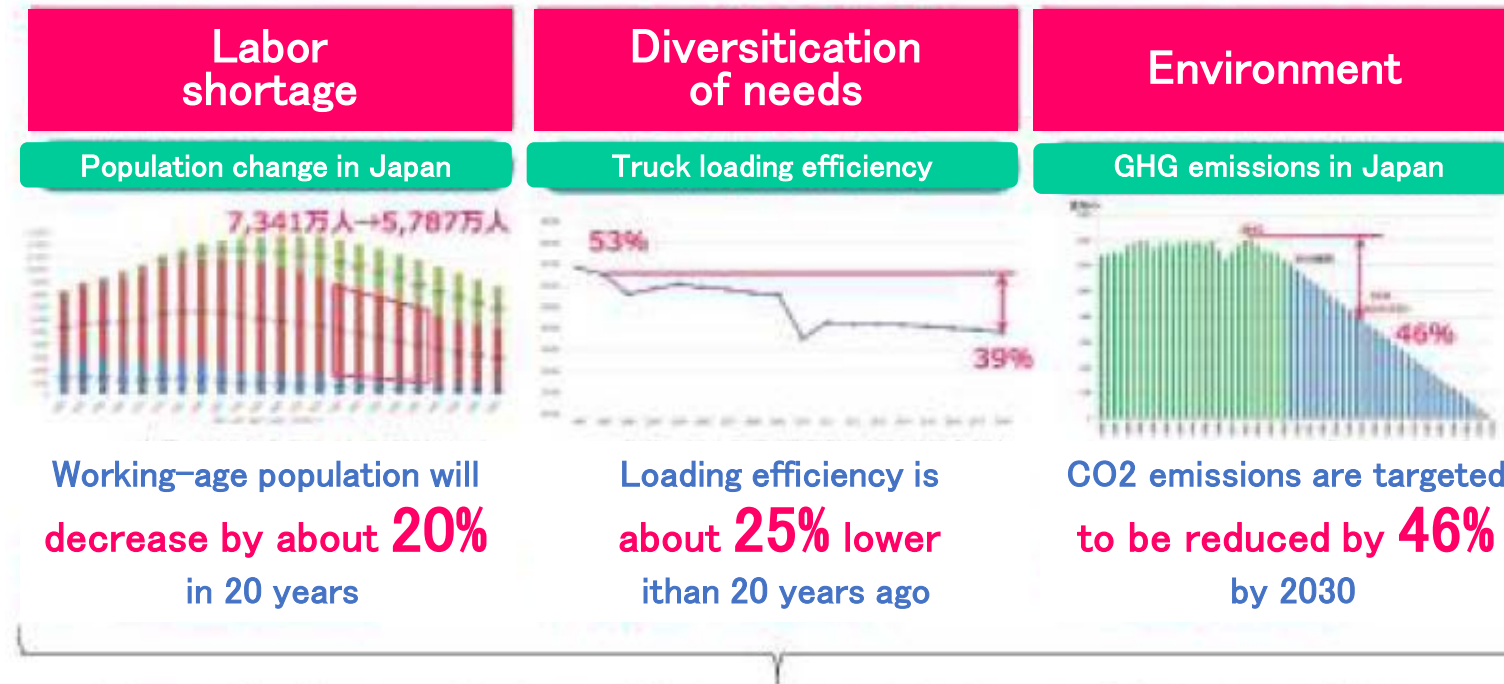
The World Aimed for by Smart Logistics Services

- ◆ Based on the smart logistics service platform, we will realize Society5.0.
→ To this end, the logistics and sales channel data infrastructure will be developed.



Productivity Improvement Targets for Smart Logistics Services

- ◆ As a quantitative target for the industry, we decided **to achieve a 30% increase in productivity**, taking into account labor shortages, diversification of needs, and environmental responsiveness.



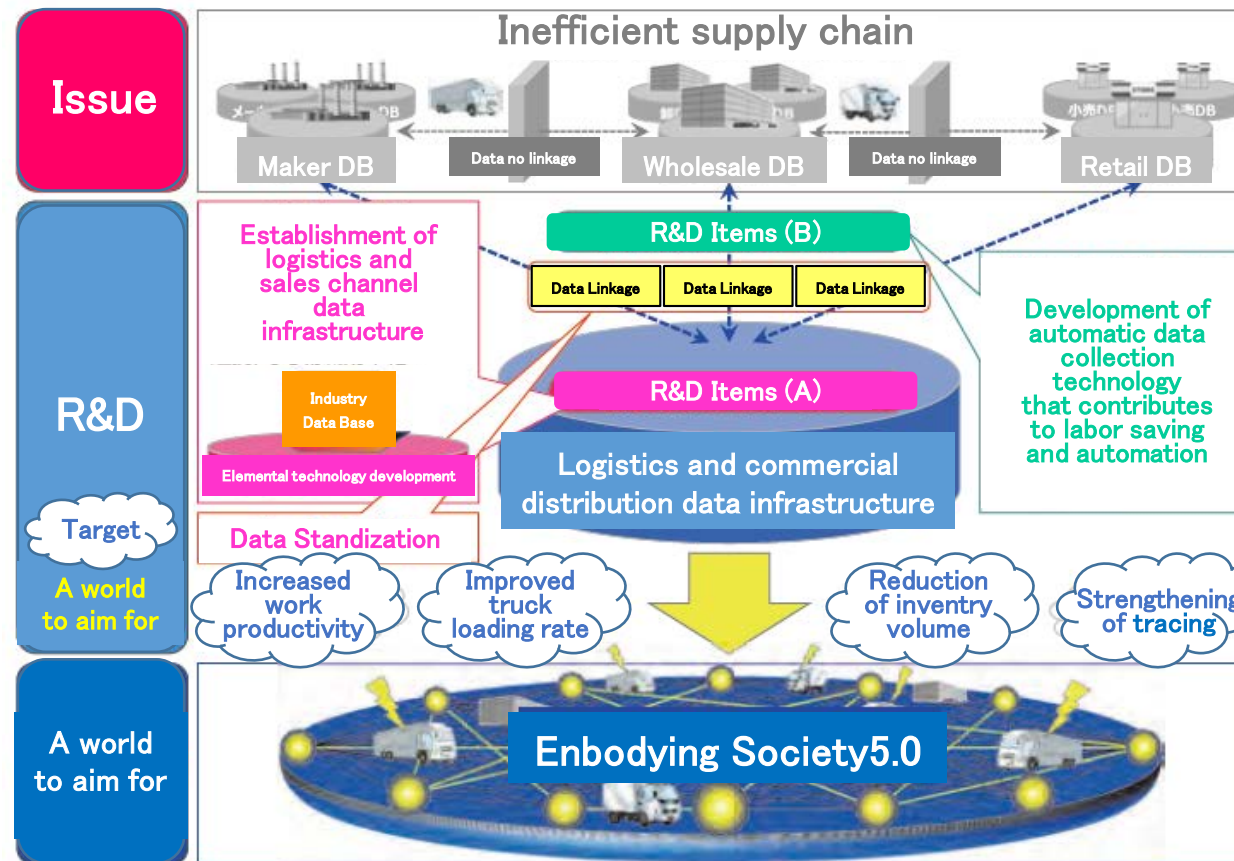
Achieving the SDGs in the logistics sector will require a 20–30% increase in productivity.

Smart logistics services deliver 30% productivity gains.

2. Outline of Research and Development

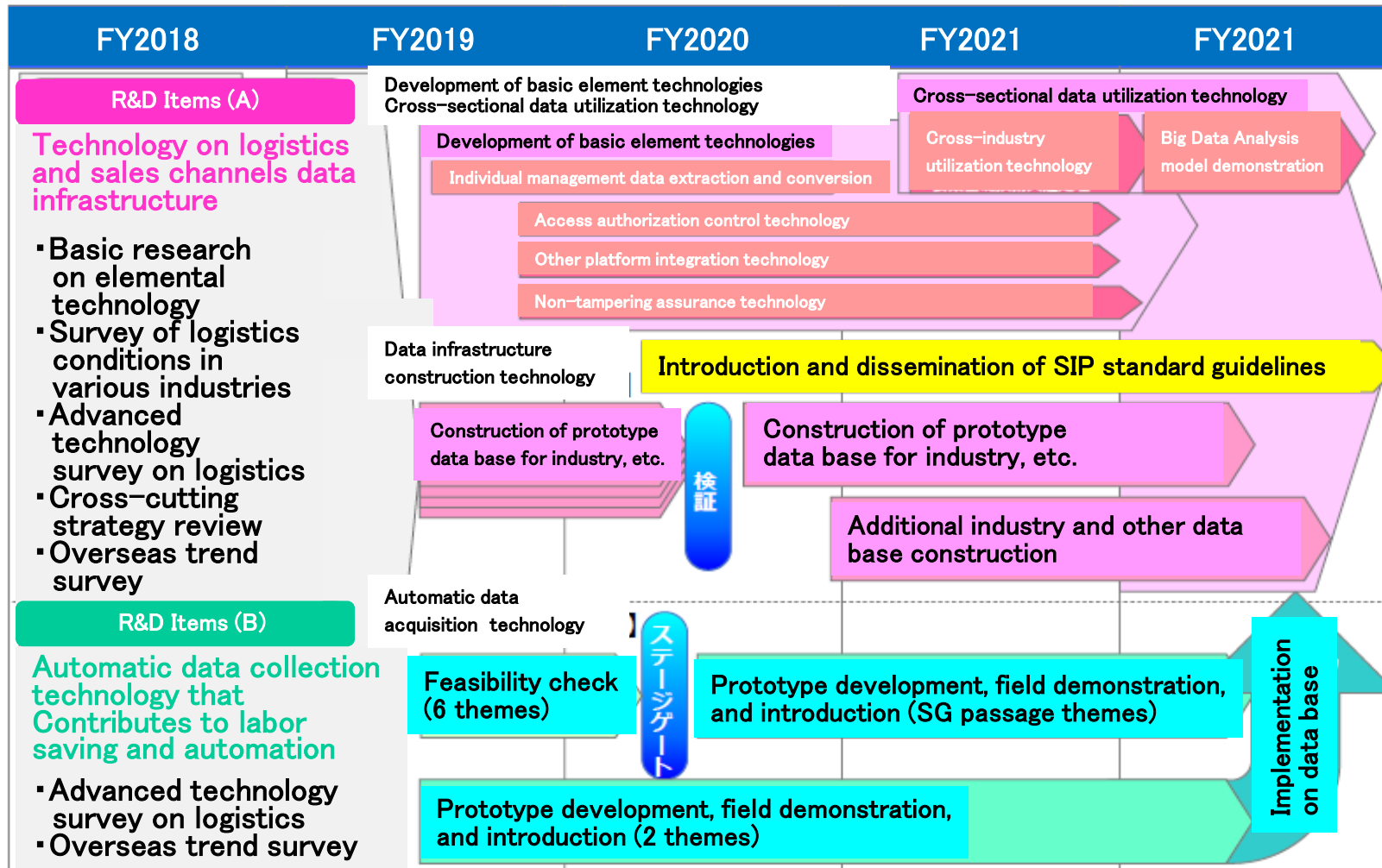
Outline of Research and Development of Smart Logistics Services

- ◆ In order to realize Society5.0, we promoted R&D largely divided into (A) Establishment of logistics and sales channel data infrastructure and (B) Development of automatic data collection technology that contributes to labor saving and automation.



R&D Process for Smart Logistics Services

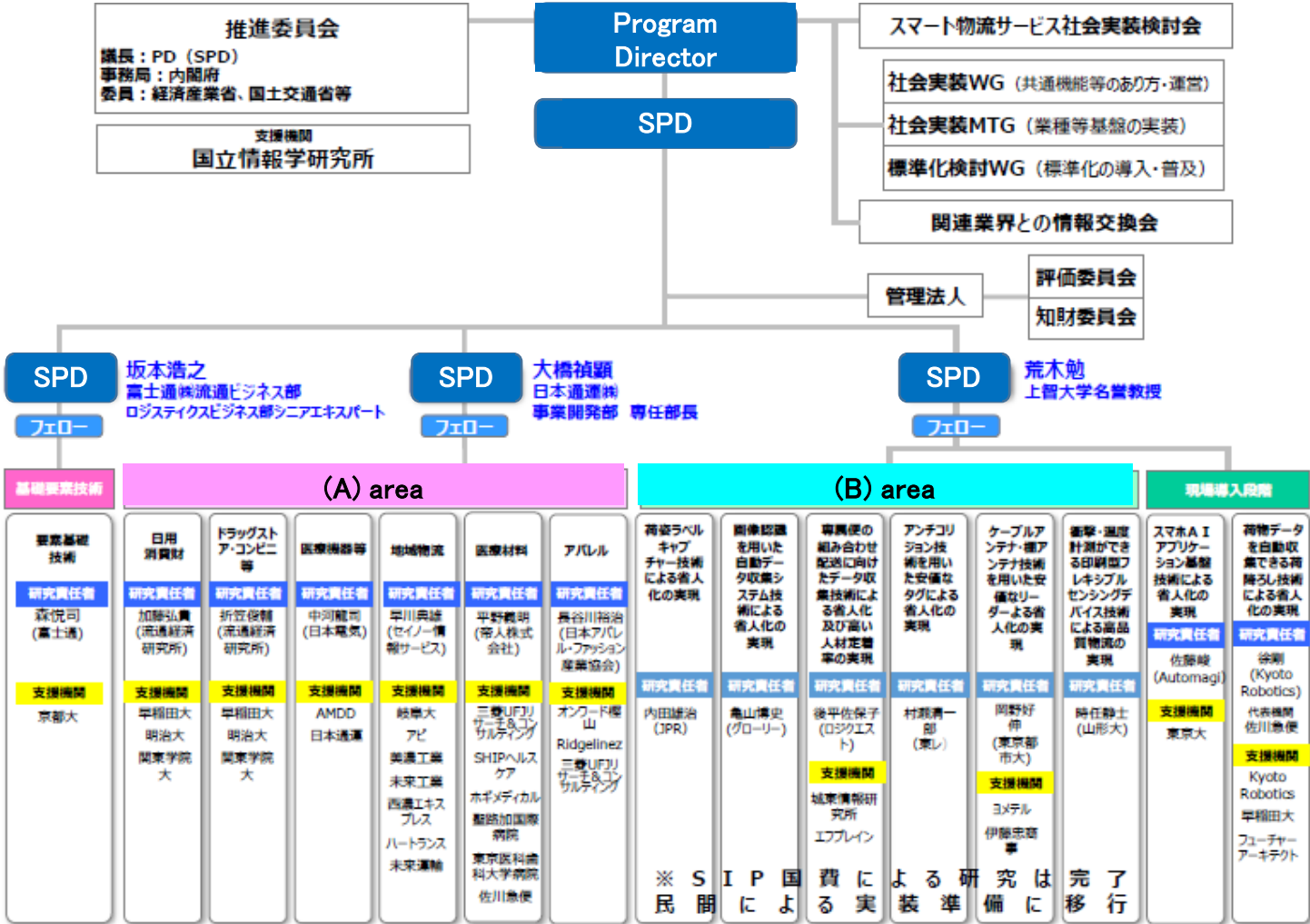
- ◆ The (A) and (B) will proceed separately starting in FY2018 and be combined in FY2022.



• Advanced technology

R&D Structure for Smart Logistics Services

- ◆ The R&D structure was also divided into (A) and (B) and promoted by each SPD unit in charge.



3. Research and Development Details

3-1. Technology related to Logistics and Commercial Distribution Data Infrastructure

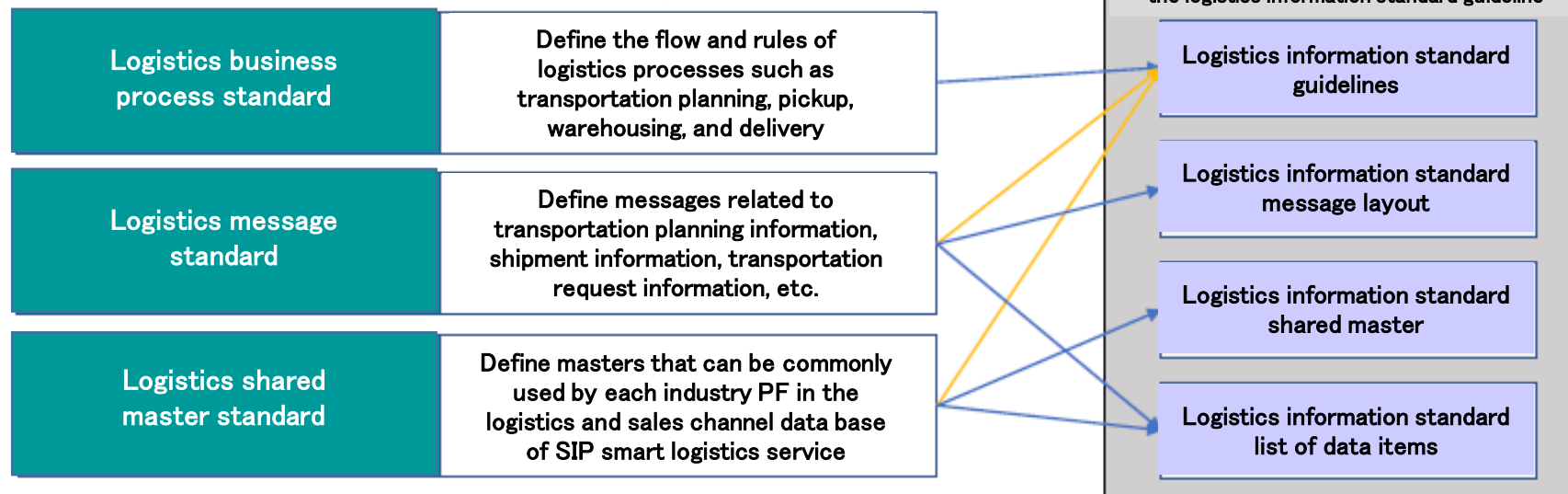
Overview of Logistics Information Standard Guidelines

◆ In order to realize Society5.0, the first step was to standardize logistics information.

■ Background and objectives of logistics information standization

Background	In the logistics industry, major challenges include the high number of written procedures, in-person and face-to-face processes, and sluggish truck-loading efficiency. As a result of efforts to improve efficiency through digitalization by each company, it is difficult to smoothly pass information to and from each other, and the efficiency of the supply chain as a whole is being compromised.
Objectives	One of the solutions, the use of digital technology, visualization and coordination of data, requires standardization of information as a prerequisite. Establish a standard format for messages and data items necessary to realize joint transportation, joint storage, inspection-less, and bar reservation, which are services to improve logistics efficiency and productivity.

■ Target of logistics information standization and position of each document



■ Policy on code standardization: This is the policy for standardization of date expressions, location codes, company codes, product codes, shipping and packing codes, etc. used in the logistics information standard message layout and the logistics information standard shared master, and specifies mandatory codes and recommended codes.



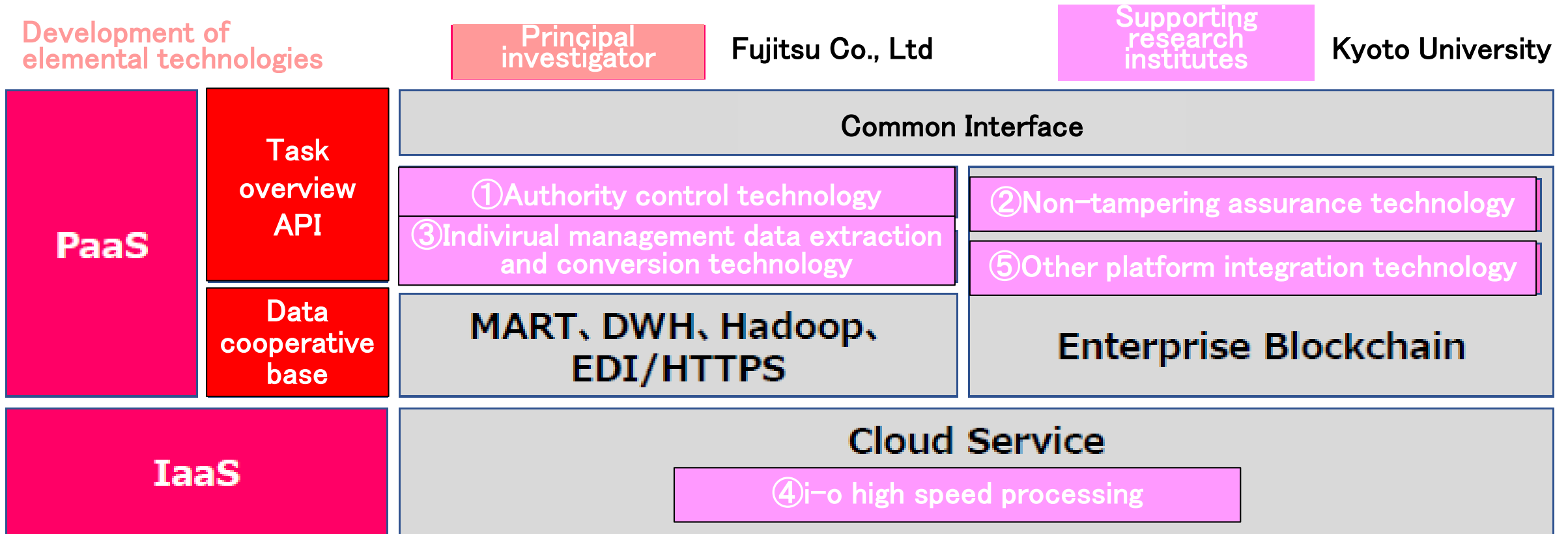
: Overview documents showing usage and concept



: Detailed explanatory material showing the standard format

Development of basic elemental technologies

- ◆ In order to promote data standardization, we developed technologies to control access privileges and guarantee non-tampering properties, etc., to enhance reliability and enable cross-industry use of the data.



Implementation of data bases for industries, etc.

- ◆ Introduce and implement the system so that it can be used for joint procurement, joint storage, joint delivery, etc. by industry.
 - **Seino Information Service** will explain **the actual examples of Japan's regional logistics** that are directly related to ASEAN's inter-regional logistics.

Construction of data infrastructure for industries, etc.

Introduced in industries that have many logistics issues in order to quickly implement logistics and sales channel data infrastructure in society.

Applicaton

Daily neccessities

Drugstores, conveni, etc.

FY2019~

Regional logistics

Pharmaceuticals and medical devices, etc.

Medical supplies

Apparel (clothing)

FY2021~

Joint procure-ment

Image recog-nition

Joint custody

Joint delivery

Tracing APP

etc...

Logistics and sales channel data base

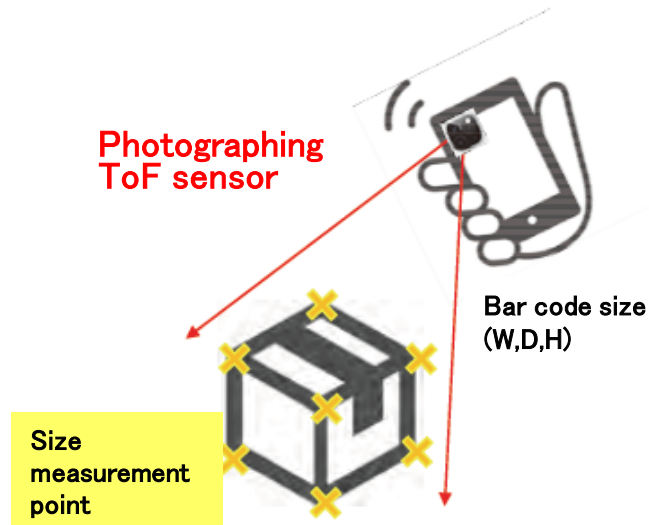
3. Research and Development Details
3-2. Automatic Data Collection Technology
that contributes to Labor Saving and Automation

R&D → Social implementation phase (1) : Automagi

- ◆ Automatically obtain cargo size information using smartphone AI to improve loading efficiency.

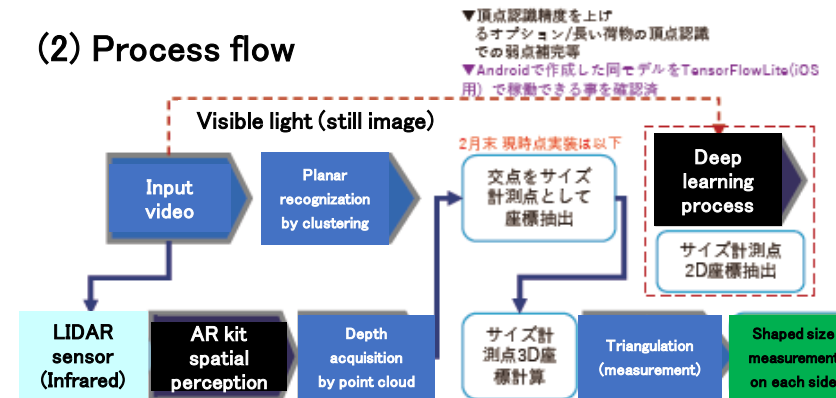
Size measurement logic for LIDAR version

(1) Solution overview

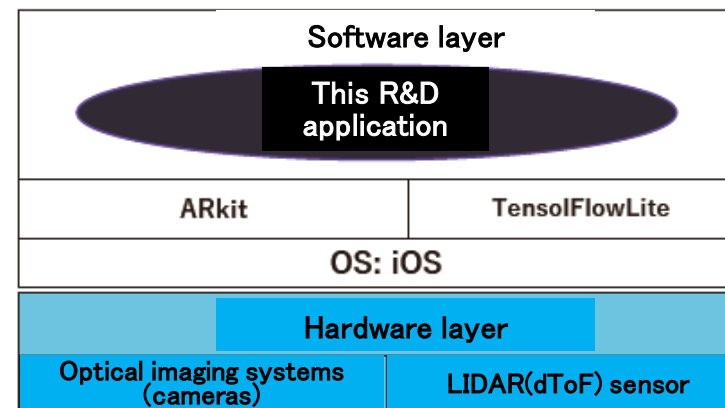


Depth information acquired by the LIDAR sensor mounted on the iPhone 12 Pro is acquired via AR technology to realize size measurement.

(2) Process flow



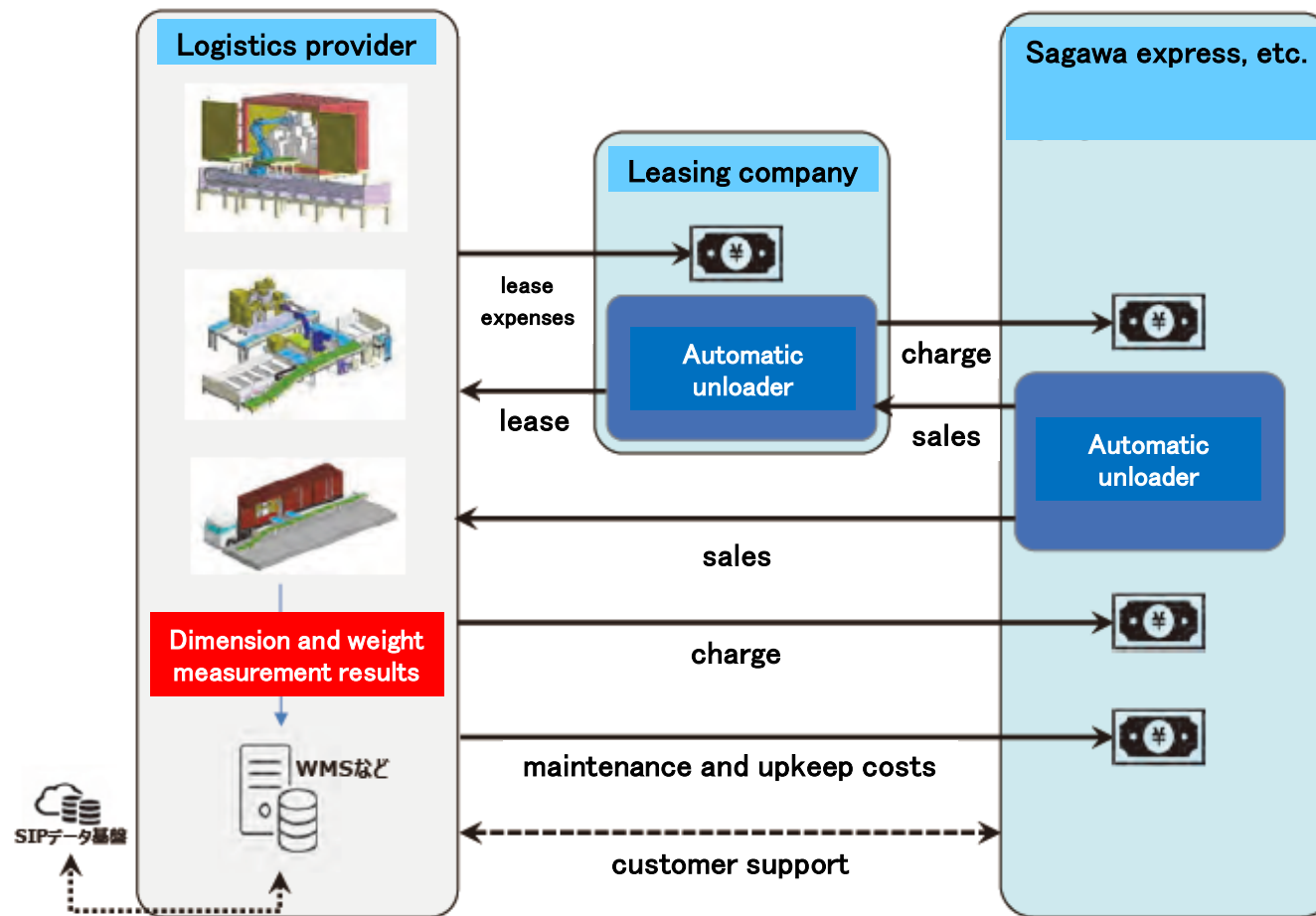
(3) Program stack (architecture diagram)



R&D → Social implementation phase (2) : Sagawa Express

- ◆ Develop automated unloading technology from truck and rail containers to automate the process.

Business model at the time of social implementation



Feasibility Verification Phase (6 items)

◆ Through public solicitation and selection, the following 6 items of research and development were conducted in the feasibility check stage.

① Labor-saving inspection and slip-less packing by utilizing packing labels.

We defined the cargo to be transported by forklift as a unit load, and developed an automatic capture technology that automatically acquires and links information on distribution containers (pallets) and loaded cargo (products) to verify the possibility of reducing inspection work onsite.

② Development of an automatic data collection system for vehicle entry/exit and loading/unloading operations at berths using image recognition, etc.

Confirm feasibility of automatic recognition and data collection related to warehouses and trucks using image recognition technology. Development of technology to read vehicle license plate numbers and a proposal to automatically collect vehicle loading and unloading status and link it to automatic equipment during loading and unloading operations.

③ Data collection technology for combined delivery of exclusive delivery services that contributes to manpower saving and human resource retention.

Since an emergency delivery while a dedicated driver is on standby can lead to increased revenue, the system automatically acquires driver location data, truck bed space availability data, and spot delivery.

④ Development of highly efficient automatic recognition tags with anti-collision function

Confirmation of feasibility of anti-collision (multiple simultaneous reading) functionality in low-cost RFID using a printing method.

⑤ Development of printable flexible sensing devices to help solve logistics issues.

Conducted R&D of integrated devices with sensors and displays that can automatically recognize individual product quality information.

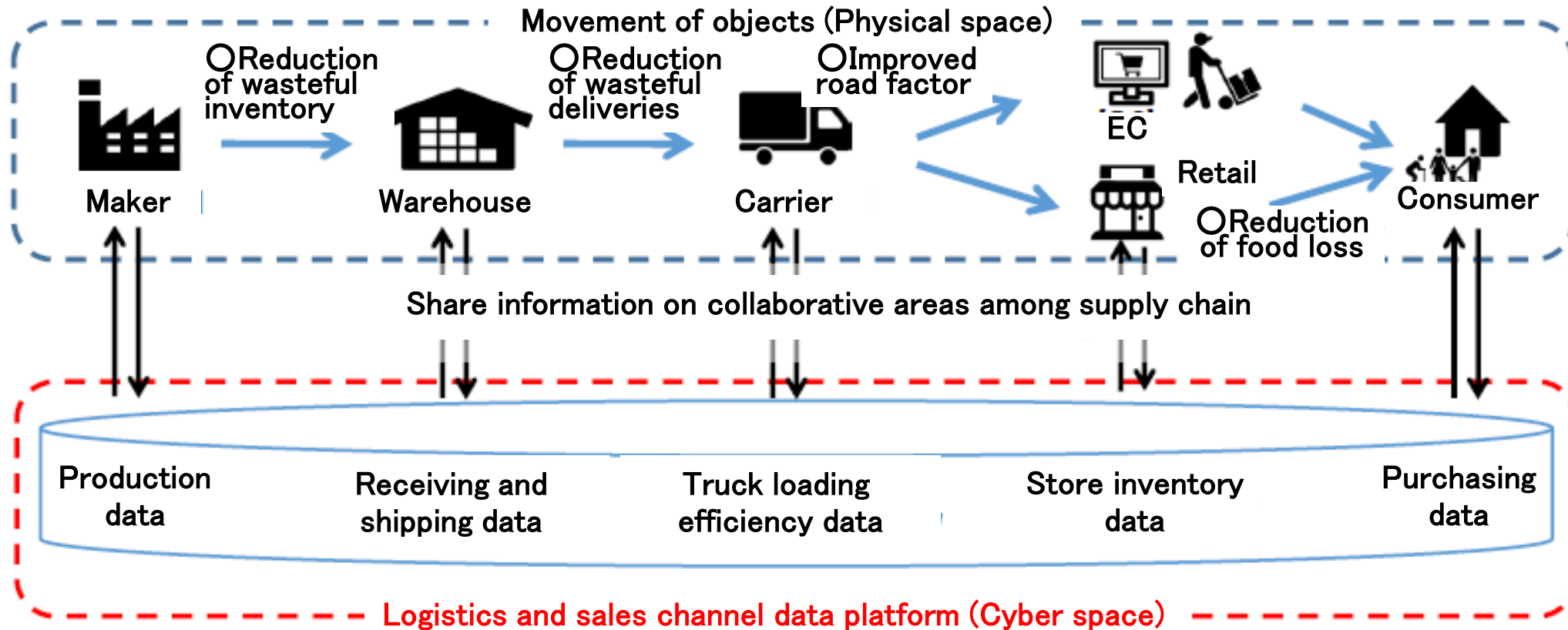
⑥ Development of cable antennas and shelf antennas that can be flexibly installed.

Developed a shelf-type antenna that can be retrofitted to product shelves and flexibly responds to shape changes, enabling RFID to automatically collect information on individual items in multiple loads.

4. Summary

Smart Logistics Service Concept

- ◆ To visualize Movement of Objects (logistics) and Product Information (sales channels), build a logistics and commercial distribution data platform that accumulates, analyzes, and shares data beyond the boundaries of companies and industries.



Summary

- ◆ In order to promote “the acceleration of logistics standardization efforts” set forth in the “Comprehensive Logistics Policy Outline”, we took the lead in software standardization in this activity.
- ◆ With the aim of realizing the Physical Internet, the ultimate open collaborative logistics, a Physical Internet Realization Conference was established by a panel of experts to formulate a roadmap for the future. Dissemination of research results and educational activities will be promoted mainly by service providers, etc.
- ◆ Based on the results of the past 5 years of research, the following 5 functions necessary for future social implementation and dissemination were summarized, and efforts were made to pass on the technology and implement it in society.
 - ① Smart Logistics Awareness and New Development→Physical Internet Center
 - ② Logistics Information Standard Guidelines→Physical Internet Center
 - ③ Elemental Technologies for Logistics and Commercial Distribution Data Infrastructure
→Each Research Team
 - ④ Logistics and Commercial Distribution Data infrastructure by Industry→Each Research Team
 - ⑤ Labor Saving and Automation Technologies→Each Research Team

Common Challenges and Future Directions with ASEAN

- ◆ Japan's own specific issues and common issues with ASEAN and future directions are shown below.

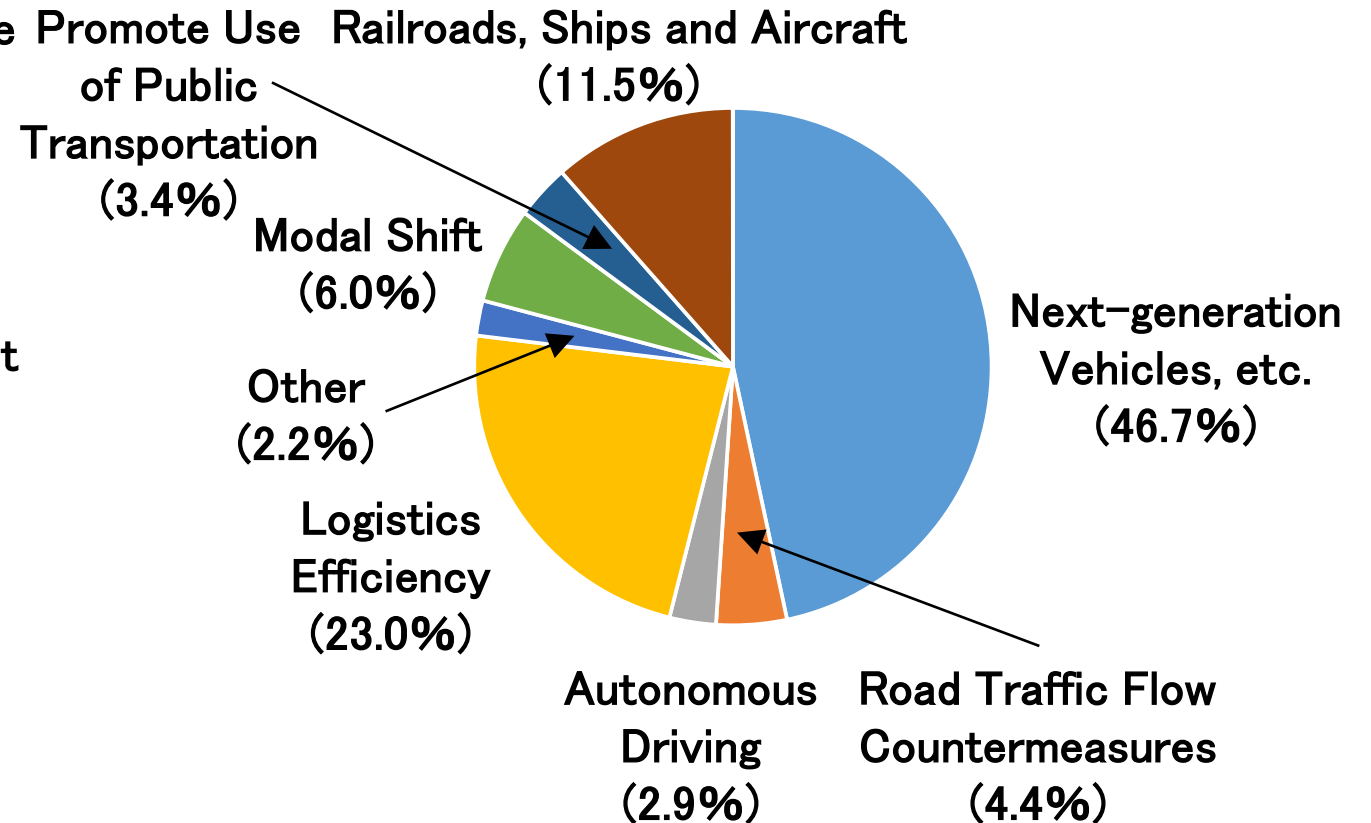
① Japan's own specific issues

- Shortage of labor due to declining birthrate and aging population
- Unique Japanese Business Practices

② Common issues with ASEAN

- Diversification of needs (rapid development of E-commerce)
- Innovation in logistics in transition
- Shift from partial to total optimization is only a matter of time

【Scenario for CO2 emissions reduction of ▲46% in 2030】
(Japan initiatives)



Thank you for your attention !



Energy Conservation Symbol

SMART CLOVER